

Report No.: SZEM191202099602

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TEST REPORT

Application No.: SZEM1912020996CR

Applicant: Hopkins Manufacturing Corporation

Address of Applicant: 428 Peyton #2 1157 Emporia Kansas United States 66801

Manufacturer: Shenzhen Joyhonest Technology Co., Ltd

Address of Manufacturer: 3A-1706, Hecheng Century Building, Wuhe Avenue, Longgang District,

Shenzhen PRC

Factory: Shenzhen Joyhonest Technology Co., Ltd

Address of Factory: 3A-1706, Hecheng Century Building, Wuhe Avenue, Longgang District,

Shenzhen PRC

Equipment Under Test (EUT):

EUT Name: vueSMART Trailer Camera

Model No.: 50050 FCC ID: TJJ50050

Standard(s): 47 CFR Part 15, Subpart C 15.247

Date of Receipt: 2019-12-09

2019-12-12 to 2019-12-23 Date of Test:

2019-12-26 Date of Issue:

Test Result: Pass*

EMC Laboratory Manager



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



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	Revision Record						
Version	Chapter	Date	Modifier	Remark			
01		2019-12-26		Original			

Authorized for issue by:		
	Bim chen	
	Bill Chen /Project Engineer	-
	EvicFu	
	Eric Fu /Reviewer	-



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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(b)(4)	Pass		

Radio Spectrum Matter Part					
Item	Standard	Method	Requirement	Result	
Minimum 6dB	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass	
Bandwidth	Subpart C 15.247	Section 11.8.1	C 15.247a(2)		
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	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass	
Density	Subpart C 15.247	Section 11.10.2	C 15.247(e)		
Conducted Band	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass	
Edges Measurement	Subpart C 15.247	Section 11.13.3.2	C 15.247(d)		
Conducted Spurious	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass	
Emissions	Subpart C 15.247	Section 11.11	C 15.247(d)		
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	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass	
Emissions	Subpart C 15.247	Section 6.4,6.5,6.6	C 15.209 & 15.247(d)		



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General Information

Details of E.U.T.

Power Supply:	DC 12V	
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz	
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK)	
	802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)	
Number of Channels:	802.11b/g/n(HT20): 11	
Channel Spacing:	5MHz	
Antenna Gain:	2dBi	
Antenna Type:	Monopole antenna	

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Rechargeable Battery	Gadlee	DP00027	REF. No.SEA2800

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	DE Dadiated newer	± 4.5dB (Below 1GHz)
7	RF Radiated power	± 4.8dB (Above 1GHz)
0	Dedicted Couriers emission test	± 4.5dB (Below 1GHz)
8	Radiated Spurious emission test	± 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:

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.

Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

4.7 Abnormalities from Standard Conditions

None





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Equipment List

RF Conducted					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06
Electric Field Probe(100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

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	2019-07-11	2020-07-10
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
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 (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21



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RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019-09-24	2020-09-23
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10

Radiated Emissions	Radiated 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	2019-07-11	2020-07-10				
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11				
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 (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23				
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31				
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31				
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23				
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21				

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	2019-09-26	2020-09-25			
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25			



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Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03



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Radio Spectrum Technical Requirement 6

Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

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 2dBi.

Antenna location: Refer to Internal photos





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7 **Radio Spectrum Matter Test Results**

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



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7.1.1 E.U.T. Operation

Operating Environment:

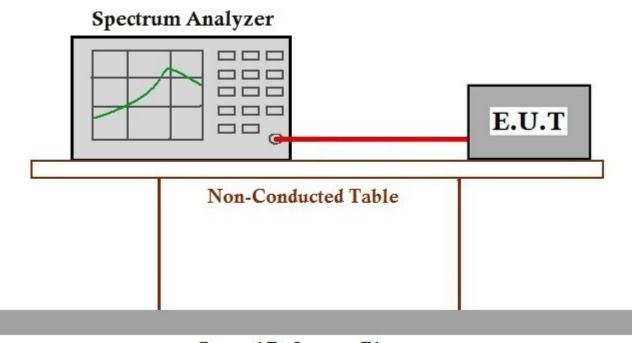
Humidity: 56.6 % RH Temperature: 21.4 °C Atmospheric Pressure: 1000 mbar

Test mode a: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



Ground Reference Plane

7.1.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.2 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)						
	1 for ≥50 hopping channels						
902-928	0.25 for 25≤ hopping channels <50						
	1 for digital modulation						
	1 for ≥75 non-overlapping hopping channels						
2400-2483.5	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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7.2.1 E.U.T. Operation

Operating Environment:

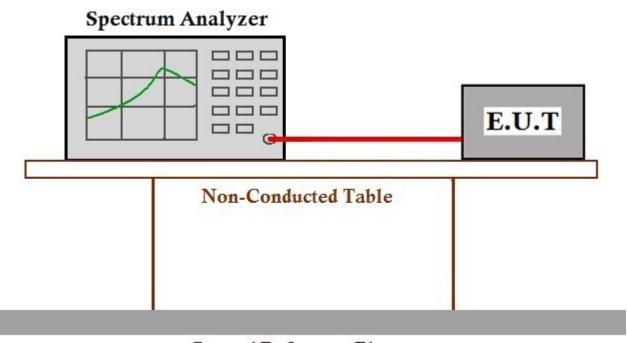
Humidity: 56.6 % RH Temperature: 21.4 °C Atmospheric Pressure: 1000 mbar

Test mode a: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



Ground Reference Plane

7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.3 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e) Test Method: ANSI C63.10 (2013) Section 11.10.2

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

transmission



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7.3.1 E.U.T. Operation

Operating Environment:

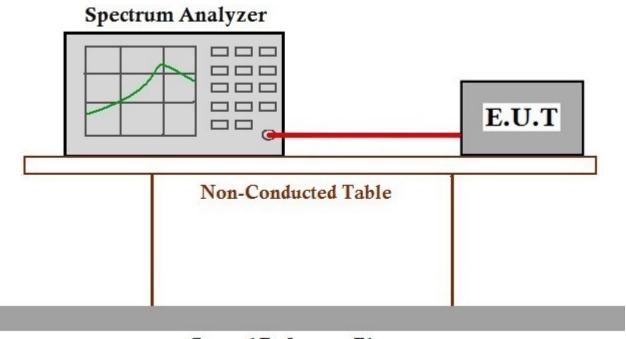
Humidity: 56.6 % RH Temperature: 21.4 °C Atmospheric Pressure: 1000 mbar

Test mode a: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



Ground Reference Plane

7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.4 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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7.4.1 E.U.T. Operation

Operating Environment:

