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

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TEST REPORT

Application No.:	SZEM1805004216CR
Applicant:	Seeed Technology Co., Ltd.
Address of Applicant:	1F, Tower B, Building 2, Shanshui Building, NanshanYungu Innovation Industry Park, Liuxian Ave, Shenzhen, China
Manufacturer:	Seeed Technology Co., Ltd.
Address of Manufacturer:	1F, Tower B, Building 2, Shanshui Building, NanshanYungu Innovation Industry Park, Liuxian Ave, Shenzhen, China
Factory:	Seeed Technology Co., Ltd.
Address of Factory:	1F, Tower B, Building 2, Shanshui Building, NanshanYungu Innovation Industry Park, Liuxian Ave, Shenzhen, China
Equipment Under Test (EUT):	
EUT Name:	An Open Modular Voice Interface to Hack Things
Model No.:	ReSpeaker Core v2.0
Trade mark:	Seeedstudio
FCC ID:	Z4T-RESPEAKERV2
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2018-05-22
Date of Test:	2018-05-28 to 2018-06-01
Date of Issue:	2018-06-20
Test Result:	**Pass***

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

Keny Xu
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		2018-06-20		Original

Authorized for issue by:				
		Harry Wu /Project Engineer		
		Eric Fu /Reviewer		

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass

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4 General Information

4.1 Details of E.U.T.

Power supply:	Input: DC 5V (Powered by Micro USB port)
Bluetooth Version:	V4.1
Antenna Gain	-5.81dBi
Antenna Type	PCB Antenna
Channel Spacing	5MHz
Modulation Type	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels	802.11b/g/n(HT20):11
Operation Frequency	802.11b/g/n(HT20): 2412MHz to 2462MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Apple	A1357 W010A051	REF. No.SEA0500
Earphone	PHILIPS	SHE6000	REF. No.SEA1000
HDMI Cable	Apple	MC838FE/B	REF. No.SEA0900
Laptop	Lenovo	T430u	REF. No.SEA1800
Micro USB Cable	PHILIPS	SWR2101	REF. No.SEA0700
Mouse	Lenovo	M-U0025-O	REF. No.:SEA2400
Network Cable	SGS	N/A	REF. No.SEA1100
Router	NETGEAR	DGN2200	REF. No.SEA2200
TF Card	Kingston	SDC8GB	REF. No.SEA0400
U-disk	Sandisk	SDCZ60-016G	REF. No.SEA0100

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 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 (Below 1GHz)
		± 4.8dB (Above 1GHz)
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 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

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

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

• **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	2020-05-09
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2017-07-13	2018-07-12
LISN	Rohde & Schwarz	ENV216	SEM007-01	2017-09-27	2018-09-26
LISN	ETS-LINDGREN	3816/2	SEM007-02	2018-04-02	2019-04-01
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018-04-02	2019-04-01

Minimum 6dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-09-27	2018-09-26

Conducted Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-09-27	2018-09-26

Power Spectrum Density					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-09-27	2018-09-26

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Conducted Band Edges Measurement					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-09-27	2018-09-26

Conducted Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-09-27	2018-09-26

Radiated Emissions which fall in the restricted bands					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2017-07-13	2018-07-12
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2018-04-02	2019-04-01
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna(15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2017-09-27	2018-09-26
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2017-09-27	2018-09-27
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2018-04-02	2019-04-01
Pre-amplifier(26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2018-04-02	2019-04-01
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2017-09-27	2018-09-26

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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

Radiated Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2017-07-13	2018-07-12
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2018-04-02	2019-04-01
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna(15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2017-09-27	2018-09-26
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2017-09-27	2018-09-27
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2018-04-02	2019-04-01
Pre-amplifier(26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2018-04-02	2019-04-01
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
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

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	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2017-09-29	2018-09-28
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2018-04-08	2019-04-07

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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 & 15.247(c)

6.1.2 Conclusion

Standard Requirement:

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

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -5.81dBi.

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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
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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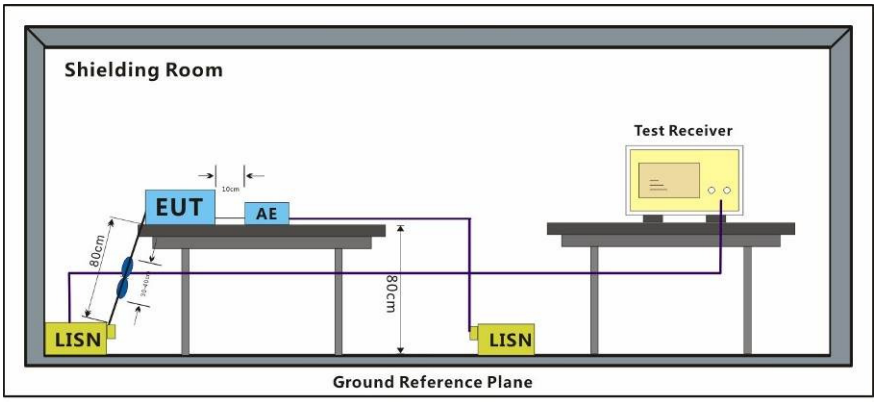
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 54.2 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). 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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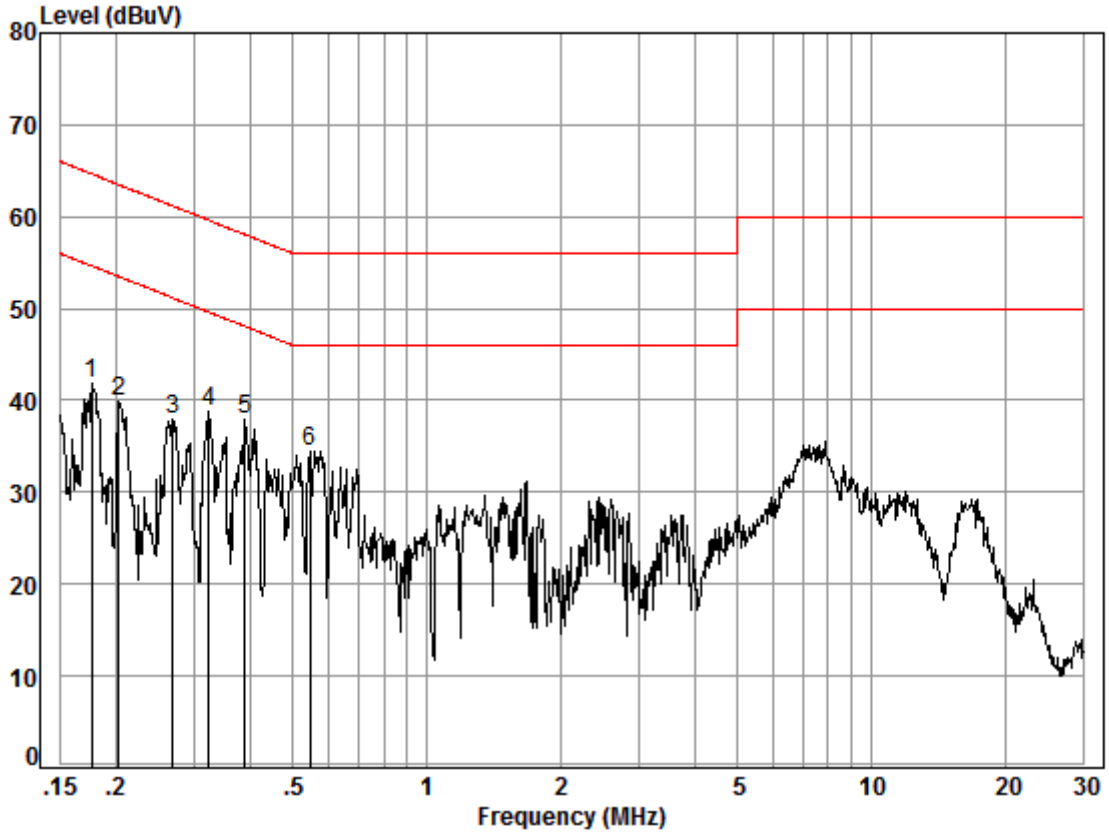
Mode: e



Site : Shielding Room
Condition: Line
Job No. : 04216CR
Test mode: e

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.18	0.03	9.52	32.30	41.85	54.68	-12.83	Peak
2	0.20	0.03	9.50	30.35	39.88	53.49	-13.61	Peak
3	0.27	0.03	9.51	28.31	37.85	51.16	-13.31	Peak
4	0.32	0.03	9.51	29.26	38.80	49.62	-10.82	Peak
5	0.39	0.04	9.49	28.32	37.85	48.08	-10.23	Peak
6	0.55	0.05	9.51	24.97	34.53	46.00	-11.47	Peak

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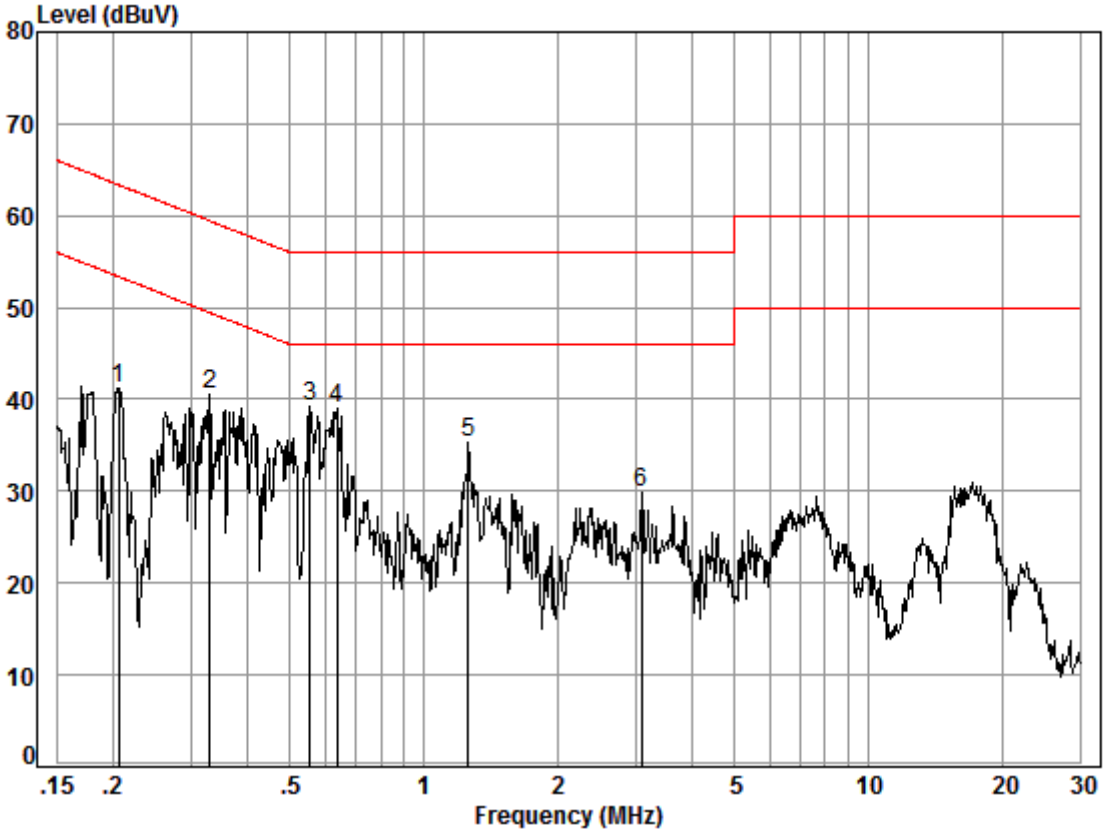
Mode: e



Site : Shielding Room
Condition: Neutral
Job No. : 04216CR
Test mode: e

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.21	0.03	9.57	31.56	41.16	53.36	-12.20	Peak
2	0.33	0.03	9.58	30.98	40.59	49.44	-8.85	Peak
3	0.56	0.05	9.61	29.52	39.18	46.00	-6.82	Peak
4	0.64	0.06	9.62	29.30	38.98	46.00	-7.02	Peak
5	1.26	0.12	9.64	25.46	35.22	46.00	-10.78	Peak
6	3.09	0.18	9.65	19.95	29.78	46.00	-16.22	Peak

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7.2 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit: ⩾500 kHz

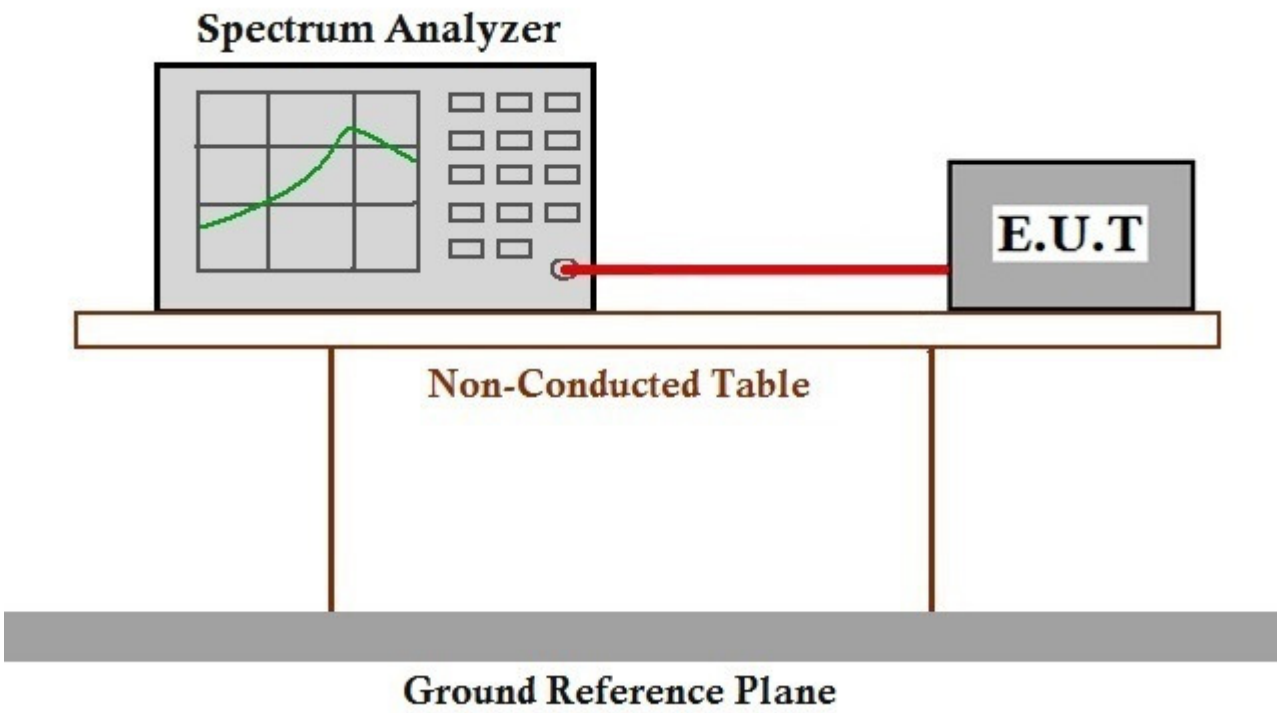
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 45.3 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). 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 15.247

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7.3 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method: ANSI C63.10 (2013) Section 11.9.1
Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

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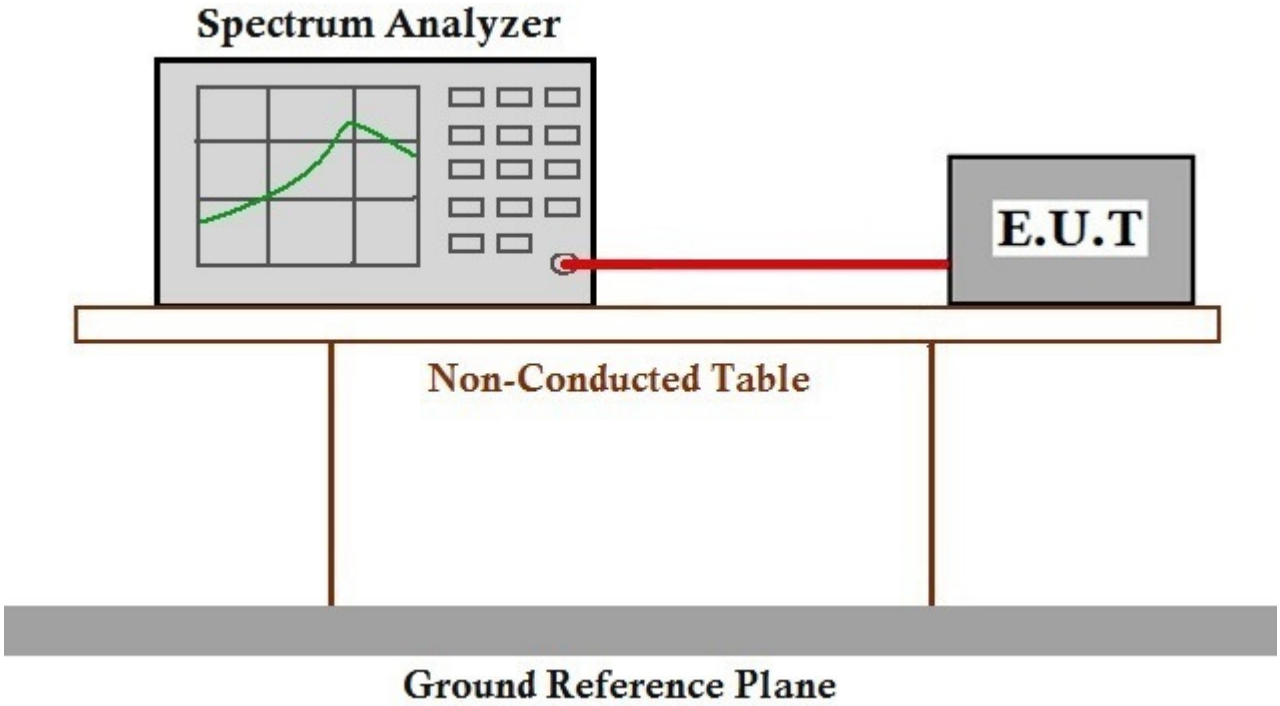
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 45.3 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). 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 15.247

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7.4 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit: ≤8dBm in any 3 kHz band during any time interval of continuous transmission

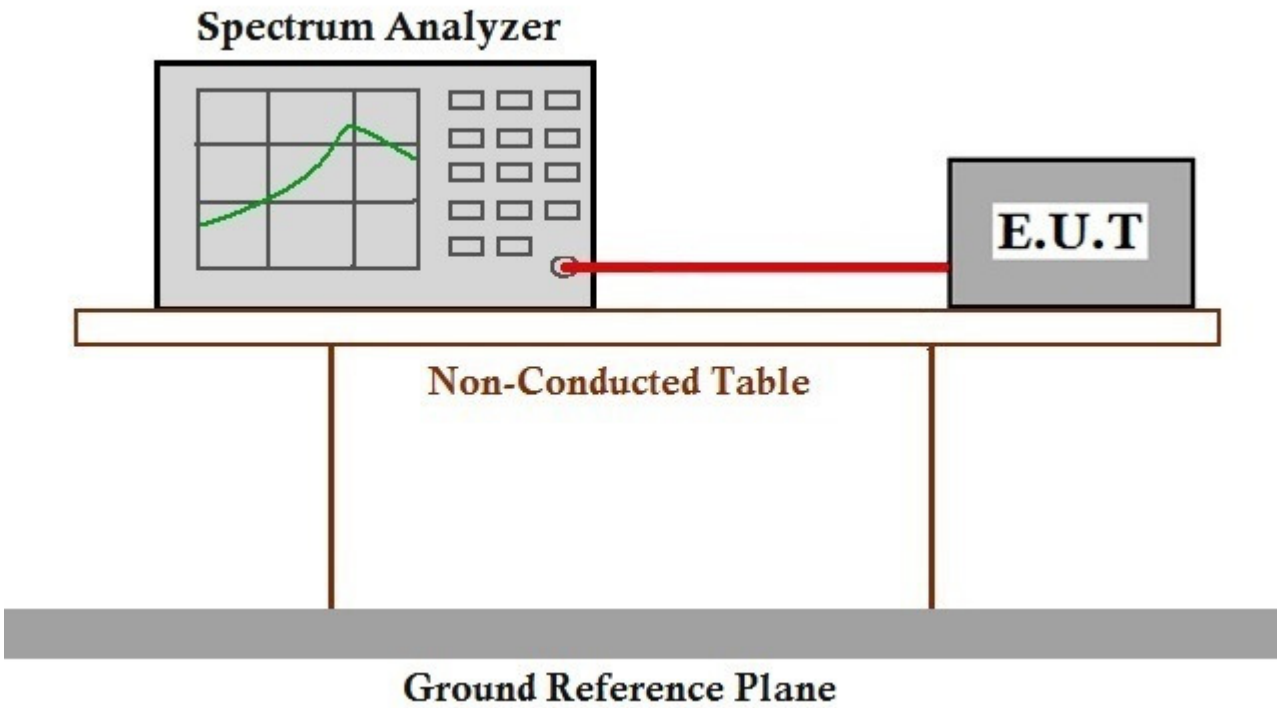
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 45.3 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). 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 15.247

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7.5 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

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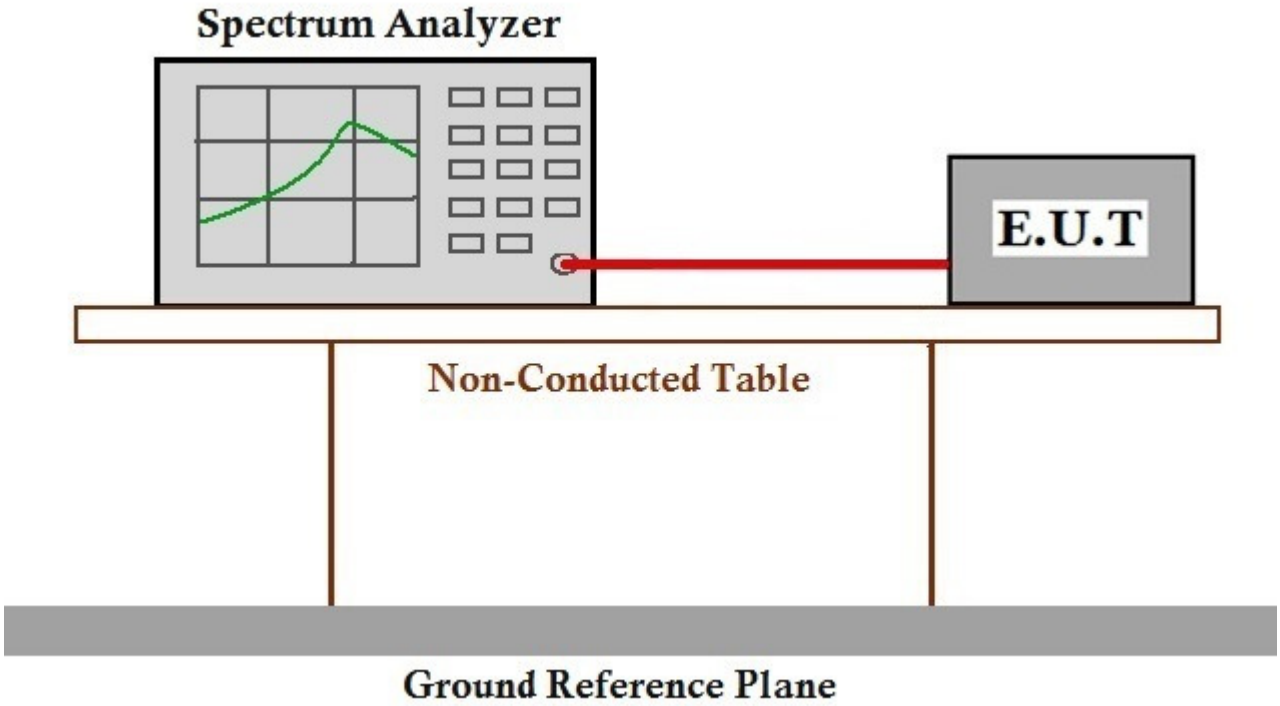
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 45.3 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). 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 15.247

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7.6 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

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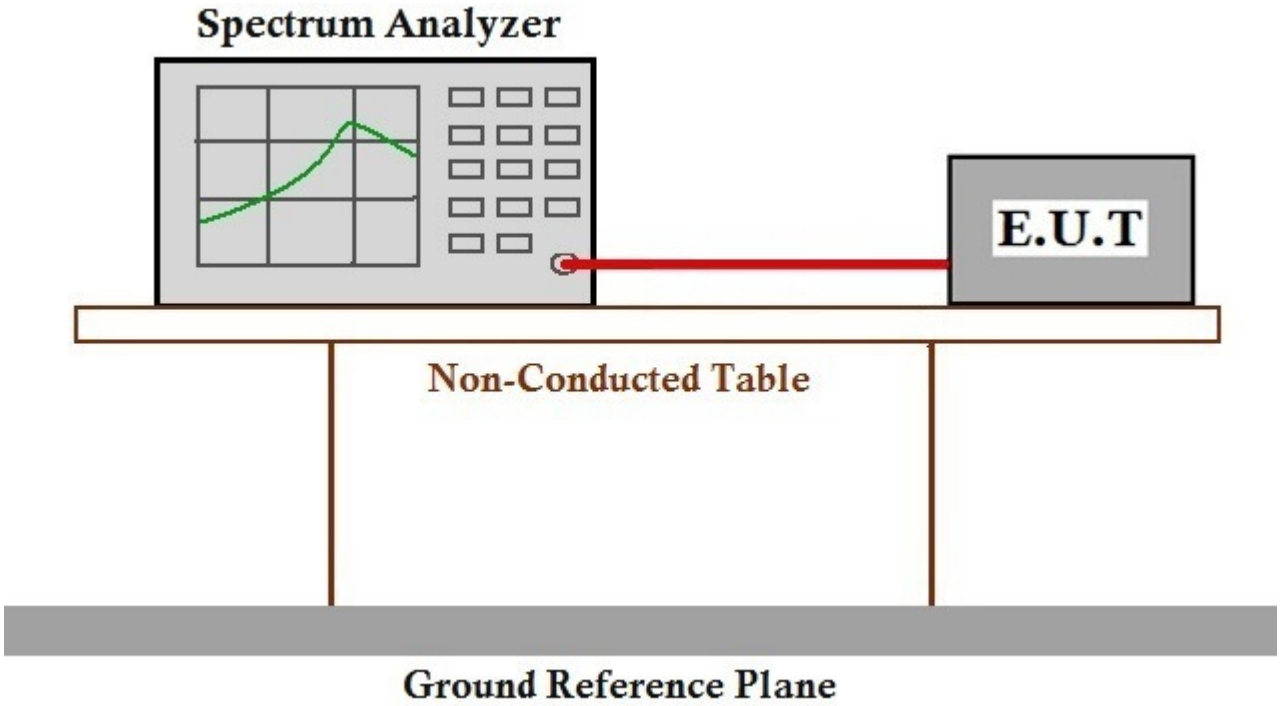
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 45.3 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). 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 15.247

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7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

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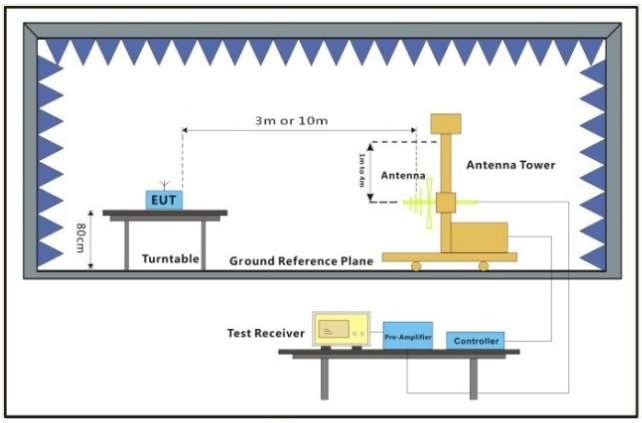
7.7.1 E.U.T. Operation

Operating Environment:

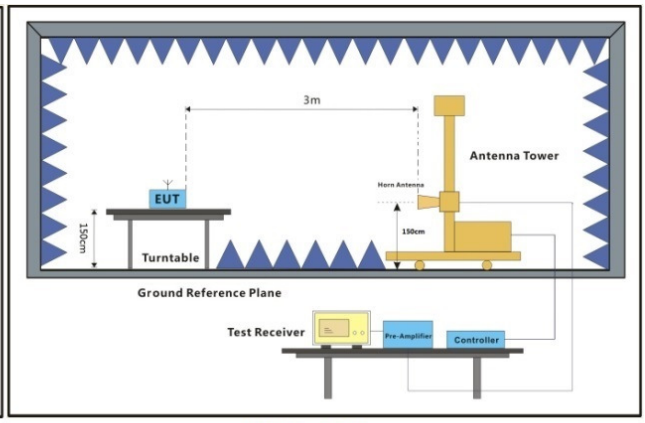
Temperature: 25.8 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.7.2 Test Setup Diagram



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

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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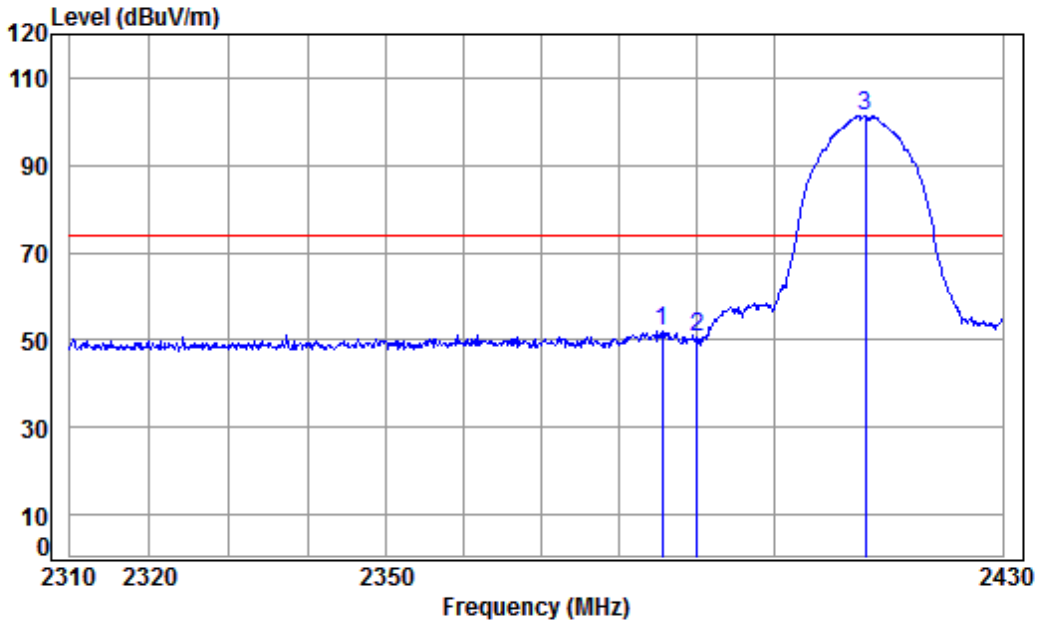
Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

	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	2385.494	5.47	28.51	41.87	60.06	52.17	74.00	-21.83	peak
2	2390.000	5.47	28.52	41.87	58.35	50.47	74.00	-23.53	peak
3 pp	2412.000	5.50	28.56	41.88	109.09	101.27	74.00	27.27	peak

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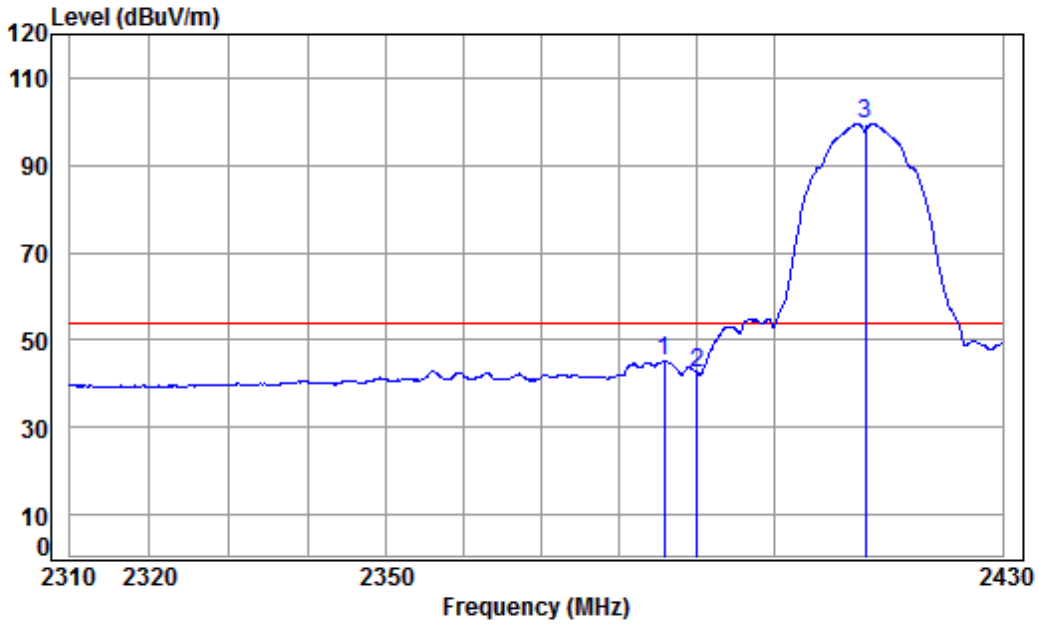
Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

	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	2385.736	5.47	28.51	41.87	53.21	45.32	54.00	-8.68	Average
2	2390.000	5.47	28.52	41.87	50.34	42.46	54.00	-11.54	Average
3 pp	2412.000	5.50	28.56	41.88	107.36	99.54	54.00	45.54	Average

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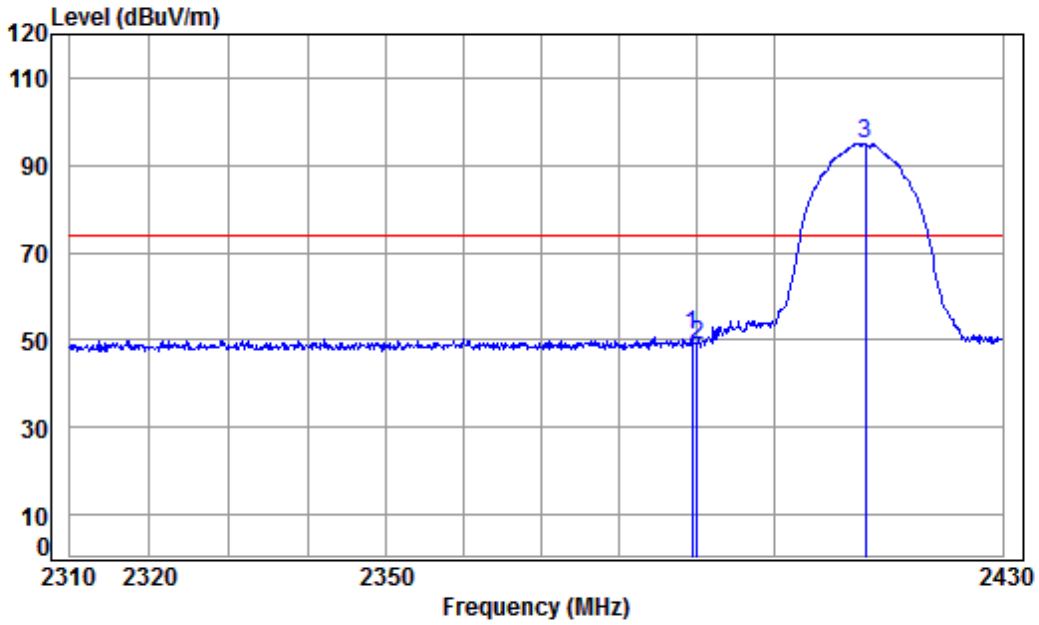
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

	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	2389.363	5.47	28.52	41.87	58.85	50.97	74.00	-23.03	Peak
2	2390.000	5.47	28.52	41.87	56.57	48.69	74.00	-25.31	Peak
3 pp	2412.000	5.50	28.56	41.88	102.84	95.02	74.00	21.02	Peak