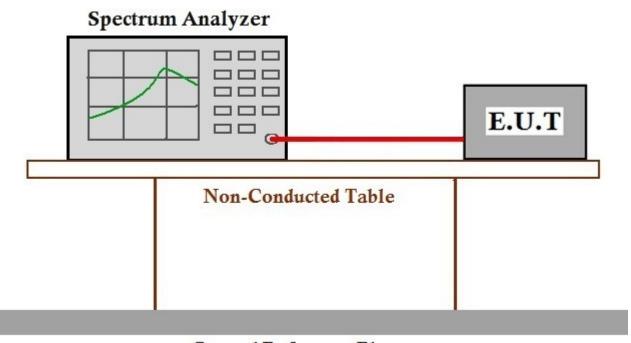
Humidity: 56.6 % RH Temperature: 21.4 °C Atmospheric Pressure: 1000 mbar

Test mode a: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



Ground Reference Plane

7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.5 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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7.5.1 E.U.T. Operation

Operating Environment:

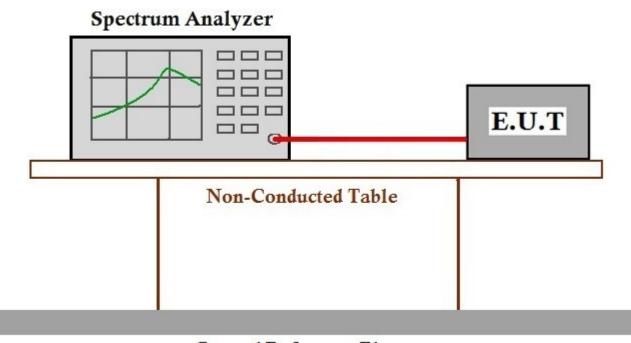
Humidity: 56.6 % RH Temperature: 21.4 °C Atmospheric Pressure: 1000 mbar

Test mode a: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



Ground Reference Plane

7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.6 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

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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7.6.1 E.U.T. Operation

Operating Environment:

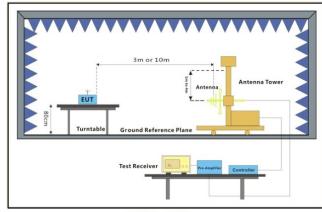
Humidity: 56.6 % RH Temperature: 21.4 °C Atmospheric Pressure: 1000 mbar

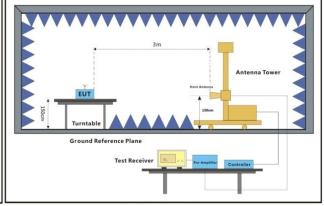
Test mode a:TX mode Keep the EUT in continuously transmitting mode with all modulation

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

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7.6.2 Test Setup Diagram





30MHz-1GHz Above 1GHz



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7.6.3 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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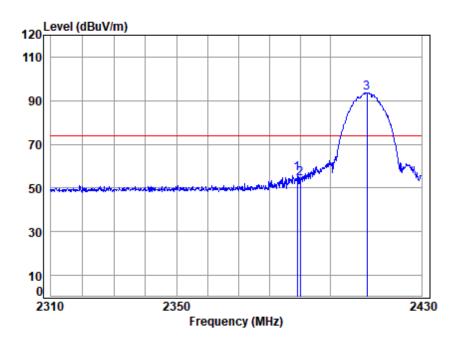
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Report No.: SZEM191202099602

Page: 25 of 107

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2412 Band edge : 2.4G WIFI 11B Note

Freq						Limit Line		Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2389.121 2390.000 * 2412.000	5.47	28.52	40.97	61.36	54.38	74.00	-19.62	peak



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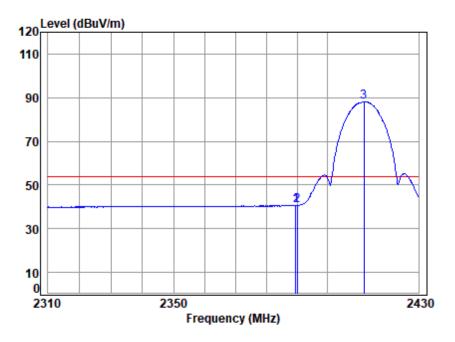
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Mode:a; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

1

Mode : 2412 Band edge : 2.4G WIFI 11B Note

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2389.605 2390.000 * 2412.000	5.47	28.52	40.97	47.58	40.60	54.00	-13.40	_



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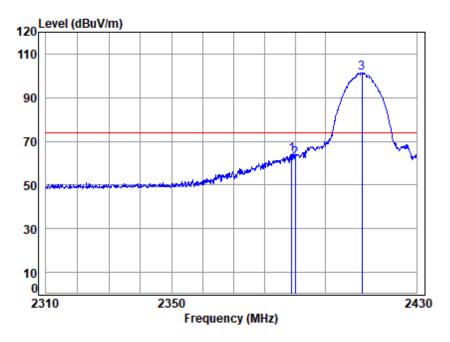
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Mode:a; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11B Note

Freq						Limit Line		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	——dB	
2388.879 2390.000								
* 2412.000								



1 2 3

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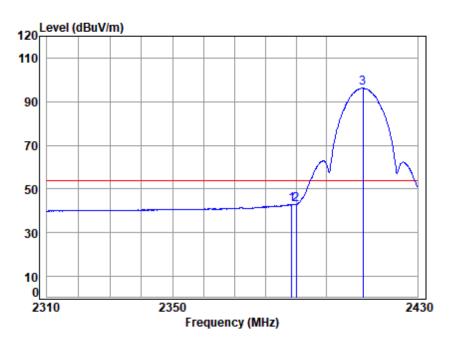
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Mode:a; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11B Note

	Freq				Read Level				Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2390	.000	5.47	28.52	40.97	49.97	42.99	54.00	-11.01	Average Average
									Average Average



1

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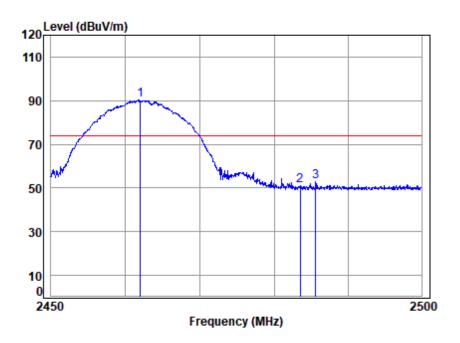
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2462 Band edge : 2.4G WIFI 11B Note

_								
Fr	Cable eq Loss	e Ant s Factor						Remark
	Hz dl	B	dB	dBuV	dBuV/m	dBuV/m	dB	
* 2462.0	00 5.5	7 28.64	41.00	96.98	90.19	74.00	16.19	peak
	00 5.60	28.67	41.01	58.02	51.28	74.00	-22.72	peak