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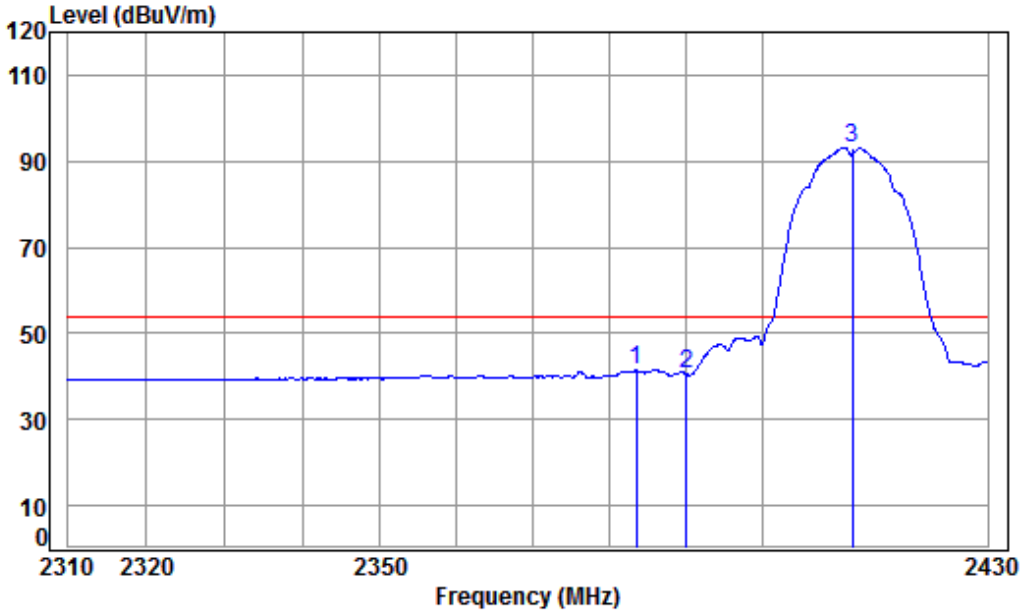
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

	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	2383.441	5.47	28.51	41.87	49.34	41.45	54.00	-12.55	Average
2	2390.000	5.47	28.52	41.87	48.46	40.58	54.00	-13.42	Average
3 pp	2412.000	5.50	28.56	41.88	100.99	93.17	54.00	39.17	Average

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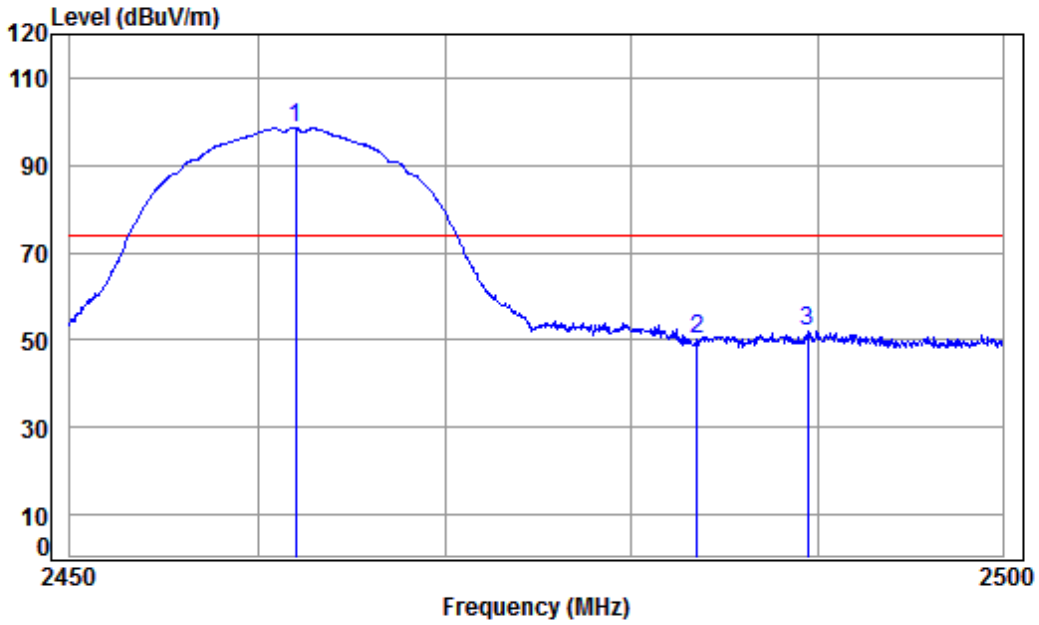
Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:High



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

		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	2462.000	5.57	28.64	41.90	106.29	98.60	74.00	24.60	peak
2		2483.500	5.60	28.67	41.91	57.61	49.97	74.00	-24.03	peak
3		2489.466	5.61	28.68	41.91	59.52	51.90	74.00	-22.10	peak

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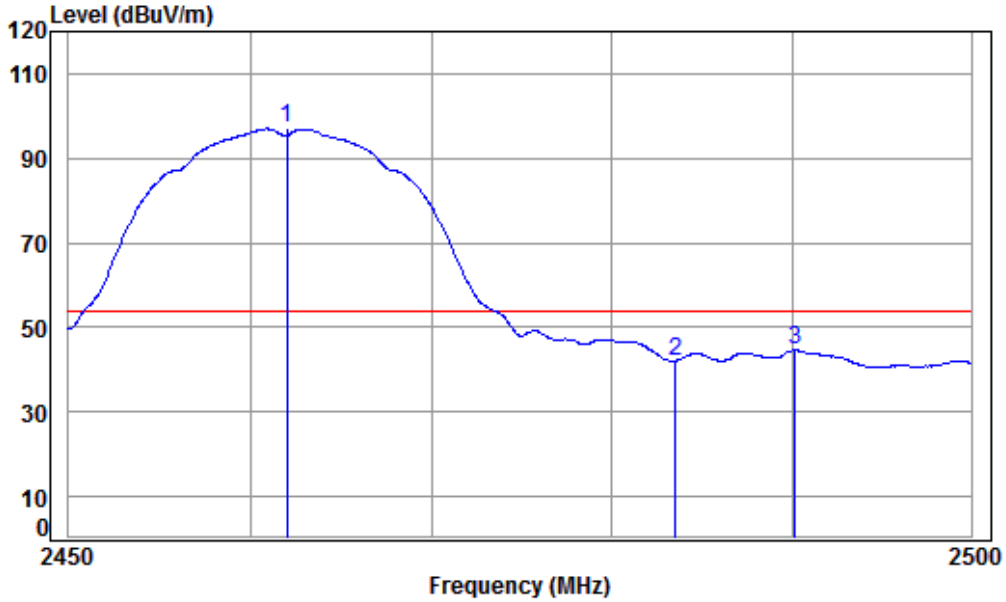
Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:High



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

		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	2462.000	5.57	28.64	41.90	104.66	96.97	54.00	42.97	Average
2		2483.500	5.60	28.67	41.91	49.71	42.07	54.00	-11.93	Average
3		2490.171	5.61	28.68	41.91	52.17	44.55	54.00	-9.45	Average

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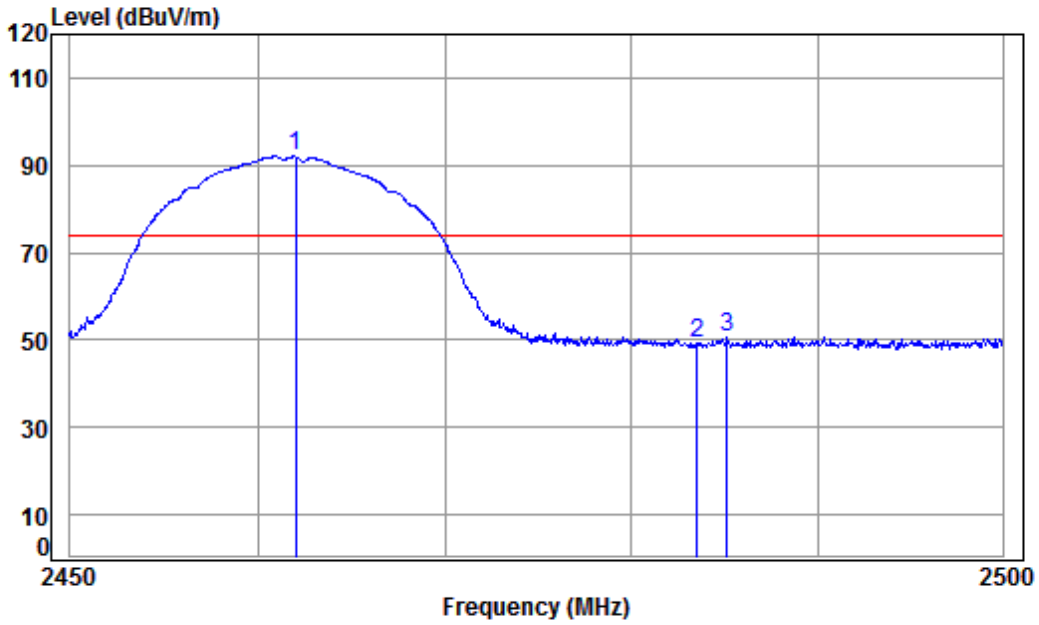
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:High



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

		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	2462.000	5.57	28.64	41.90	99.78	92.09	74.00	18.09	Peak
2		2483.500	5.60	28.67	41.91	56.87	49.23	74.00	-24.77	Peak
3		2485.145	5.60	28.68	41.91	58.27	50.64	74.00	-23.36	Peak

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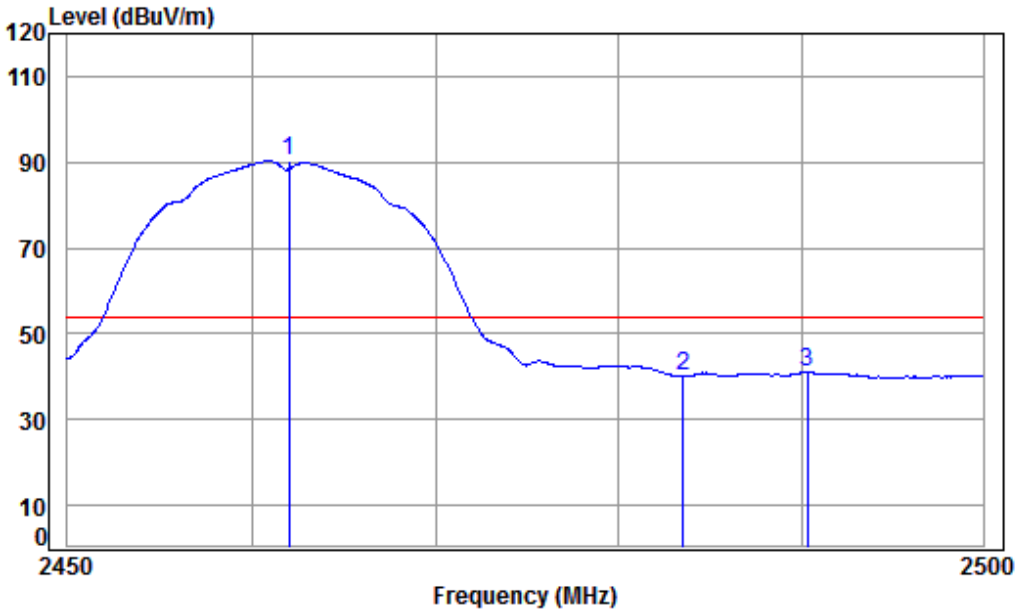
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:High



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11B
Power Setting: 68

	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	2462.000	5.57	28.64	41.90	97.93	90.24	54.00	36.24	Average
2	2483.500	5.60	28.67	41.91	47.79	40.15	54.00	-13.85	Average
3	2490.322	5.61	28.68	41.91	48.67	41.05	54.00	-12.95	Average

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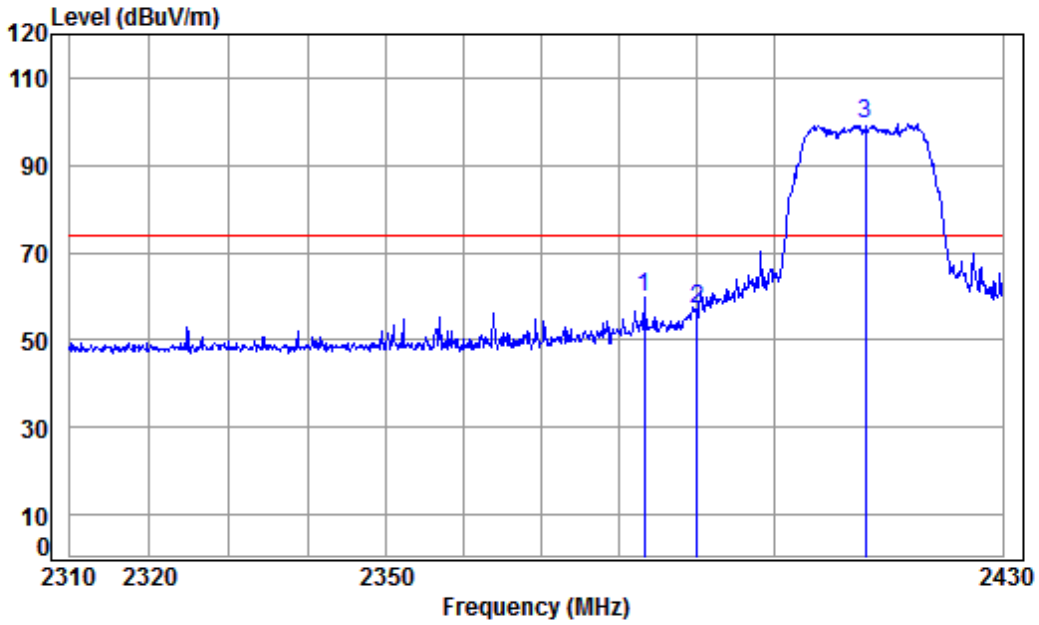
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

	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	2383.200	5.47	28.51	41.87	67.56	59.67	74.00	-14.33	peak
2	2390.000	5.47	28.52	41.87	64.89	57.01	74.00	-16.99	peak
3 pp	2412.000	5.50	28.56	41.88	107.45	99.63	74.00	25.63	peak

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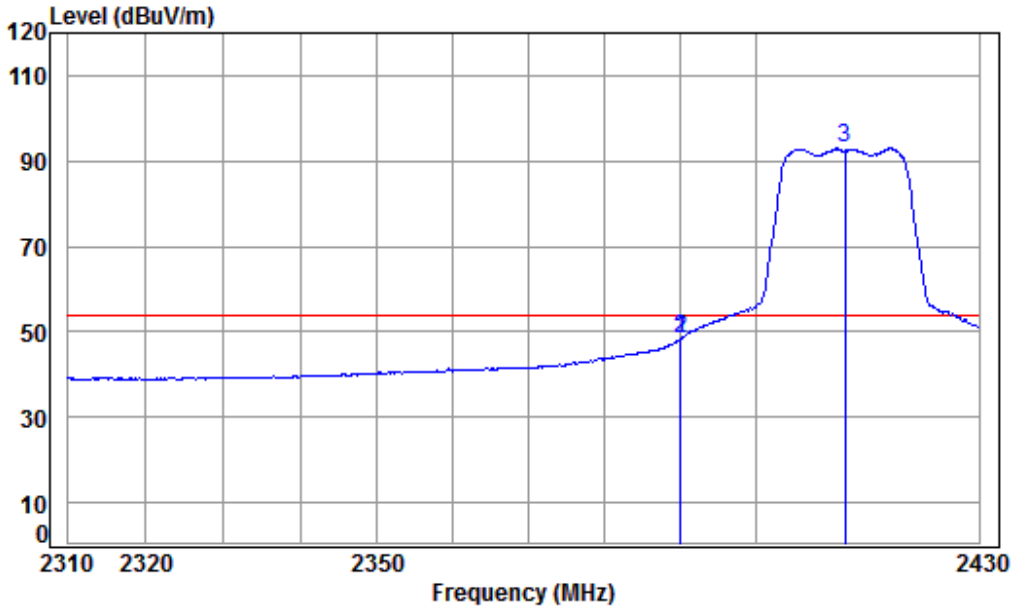
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

	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	2389.968	5.47	28.52	41.87	56.18	48.30	54.00	-5.70	Average
2	2390.000	5.47	28.52	41.87	56.18	48.30	54.00	-5.70	Average
3 pp	2412.000	5.50	28.56	41.88	100.86	93.04	54.00	39.04	Average

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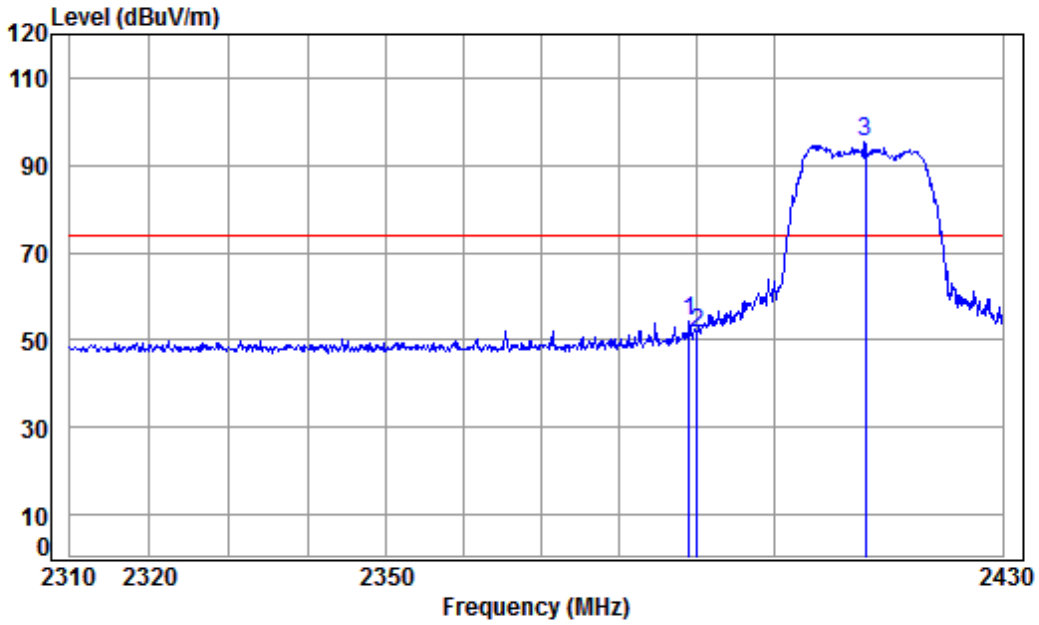
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

	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	2389.000	5.47	28.52	41.87	62.22	54.34	74.00	-19.66	Peak
2	2390.000	5.47	28.52	41.87	59.64	51.76	74.00	-22.24	Peak
3 pp	2412.000	5.50	28.56	41.88	103.29	95.47	74.00	21.47	Peak

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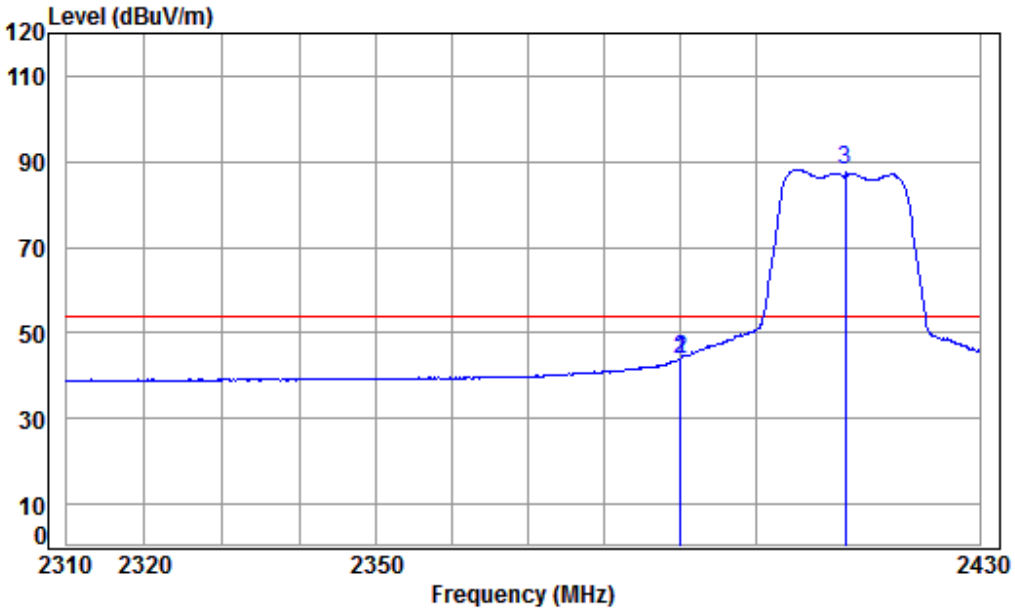
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

	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	2389.968	5.47	28.52	41.87	51.65	43.77	54.00	-10.23	Average
2	2390.000	5.47	28.52	41.87	51.65	43.77	54.00	-10.23	Average
3 pp	2412.000	5.50	28.56	41.88	96.09	88.27	54.00	34.27	Average

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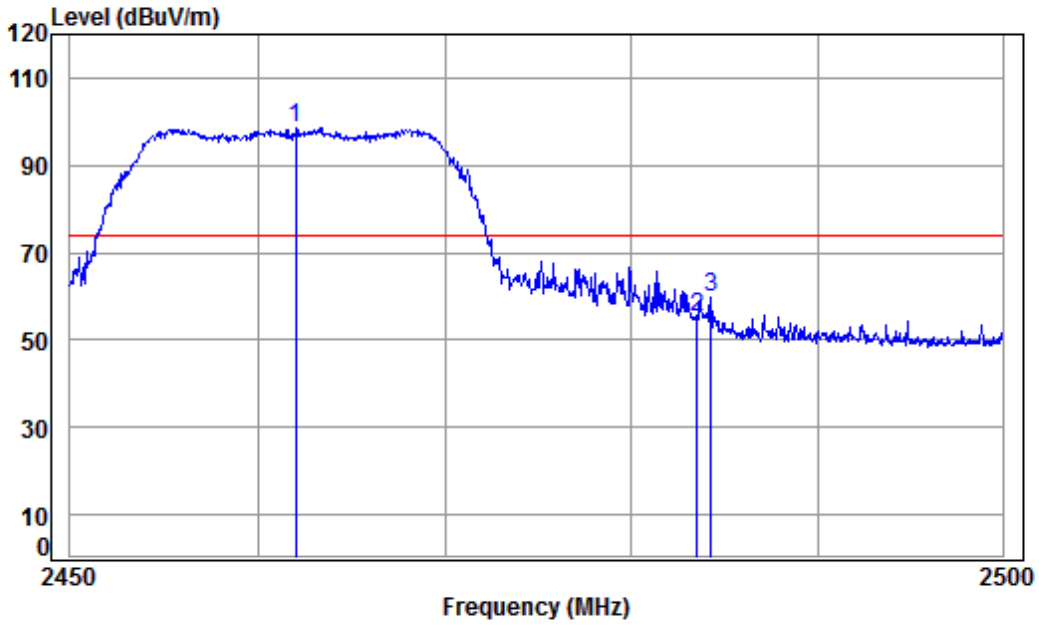
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:High



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

		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	2462.000	5.57	28.64	41.90	106.41	98.72	74.00	24.72	peak
2		2483.500	5.60	28.67	41.91	62.85	55.21	74.00	-18.79	peak
3		2484.241	5.60	28.67	41.91	67.45	59.81	74.00	-14.19	peak

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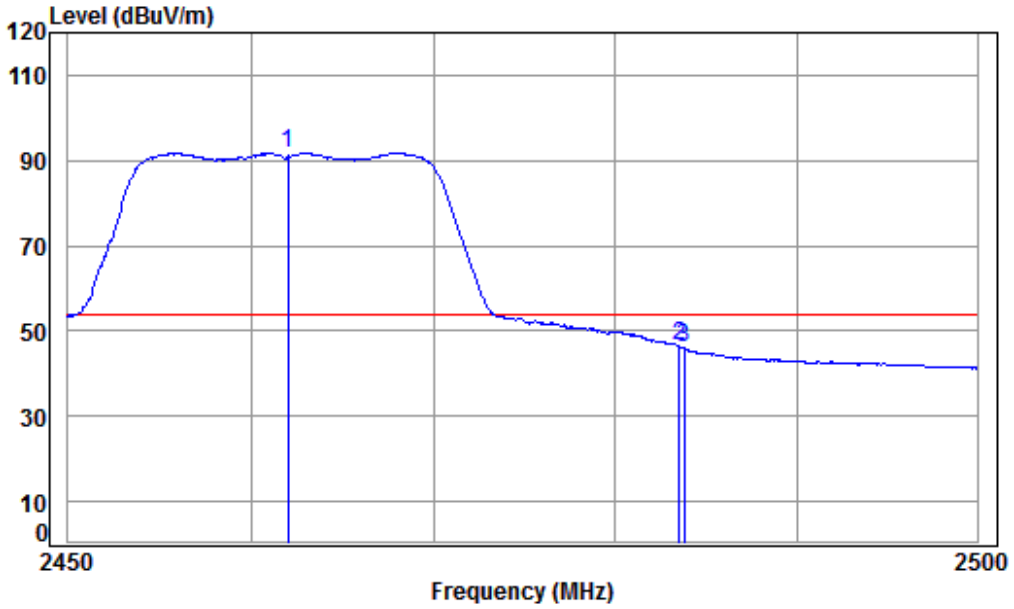
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:High



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

	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	2462.000	5.57	28.64	41.90	99.51	91.82	54.00	37.82	Average
2	2483.500	5.60	28.67	41.91	53.99	46.35	54.00	-7.65	Average
3	2483.790	5.60	28.67	41.91	53.56	45.92	54.00	-8.08	Average

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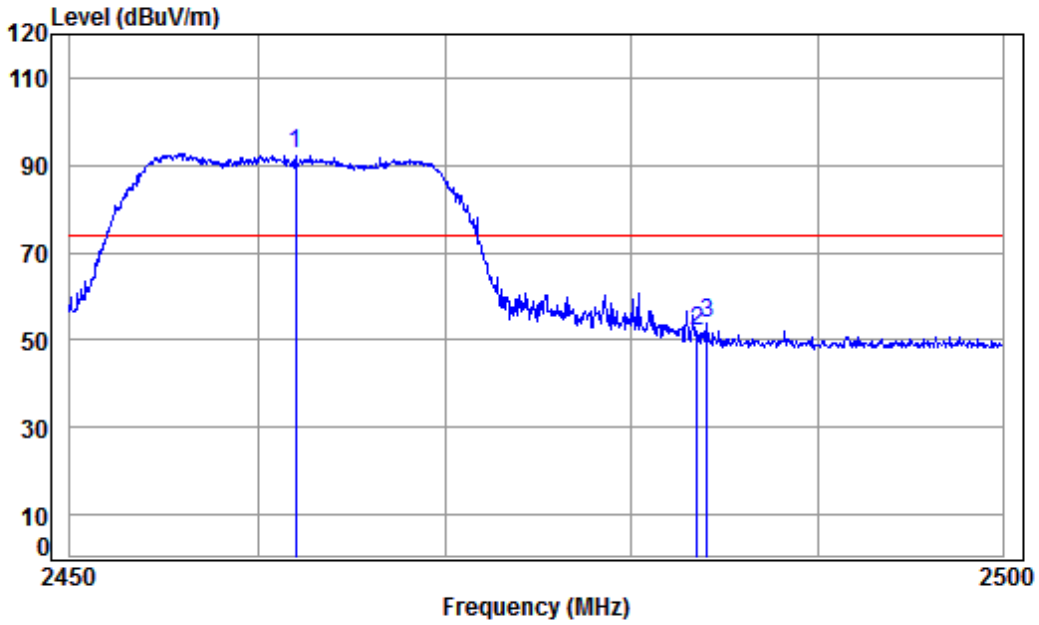
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:High



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

		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	2462.000	5.57	28.64	41.90	100.27	92.58	74.00	18.58	Peak
2		2483.500	5.60	28.67	41.91	59.57	51.93	74.00	-22.07	Peak
3		2484.041	5.60	28.67	41.91	61.48	53.84	74.00	-20.16	Peak

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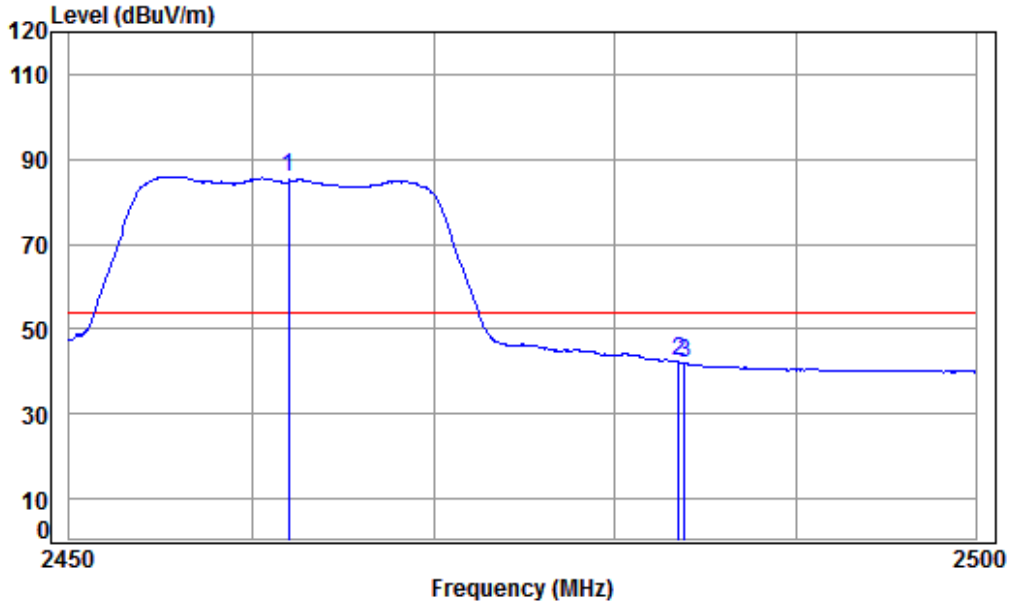
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:High



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11G
Power Setting: 60

	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	2462.000	5.57	28.64	41.90	93.65	85.96	54.00	31.96	Average
2	2483.500	5.60	28.67	41.91	49.89	42.25	54.00	-11.75	Average
3	2483.840	5.60	28.67	41.91	49.65	42.01	54.00	-11.99	Average

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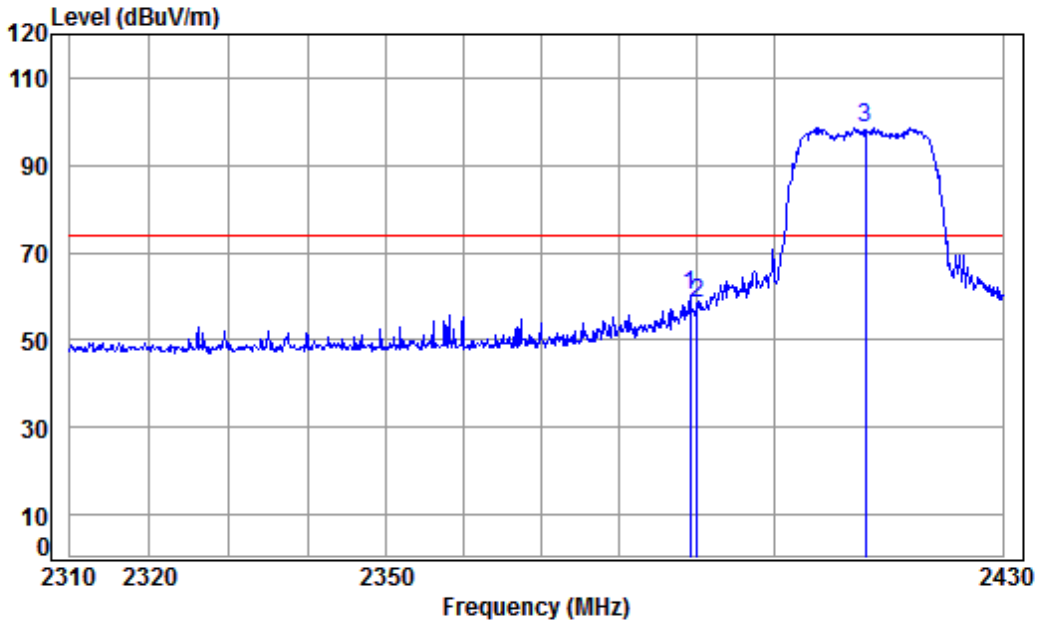
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2389.121	5.47	28.52	41.87	68.33	60.45	74.00	-13.55	peak
2	2390.000	5.47	28.52	41.87	66.25	58.37	74.00	-15.63	peak
3 pp	2412.000	5.50	28.56	41.88	106.30	98.48	74.00	24.48	peak

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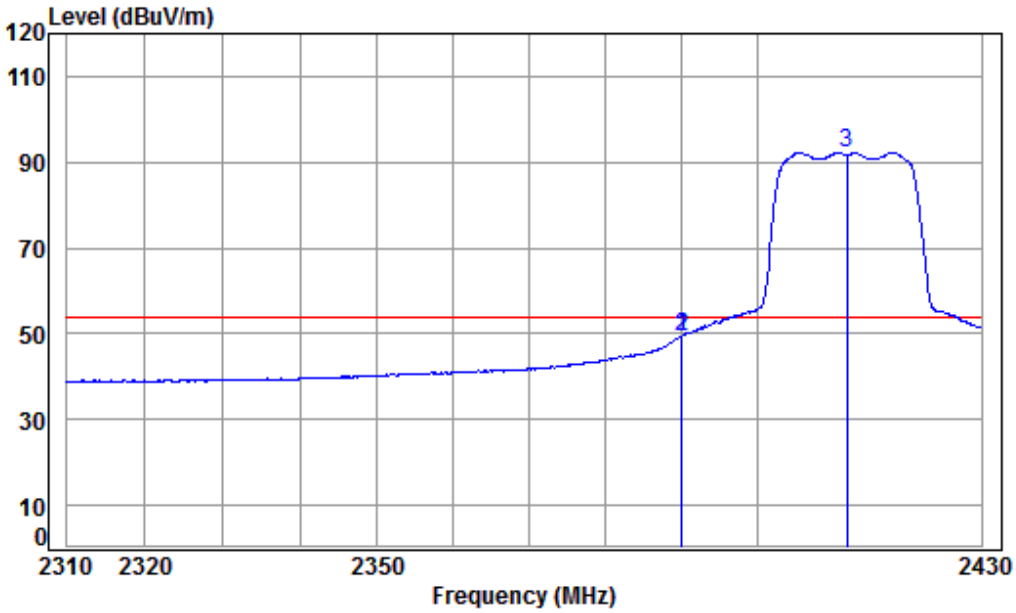
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2389.968	5.47	28.52	41.87	57.17	49.29	54.00	-4.71	Average
2	2390.000	5.47	28.52	41.87	57.17	49.29	54.00	-4.71	Average
3 pp	2412.000	5.50	28.56	41.88	100.12	92.30	54.00	38.30	Average

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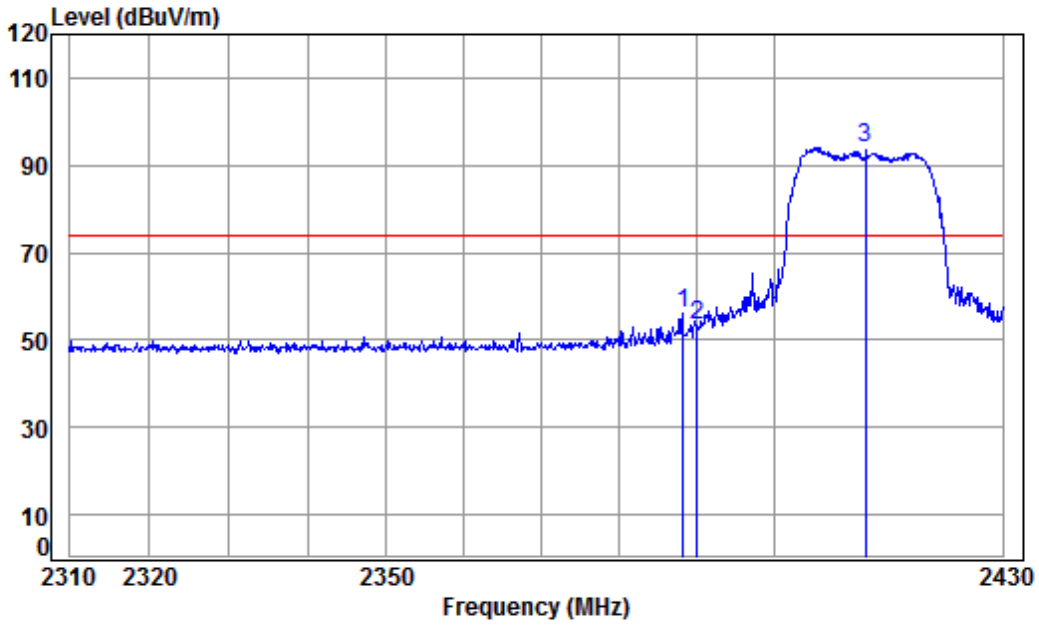
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2388.154	5.47	28.52	41.87	63.99	56.11	74.00	-17.89	Peak
2	2390.000	5.47	28.52	41.87	61.28	53.40	74.00	-20.60	Peak
3 pp	2412.000	5.50	28.56	41.88	102.04	94.22	74.00	20.22	Peak