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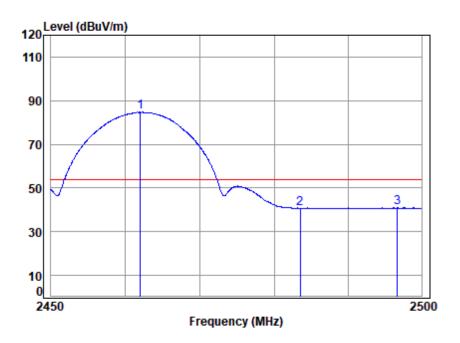
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2462 Band edge · 2.4G WTFT 11B Note

e	: Z.	4G WIF.	T TID							
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
										_
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
*	2462.000	5.57	28.64	41.00	91.52	84.73	54.00	30.73	Average	
	2483.500	5.60	28.67	41.01	47.48	40.74	54.00	-13.26	Average	
	2496.719	5.62	28.69	41.02	47.65	40.94	54.00	-13.06	Average	



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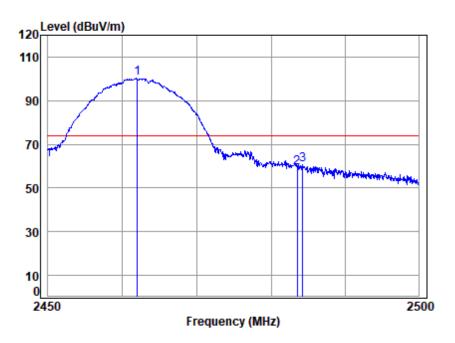
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Mode:a; Polarization: Vertical; Modulation: 802.11b; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2462 Band edge : 2.4G WTFT 11B Note

_		TO WITE	1 110							
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
*	2462.000	5.57	28.64	41.00	107.03	100.24	74.00	26.24	Peak	
	2483.500	5.60	28.67	41.01	65.94	59.20	74.00	-14.80	Peak	
	2484.292	5.60	28.67	41.01	67.22	60.48	74.00	-13.52	Peak	



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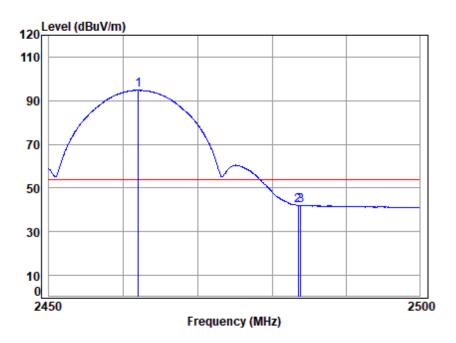
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Mode:a; Polarization: Vertical; Modulation: 802.11b; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2462 Band edge : 2.4G WIFI 11B Note

	Freq					Level			Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 *	2462.000	5.57	28.64	41.00	101.64	94.85	54.00	40.85	Average
2	2483.500	5.60	28.67	41.01	48.70	41.96	54.00	-12.04	Average
3	2483.840	5.60	28.67	41.01	48.75	42.01	54.00	-11.99	Average



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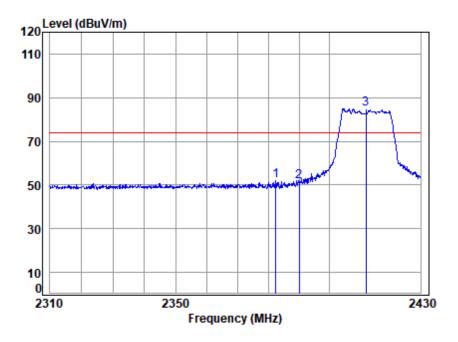
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Mode:a; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

1 2 3

Mode : 2412 Band edge : 2.4G WIFI 11G Note

_										
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
	2382.355	5.46	28.51	40.97	59.15	52.15	74.00	-21.85	peak	
	2390.000	5.47	28.52	40.97	58.75	51.77	74.00	-22.23	peak	
*	2412.000	5.50	28.56	40.98	91.91	84.99	74.00	10.99	peak	



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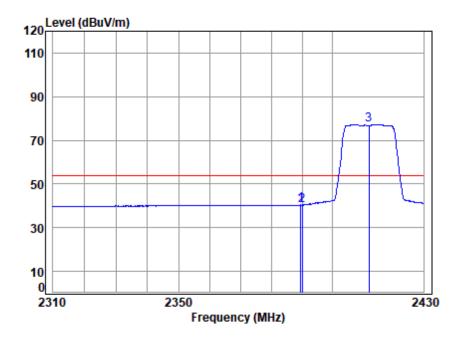
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Mode:a; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11G Note

	Freq			Preamp Factor					Remark
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2389.484	5.47	28.52	40.97	47.42	40.44	54.00	-13.56	Average
2	2390.000	5.47	28.52	40.97	47.27	40.29	54.00	-13.71	Average
3 *	2412.000	5.50	28.56	40.98	84.05	77.13	54.00	23.13	Average



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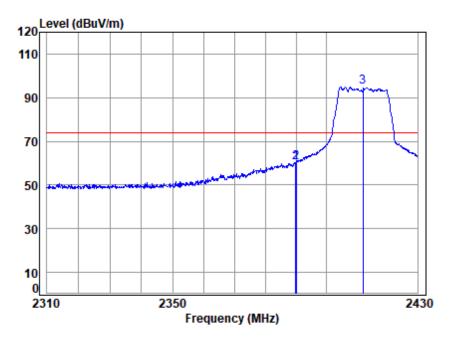
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Mode:a; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11G Note

Freq						Limit Line		Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	——dB	
2389.847 2390.000								
* 2412.000								



1 2 3

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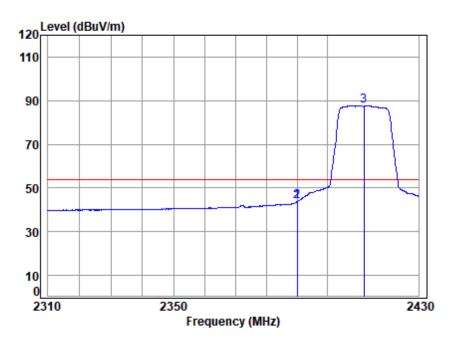
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Report No.: SZEM191202099602

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



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11G Note

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2389.968 2390.000								_
* 2412 000	5 50	28 56	40 98	94 73	87 81	54 00	33 81	Average



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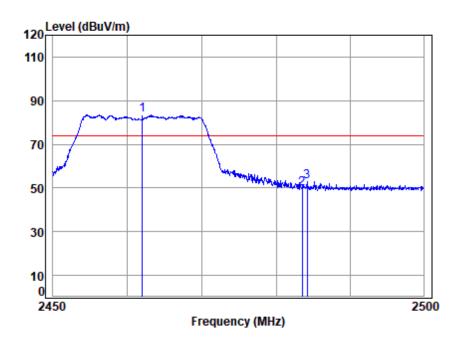
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2462 Band edge : 2.4G WIFI 11G Note

_									
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
*	2462.000	5.57	28.64	41.00	90.25	83.46	74.00	9.46	peak
	2483.500	5.60	28.67	41.01	56.39	49.65	74.00	-24.35	peak
	2484.191	5.60	28.67	41.01	59.56	52.82	74.00	-21.18	peak



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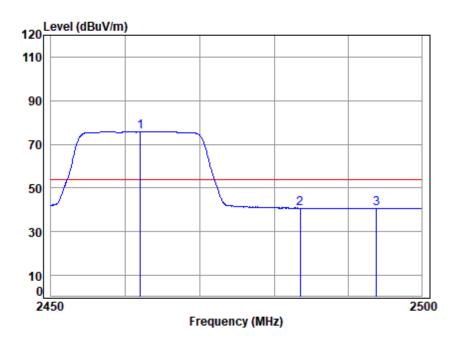
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Mode:a; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2462 Band edge : 2.4G WIFI 11G Note

_										
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
										_
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
*	2462.000	5.57	28.64	41.00	82.75	75.96	54.00	21.96	Average	
	2483.500	5.60	28.67	41.01	47.42	40.68	54.00	-13.32	Average	
	2493.846	5.61	28.69	41.01	47.46	40.75	54.00	-13.25	Average	



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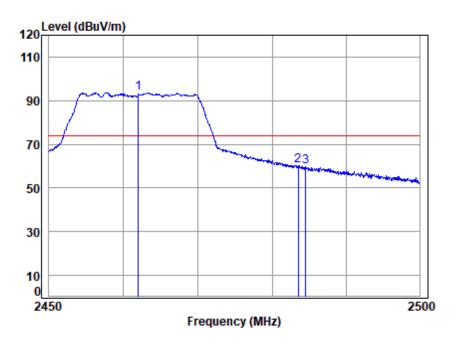
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Mode:a; Polarization: Vertical; Modulation: 802.11g; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2462 Band edge : 2.4G WIFI 11G Note

Freq						Limit Line		Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
* 2462.000 2483.500								
2484.542								



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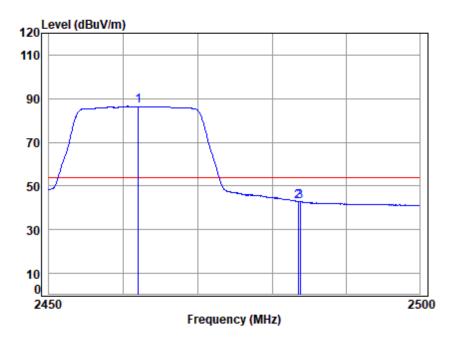
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Mode:a; Polarization: Vertical; Modulation: 802.11g; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2462 Band edge : 2.4G WIFI 11G Note

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
* 2462.000 2483.500								_
2483.790								_



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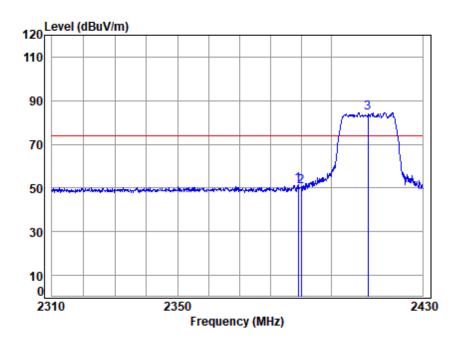
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Mode:a; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

1 2 3

Mode : 2412 Band edge : 2.4G WIFI 11N20 Note

				_					
	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	2389.000								•
	2390.000	5.47	28.52	40.97	57.46	50.48	74.00	-23.52	peak
*	2412.000	5.50	28.56	40.98	91.43	84.51	74.00	10.51	peak



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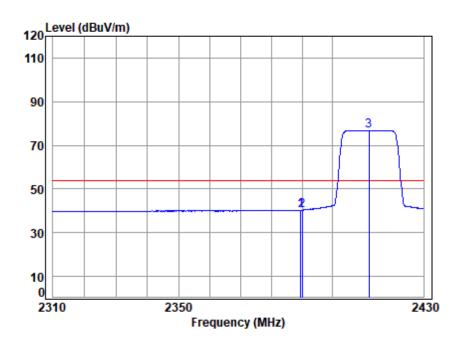
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

1 2 3

Mode : 2412 Band edge : 2.4G WIFI 11N20 Note

				_						
	Freq			Preamp Factor						
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		_
	2389.605	5.47	28.52	40.97	47.35	40.37	54.00	-13.63	Average	
	2390.000	5.47	28.52	40.97	47.30	40.32	54.00	-13.68	Average	
*	2412.000	5.50	28.56	40.98	83.70	76.78	54.00	22.78	Average	



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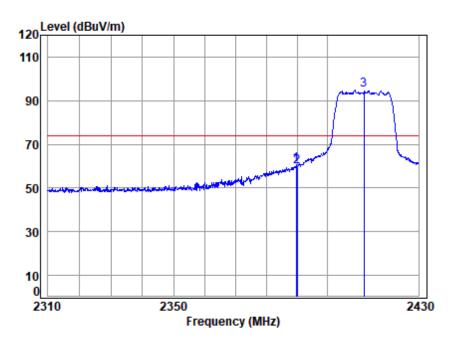
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Report No.: SZEM191202099602

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



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11N20 Note

Freq						Limit Line		Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2389.726 2390.000								
* 2412.000	5.50	28.56	40.98	101.79	94.87	74.00	20.87	Peak



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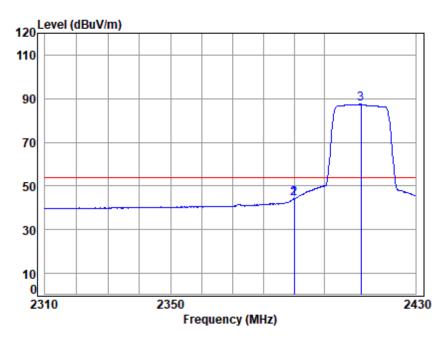
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Mode:a; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 Band edge : 2.4G WIFI 11N20 Note

				_					
	Freq						Limit Line		Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	2389.968	5.47	28.52	40.97	51.06	44.08	54.00	-9.92	Average
	2390.000								_
×	2412.000	5.50	28.56	40.98	94.33	87.41	54.00	33.41	Average