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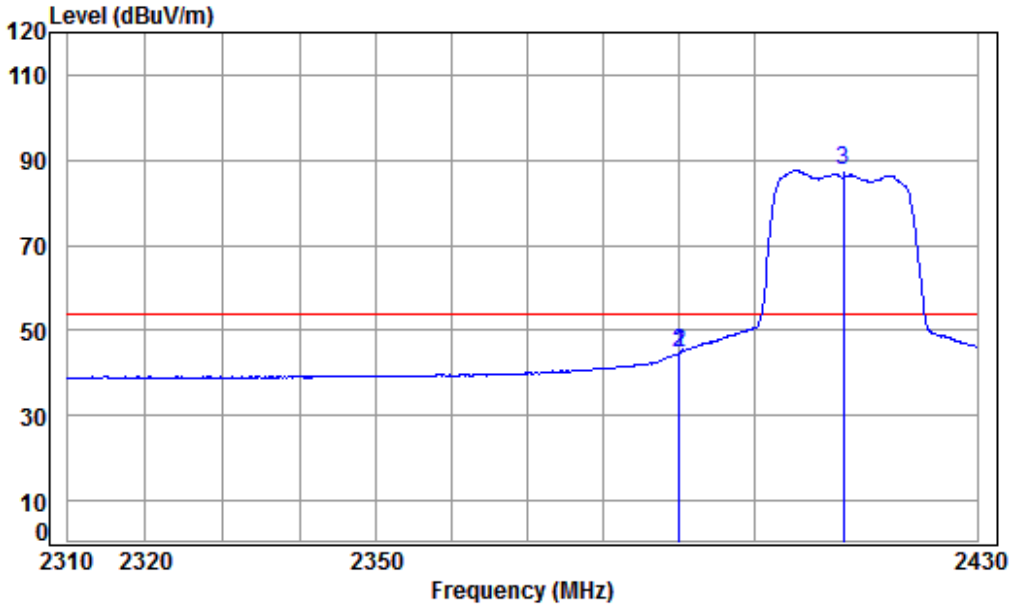
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2412 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2389.968	5.47	28.52	41.87	52.59	44.71	54.00	-9.29	Average
2	2390.000	5.47	28.52	41.87	52.59	44.71	54.00	-9.29	Average
3 pp	2412.000	5.50	28.56	41.88	95.50	87.68	54.00	33.68	Average

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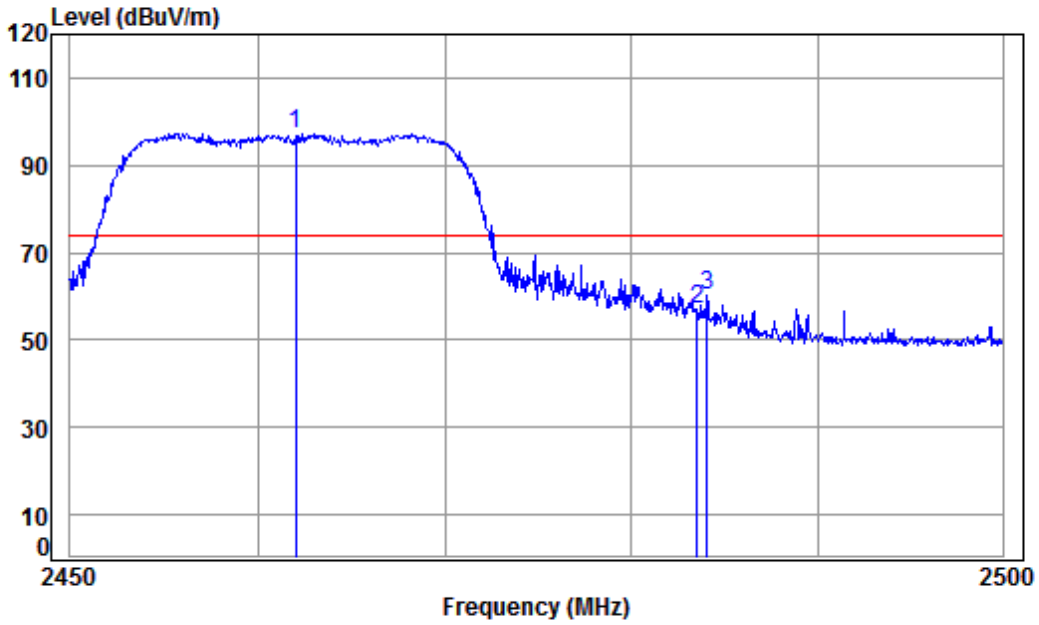
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:High



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

		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	2462.000	5.57	28.64	41.90	105.10	97.41	74.00	23.41	peak
2		2483.500	5.60	28.67	41.91	64.87	57.23	74.00	-16.77	peak
3		2484.041	5.60	28.67	41.91	67.81	60.17	74.00	-13.83	peak

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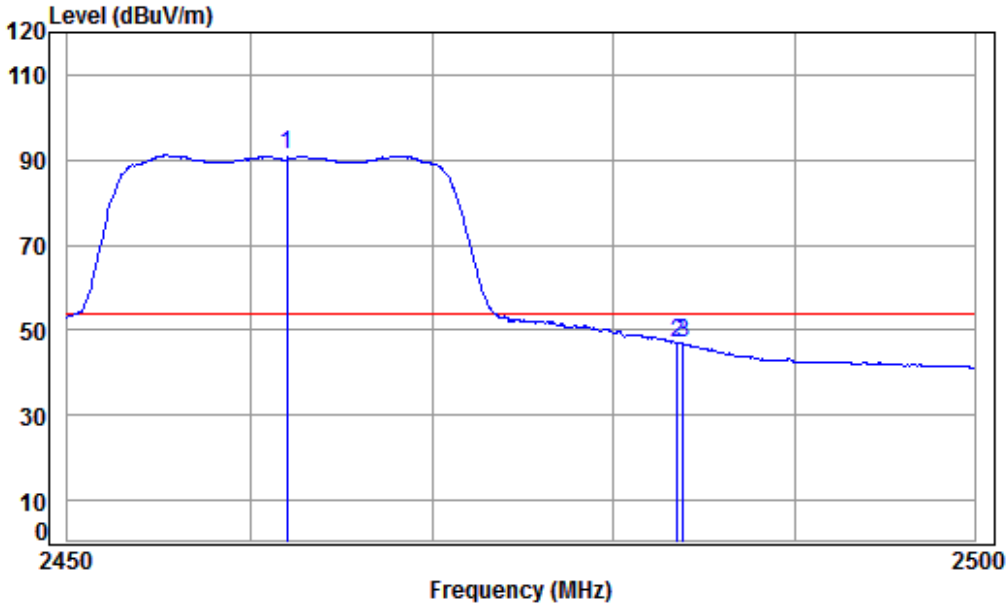
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:High



Condition : 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2462.000	5.57	28.64	41.90	98.81	91.12	54.00	37.12	Average
2	2483.500	5.60	28.67	41.91	54.66	47.02	54.00	-6.98	Average
3	2483.840	5.60	28.67	41.91	54.52	46.88	54.00	-7.12	Average

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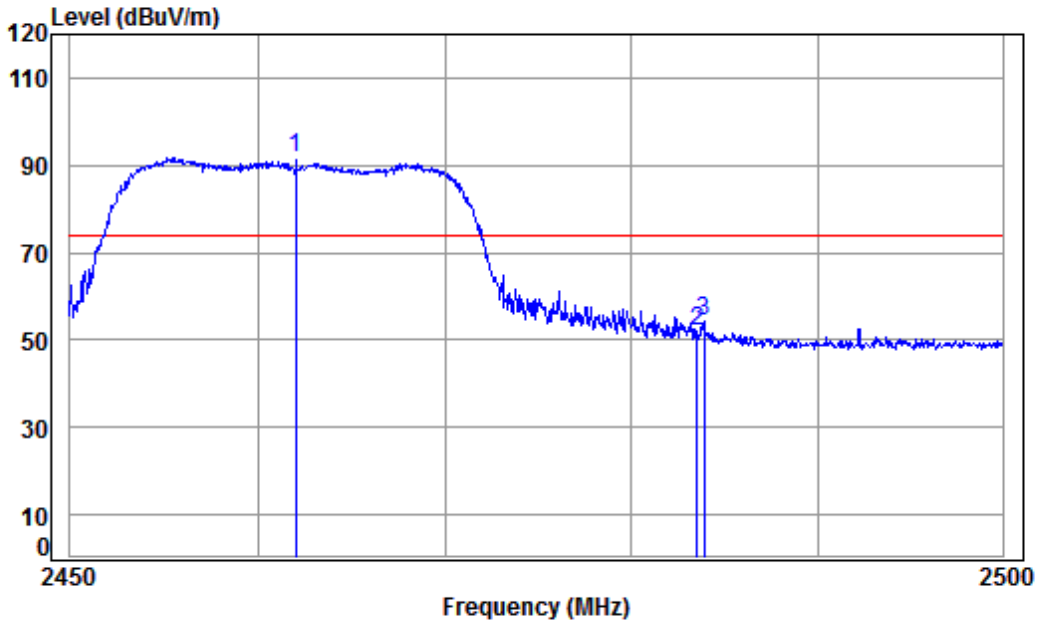
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:High



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2462.000	5.57	28.64	41.90	99.30	91.61	74.00	17.61	Peak
2	2483.500	5.60	28.67	41.91	59.54	51.90	74.00	-22.10	Peak
3	2483.890	5.60	28.67	41.91	62.16	54.52	74.00	-19.48	Peak

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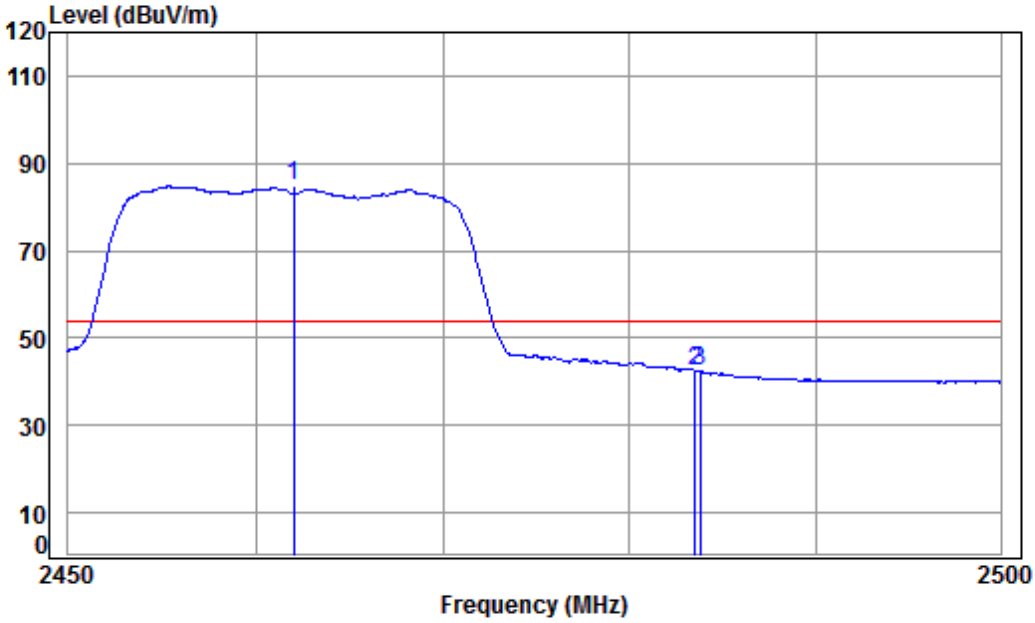
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:High



Condition : 3m VERTICAL
Job No : 04216CR
Mode : 2462 Band edge
Note : 2.4G WiFi 11N20
Power Setting: 60

	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	2462.000	5.57	28.64	41.90	92.50	84.81	54.00	30.81	Average
2	2483.500	5.60	28.67	41.91	50.00	42.36	54.00	-11.64	Average
3	2483.790	5.60	28.67	41.91	50.14	42.50	54.00	-11.50	Average

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7.8 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
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.		

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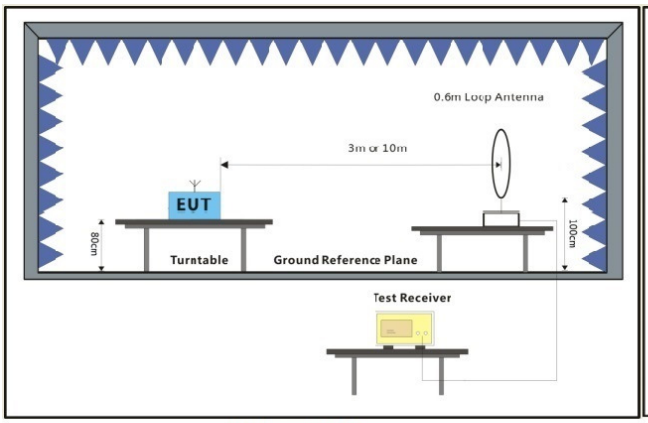
7.8.1 E.U.T. Operation

Operating Environment:

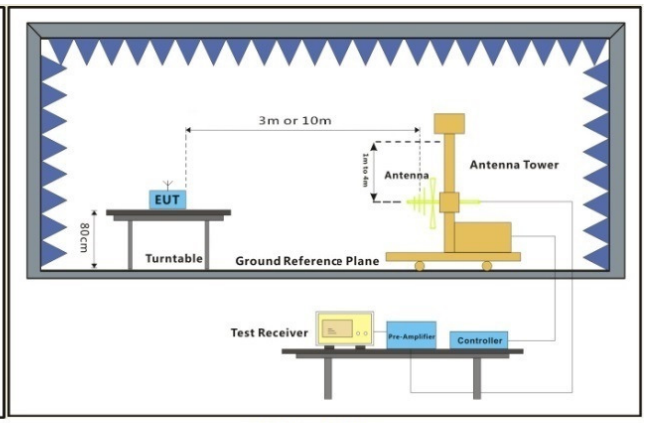
Temperature: 23.4 °C Humidity: 55 % RH Atmospheric Pressure: 1015 mbar

Test mode e:TX mode_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 @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

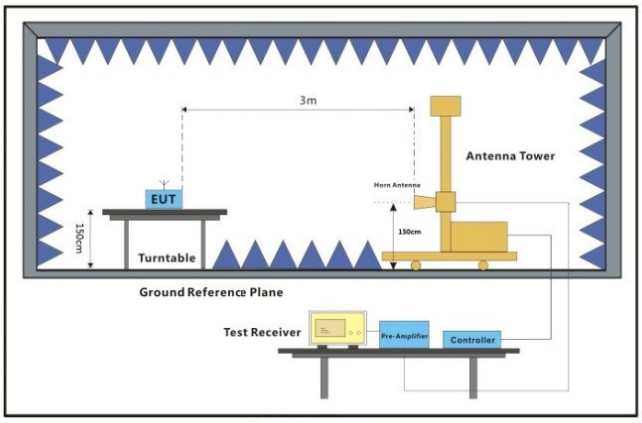
7.8.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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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:

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. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

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

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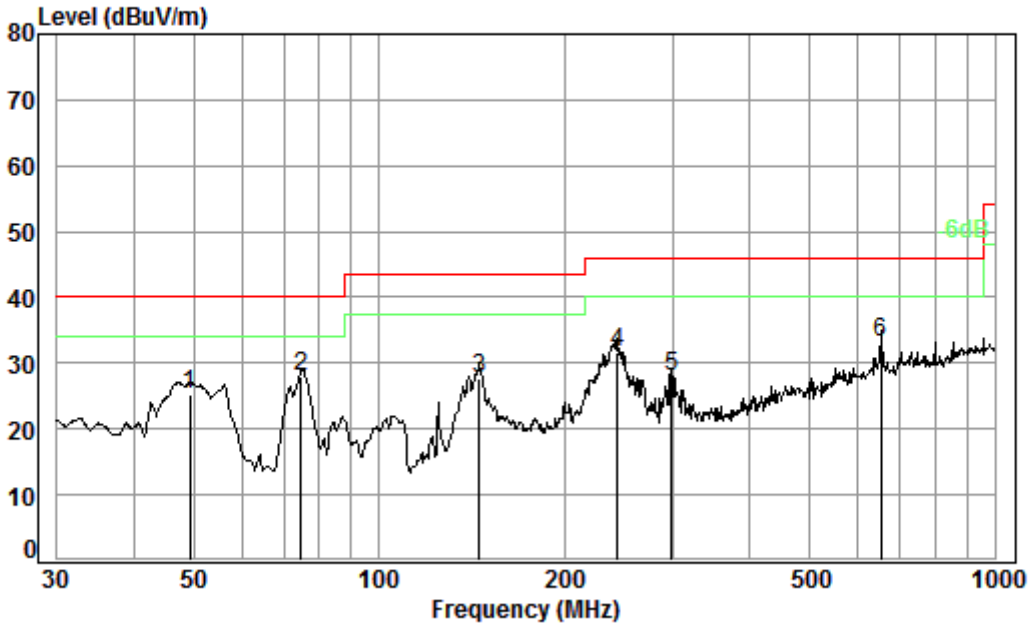
30MHz~1GHz

QP value:

Mode:e; Polarization:Horizontal;



Condition: 3m HORIZONTAL
Job No. : 04216CR
Test mode: e

	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	49.36	0.79	14.39	27.29	37.27	25.16	40.00	-14.84
2 pp	74.66	0.94	12.41	27.24	41.78	27.89	40.00	-12.11
3	145.35	1.31	14.21	26.93	39.24	27.83	43.50	-15.67
4	244.23	1.65	18.87	26.55	37.72	31.69	46.00	-14.31
5	298.27	1.89	19.53	26.41	32.93	27.94	46.00	-18.06
6	651.94	2.81	27.30	27.47	30.46	33.10	46.00	-12.90

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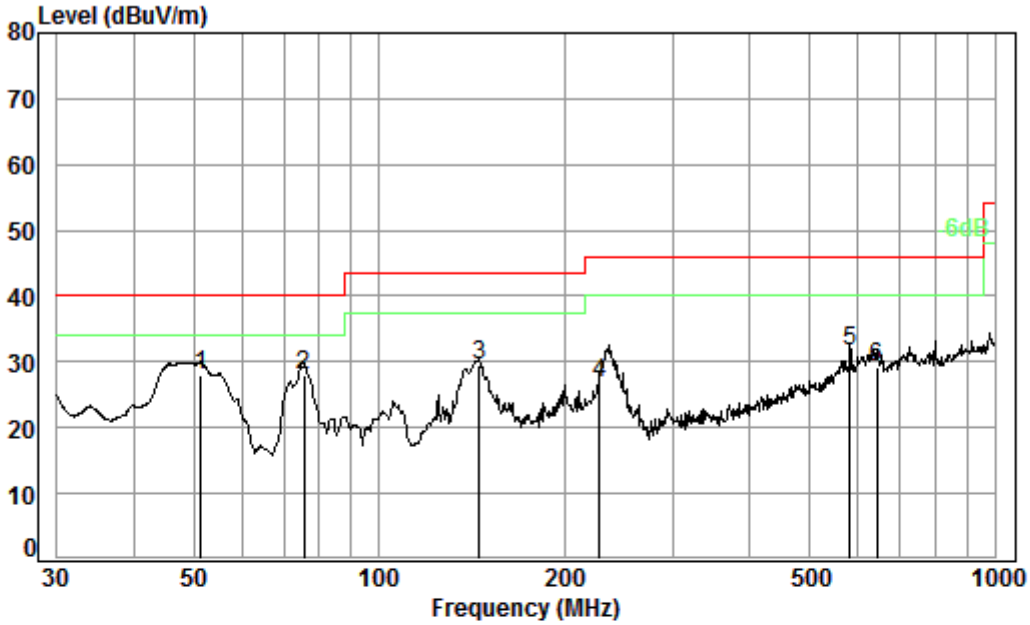
Mode:e; Polarization:Vertical



Condition: 3m VERTICAL
Job No. : 04216CR
Test mode: e

	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	51.30	0.80	14.06	27.29	40.55	28.12	40.00	-11.88
2	75.71	0.97	12.33	27.24	41.87	27.93	40.00	-12.07
3	145.35	1.31	14.21	26.93	40.94	29.53	43.50	-13.97
4	228.49	1.56	17.90	26.60	33.83	26.69	46.00	-19.31
5	580.70	2.68	26.24	27.57	30.22	31.57	46.00	-14.43
6	642.86	2.79	27.18	27.49	26.60	29.08	46.00	-16.92

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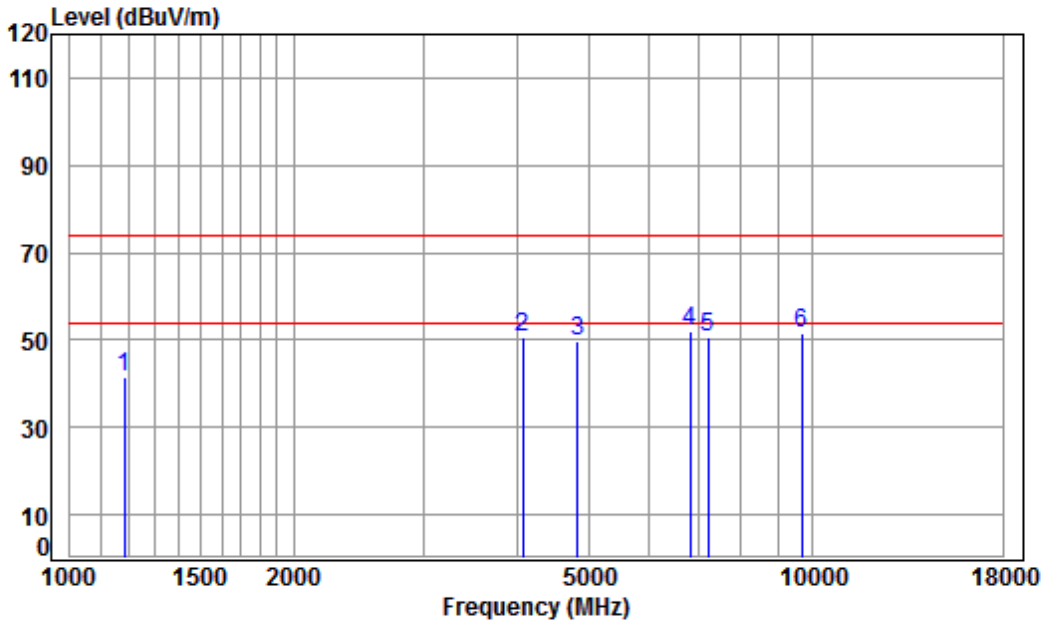
Above 1GHz

Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11B

	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	1185.936	4.36	24.41	38.08	50.63	41.32	74.00	-32.68	peak
2	4074.388	7.07	33.60	38.04	47.81	50.44	74.00	-23.56	peak
3	4824.000	7.91	34.19	38.42	45.95	49.63	74.00	-24.37	peak
4 pp	6835.278	10.58	36.05	37.45	42.82	52.00	74.00	-22.00	peak
5	7236.000	10.07	36.40	37.08	41.38	50.77	74.00	-23.23	peak
6	9648.000	10.77	37.53	35.07	38.37	51.60	74.00	-22.40	peak

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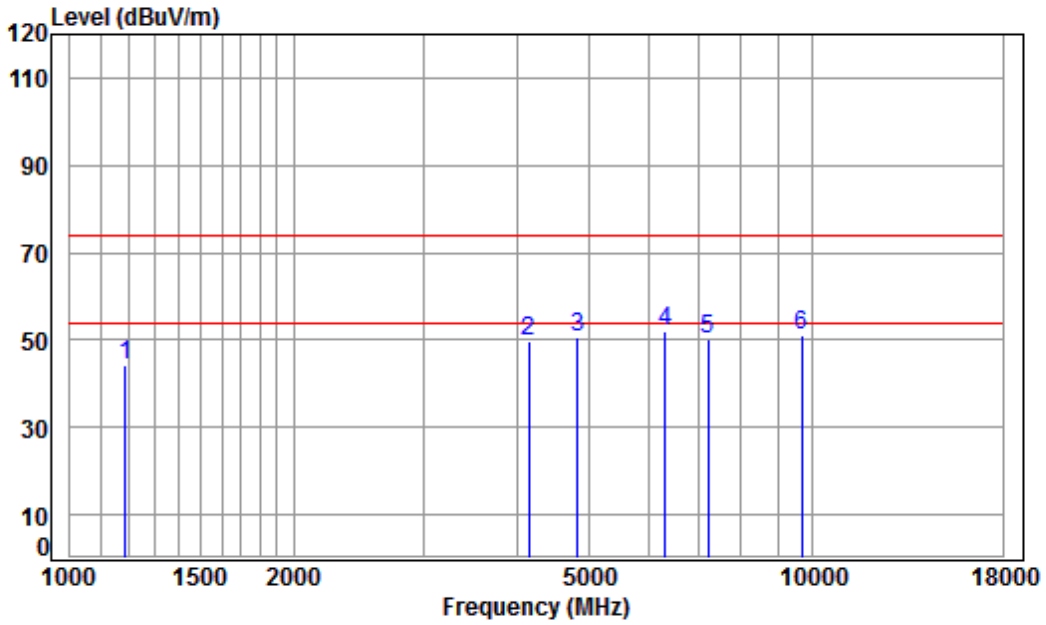
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11B

		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		1189.368	4.38	24.43	38.07	53.42	44.16	74.00	-29.84	peak
2		4145.664	7.16	33.60	38.08	47.12	49.80	74.00	-24.20	peak
3		4824.000	7.91	34.19	38.42	46.74	50.42	74.00	-23.58	peak
4	pp	6322.136	11.20	34.96	37.96	43.89	52.09	74.00	-21.91	peak
5		7236.000	10.07	36.40	37.08	40.90	50.29	74.00	-23.71	peak
6		9648.000	10.77	37.53	35.07	37.90	51.13	74.00	-22.87	peak

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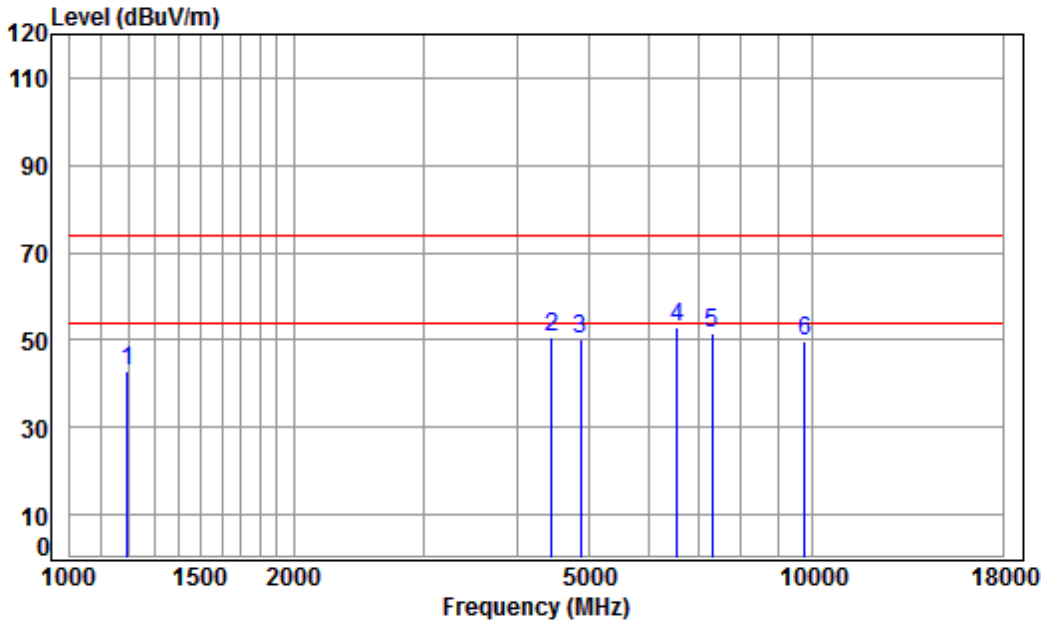
Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:middle



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11B

	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	4.40	24.46	38.07	51.96	42.75	74.00	-31.25	peak
2	4456.315	7.51	33.60	38.24	47.67	50.54	74.00	-23.46	peak
3	4874.000	7.96	34.28	38.44	46.27	50.07	74.00	-23.93	peak
4 pp	6564.209	11.35	35.29	37.72	44.16	53.08	74.00	-20.92	peak
5	7311.000	10.05	36.37	37.01	42.37	51.78	74.00	-22.22	peak
6	9748.000	10.82	37.55	35.02	36.55	49.90	74.00	-24.10	peak

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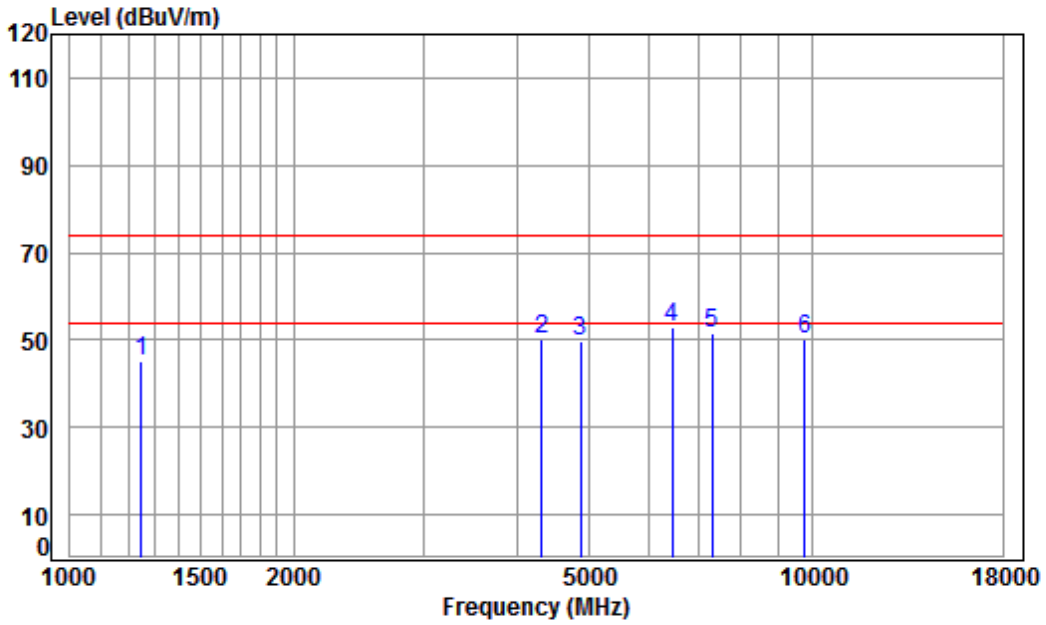
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:middle



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11B

		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	4.61	24.72	38.07	53.86	45.12	74.00	-28.88	peak
2		4316.859	7.36	33.60	38.17	47.61	50.40	74.00	-23.60	peak
3		4874.000	7.96	34.28	38.44	45.92	49.72	74.00	-24.28	peak
4	pp	6470.026	11.48	35.08	37.81	44.35	53.10	74.00	-20.90	peak
5		7311.000	10.05	36.37	37.01	42.23	51.64	74.00	-22.36	peak
6		9748.000	10.82	37.55	35.02	36.95	50.30	74.00	-23.70	peak

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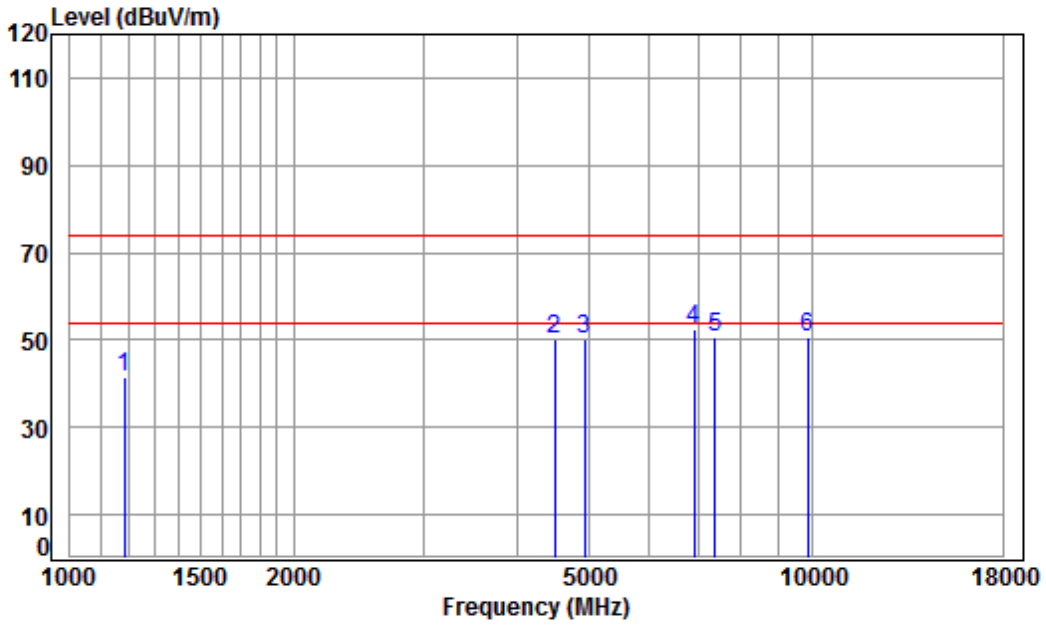
Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11B

	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	1182.513	4.35	24.39	38.08	51.05	41.71	74.00	-32.29	peak
2	4495.125	7.55	33.60	38.26	47.40	50.29	74.00	-23.71	peak
3	4924.000	8.01	34.37	38.47	46.06	49.97	74.00	-24.03	peak
4 pp	6914.763	10.36	36.27	37.38	43.29	52.54	74.00	-21.46	peak
5	7386.000	10.03	36.34	36.94	41.09	50.52	74.00	-23.48	peak
6	9848.000	10.87	37.57	34.97	37.29	50.76	74.00	-23.24	peak

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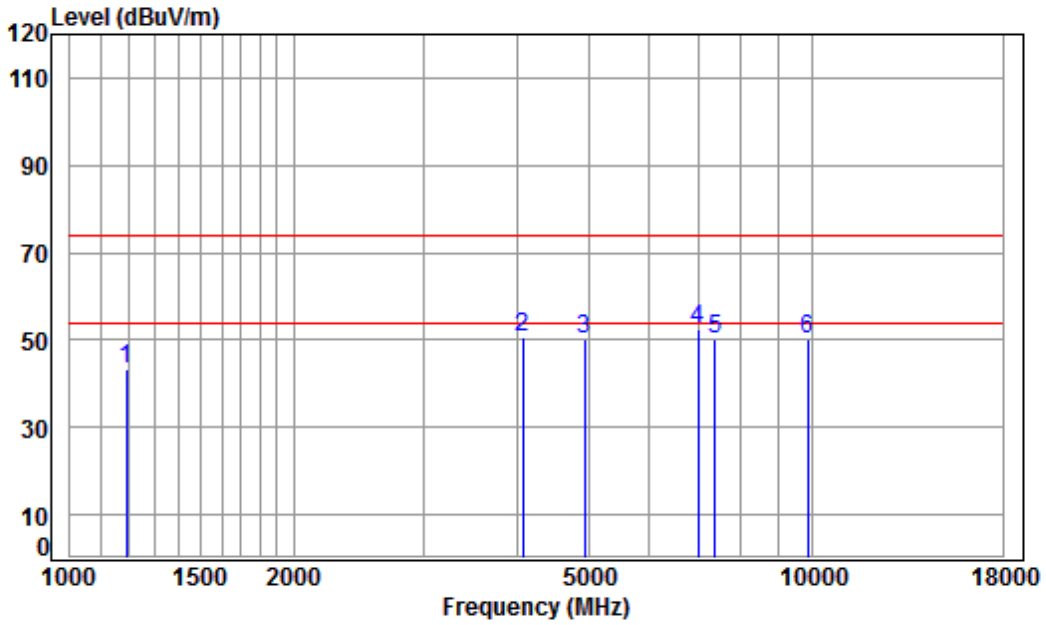
Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11B

		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		1192.811	4.39	24.44	38.07	52.64	43.40	74.00	-30.60	peak
2		4074.388	7.07	33.60	38.04	47.91	50.54	74.00	-23.46	peak
3		4924.000	8.01	34.37	38.47	46.17	50.08	74.00	-23.92	peak
4	pp	6995.172	10.14	36.49	37.30	43.21	52.54	74.00	-21.46	peak
5		7386.000	10.03	36.34	36.94	40.80	50.23	74.00	-23.77	peak
6		9848.000	10.87	37.57	34.97	36.81	50.28	74.00	-23.72	peak