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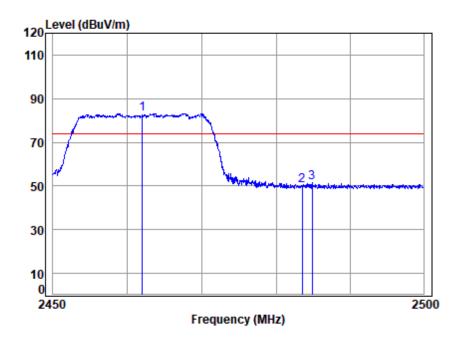
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2462 Band edge : 2.4G WIFI 11N20 Note

				_					
	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
*	2462.000	5.57	28.64	41.00	89.97	83.18	74.00	9.18	peak
	2483.500	5.60	28.67	41.01	56.99	50.25	74.00	-23.75	peak
	2484.844	5.60	28.68	41.01	58.30	51.57	74.00	-22.43	peak



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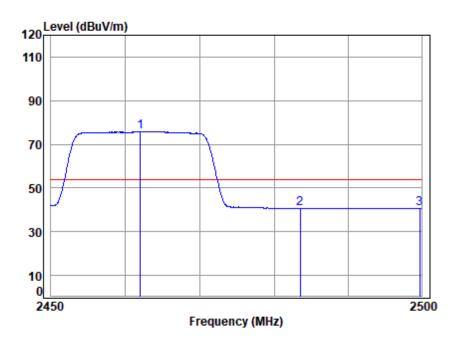
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Mode:a; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

1 2 3

Mode : 2462 Band edge : 2.4G WIFI 11N20 Note

_				-						
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
										_
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
*	2462.000	5.57	28.64	41.00	82.56	75.77	54.00	21.77	Average	
	2483.500	5.60	28.67	41.01	47.24	40.50	54.00	-13.50	Average	
	2499.748	5.62	28.70	41.02	47.38	40.68	54.00	-13.32	Average	



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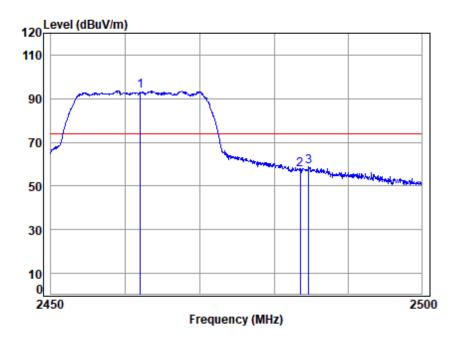
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Mode:a; Polarization: Vertical; Modulation: 802.11n; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2462 Band edge : 2.4G WIFI 11N20 Note

Freq						Limit Line		Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 * 2462.000 2 2483.500 3 2484.693	5.60	28.67	41.01	64.16	57.42	74.00	-16.58	Peak



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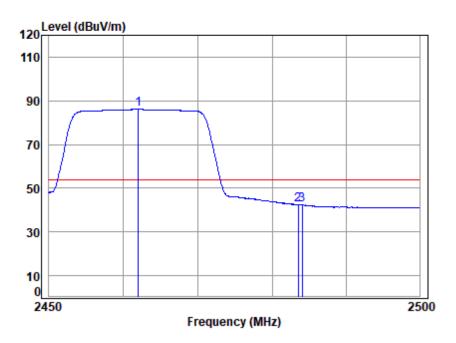
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Mode:a; Polarization: Vertical; Modulation: 802.11n; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2462 Band edge : 2.4G WIFI 11N20 Note

				_						
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
										_
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
*	2462.000	5.57	28.64	41.00	92.99	86.20	54.00	32.20	Average	
2	2483.500	5.60	28.67	41.01	49.08	42.34	54.00	-11.66	Average	
;	2484.041	5.60	28.67	41.01	49.22	42.48	54.00	-11.52	Average	



1 2 3

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7.7 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

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:

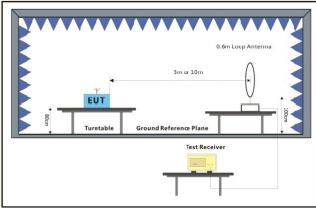
Atmospheric Pressure: 1000 mbar Humidity: 56.6 % RH Temperature: 21.4 °C

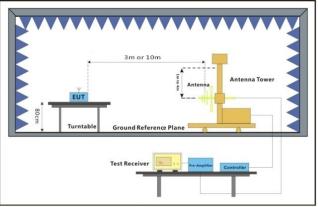
Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation

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.

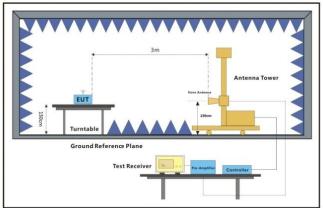
7.7.2 Test Setup Diagram





Below 30MHz

30MHz-1GHz



Above 1GHz



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7.7.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

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

- 3) 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.
- 4) 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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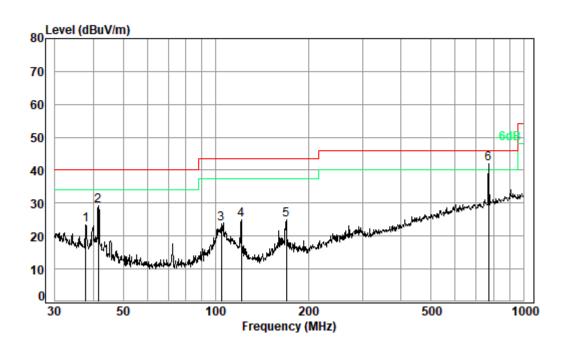


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30MHz~1GHz

Mode: a; Polarization: Horizontal



Condition: 3m HORIZONTAL

Job No. : 20996CR

Test mode: a

	Freq	Ant Factor	Cable Loss					Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.81	18.48	0.60	32.20	23.57	40.00	-16.43	QP
2	41.57	16.93	0.63	39.41	29.27	40.00	-10.73	QP
3	104.17	13.80	1.21	36.30	23.70	43.50	-19.80	QP
4	121.12	13.14	1.26	38.08	24.97	43.50	-18.53	QP
5	169.60	15.70	1.35	35.17	24.94	43.50	-18.56	QP
6 рр	768.75	28.32	3.11	38.32	41.97	46.00	-4.03	QP



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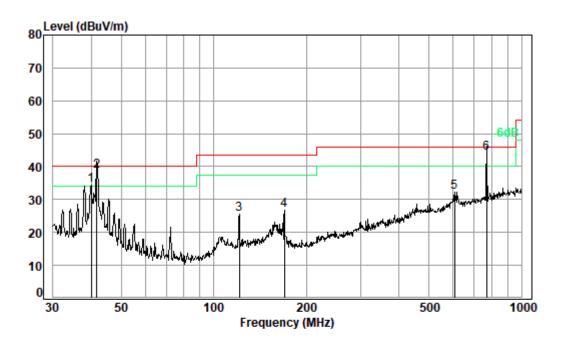
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Mode: a; Polarization: Vertical



Condition: 3m VERTICAL Job No. : 20996CR

Test mode: a

	Freq	Ant Factor	Cable Loss					
_	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	39.99	17.50	0.60	43.89	34.28	40.00	-5.72	QP
	41.71	16.88	0.64	48.78	38.60	40.00	-1.40	QP
3	121.12	13.14	1.26	38.68	25.57	43.50	-17.93	QP
4	169.60	15.70	1.35	37.03	26.80	43.50	-16.70	QP
5	605.66	26.68	2.71	31.06	32.29	46.00	-13.71	QP
6	768.75	28.32	3.11	40.50	44.15	46.00	-1.85	OP



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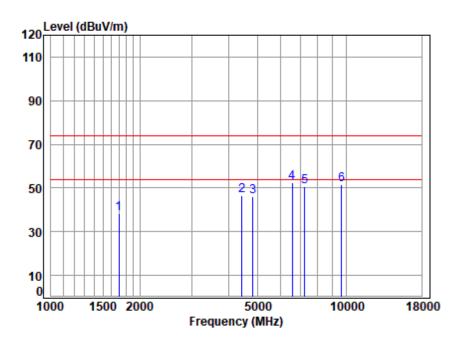


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Above 1GHz

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



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

Mode : 2412 TX RSE Note : 2.4G WIFI 11B

		10 111	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1697.129	5.23	26.66	40.63	47.23	38.49	74.00	-35.51	peak
2	4430.628	7.48	33.48	42.50	48.09	46.55	74.00	-27.45	peak
3	4824.000	7.91	34.00	42.78	46.87	46.00	74.00	-28.00	peak
4	6564.209	11.35	35.64	41.92	47.34	52.41	74.00	-21.59	peak
5	7236.000	10.07	36.09	41.56	45.98	50.58	74.00	-23.42	peak
6	9648.000	10.77	37.69	38.51	41.52	51.47	74.00	-22.53	peak



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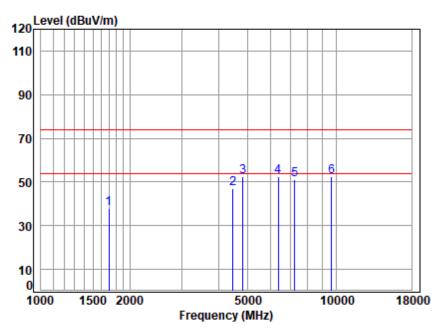
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Mode:a; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2412 TX RSE : 2.4G WTFT 11B Note

,,,,	. 2	TO WITE	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1702.042	5.23	26.68	40.63	46.63	37.91	74.00	-36.09	peak
2	4469.214	7.53	33.55	42.53	48.24	46.79	74.00	-27.21	peak
3	4824.000	7.91	34.00	42.78	53.27	52.40	74.00	-21.60	peak
4	6377.195	11.31	35.48	42.02	47.86	52.63	74.00	-21.37	peak
5	7236.000	10.07	36.09	41.56	46.28	50.88	74.00	-23.12	peak
6	9648.000	10.77	37.69	38.51	42.64	52.59	74.00	-21.41	peak



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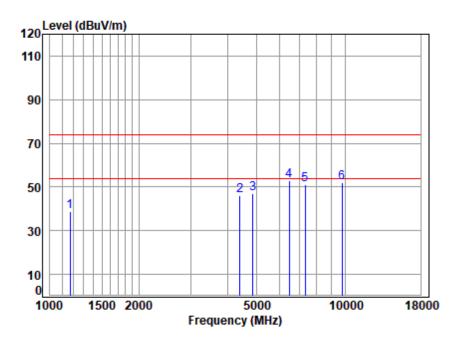
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Mode:a; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

Mode : 2437 TX RSE Note : 2.4G WIFI 11B

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1168.920	4.29	24.45	40.26	50.32	38.80	74.00	-35.20	peak
2	4405.090	7.46	33.44	42.48	47.85	46.27	74.00	-27.73	peak
3	4874.000	7.96	34.05	42.82	48.02	47.21	74.00	-26.79	peak
4	6470.026	11.48	35.57	41.97	47.92	53.00	74.00	-21.00	peak
5	7311.000	10.05	36.15	41.53	46.63	51.30	74.00	-22.70	peak
6	9748.000	10.82	37.75	38.37	41.63	51.83	74.00	-22.17	peak



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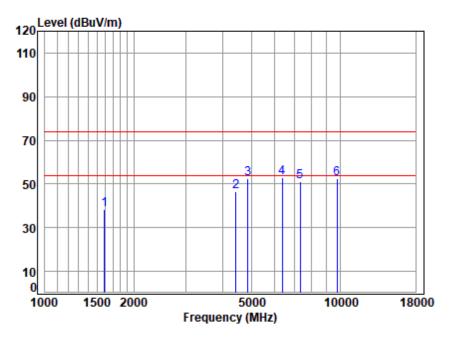
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Report No.: SZEM191202099602

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



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2437 TX RSE : 2.4G WIFI 11B Note

		10 111	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1592.571	5.36	26.22	40.57	47.23	38.24	74.00	-35.76	peak
2	4443.453	7.50	33.50	42.51	48.09	46.58	74.00	-27.42	peak
3	4874.000	7.96	34.05	42.82	53.07	52.26	74.00	-21.74	peak
4	6358.789	11.27	35.46	42.03	48.08	52.78	74.00	-21.22	peak
5	7311.000	10.05	36.15	41.53	46.24	50.91	74.00	-23.09	peak
6	9748.000	10.82	37.75	38.37	42.18	52.38	74.00	-21.62	peak



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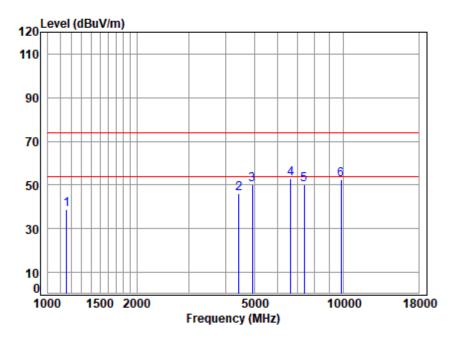
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

Mode : 2462 TX RSE Note : 2.4G WIFI 11B

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1155.483	4.24	24.38	40.24	50.57	38.95	74.00	-35.05	peak
2	4430.628	7.48	33.48	42.50	47.59	46.05	74.00	-27.95	peak
3	4924.000	8.01	34.11	42.85	50.89	50.16	74.00	-23.84	peak
4	6640.542	11.13	35.69	41.87	48.02	52.97	74.00	-21.03	peak
5	7386.000	10.03	36.21	41.49	45.55	50.30	74.00	-23.70	peak
6	9848.000	10.87	37.81	38.22	42.09	52.55	74.00	-21.45	peak