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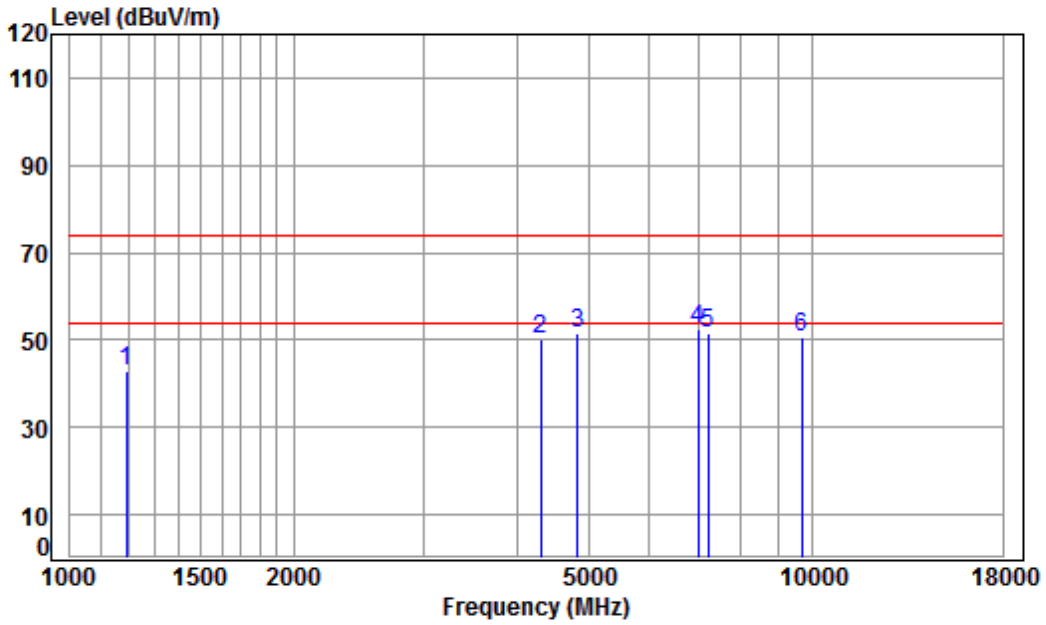
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11G

	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	1192.811	4.39	24.44	38.07	52.04	42.80	74.00	-31.20	peak
2	4304.400	7.34	33.60	38.16	47.61	50.39	74.00	-23.61	peak
3	4824.000	7.91	34.19	38.42	47.92	51.60	74.00	-22.40	peak
4 pp	6995.172	10.14	36.49	37.30	43.09	52.42	74.00	-21.58	peak
5	7236.000	10.07	36.40	37.08	41.98	51.37	74.00	-22.63	peak
6	9648.000	10.77	37.53	35.07	37.31	50.54	74.00	-23.46	peak

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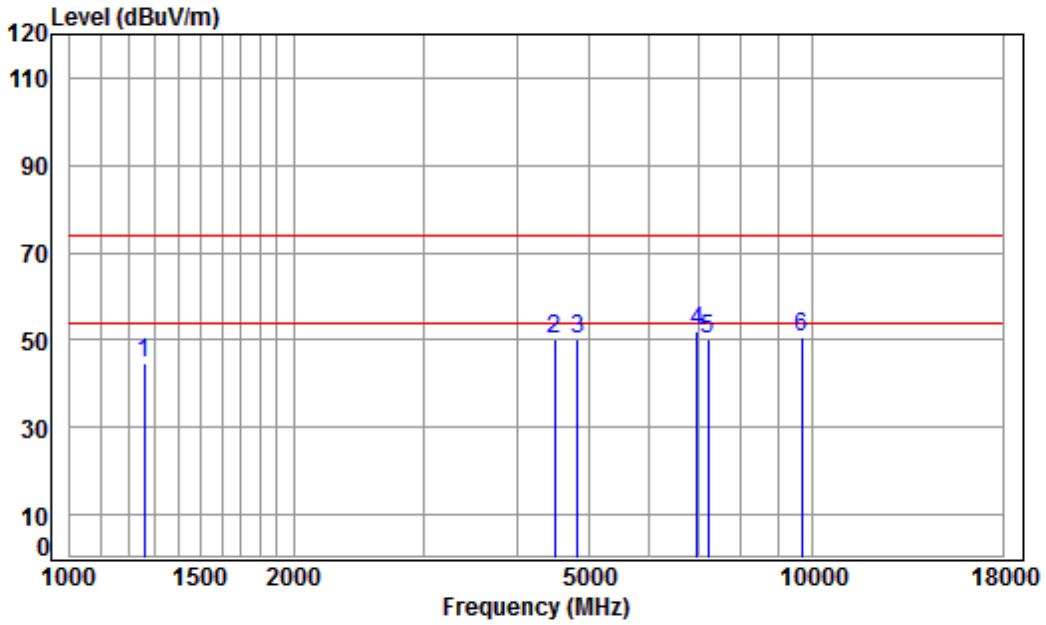
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11G

		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	4.65	24.77	38.07	53.28	44.63	74.00	-29.37	peak
2		4495.125	7.55	33.60	38.26	47.21	50.10	74.00	-23.90	peak
3		4824.000	7.91	34.19	38.42	46.55	50.23	74.00	-23.77	peak
4	pp	6974.982	10.20	36.43	37.32	42.73	52.04	74.00	-21.96	peak
5		7236.000	10.07	36.40	37.08	40.81	50.20	74.00	-23.80	peak
6		9648.000	10.77	37.53	35.07	37.29	50.52	74.00	-23.48	peak

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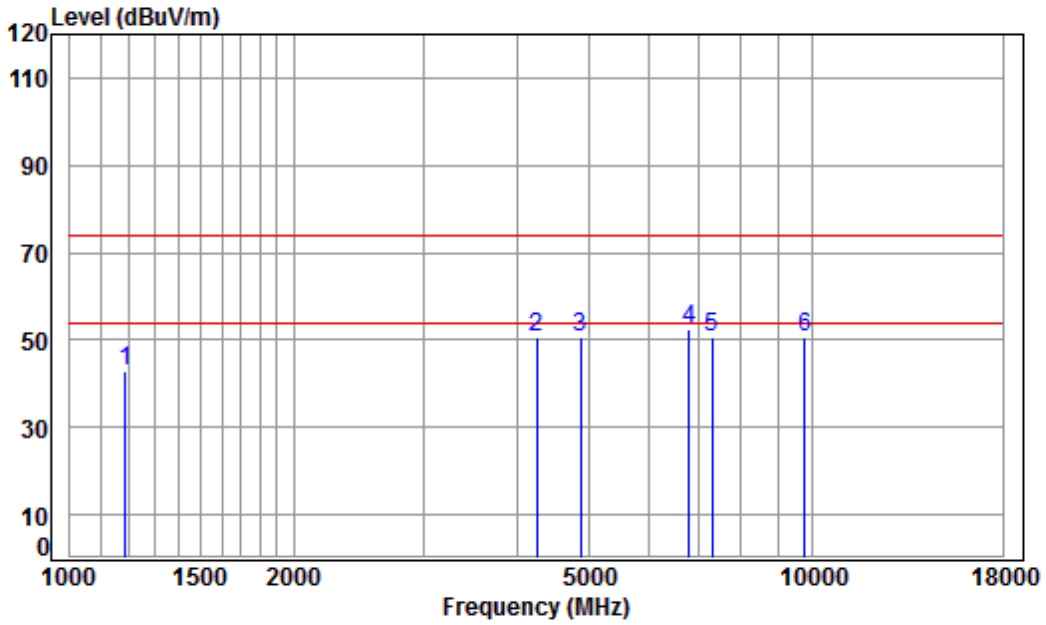
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:middle



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11G

	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	1189.368	4.38	24.43	38.07	52.22	42.96	74.00	-31.04	peak
2	4254.921	7.28	33.60	38.14	48.10	50.84	74.00	-23.16	peak
3	4874.000	7.96	34.28	38.44	47.01	50.81	74.00	-23.19	peak
4 pp	6815.551	10.64	36.00	37.47	43.16	52.33	74.00	-21.67	peak
5	7311.000	10.05	36.37	37.01	41.34	50.75	74.00	-23.25	peak
6	9748.000	10.82	37.55	35.02	37.09	50.44	74.00	-23.56	peak

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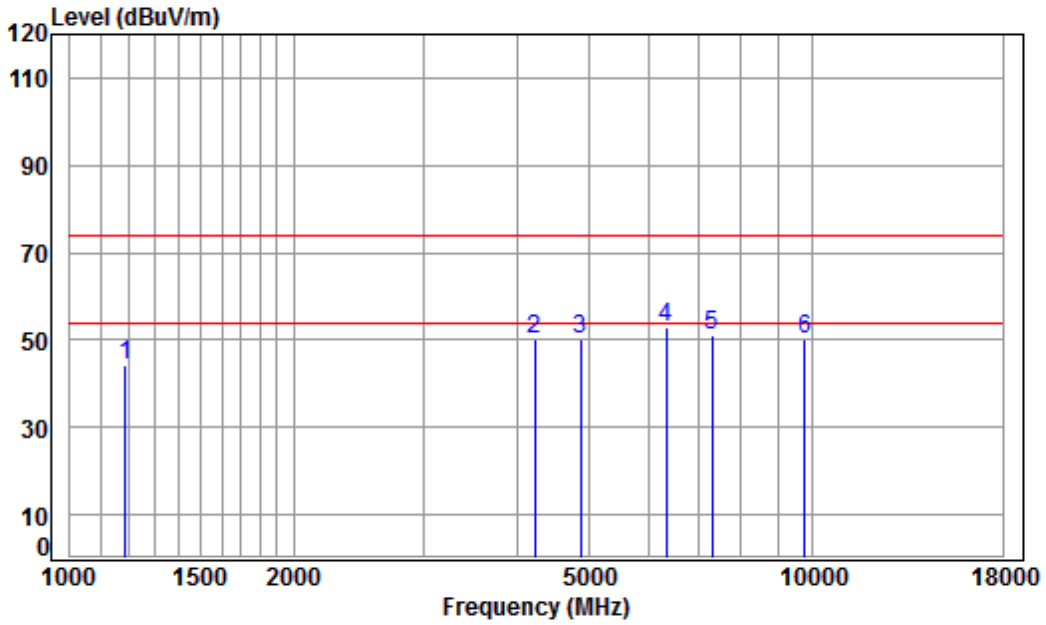
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:middle



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11G

		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		1189.368	4.38	24.43	38.07	53.41	44.15	74.00	-29.85	peak
2		4218.186	7.24	33.60	38.12	47.70	50.42	74.00	-23.58	peak
3		4874.000	7.96	34.28	38.44	46.55	50.35	74.00	-23.65	peak
4	pp	6340.436	11.24	34.98	37.94	44.62	52.90	74.00	-21.10	peak
5		7311.000	10.05	36.37	37.01	41.52	50.93	74.00	-23.07	peak
6		9748.000	10.82	37.55	35.02	36.77	50.12	74.00	-23.88	peak

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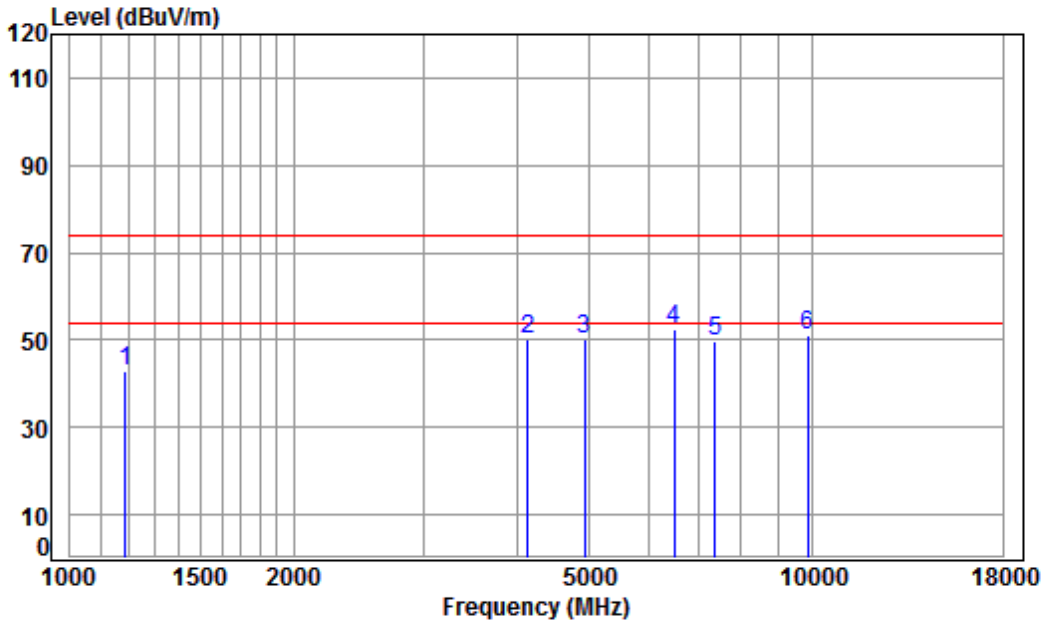
Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11G

	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	1189.368	4.38	24.43	38.07	52.18	42.92	74.00	-31.08	peak
2	4133.699	7.14	33.60	38.07	47.36	50.03	74.00	-23.97	peak
3	4924.000	8.01	34.37	38.47	46.42	50.33	74.00	-23.67	peak
4 pp	6507.536	11.52	35.12	37.77	43.54	52.41	74.00	-21.59	peak
5	7386.000	10.03	36.34	36.94	40.40	49.83	74.00	-24.17	peak
6	9848.000	10.87	37.57	34.97	37.74	51.21	74.00	-22.79	peak

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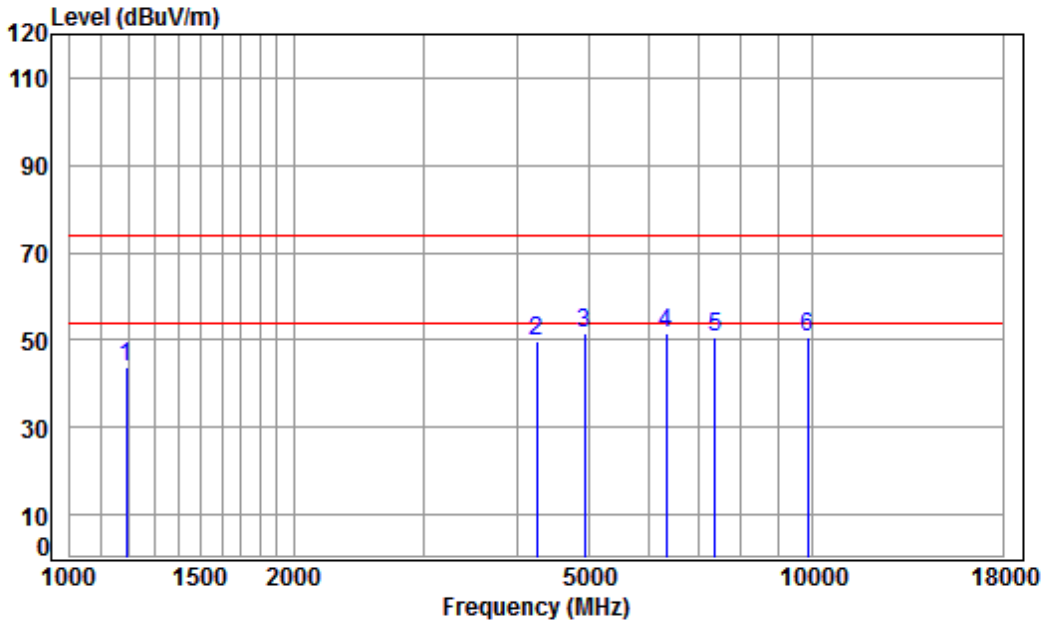
Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11G

	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	1192.811	4.39	24.44	38.07	53.00	43.76	74.00	-30.24	peak
2	4254.921	7.28	33.60	38.14	47.01	49.75	74.00	-24.25	peak
3	4924.000	8.01	34.37	38.47	47.43	51.34	74.00	-22.66	peak
4 pp	6340.436	11.24	34.98	37.94	43.39	51.67	74.00	-22.33	peak
5	7386.000	10.03	36.34	36.94	41.00	50.43	74.00	-23.57	peak
6	9848.000	10.87	37.57	34.97	37.35	50.82	74.00	-23.18	peak

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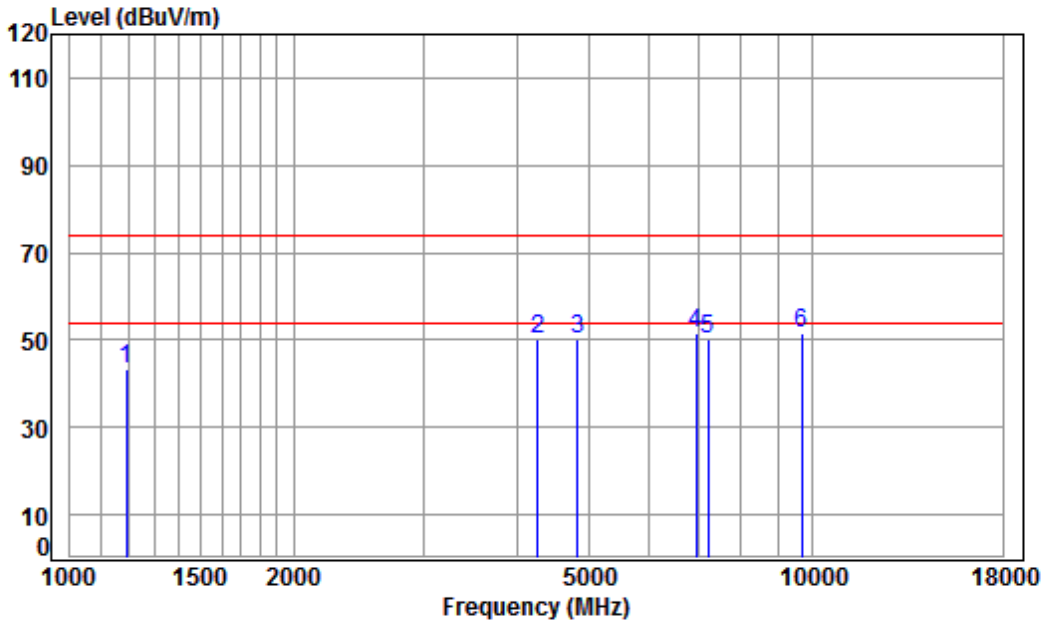
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11N 20

		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		1192.811	4.39	24.44	38.07	52.47	43.23	74.00	-30.77	peak
2		4267.237	7.30	33.60	38.14	47.56	50.32	74.00	-23.68	peak
3		4824.000	7.91	34.19	38.42	46.45	50.13	74.00	-23.87	peak
4	pp	6954.852	10.25	36.38	37.34	42.38	51.67	74.00	-22.33	peak
5		7236.000	10.07	36.40	37.08	40.81	50.20	74.00	-23.80	peak
6		9648.000	10.77	37.53	35.07	38.14	51.37	74.00	-22.63	peak

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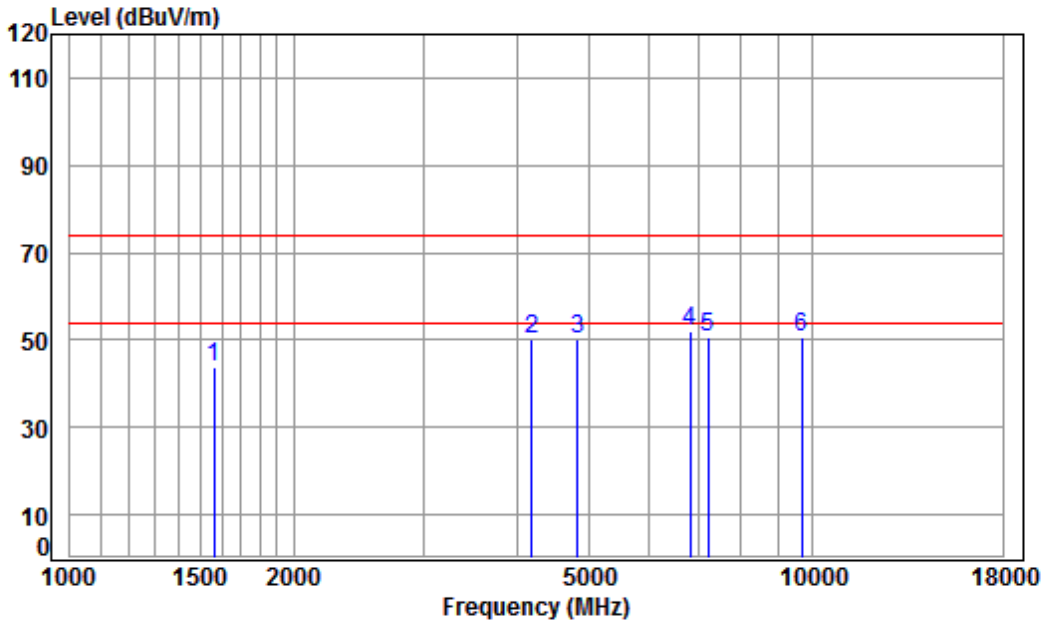
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11N 20

	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	1565.191	5.39	26.10	38.04	50.39	43.84	74.00	-30.16	peak
2	4181.768	7.20	33.60	38.10	47.47	50.17	74.00	-23.83	peak
3	4824.000	7.91	34.19	38.42	46.36	50.04	74.00	-23.96	peak
4 pp	6835.278	10.58	36.05	37.45	42.64	51.82	74.00	-22.18	peak
5	7236.000	10.07	36.40	37.08	41.12	50.51	74.00	-23.49	peak
6	9648.000	10.77	37.53	35.07	37.49	50.72	74.00	-23.28	peak

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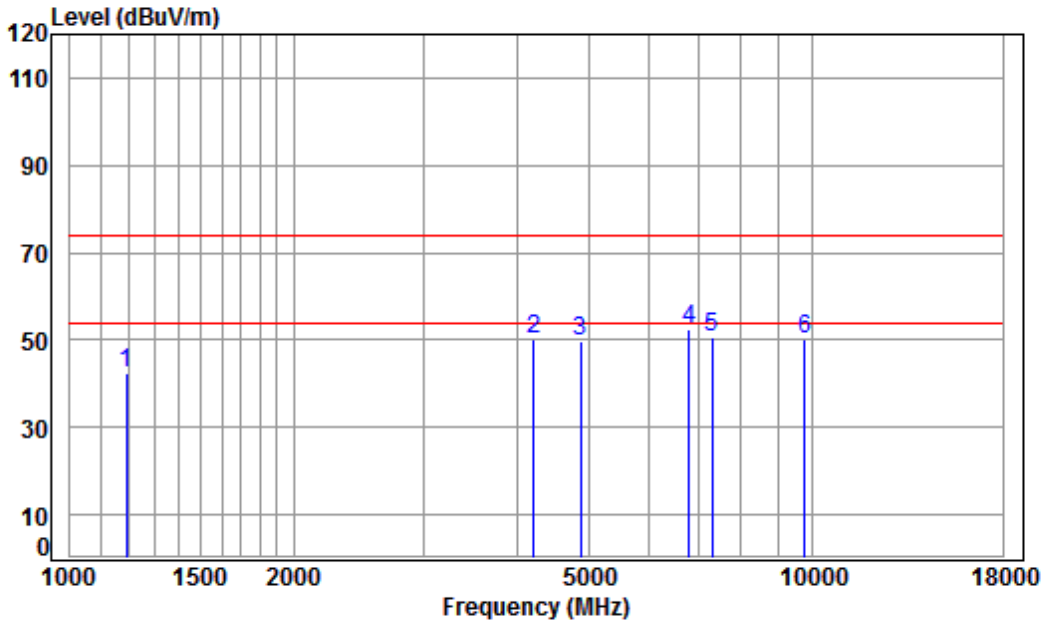
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:middle



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11N 20

	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	1192.811	4.39	24.44	38.07	51.64	42.40	74.00	-31.60	peak
2	4206.011	7.23	33.60	38.11	47.25	49.97	74.00	-24.03	peak
3	4874.000	7.96	34.28	38.44	45.82	49.62	74.00	-24.38	peak
4 pp	6815.551	10.64	36.00	37.47	43.15	52.32	74.00	-21.68	peak
5	7311.000	10.05	36.37	37.01	41.42	50.83	74.00	-23.17	peak
6	9748.000	10.82	37.55	35.02	36.79	50.14	74.00	-23.86	peak

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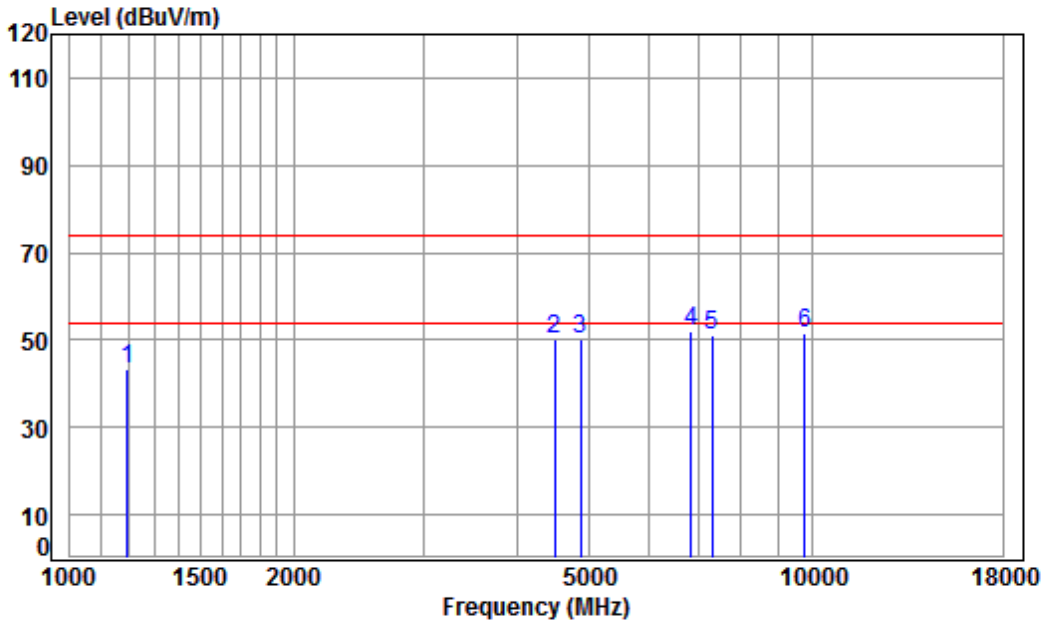
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:middle



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11N 20

		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	4.40	24.46	38.07	52.45	43.24	74.00	-30.76	peak
2		4495.125	7.55	33.60	38.26	47.50	50.39	74.00	-23.61	peak
3		4874.000	7.96	34.28	38.44	46.47	50.27	74.00	-23.73	peak
4	pp	6855.063	10.53	36.10	37.44	42.81	52.00	74.00	-22.00	peak
5		7311.000	10.05	36.37	37.01	41.79	51.20	74.00	-22.80	peak
6		9748.000	10.82	37.55	35.02	38.36	51.71	74.00	-22.29	peak

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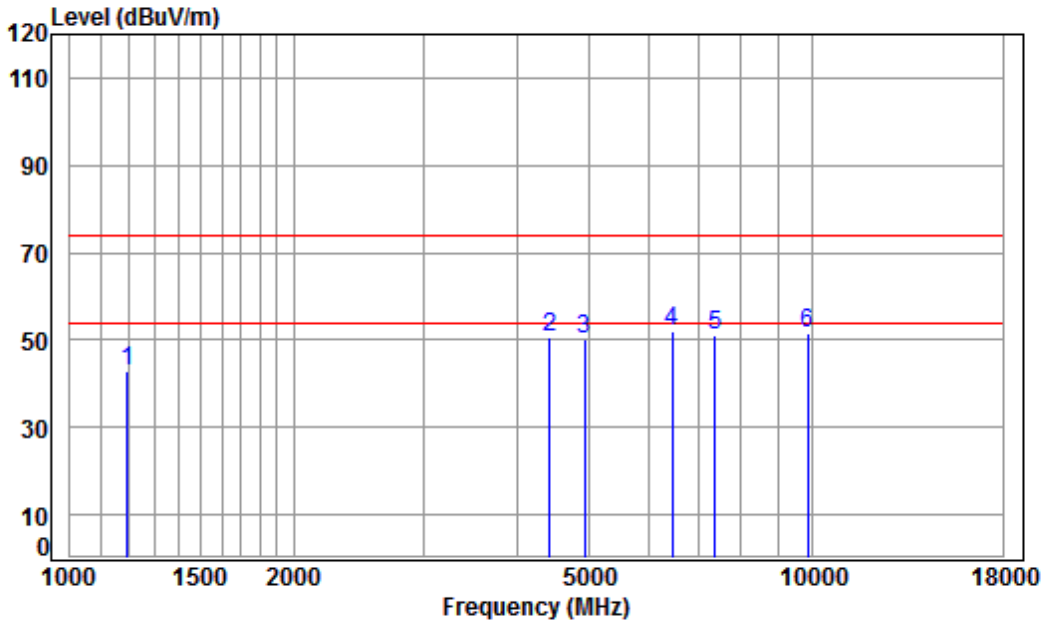
Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No : 04216CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11N 20

	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	4.40	24.46	38.07	51.91	42.70	74.00	-31.30	peak
2	4417.841	7.47	33.60	38.22	47.84	50.69	74.00	-23.31	peak
3	4924.000	8.01	34.37	38.47	46.25	50.16	74.00	-23.84	peak
4 pp	6470.026	11.48	35.08	37.81	43.41	52.16	74.00	-21.84	peak
5	7386.000	10.03	36.34	36.94	41.65	51.08	74.00	-22.92	peak
6	9848.000	10.87	37.57	34.97	37.88	51.35	74.00	-22.65	peak

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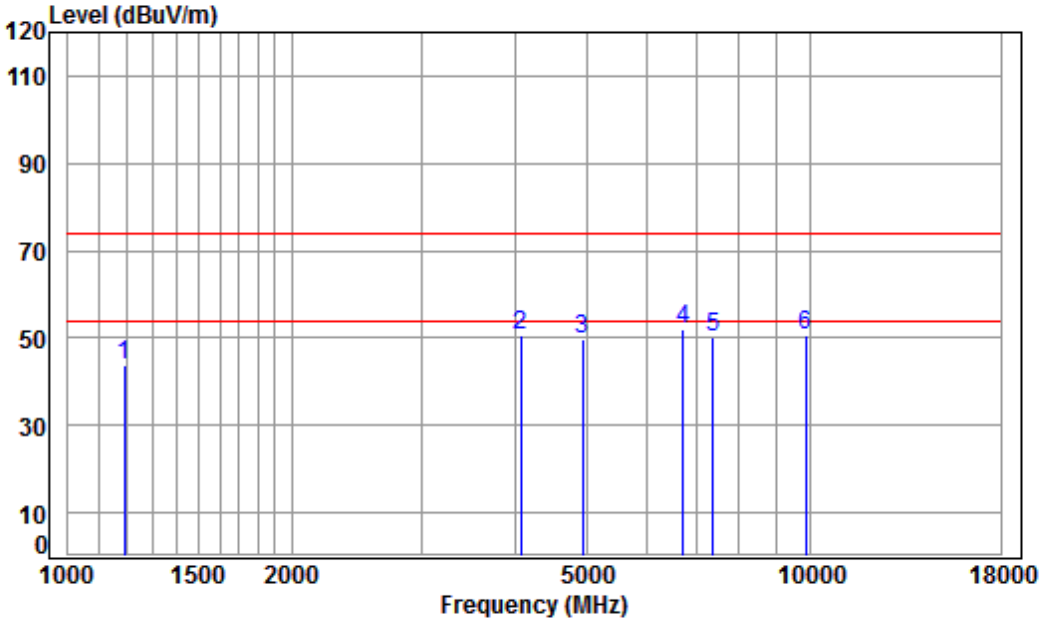
Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No : 04216CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11N 20

	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	1192.811	4.39	24.44	38.07	53.08	43.84	74.00	-30.16	peak
2	4074.388	7.07	33.60	38.04	48.01	50.64	74.00	-23.36	peak
3	4924.000	8.01	34.37	38.47	45.68	49.59	74.00	-24.41	peak
4 pp	6737.207	10.86	35.78	37.55	42.89	51.98	74.00	-22.02	peak
5	7386.000	10.03	36.34	36.94	40.96	50.39	74.00	-23.61	peak
6	9848.000	10.87	37.57	34.97	37.17	50.64	74.00	-23.36	peak

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8 Appendix

Appendix 15.247

1.6dB Bandwidth

Test Mode	Test	Ant	EBW[MHz]	Limit[MHz]	Verdict
11B	2412	Ant1	8.640	>=0.5	PASS
11B	2437	Ant1	9.090	>=0.5	PASS
11B	2462	Ant1	8.580	>=0.5	PASS
11G	2412	Ant1	15.870	>=0.5	PASS
11G	2437	Ant1	15.720	>=0.5	PASS
11G	2462	Ant1	15.915	>=0.5	PASS
11N20SISO	2412	Ant1	16.950	>=0.5	PASS
11N20SISO	2437	Ant1	16.410	>=0.5	PASS
11N20SISO	2462	Ant1	16.710	>=0.5	PASS

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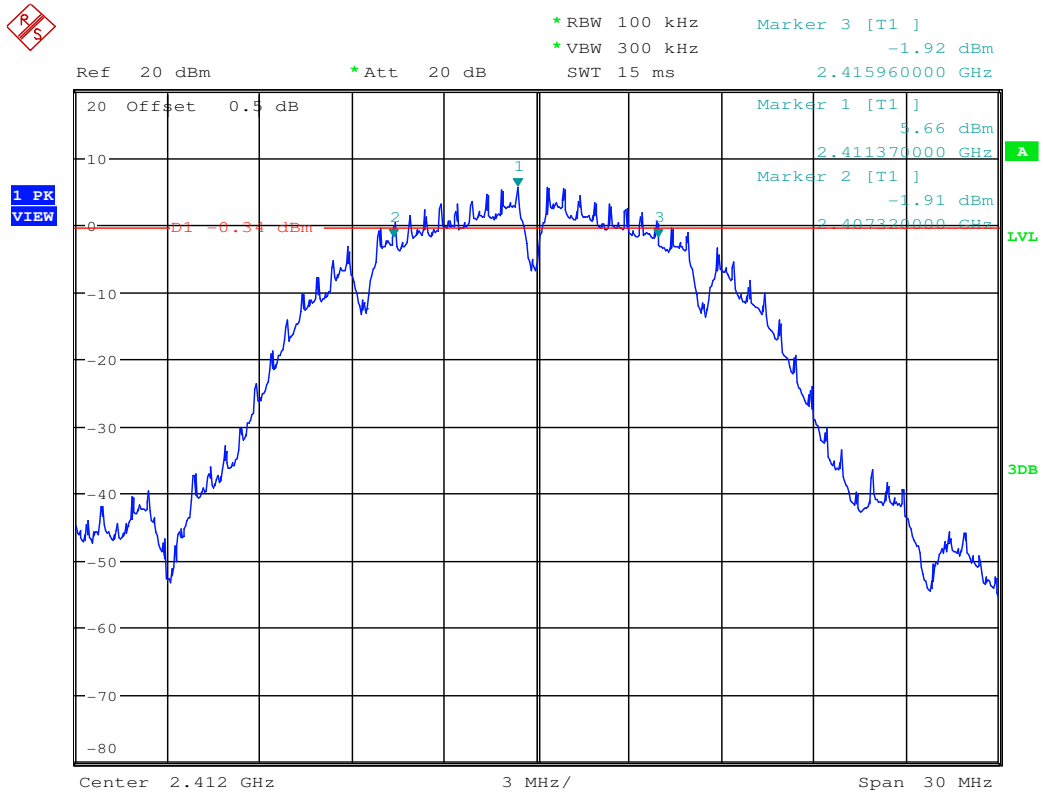
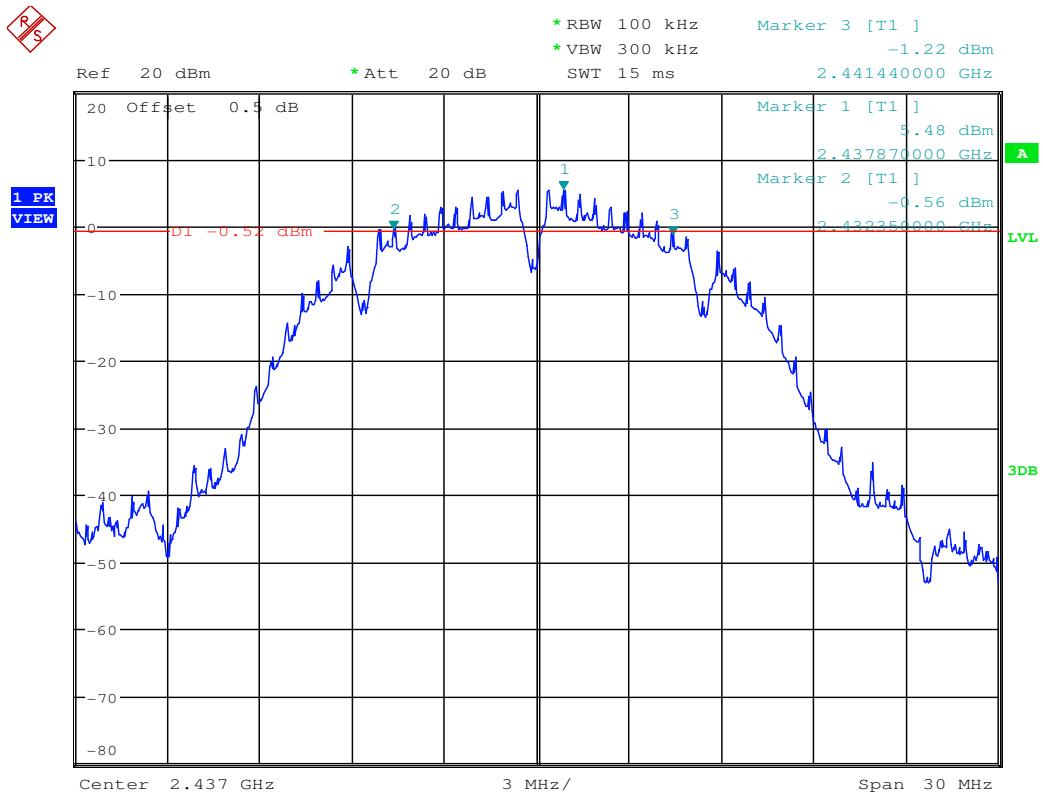
6dB Bandwidth_11B_2412_Ant1



6dB Bandwidth_11B_2437_Ant1



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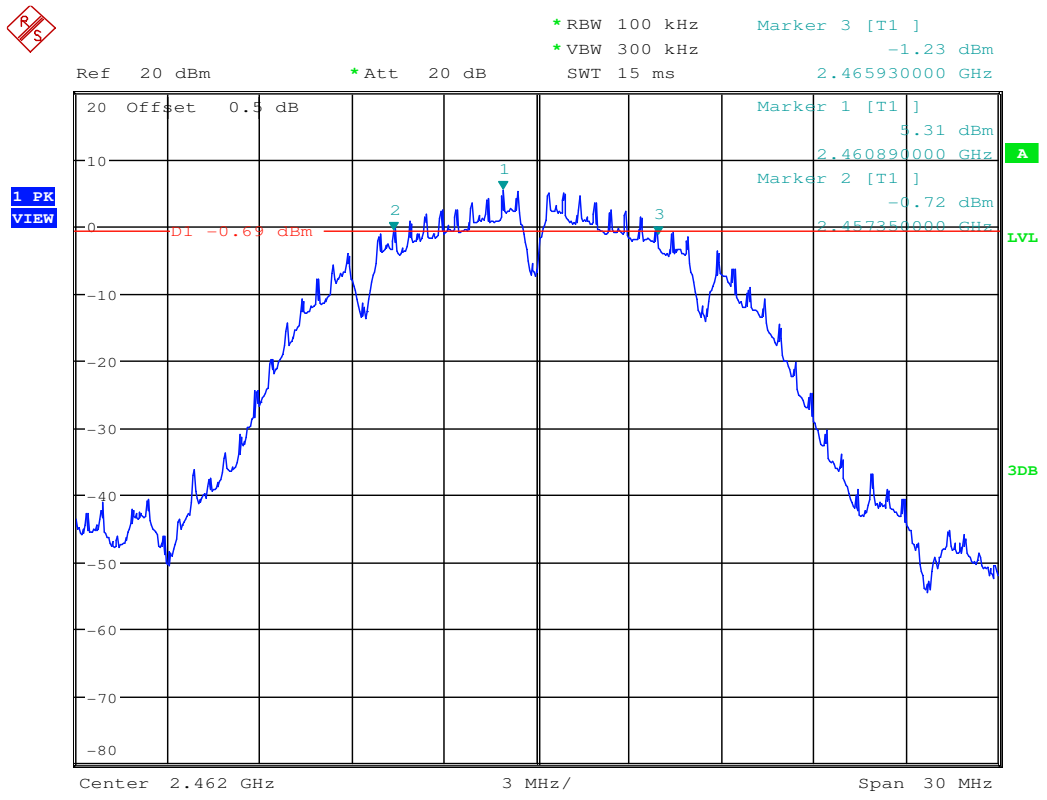
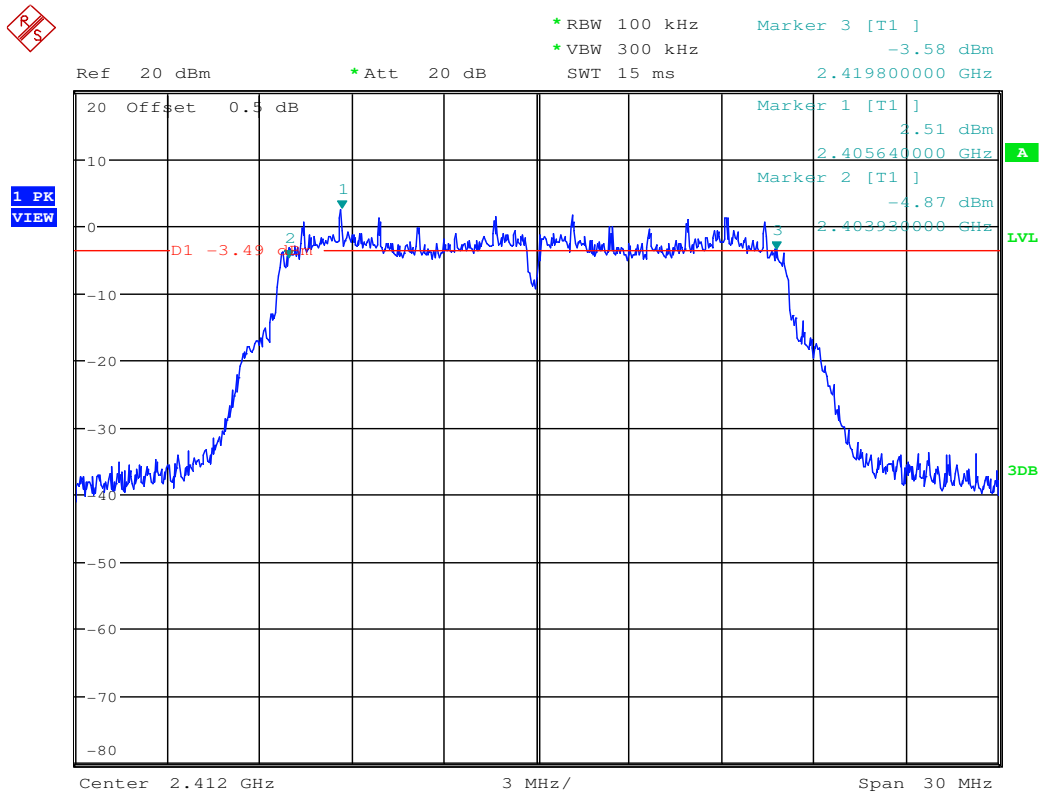
6dB Bandwidth_11B_2462_Ant1



6dB Bandwidth_11G_2412_Ant1



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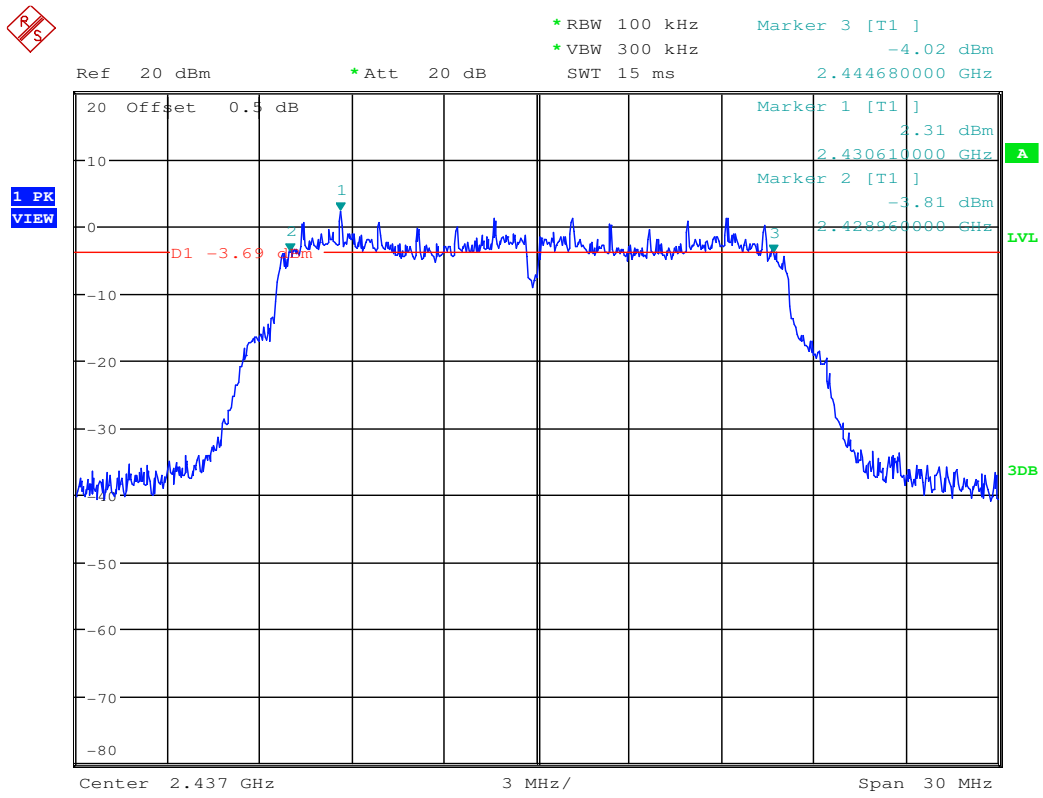
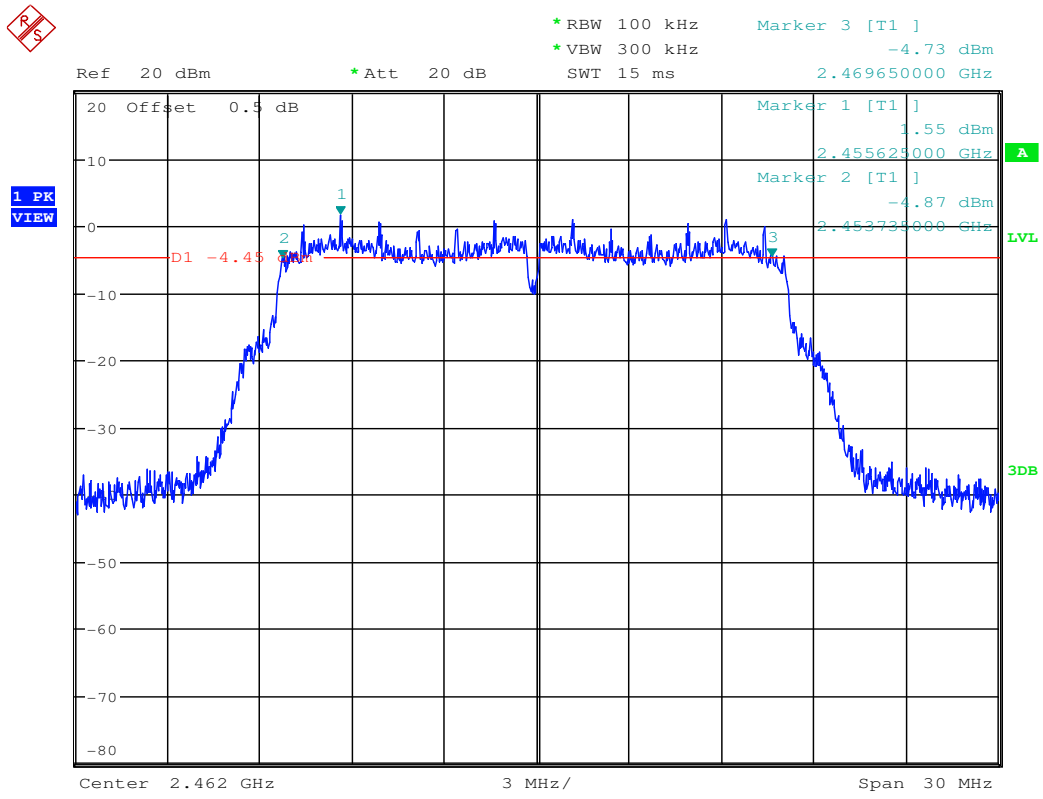
6dB Bandwidth_11G_2437_Ant1



6dB Bandwidth_11G_2462_Ant1



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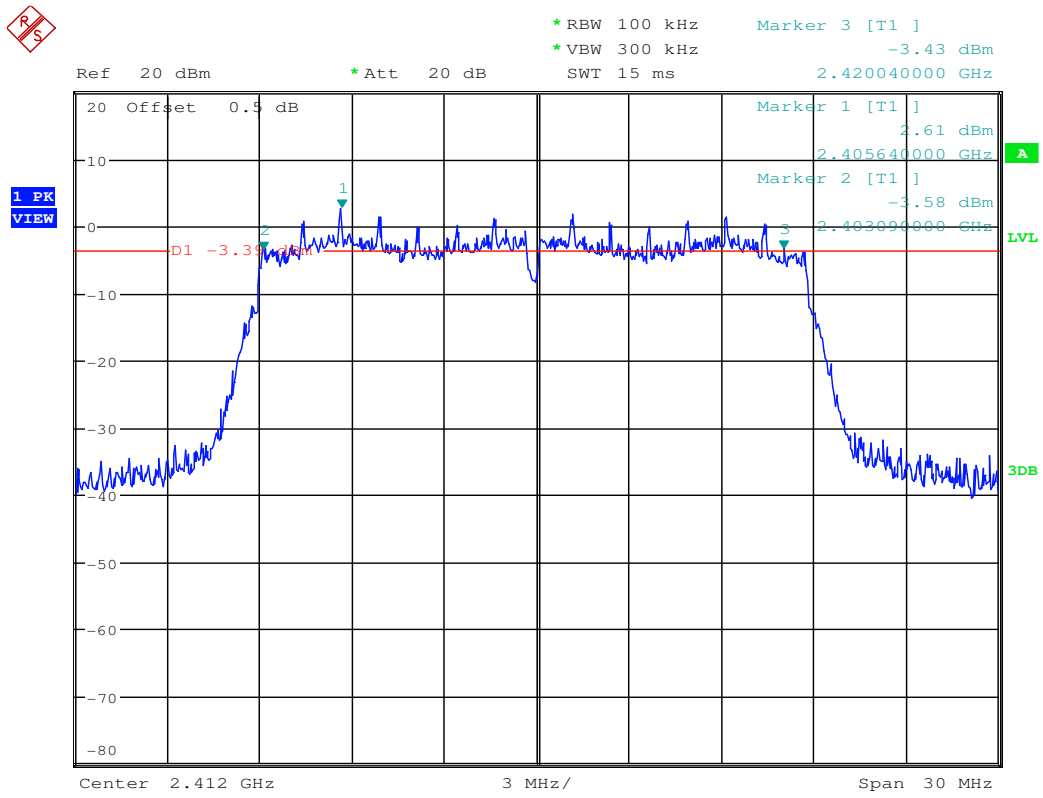
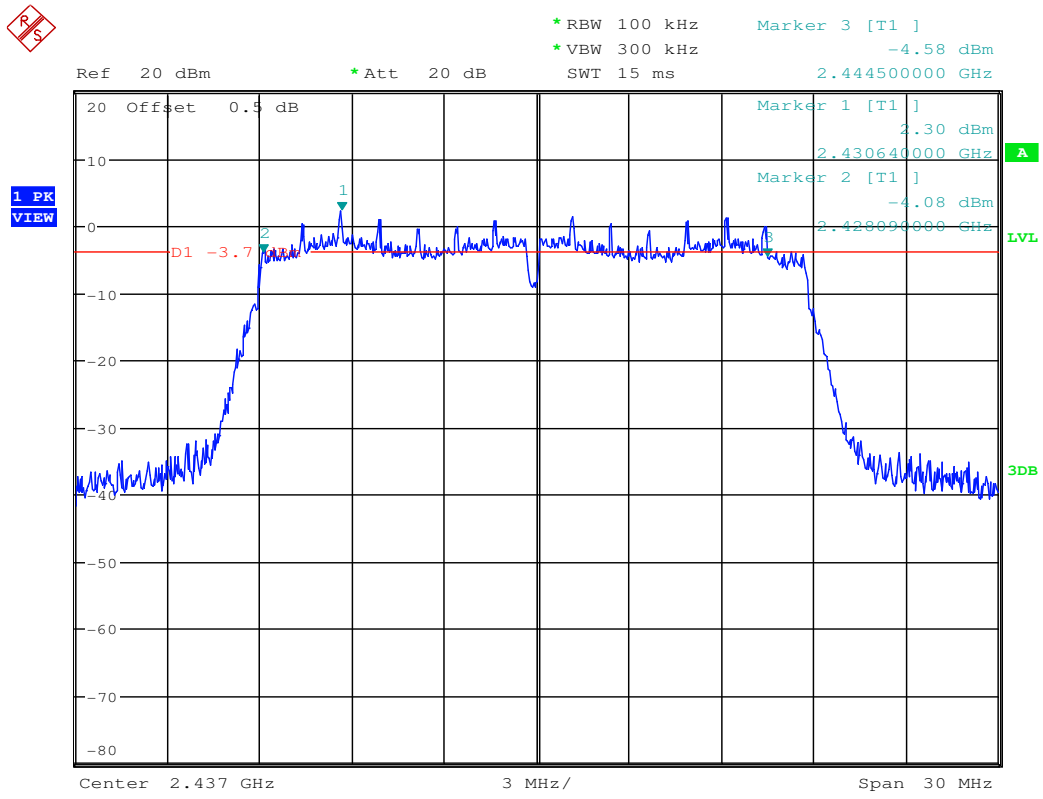
6dB Bandwidth_11N20SISO_2412_Ant1



6dB Bandwidth_11N20SISO_2437_Ant1



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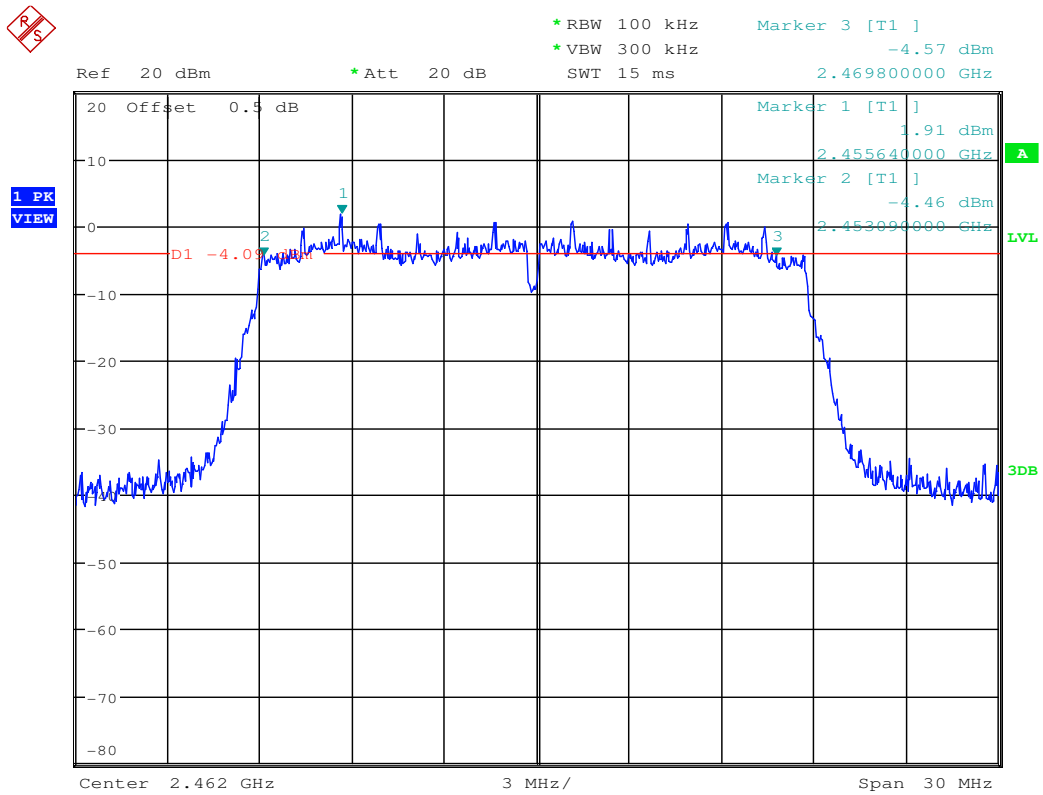
6dB Bandwidth_11N20SISO_2462_Ant1



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3.Maximum peak conducted output power

Test Mode	Test Channel	Ant	Power[dBm]	Limit[dBm]	Verdict
11B	2412	Ant1	17.54	<30	PASS
11B	2437	Ant1	17.62	<30	PASS
11B	2462	Ant1	17.14	<30	PASS
11G	2412	Ant1	21.62	<30	PASS
11G	2437	Ant1	21.43	<30	PASS
11G	2462	Ant1	21.03	<30	PASS
11N20SISO	2412	Ant1	21.54	<30	PASS
11N20SISO	2437	Ant1	21.31	<30	PASS
11N20SISO	2462	Ant1	20.94	<30	PASS

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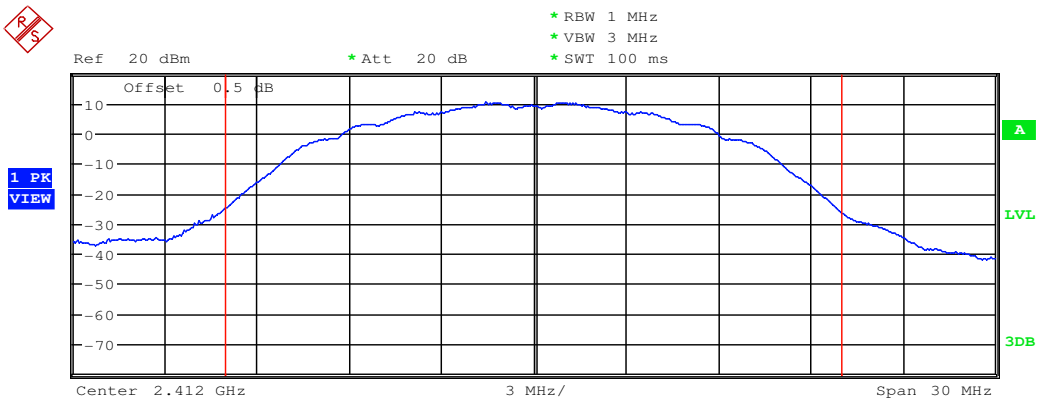
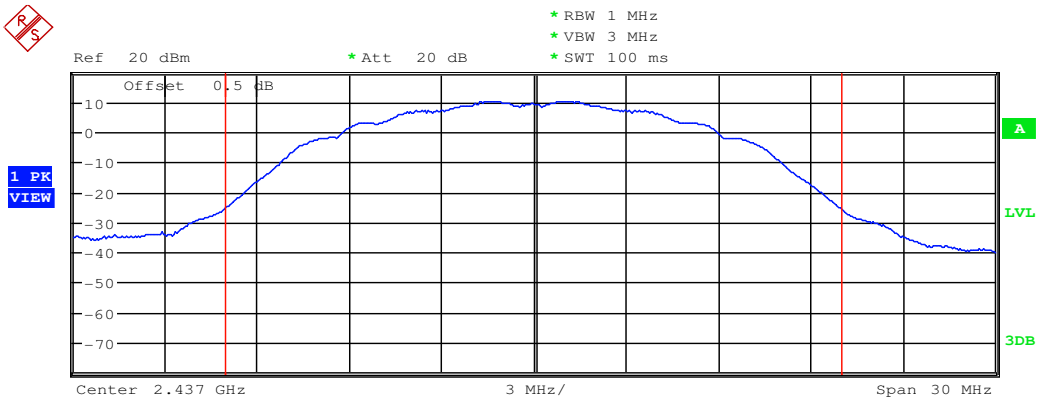
Maximum peak conducted output power_11B_2412_Ant1



Tx Channel

Bandwidth 20 MHz Power 17.54 dBm

Maximum peak conducted output power_11B_2437_Ant1



Tx Channel

Bandwidth 20 MHz Power 17.62 dBm

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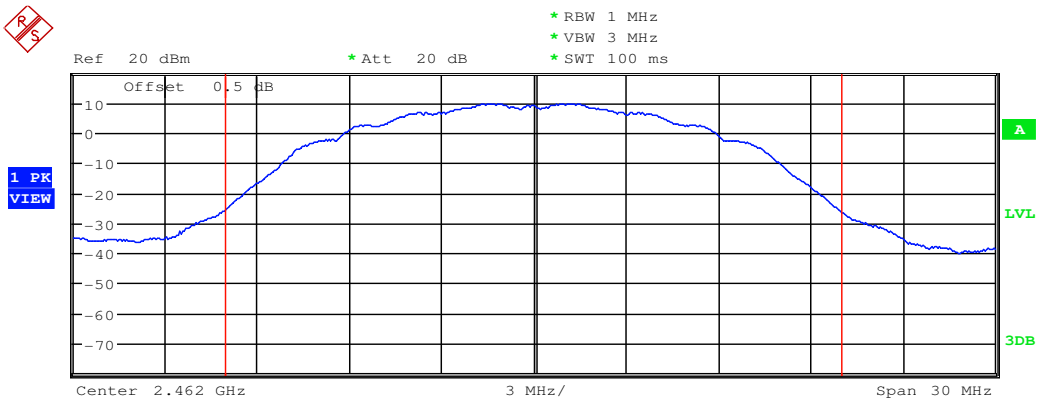
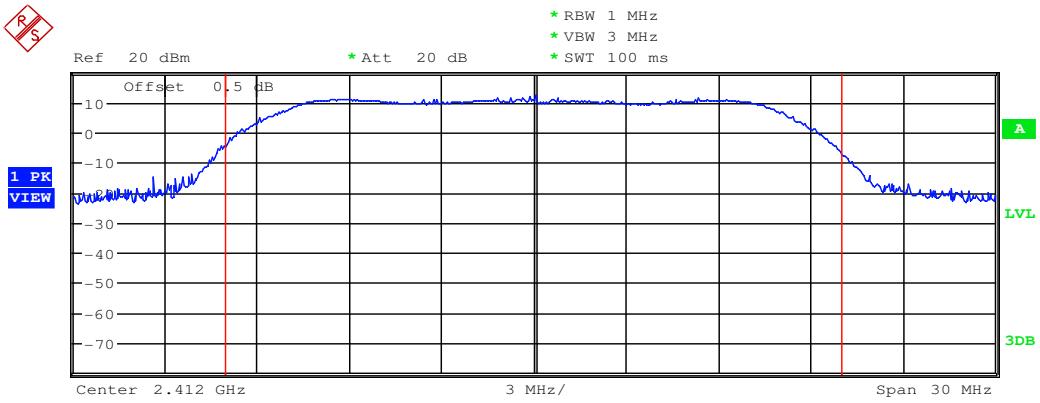
Maximum peak conducted output power_11B_2462_Ant1



Tx Channel
Bandwidth 20 MHz Power 17.14 dBm

Maximum peak conducted output power_11G_2412_Ant1



Tx Channel
Bandwidth 20 MHz Power 21.62 dBm

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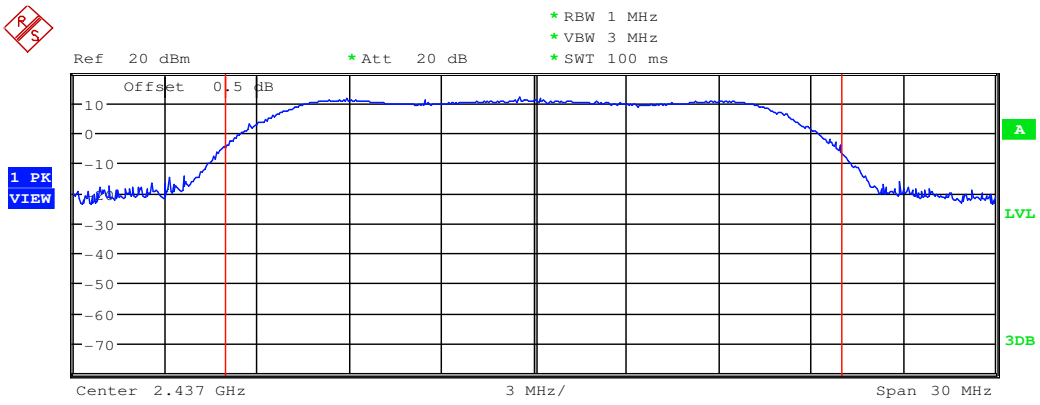
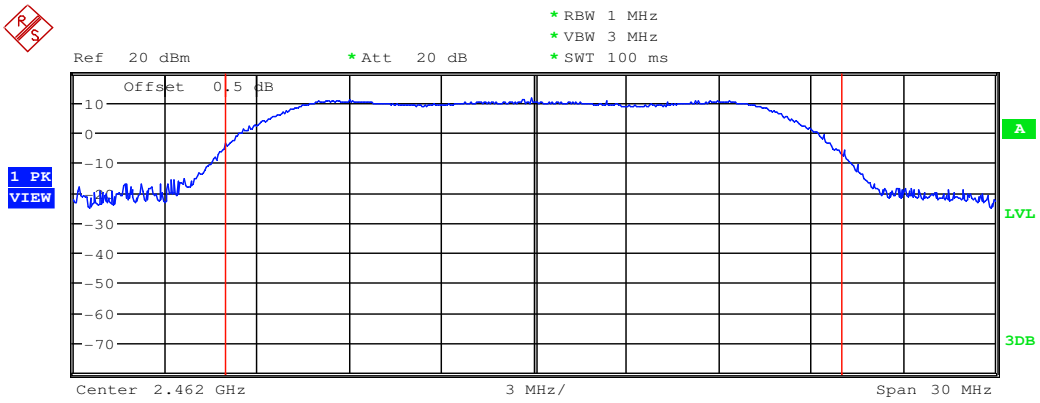
Maximum peak conducted output power_11G_2437_Ant1



Tx Channel
Bandwidth 20 MHz Power 21.43 dBm

Maximum peak conducted output power_11G_2462_Ant1



Tx Channel
Bandwidth 20 MHz Power 21.03 dBm

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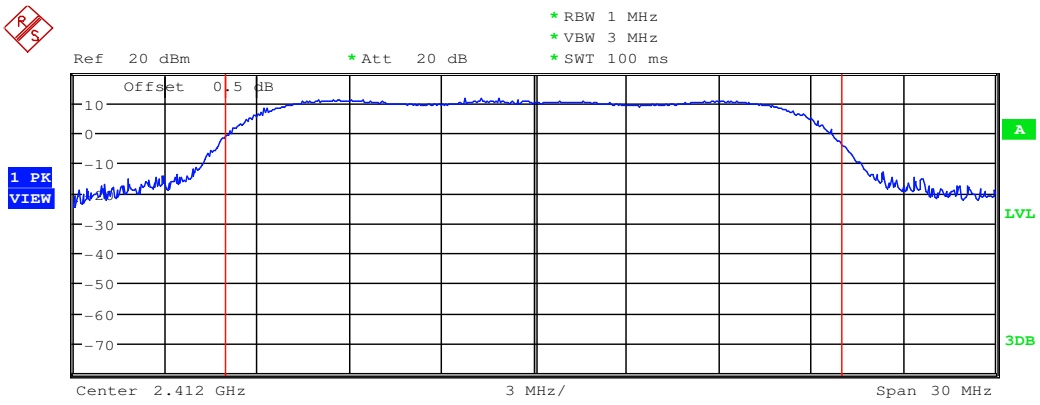
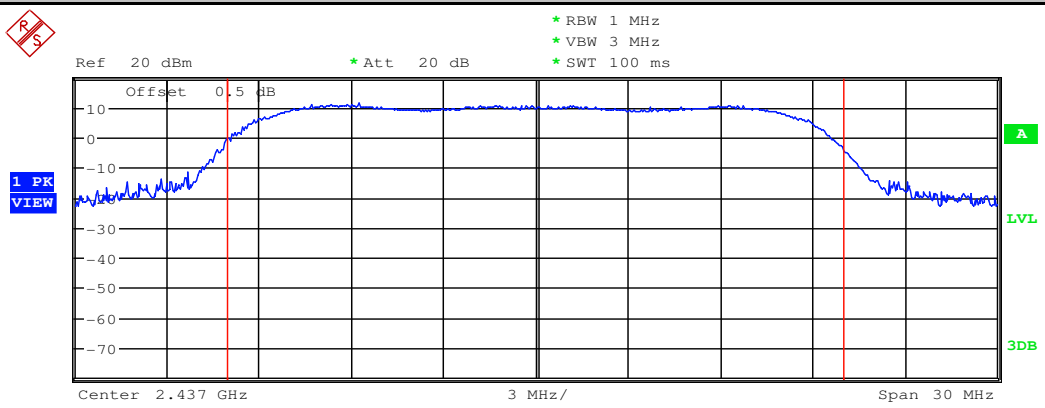
Maximum peak conducted output power_11N20SISO_2412_Ant1



Tx Channel
Bandwidth 20 MHz Power 21.54 dBm

Maximum peak conducted output power_11N20SISO_2437_Ant1



Tx Channel
Bandwidth 20 MHz Power 21.31 dBm

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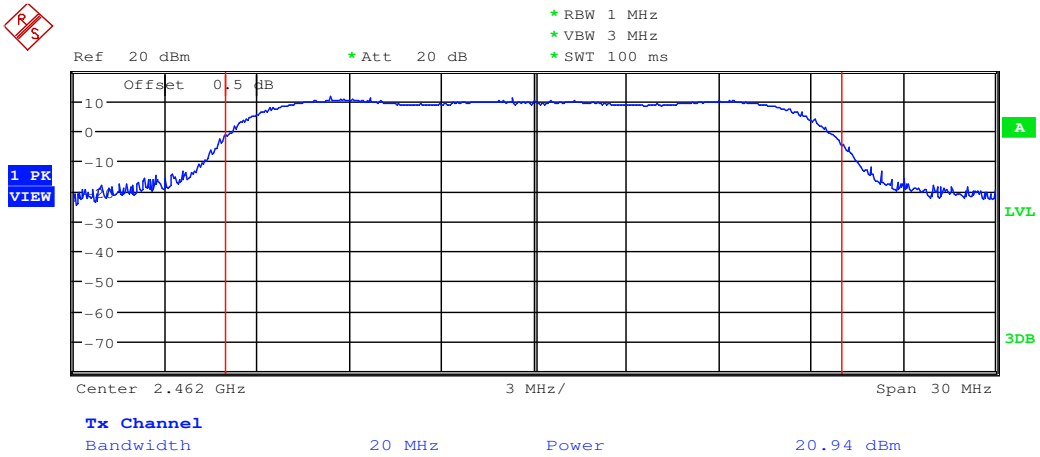
Maximum peak conducted output power_11N20SISO_2462_Ant1



4.Maximum Peak power spectral density

Test Mode	Test Channel	Ant	PSD[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	2412	Ant1	-8.1	<8.00	PASS
11B	2437	Ant1	-8.21	<8.00	PASS
11B	2462	Ant1	-9.32	<8.00	PASS
11G	2412	Ant1	-12.67	<8.00	PASS
11G	2437	Ant1	-11.71	<8.00	PASS
11G	2462	Ant1	-12.38	<8.00	PASS
11N20SISO	2412	Ant1	-10.34	<8.00	PASS
11N20SISO	2437	Ant1	-12.93	<8.00	PASS
11N20SISO	2462	Ant1	-10.84	<8.00	PASS