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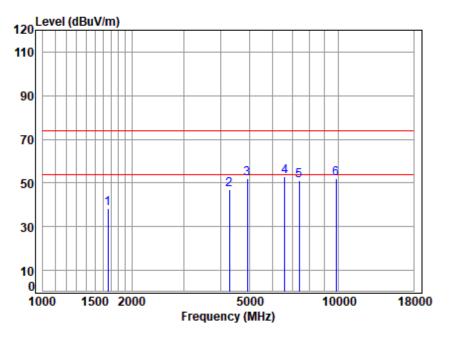
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Mode:a; Polarization: Vertical; Modulation: 802.11b; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2462 TX RSE : 2.4G WIFI 11B Note

	. 2	TO WILL	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1658.337	5.28	26.50	40.61	47.19	38.36	74.00	-35.64	peak
2	4291.977	7.33	33.24	42.39	48.79	46.97	74.00	-27.03	peak
3	4924.000	8.01	34.11	42.85	52.59	51.86	74.00	-22.14	peak
4	6583.209	11.30	35.65	41.91	47.75	52.79	74.00	-21.21	peak
5	7386.000	10.03	36.21	41.49	46.16	50.91	74.00	-23.09	peak
6	9848.000	10.87	37.81	38.22	41.78	52.24	74.00	-21.76	peak



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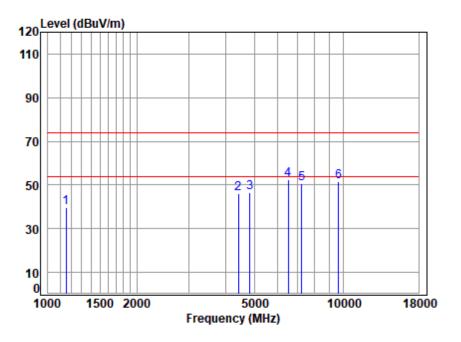
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Report No.: SZEM191202099602

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



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

Mode : 2412 TX RSE : 2.4G WIFI 11G Note

		10 111	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1152.148	4.22	24.37	40.24	51.45	39.80	74.00	-34.20	peak
2	4417.841	7.47	33.46	42.49	47.84	46.28	74.00	-27.72	peak
3	4824.000	7.91	34.00	42.78	47.59	46.72	74.00	-27.28	peak
4	6507.536	11.52	35.60	41.95	47.21	52.38	74.00	-21.62	peak
5	7236.000	10.07	36.09	41.56	46.03	50.63	74.00	-23.37	peak
6	9648.000	10.77	37.69	38.51	41.78	51.73	74.00	-22.27	peak



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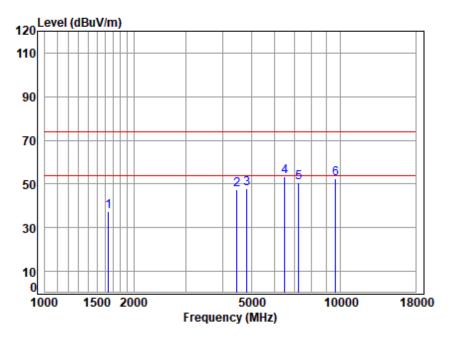
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Report No.: SZEM191202099602

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



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2412 TX RSE : 2.4G WIFI 11G Note

,,,,	. 2	TO WILL	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1639.274	5.30	26.42	40.59	46.15	37.28	74.00	-36.72	peak
2	4469.214	7.53	33.55	42.53	48.80	47.35	74.00	-26.65	peak
3	4824.000	7.91	34.00	42.78	48.59	47.72	74.00	-26.28	peak
4	6488.754	11.52	35.59	41.96	48.26	53.41	74.00	-20.59	peak
5	7236.000	10.07	36.09	41.56	46.08	50.68	74.00	-23.32	peak
6	9648.000	10.77	37.69	38.51	42.44	52.39	74.00	-21.61	peak



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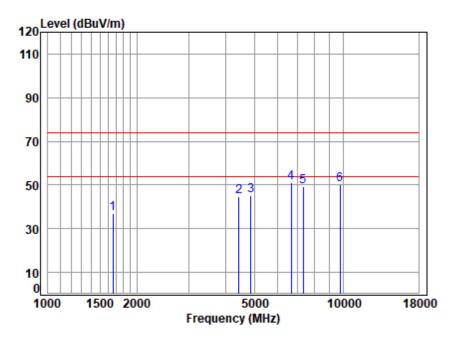
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Mode:a; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

Mode : 2437 TX RSE Note : 2.4G WIFI 11G

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1663.137	5.27	26.52	40.61	45.69	36.87	74.00	-37.13	peak
2	4443.453	7.50	33.50	42.51	46.37	44.86	74.00	-29.14	peak
3	4874.000	7.96	34.05	42.82	46.09	45.28	74.00	-28.72	peak
4	6659.763	11.08	35.70	41.86	46.32	51.24	74.00	-22.76	peak
5	7311.000	10.05	36.15	41.53	44.73	49.40	74.00	-24.60	peak
6	9748.000	10.82	37.75	38.37	40.11	50.31	74.00	-23.69	peak



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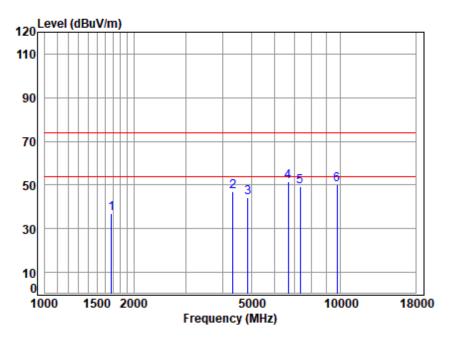
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Mode:a; Polarization: Vertical; Modulation: 802.11g; bandwidth: 20MHz; Channel: middle



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2437 TX RSE : 2.4G WIFI 11G Note

		10 111	1 110						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1677.621	5.25	26.58	40.62	45.59	36.80	74.00	-37.20	peak
2	4329.354	7.37	33.30	42.42	48.96	47.21	74.00	-26.79	peak
3	4874.000	7.96	34.05	42.82	44.98	44.17	74.00	-29.83	peak
4	6659.763	11.08	35.70	41.86	46.66	51.58	74.00	-22.42	peak
5	7311.000	10.05	36.15	41.53	44.75	49.42	74.00	-24.58	peak
6	9748.000	10.82	37.75	38.37	40.08	50.28	74.00	-23.72	peak