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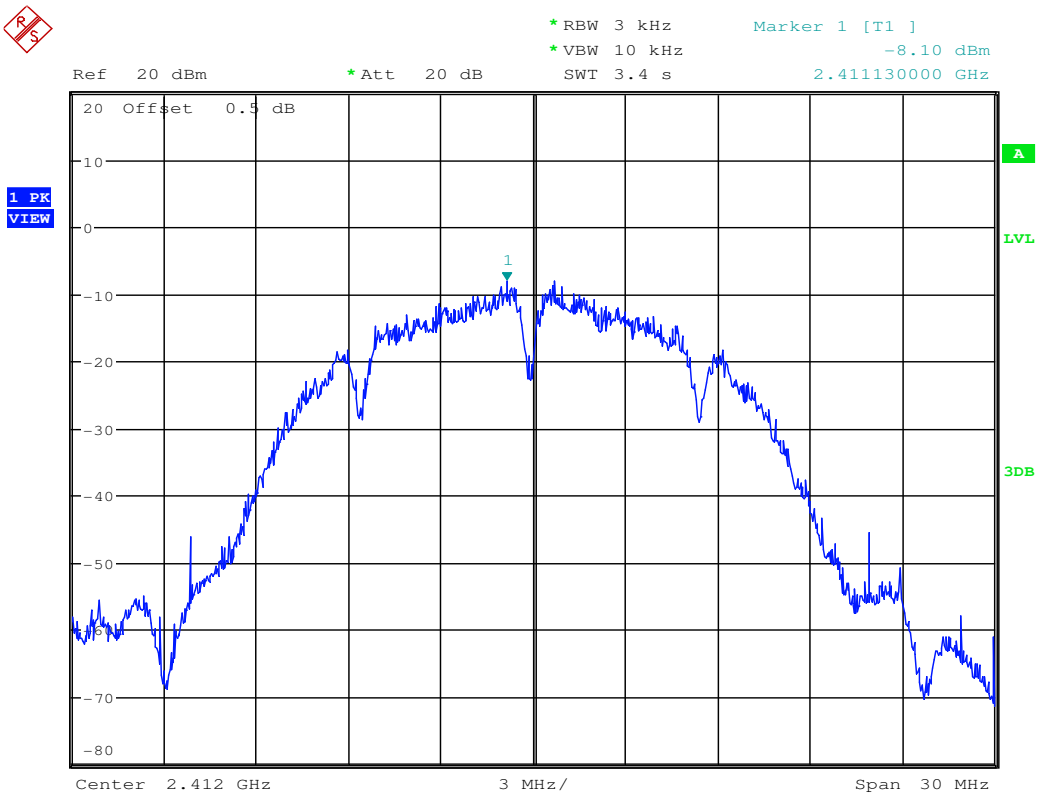
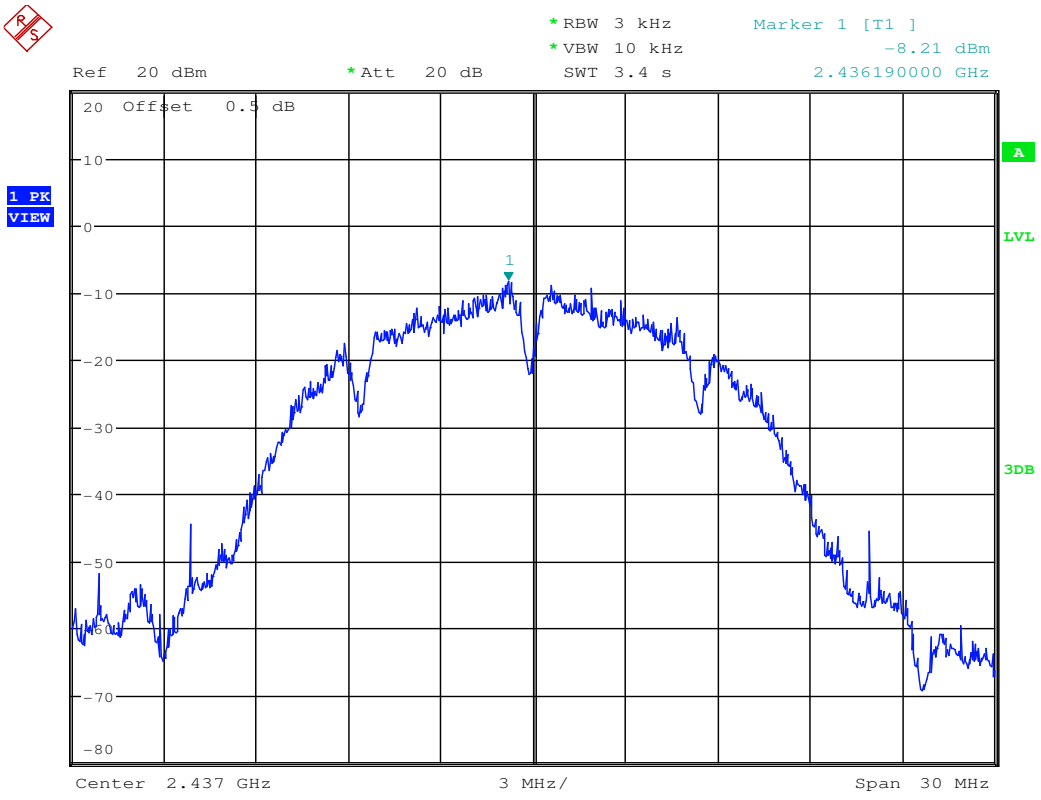
Maximum Peak power spectral density_11B_2412_Ant1



Maximum Peak power spectral density_11B_2437_Ant1



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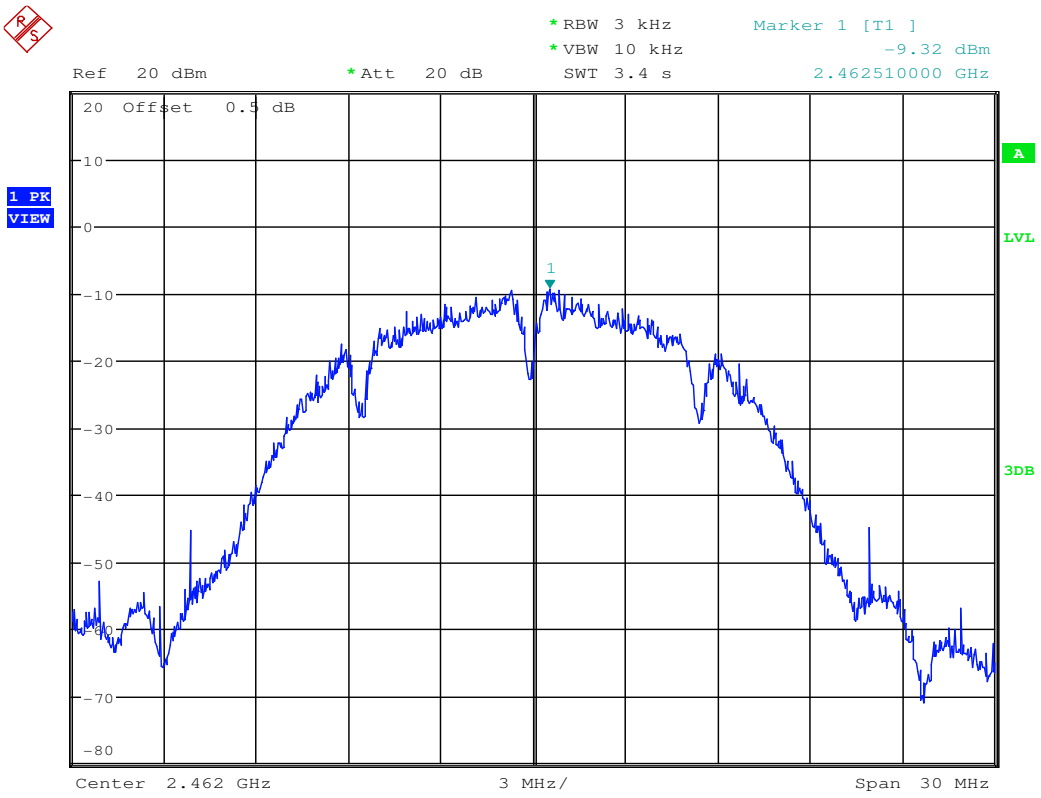
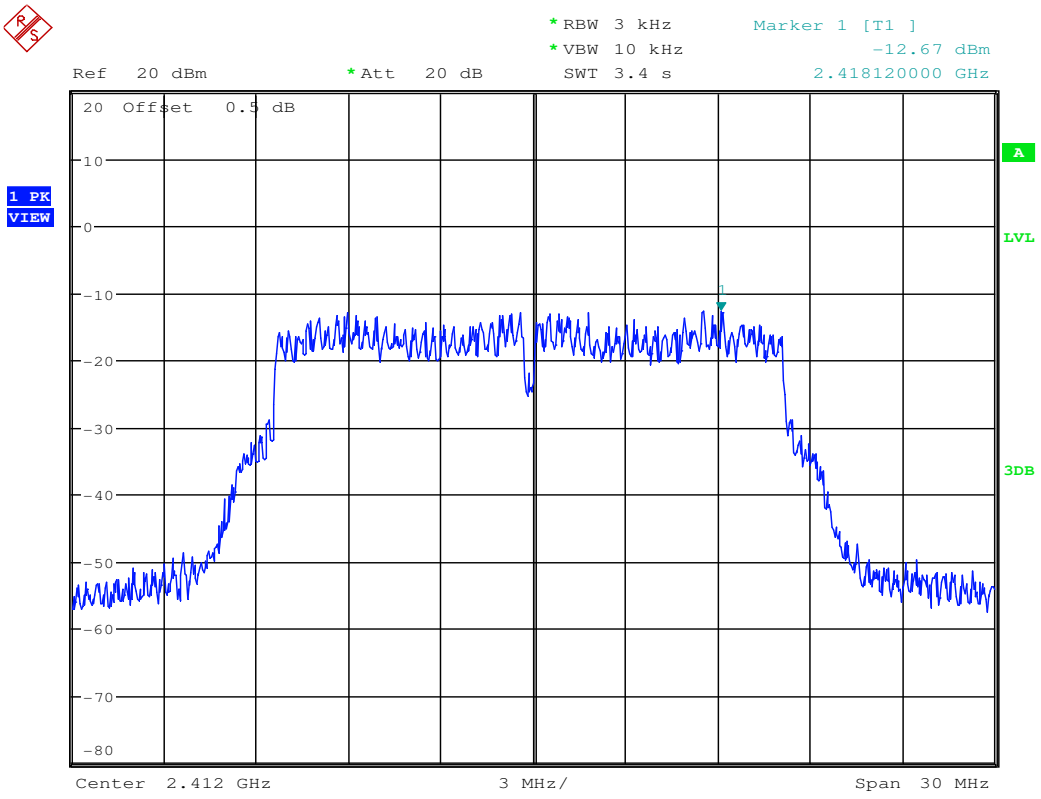
Maximum Peak power spectral density_11B_2462_Ant1



Maximum Peak power spectral density_11G_2412_Ant1



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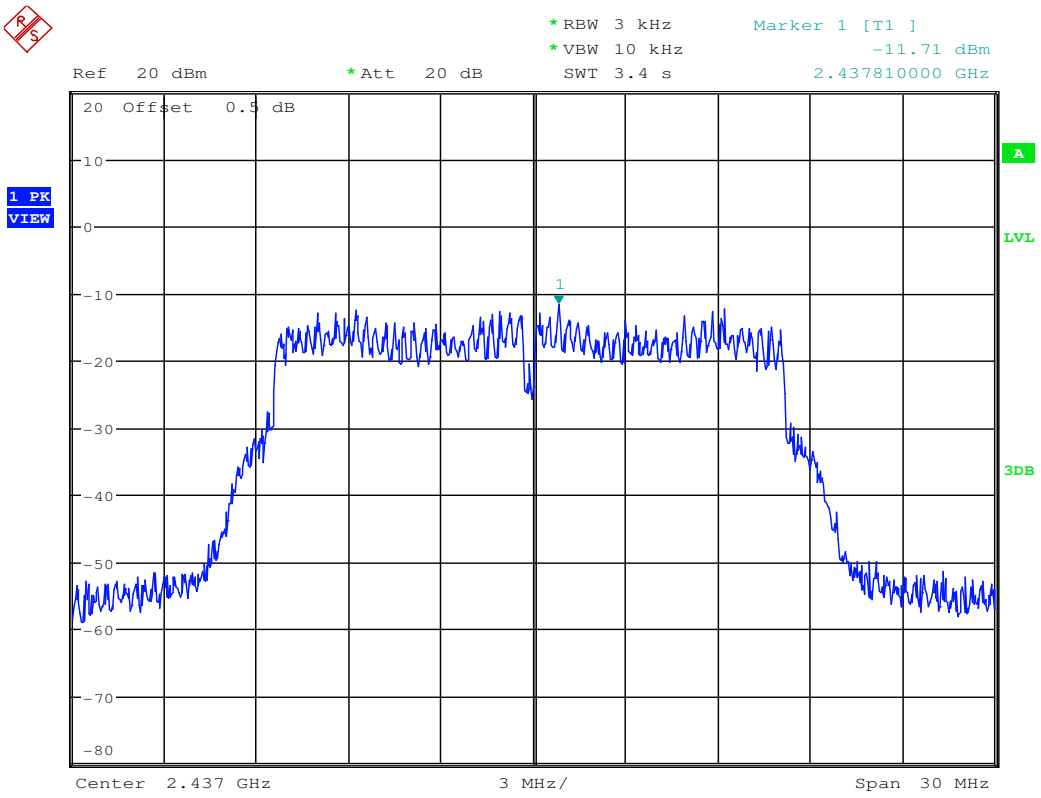
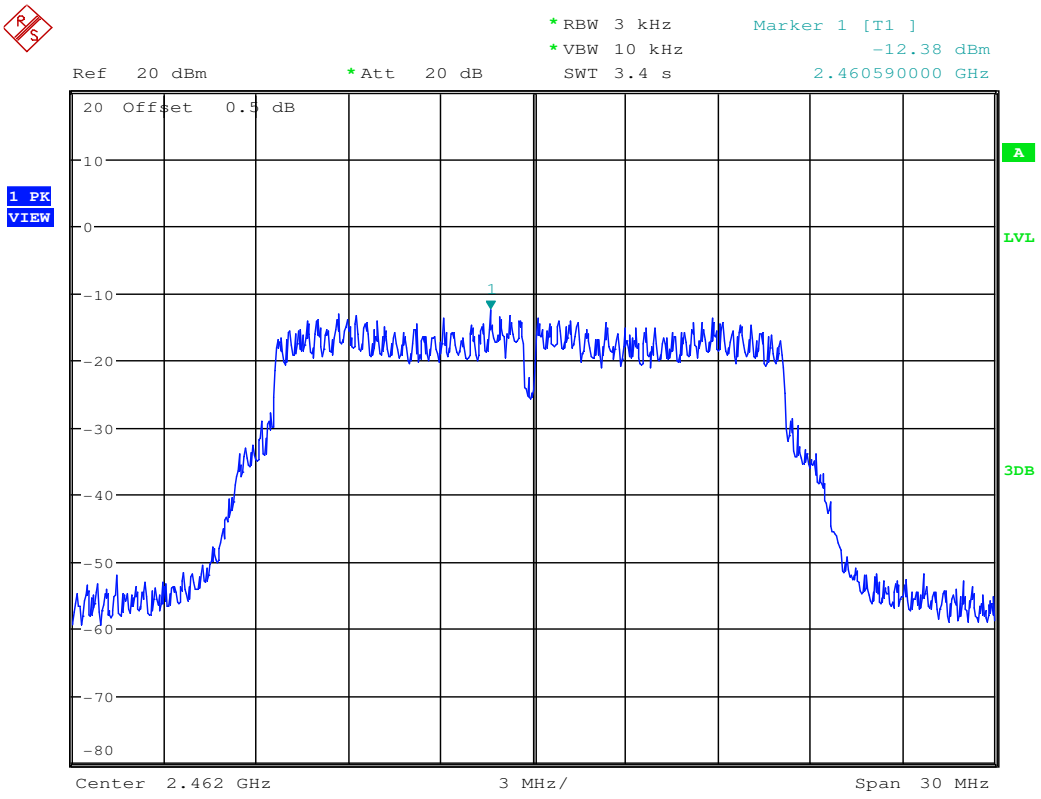
Maximum Peak power spectral density_11G_2437_Ant1



Maximum Peak power spectral density_11G_2462_Ant1



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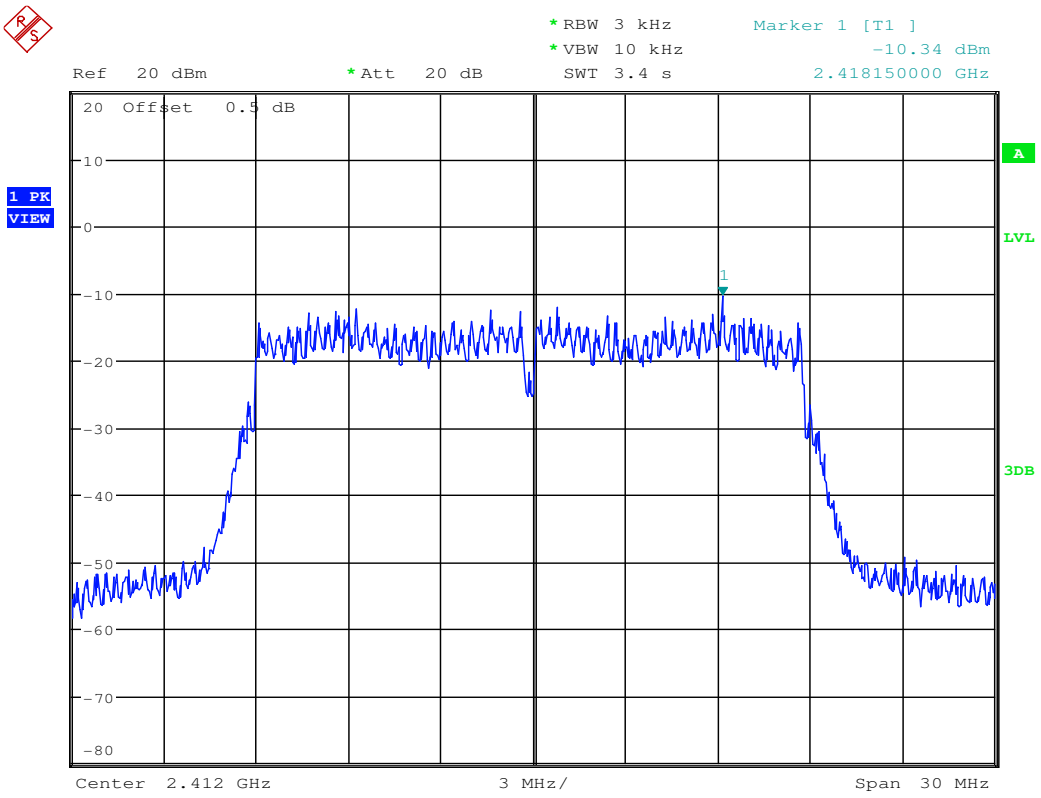
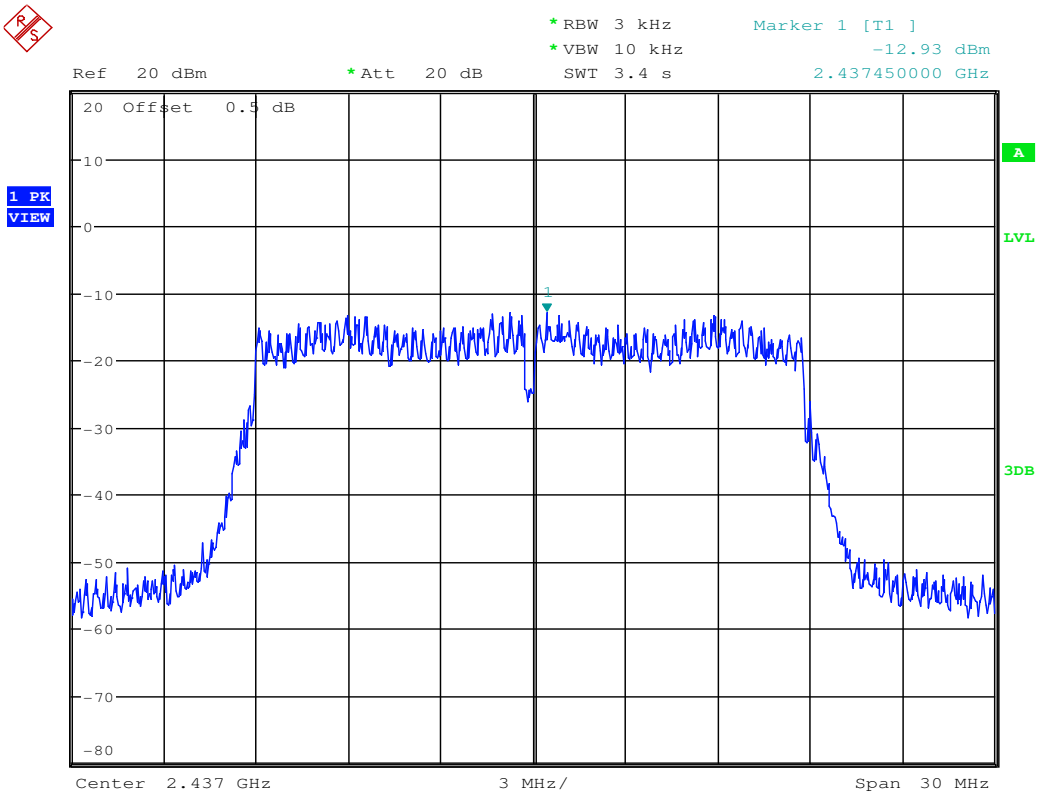
Maximum Peak power spectral density_11N20SISO_2412_Ant1



Maximum Peak power spectral density_11N20SISO_2437_Ant1



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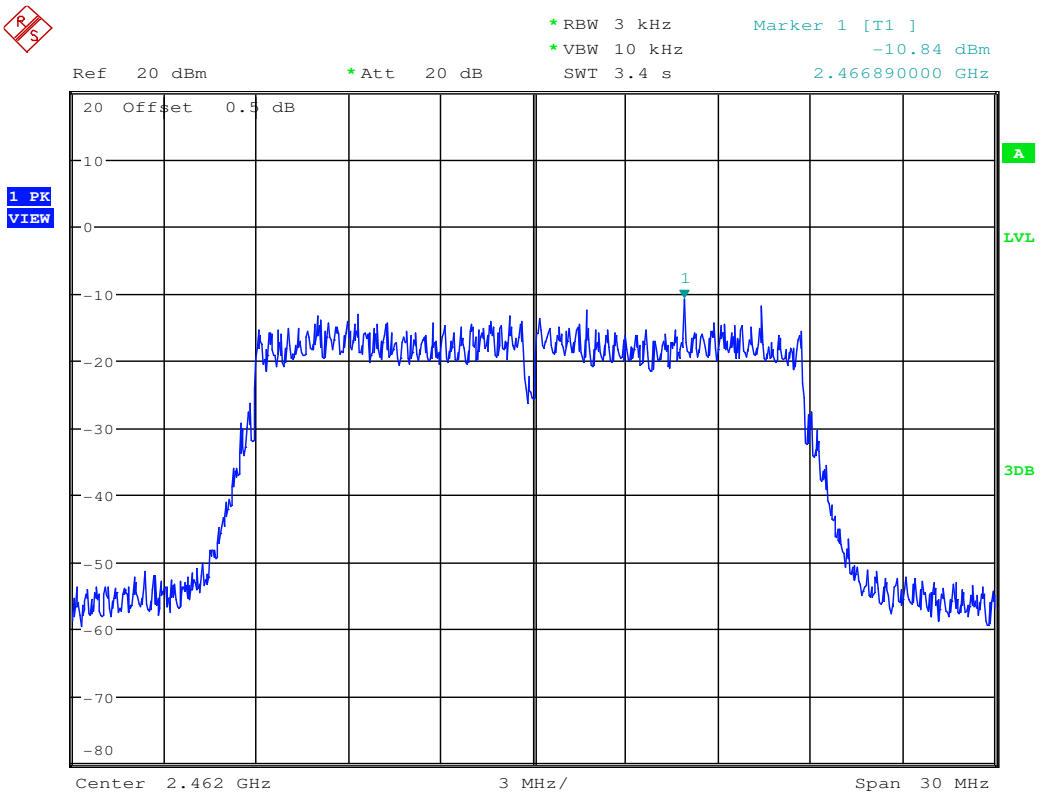
Maximum Peak power spectral density_11N20SISO_2462_Ant1



5.Band-edge for RF Conducted Emissions

Test Mode	Test Channel	Ant	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B	2412	Ant1	5.440	-45.813	<-14.56	PASS
11B	2462	Ant1	4.990	-49.159	<-15.01	PASS
11G	2412	Ant1	2.330	-42.919	<-17.67	PASS
11G	2462	Ant1	1.720	-45.162	<-18.28	PASS
11N20SISO	2412	Ant1	1.290	-42.338	<-18.71	PASS
11N20SISO	2462	Ant1	1.740	-43.854	<-18.26	PASS

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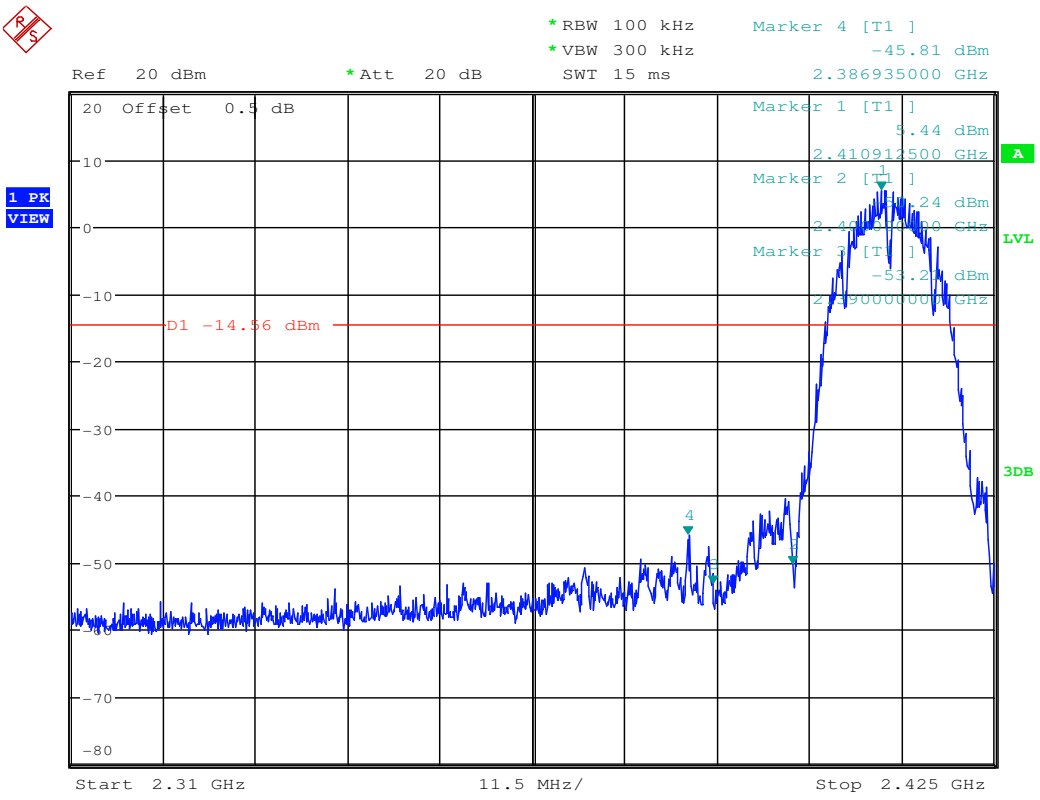
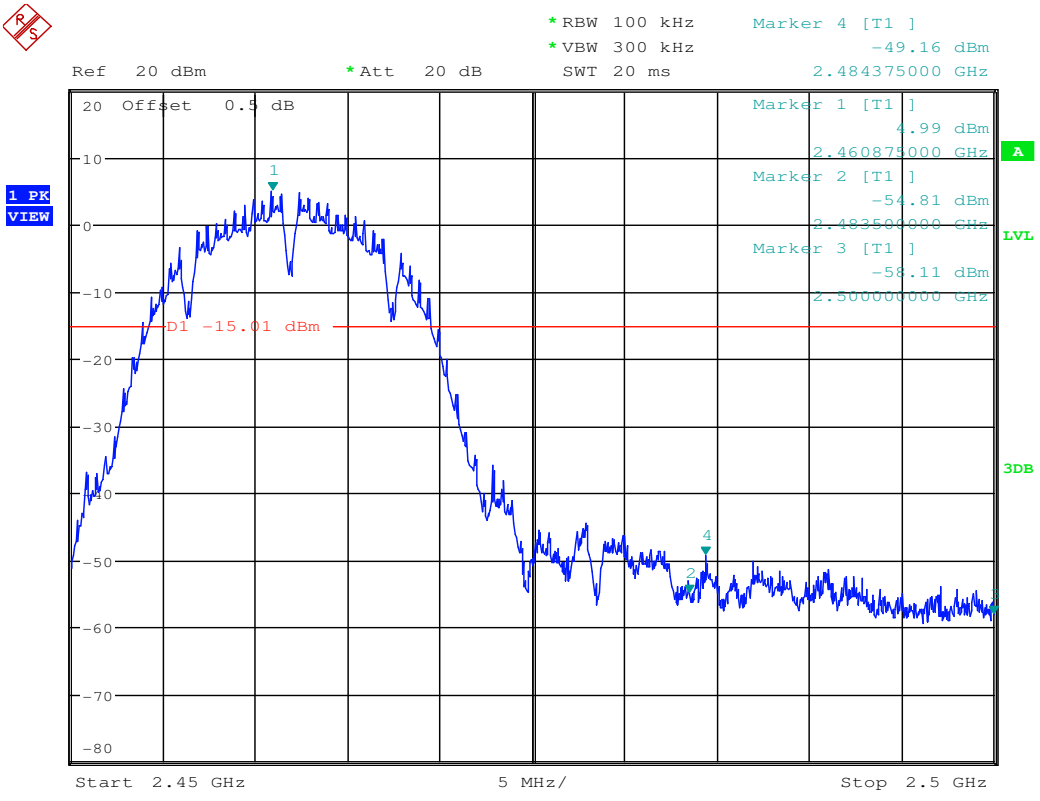
Band-edge for RF Conducted Emissions_11B_2412_Ant1



Band-edge for RF Conducted Emissions_11B_2462_Ant1



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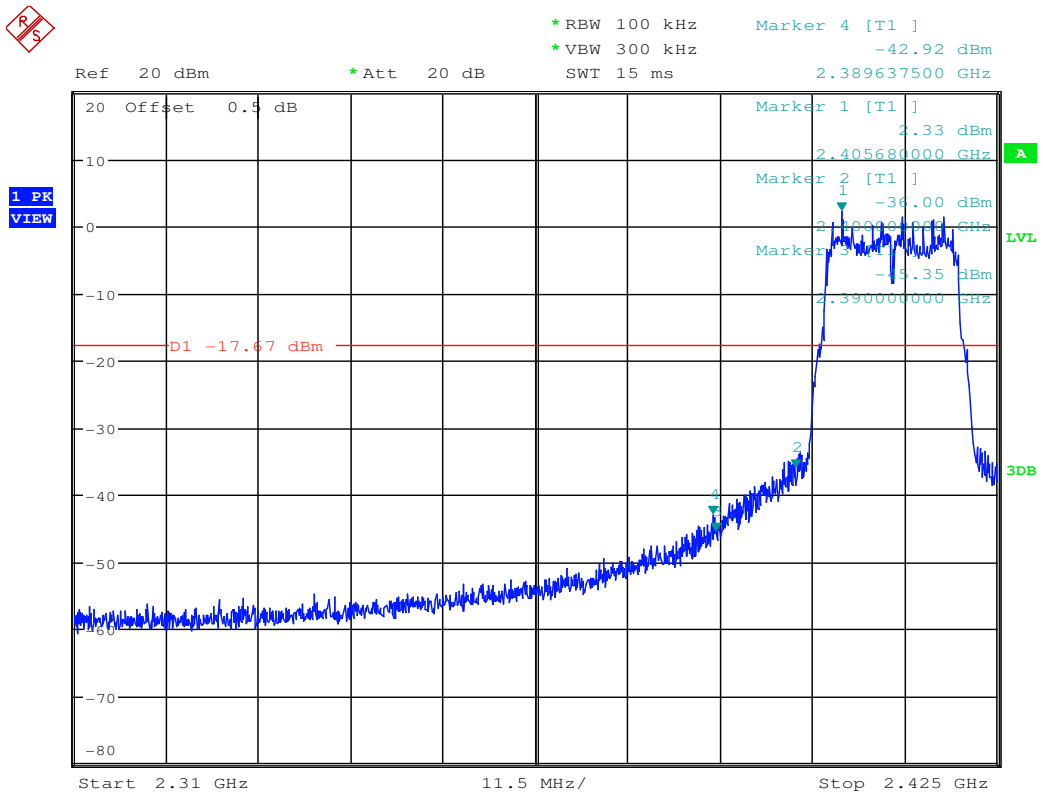
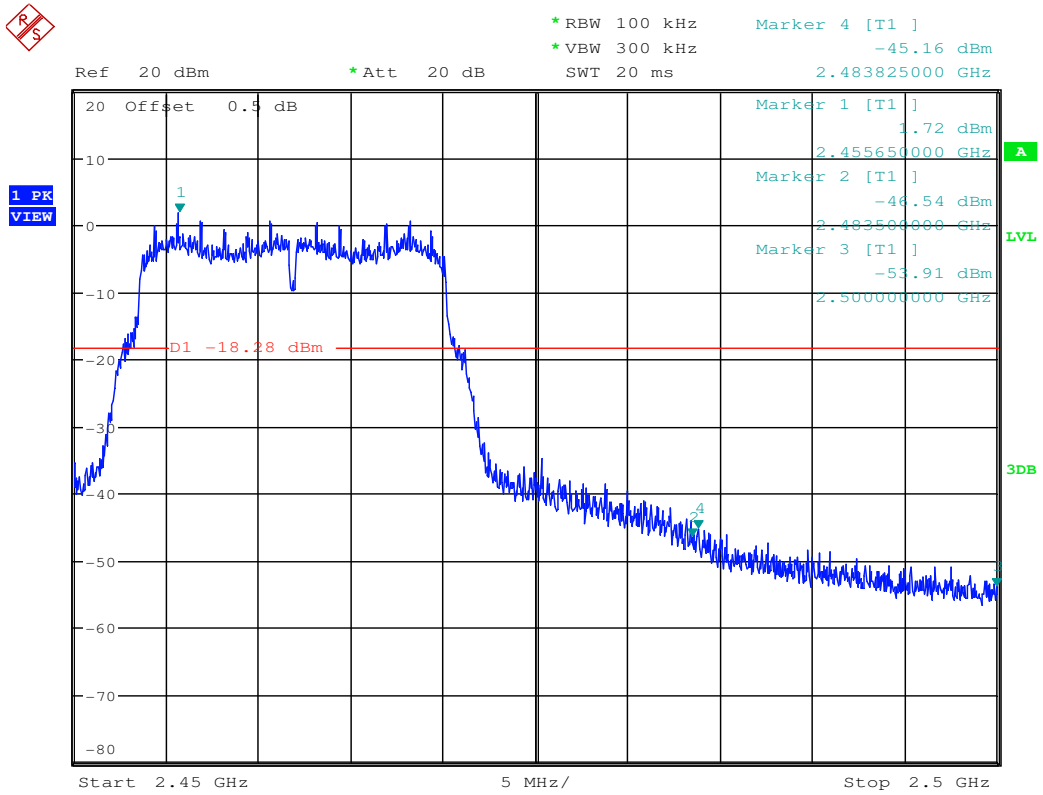
Band-edge for RF Conducted Emissions_11G_2412_Ant1



Band-edge for RF Conducted Emissions_11G_2462_Ant1



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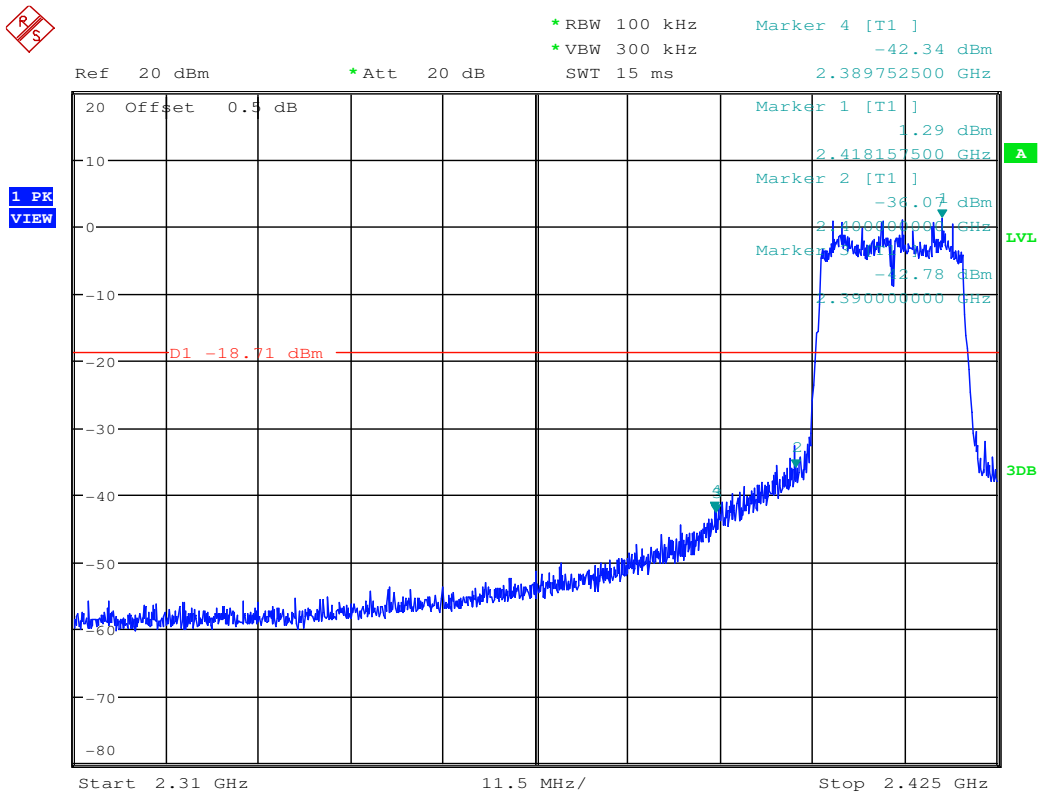
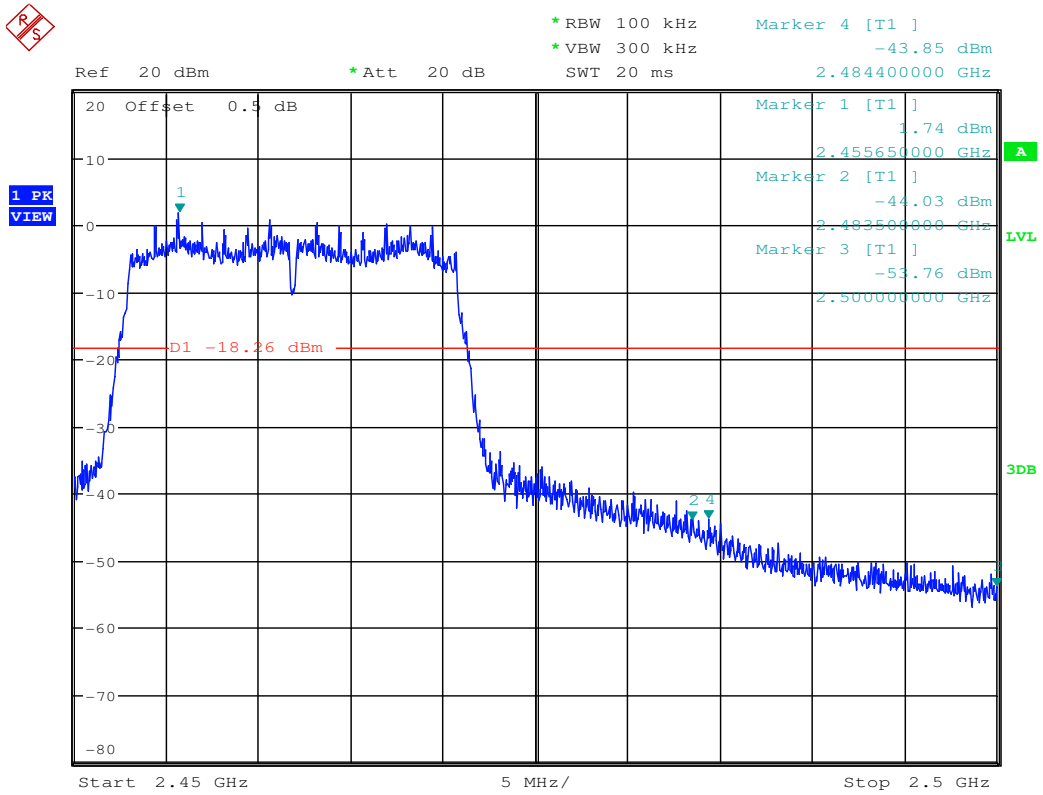
Band-edge for RF Conducted Emissions_11N20SISO_2412_Ant1



Band-edge for RF Conducted Emissions_11N20SISO_2462_Ant1



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6.RF Conducted Spurious Emissions

Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	2412	30	10000	1000	3000	5.75	-27.430	<-14.25	PASS
11B	2412	10000	25000	1000	3000	5.75	-60.610	<-14.25	PASS
11B	2437	30	10000	1000	3000	5.98	-27.930	<-14.02	PASS
11B	2437	10000	25000	1000	3000	5.98	-60.070	<-14.02	PASS
11B	2462	30	10000	1000	3000	5.31	-29.440	<-14.69	PASS
11B	2462	10000	25000	1000	3000	5.31	-59.760	<-14.69	PASS
11G	2412	30	10000	1000	3000	2.23	-27.960	<-17.77	PASS
11G	2412	10000	25000	1000	3000	2.23	-59.980	<-17.77	PASS
11G	2437	30	10000	1000	3000	1.97	-31.400	<-18.03	PASS
11G	2437	10000	25000	1000	3000	1.97	-60.040	<-18.03	PASS
11G	2462	30	10000	1000	3000	1.02	-30.990	<-18.98	PASS
11G	2462	10000	25000	1000	3000	1.02	-60.250	<-18.98	PASS
11N20SISO	2412	30	10000	1000	3000	1.93	-30.650	<-18.07	PASS
11N20SISO	2412	10000	25000	1000	3000	1.93	-60.320	<-18.07	PASS
11N20SISO	2437	30	10000	1000	3000	1.44	-30.610	<-18.56	PASS
11N20SISO	2437	10000	25000	1000	3000	1.44	-60.650	<-18.56	PASS
11N20SISO	2462	30	10000	1000	3000	0.2	-32.490	<-19.8	PASS
11N20SISO	2462	10000	25000	1000	3000	0.2	-60.270	<-19.8	PASS

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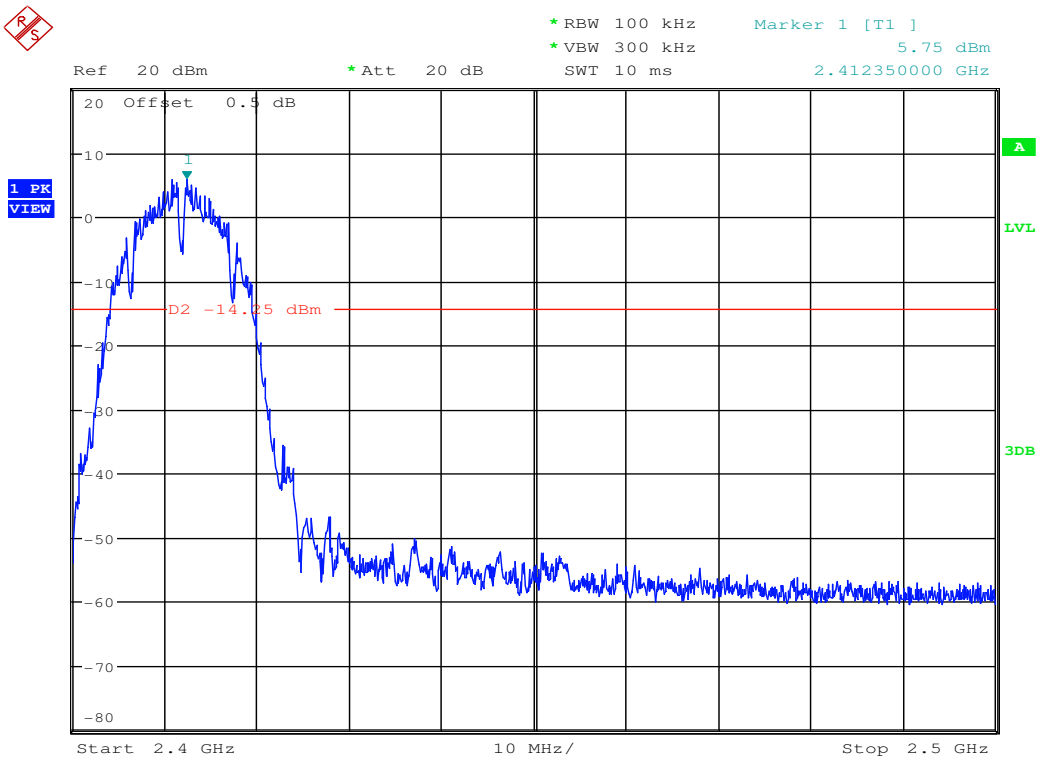
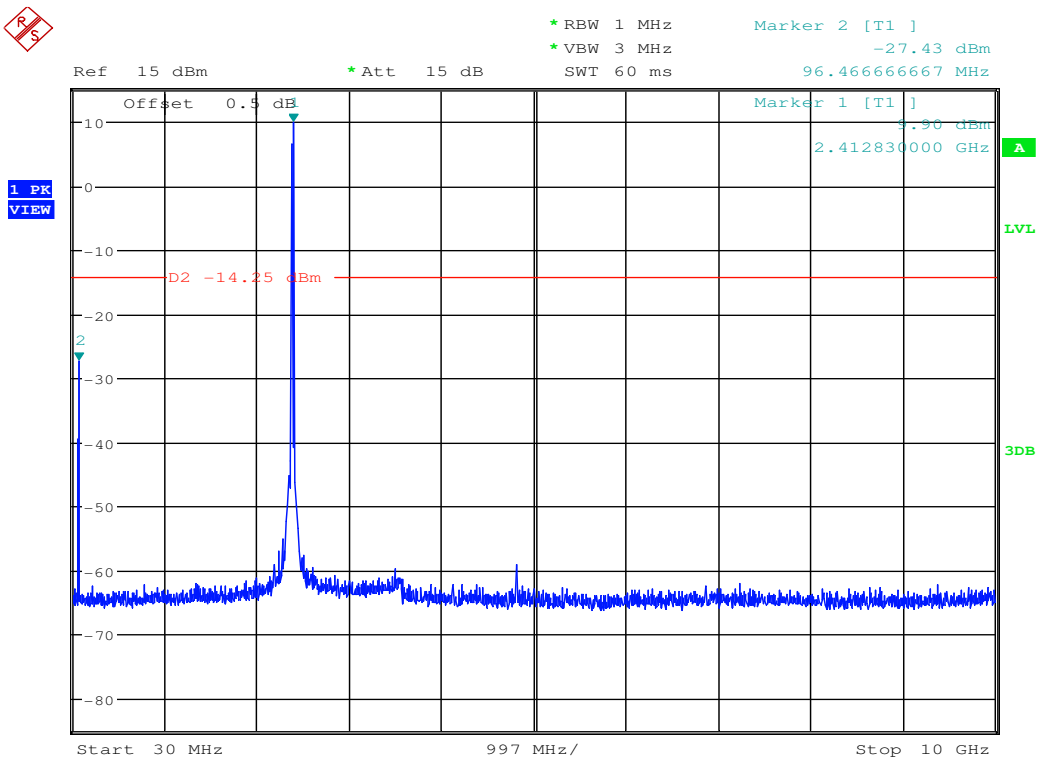
Pref	
CSE_1	

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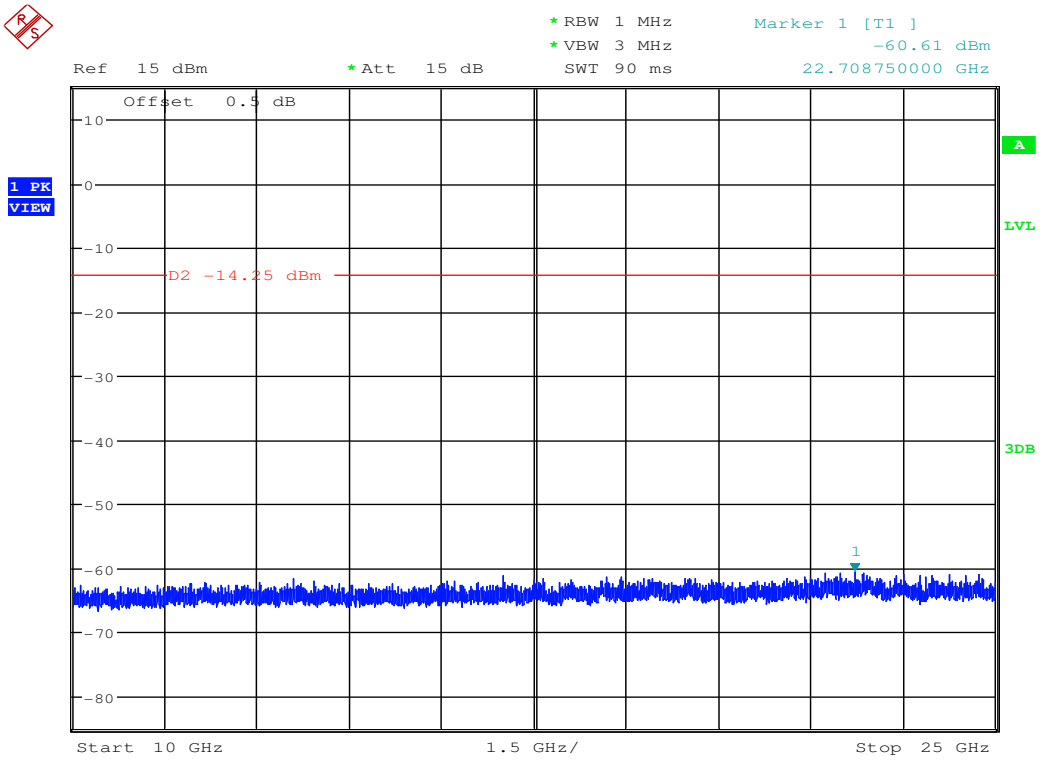
CSE_2



RF Conducted Spurious Emissions_11B_2437_Ant1

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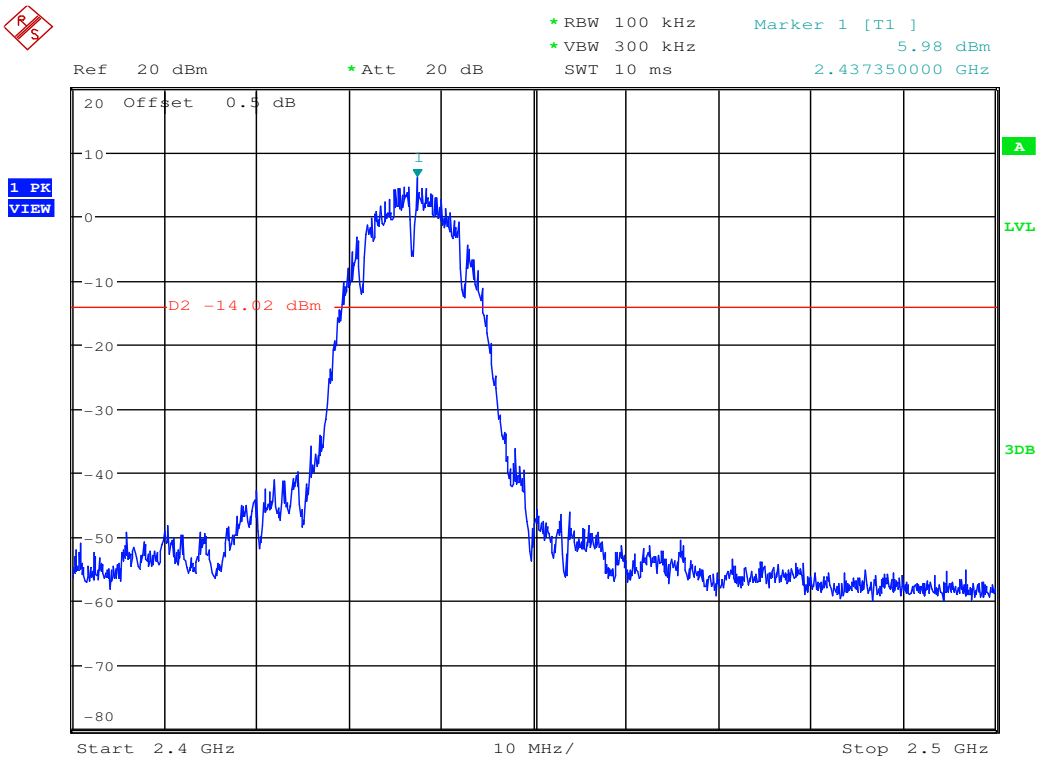

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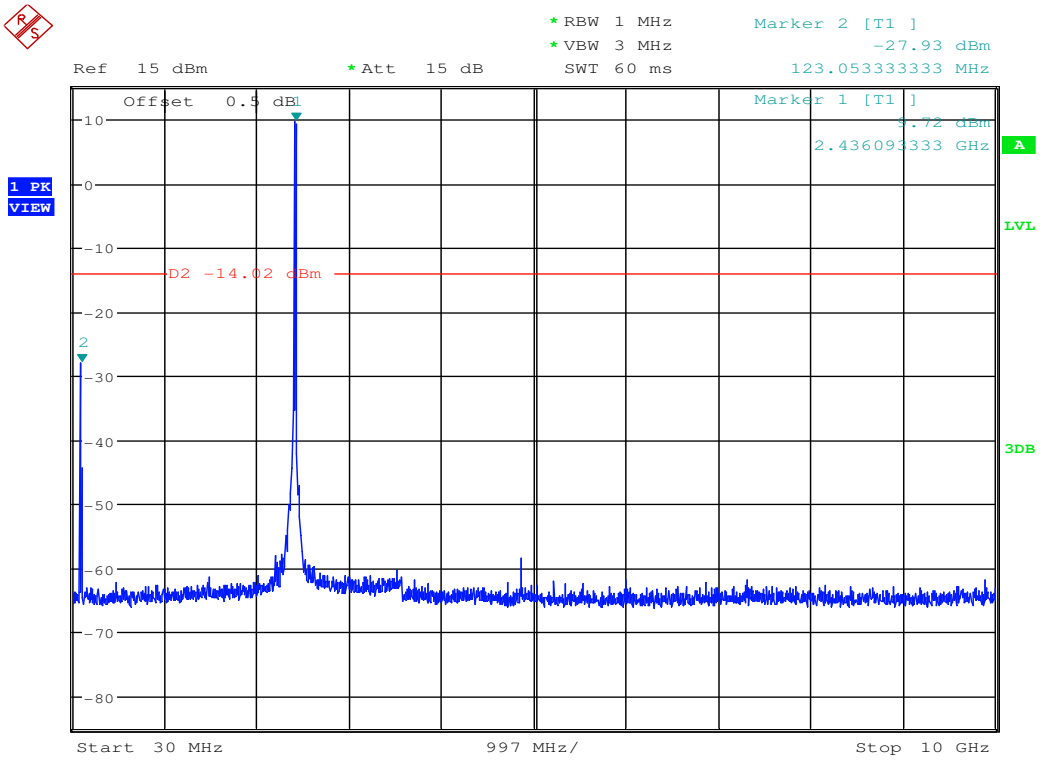

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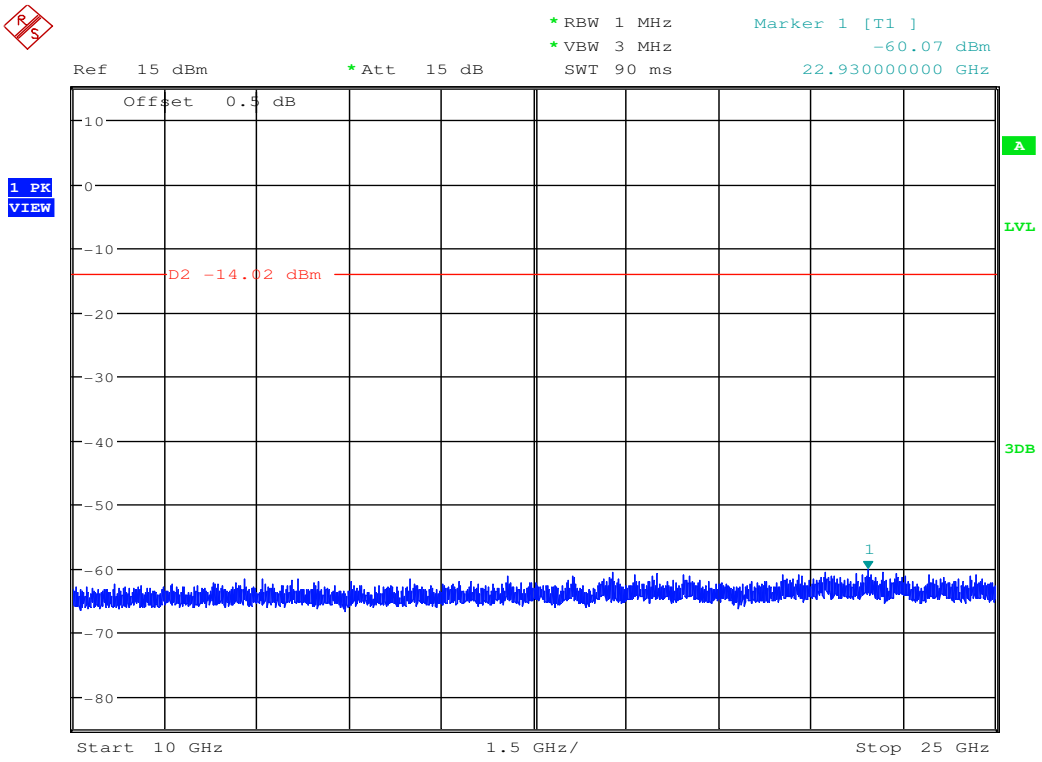

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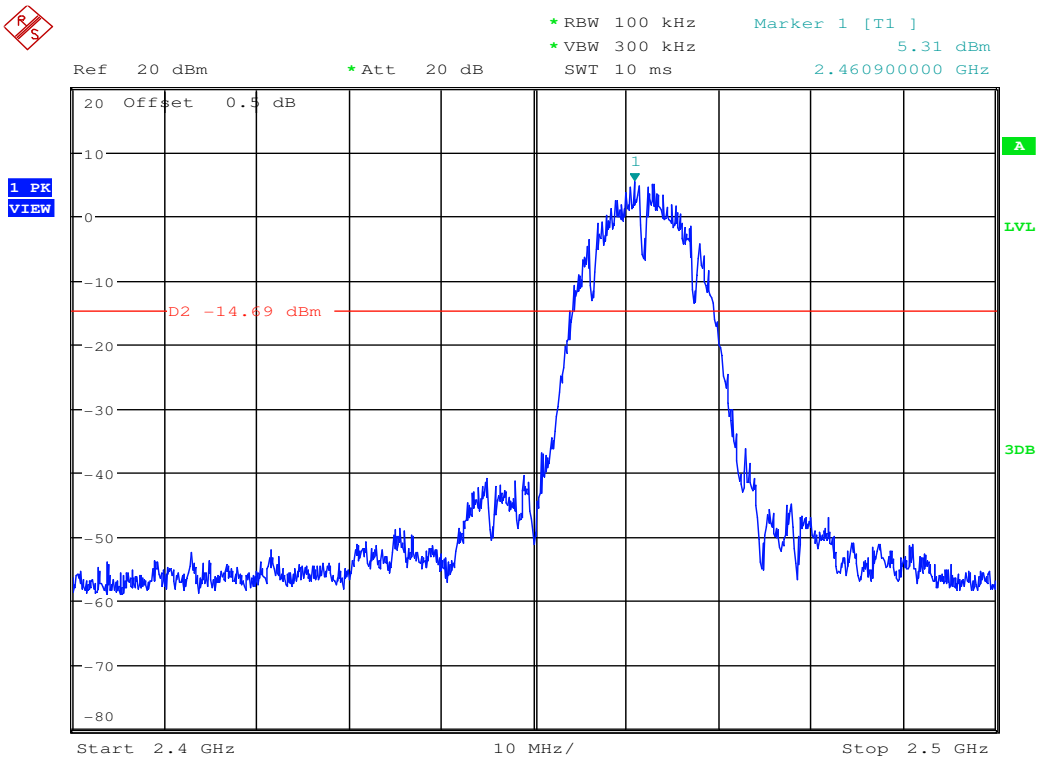
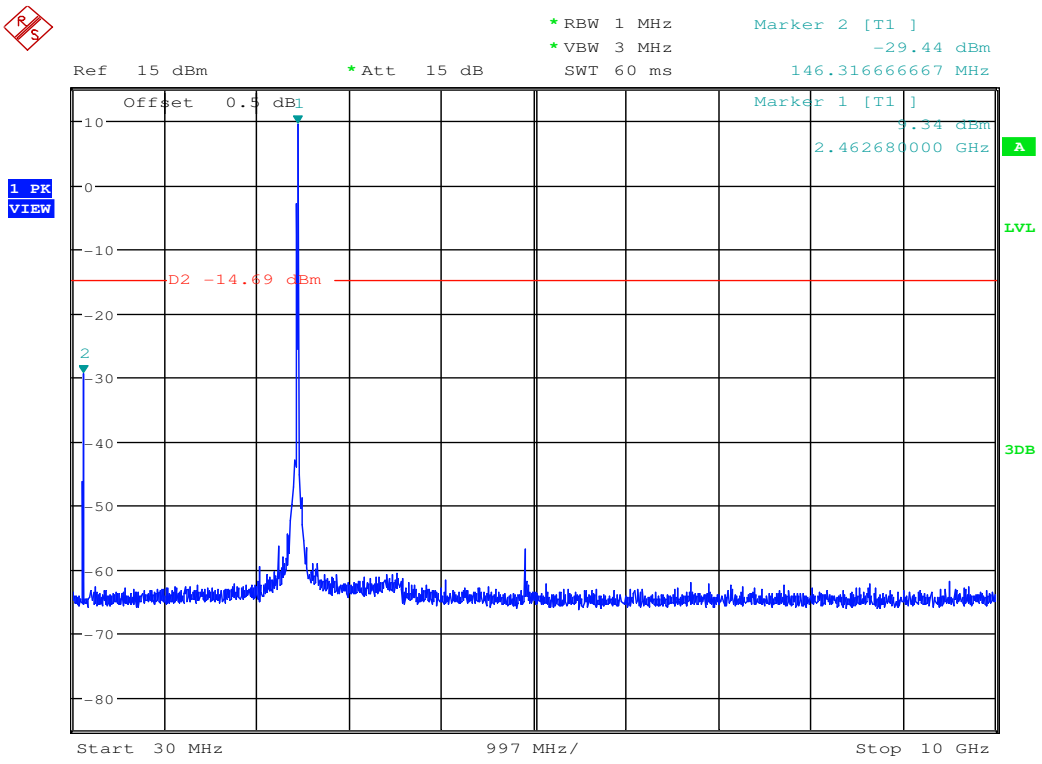
Pref	
CSE_1	

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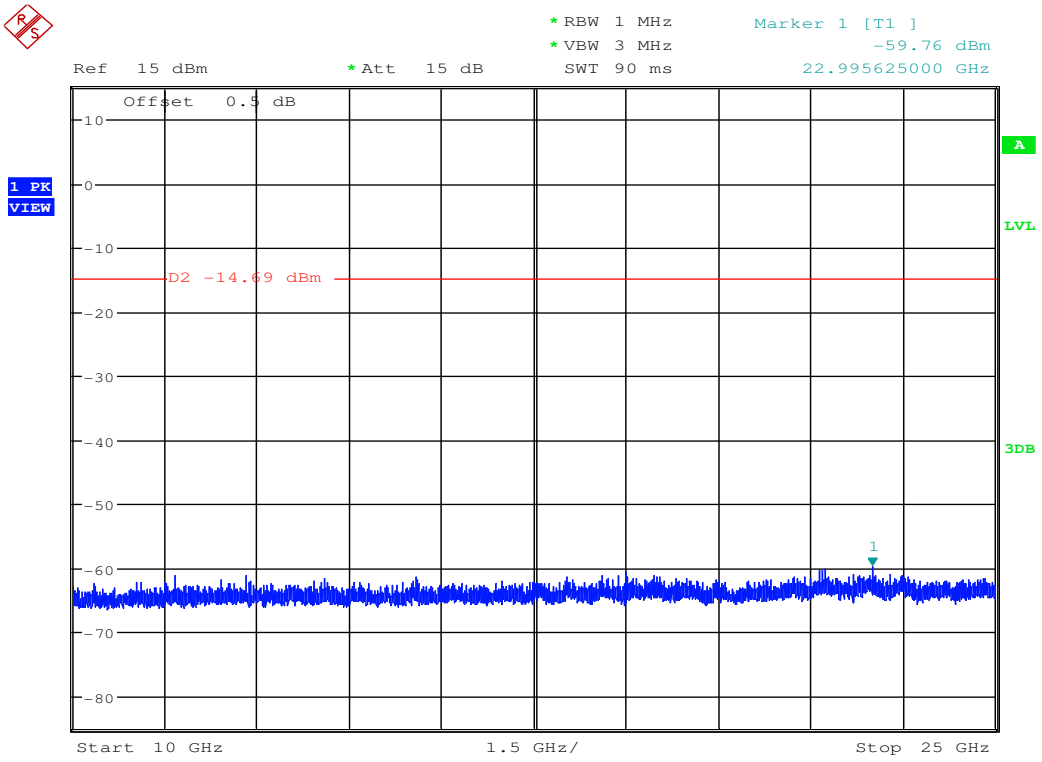
CSE_2



RF Conducted Spurious Emissions_11G_2412_Ant1

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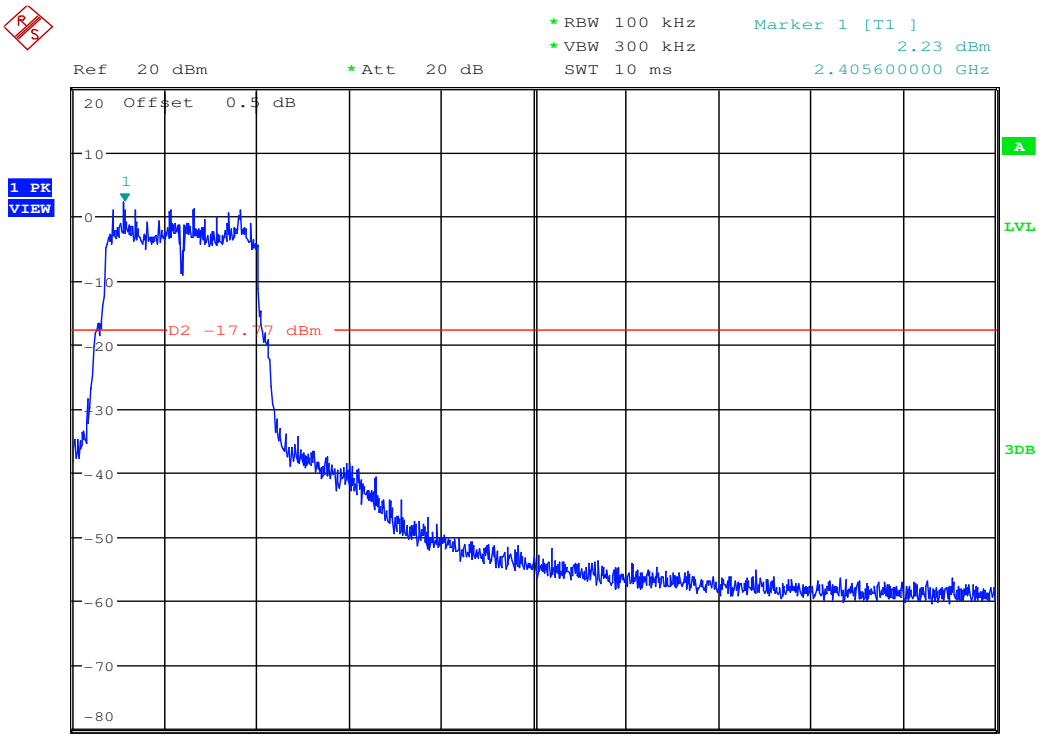

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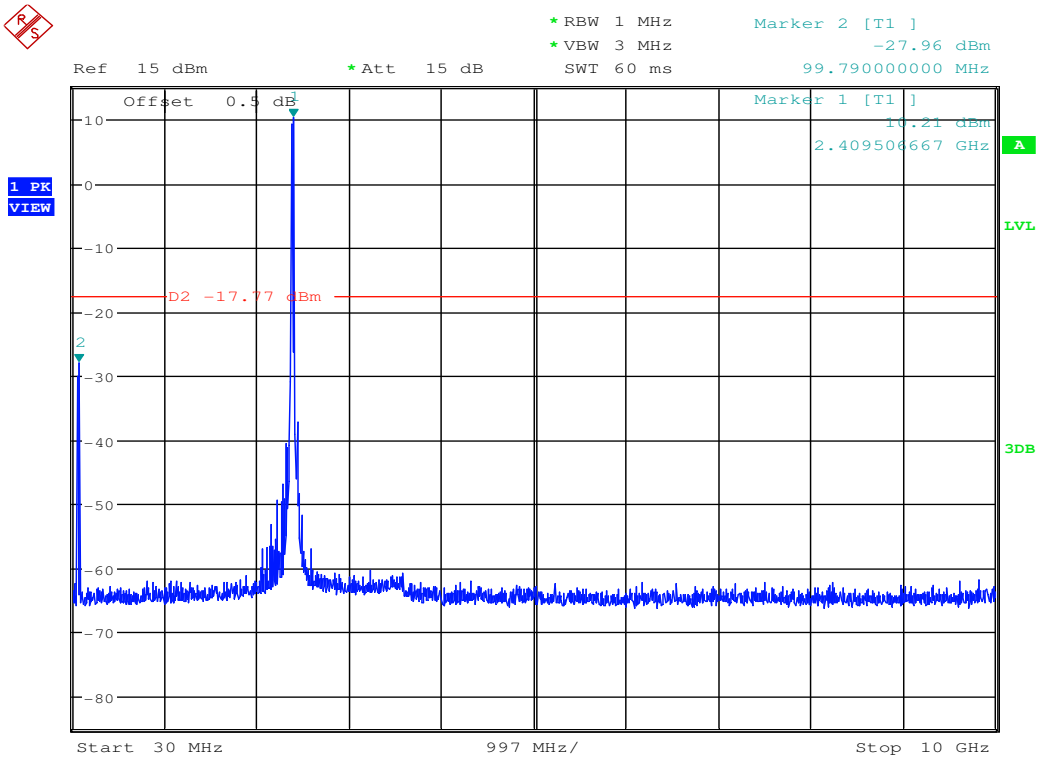
CSE_1



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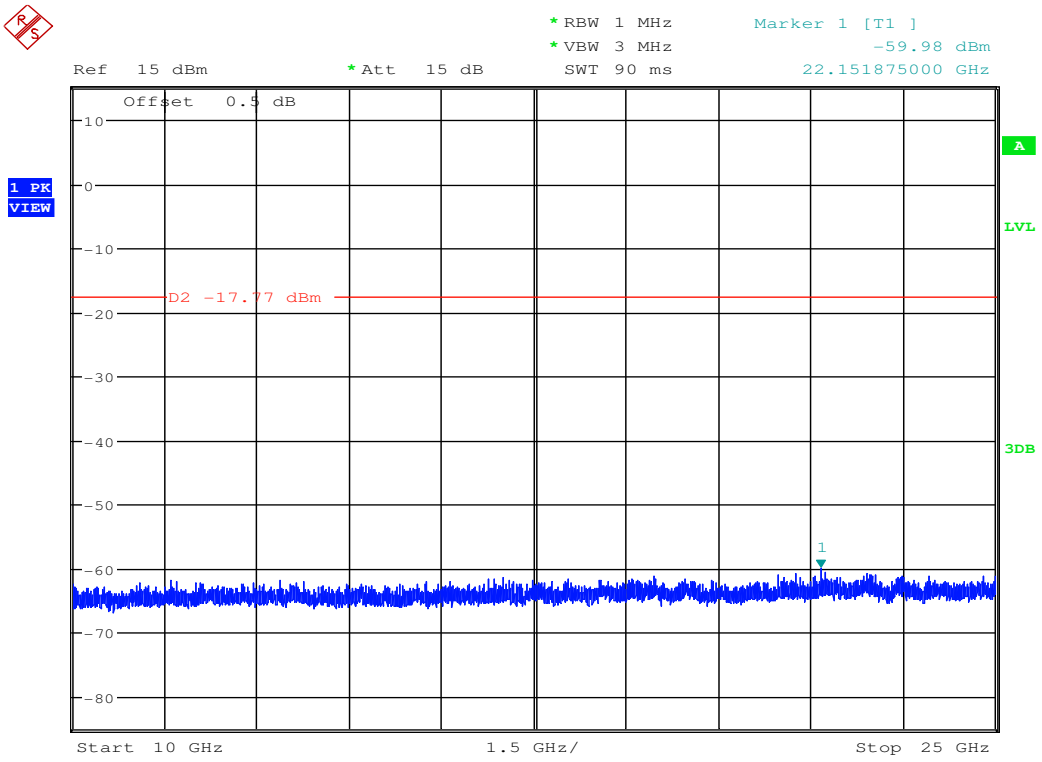

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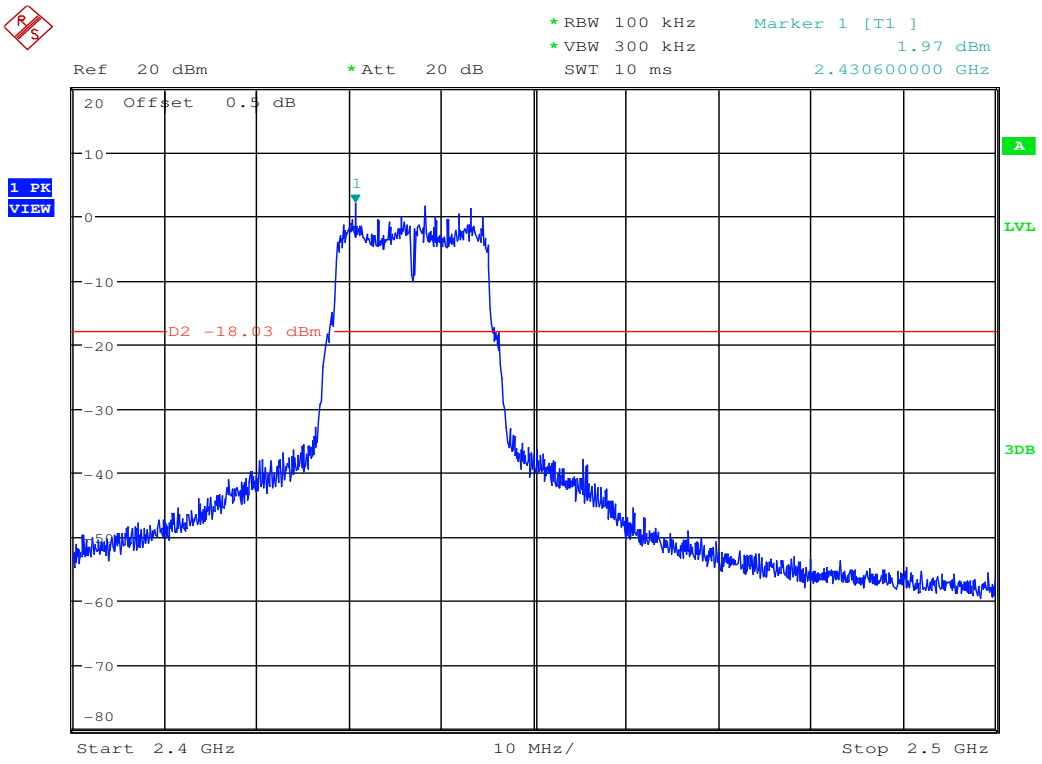
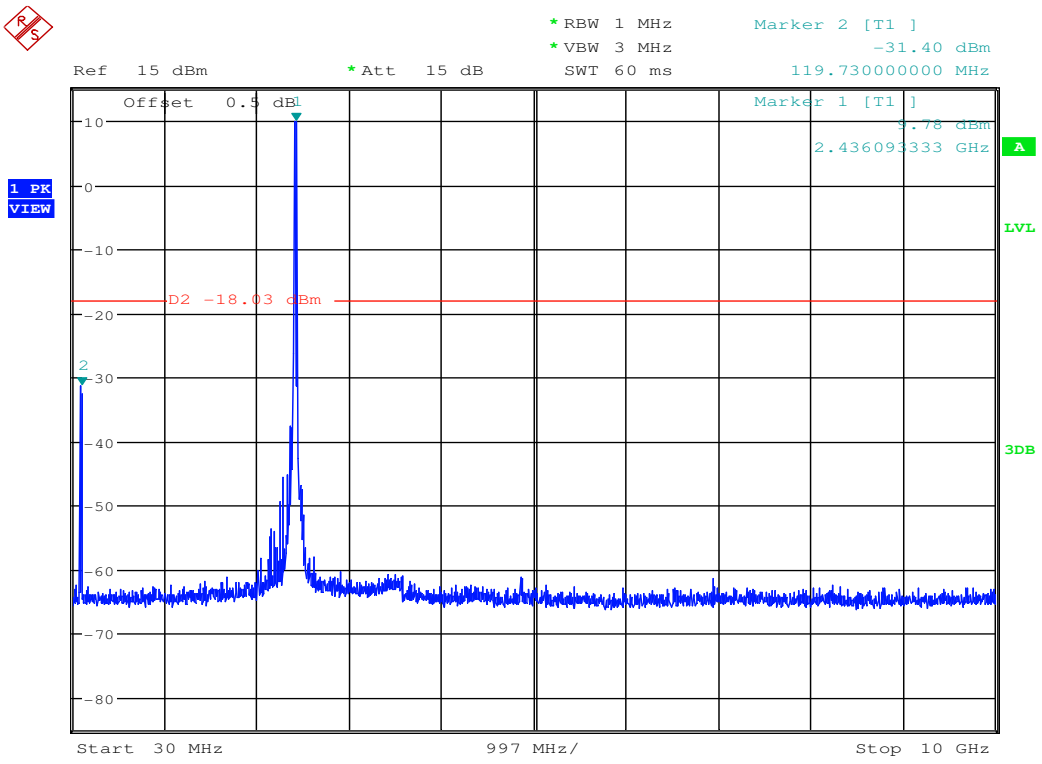
Pref	
CSE_1	

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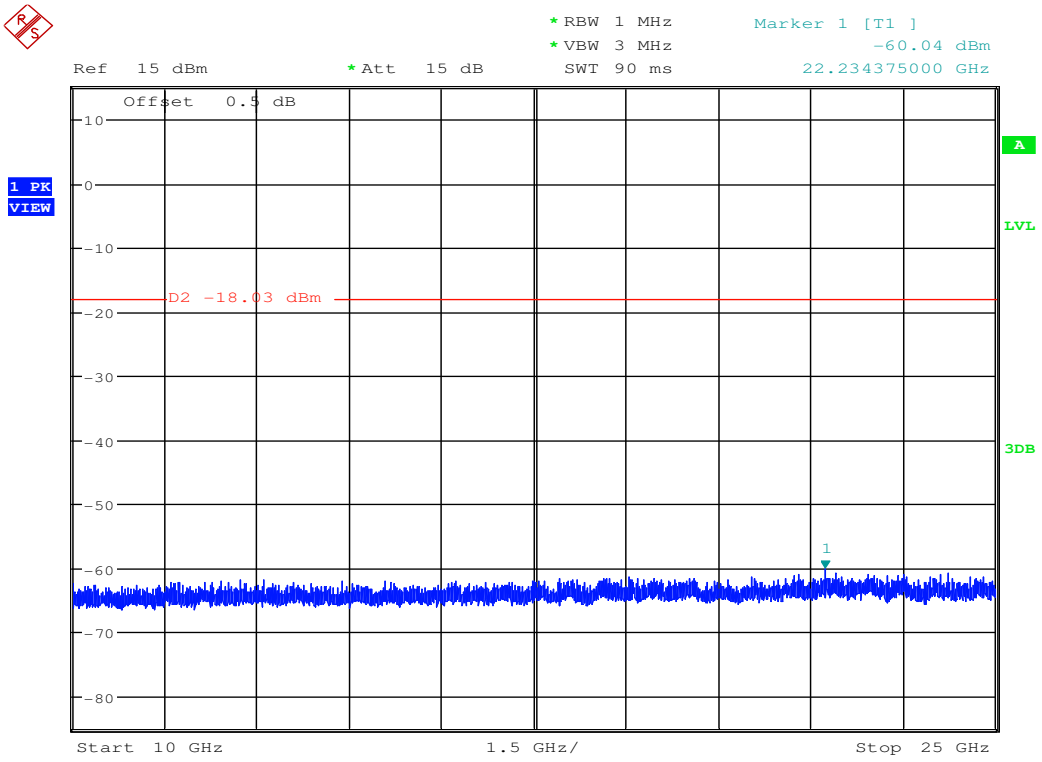
CSE_2



RF Conducted Spurious Emissions_11G_2462_Ant1

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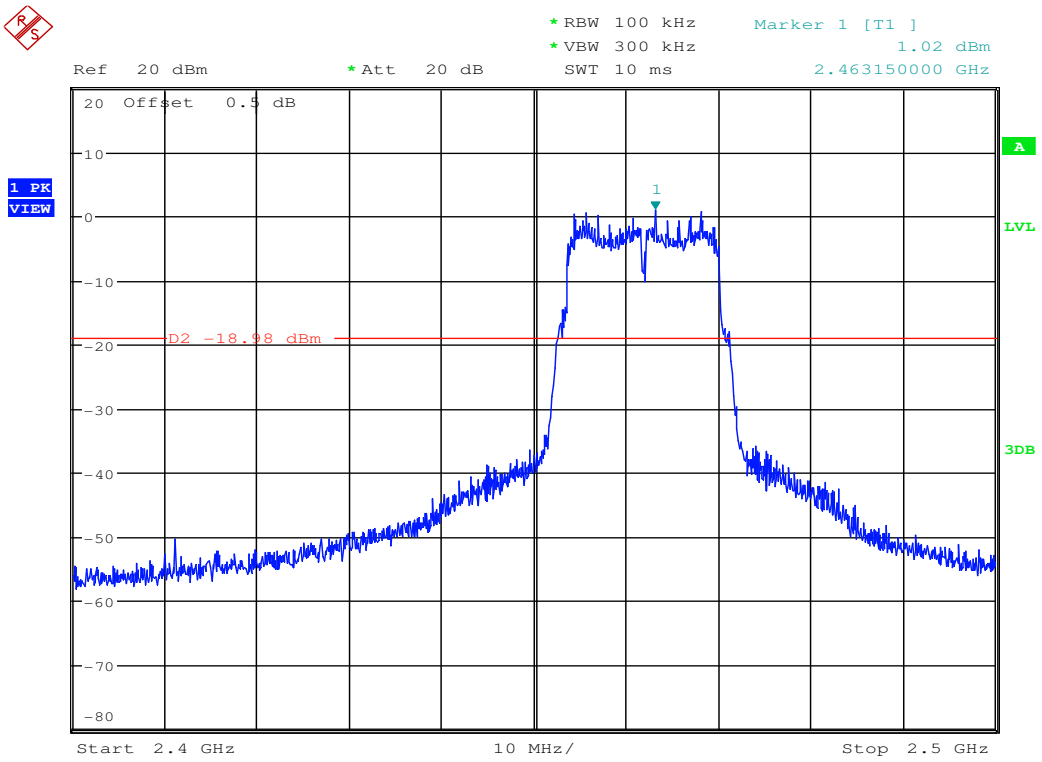

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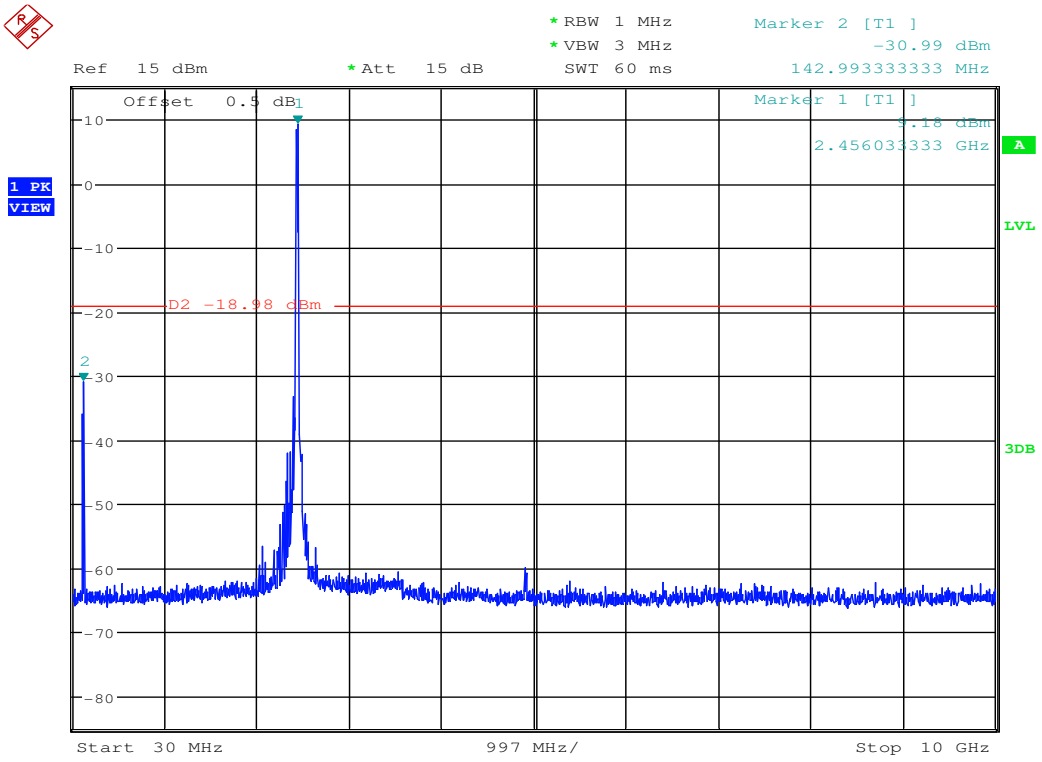
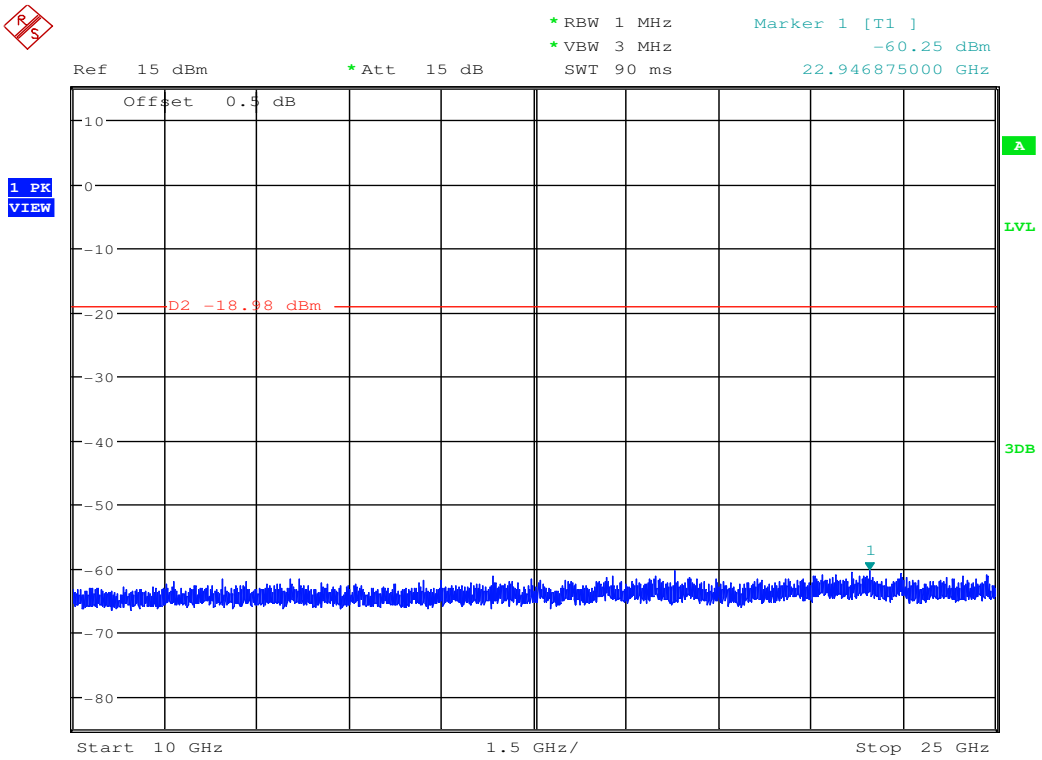
CSE_1	
CSE_2	

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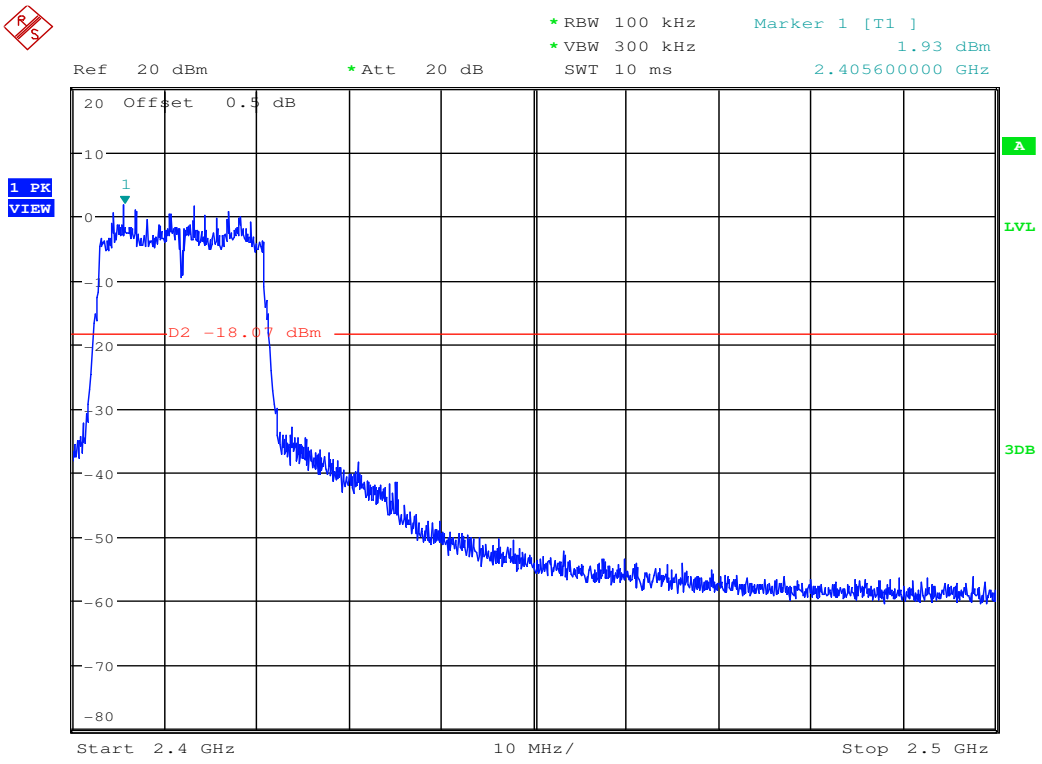
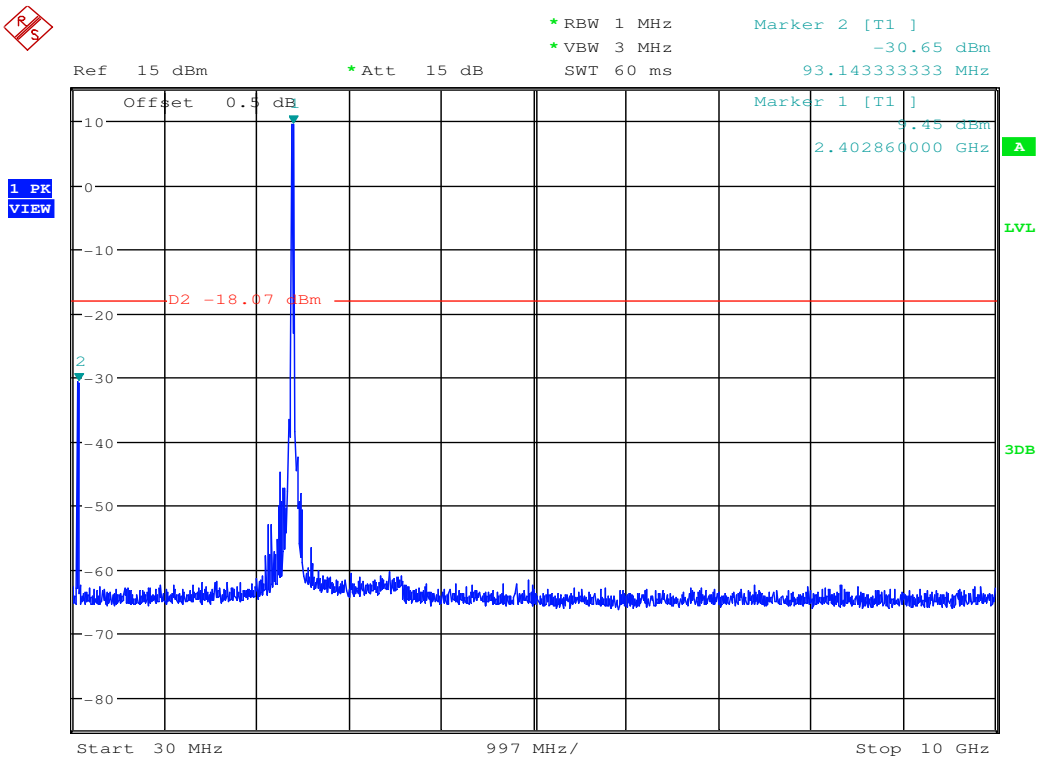
Pref	
CSE_1	

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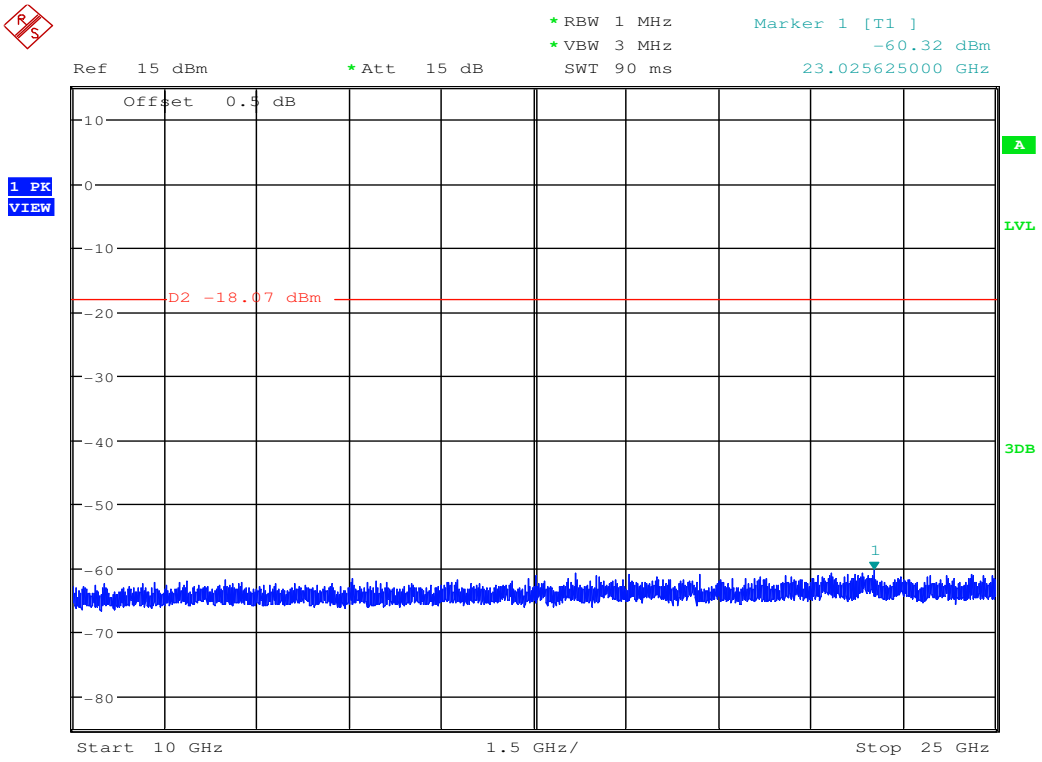

RF Conducted Spurious Emissions_11N20SISO_2437_Ant1

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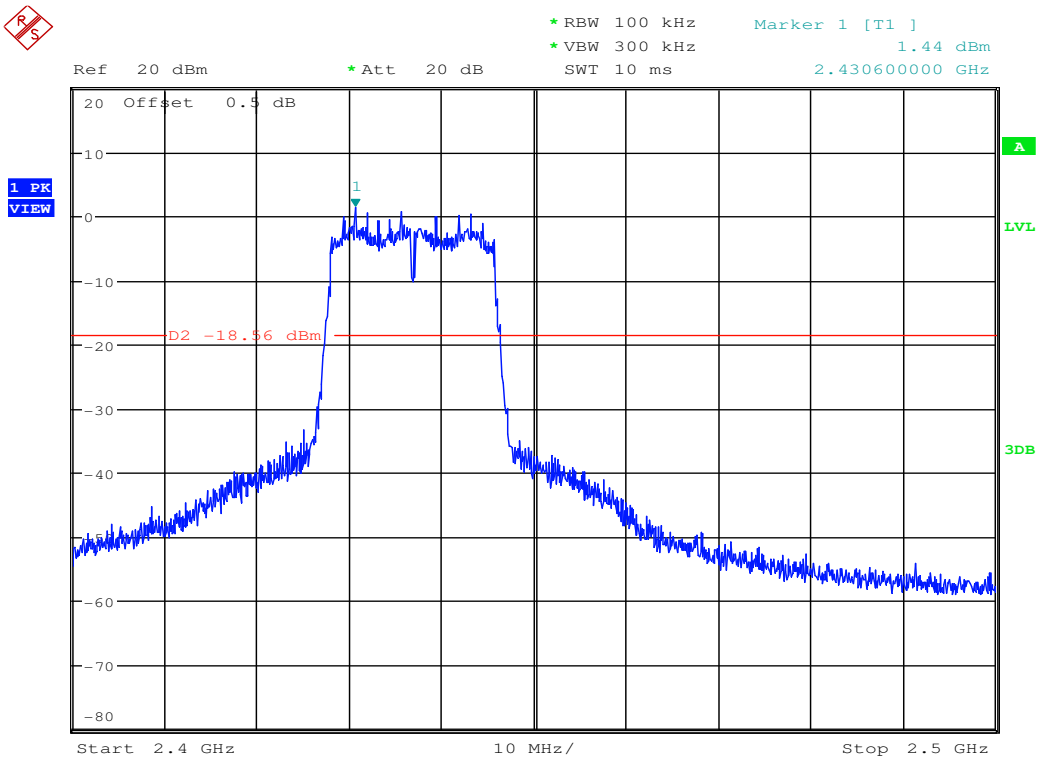

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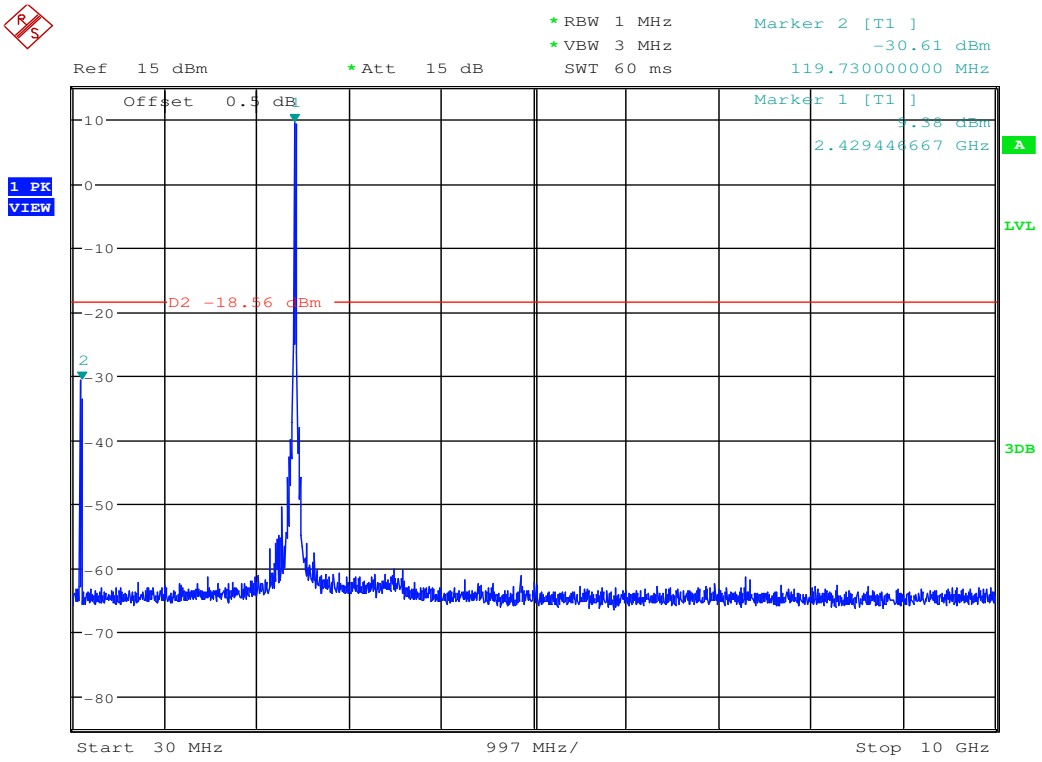
CSE_1



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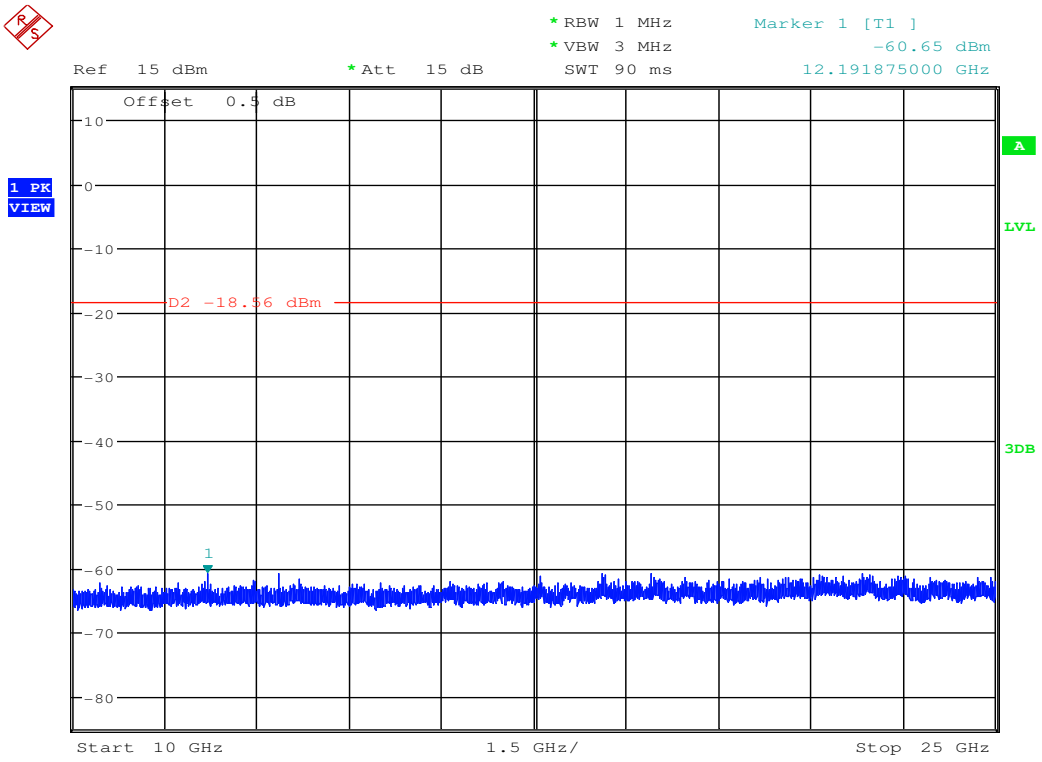

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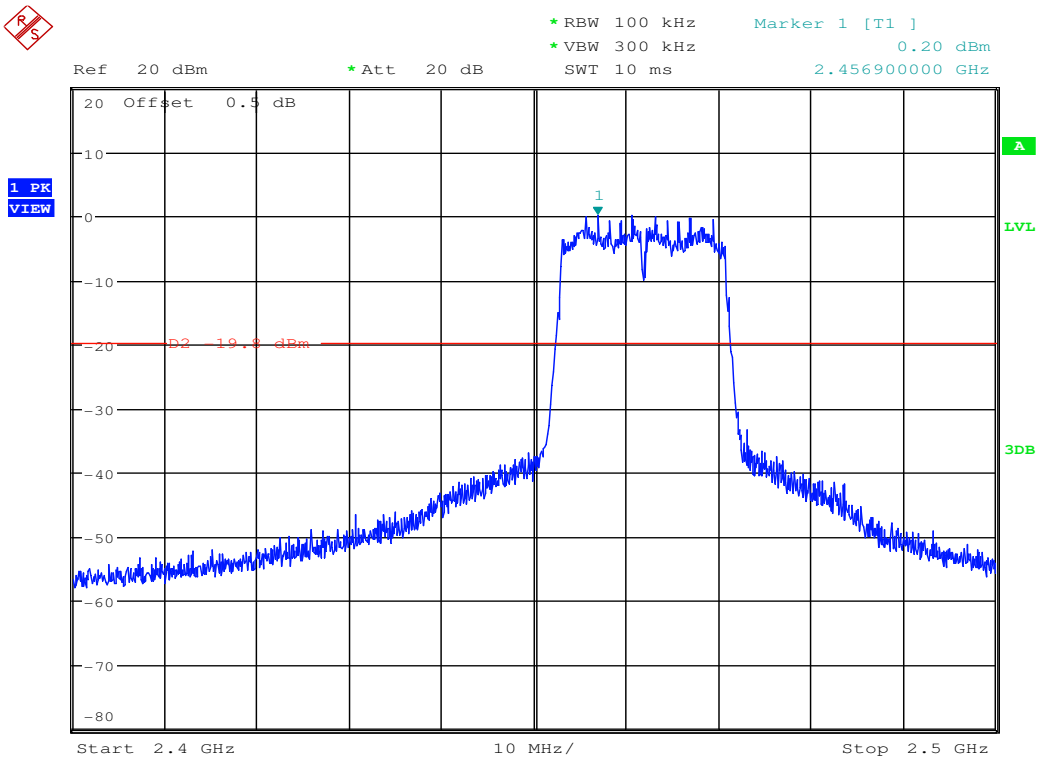
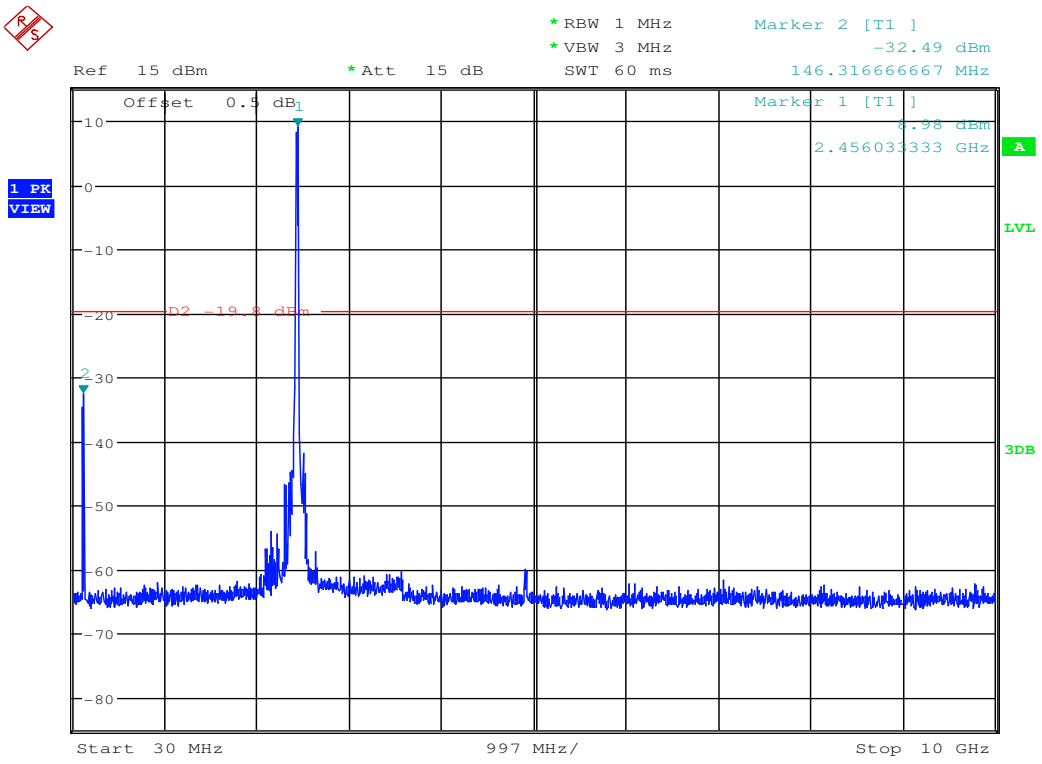
Pref	
CSE_1	

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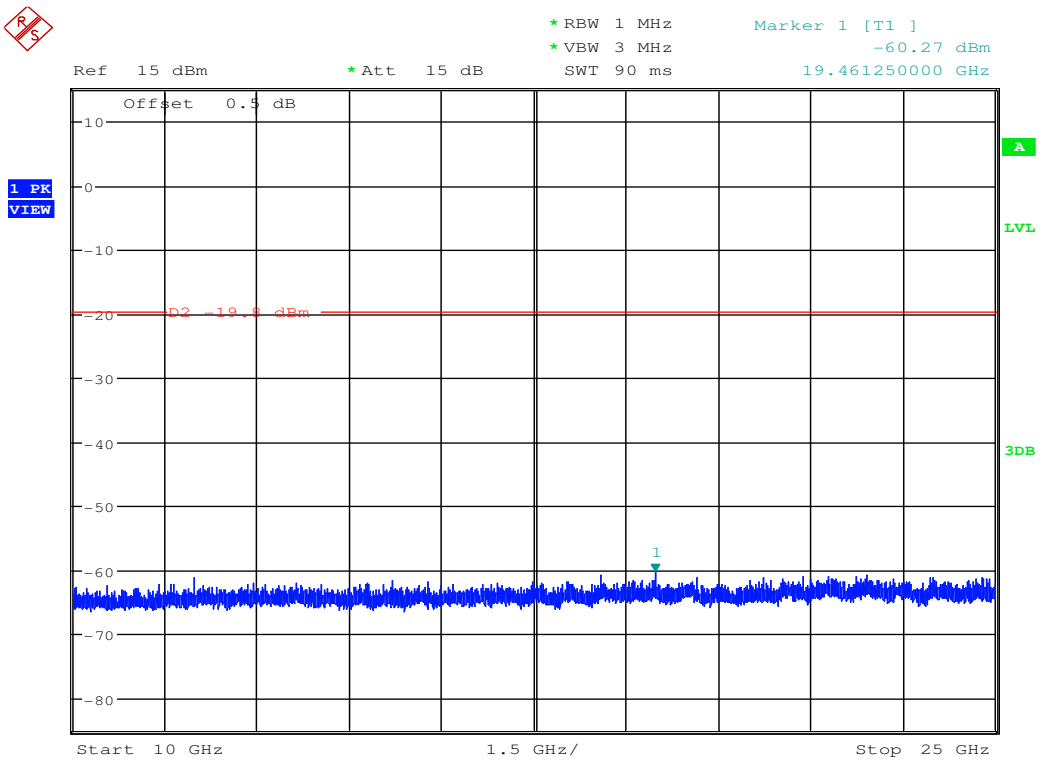
CSE_2



- End of the Report -

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