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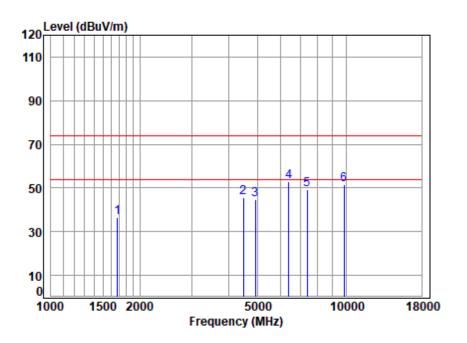
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Mode:a; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

Mode : 2462 TX RSE : 2.4G WIFI 11G Note

IOCC	. 2.40 WITT 110										
		Cable	Ant	Preamp	Read		Limit	0ver			
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark		
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB			
1	1682.477	5.25	26.60	40.62	45.09	36.32	74.00	-37.68	peak		
2	4495.125	7.55	33.59	42.55	47.11	45.70	74.00	-28.30	peak		
3	4924.000	8.01	34.11	42.85	45.58	44.85	74.00	-29.15	peak		
4	6395.654	11.34	35.50	42.01	47.95	52.78	74.00	-21.22	peak		
5	7386.000	10.03	36.21	41.49	44.36	49.11	74.00	-24.89	peak		
6	9848.000	10.87	37.81	38.22	41.12	51.58	74.00	-22.42	peak		



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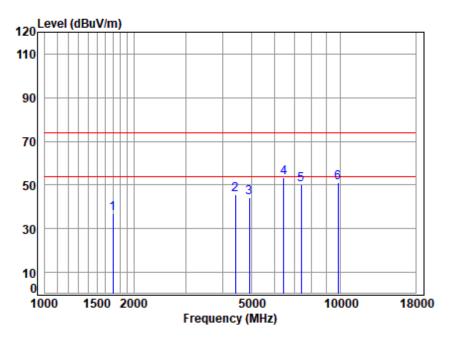
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Mode:a; Polarization: Vertical; Modulation: 802.11g; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL : 20996CR Job No

Mode : 2462 TX RSE Note : 2.4G WIFI 11G

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1702.042	5.23	26.68	40.63	45.64	36.92	74.00	-37.08	peak
2	4417.841	7.47	33.46	42.49	47.35	45.79	74.00	-28.21	peak
3	4924.000	8.01	34.11	42.85	45.10	44.37	74.00	-29.63	peak
4	6451.353	11.45	35.55	41.98	48.18	53.20	74.00	-20.80	peak
5	7386.000	10.03	36.21	41.49	45.30	50.05	74.00	-23.95	peak
6	9848.000	10.87	37.81	38.22	40.86	51.32	74.00	-22.68	peak



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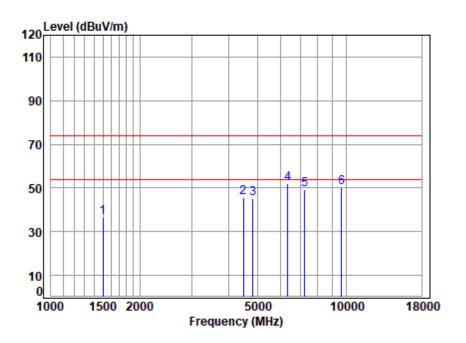
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Mode:a; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20996CR

Mode : 2412 TX RSE

Note : 2.4G WIFI 11N20

				_					
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1503.119	5.48	25.81	40.51	45.72	36.50	74.00	-37.50	peak
2	4482.150	7.54	33.57	42.54	47.04	45.61	74.00	-28.39	peak
3	4824.000	7.91	34.00	42.78	46.02	45.15	74.00	-28.85	peak
4	6340.436	11.24	35.44	42.04	47.18	51.82	74.00	-22.18	peak
5	7236.000	10.07	36.09	41.56	44.61	49.21	74.00	-24.79	peak
6	9648.000	10.77	37.69	38.51	40.44	50.39	74.00	-23.61	peak



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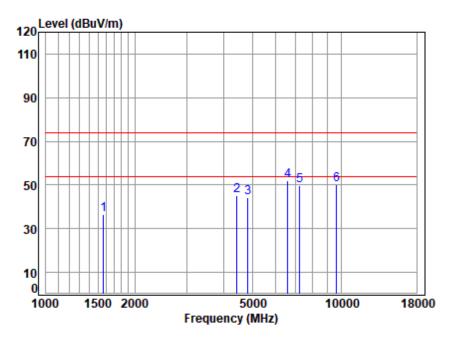
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Mode:a; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2412 TX RSE

Note : 2.4G WIFI 11N20

		Cable	Ant	Preamp	Read		Limit	0ver			
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark		
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB			
1	1565.191	5.39	26.10	40.55	45.45	36.39	74.00	-37.61	peak		
2	4430.628	7.48	33.48	42.50	46.54	45.00	74.00	-29.00	peak		
3	4824.000	7.91	34.00	42.78	45.30	44.43	74.00	-29.57	peak		
4	6602.265	11.24	35.66	41.89	47.02	52.03	74.00	-21.97	peak		
5	7236.000	10.07	36.09	41.56	44.93	49.53	74.00	-24.47	peak		
6	9648.000	10.77	37.69	38.51	40.06	50.01	74.00	-23.99	peak		



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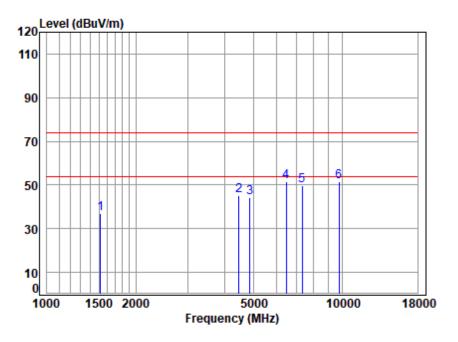
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Mode:a; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

Mode : 2437 TX RSE

Note : 2.4G WIFI 11N20

		Cable	Ant	Preamp	Read		Limit	0ver				
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark			
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB				
	4500 500	- 4-	25.00	40.50	45.04	26.76	74.00	27.04				
1	1520.598	5.45	25.89	40.52	45.94	36.76	74.00	-3/.24	peak			
2	4469.214	7.53	33.55	42.53	46.54	45.09	74.00	-28.91	peak			
3	4874.000	7.96	34.05	42.82	45.03	44.22	74.00	-29.78	peak			
4	6470.026	11.48	35.57	41.97	46.33	51.41	74.00	-22.59	peak			
5	7311.000	10.05	36.15	41.53	45.05	49.72	74.00	-24.28	peak			
6	9748.000	10.82	37.75	38.37	41.46	51.66	74.00	-22.34	peak			



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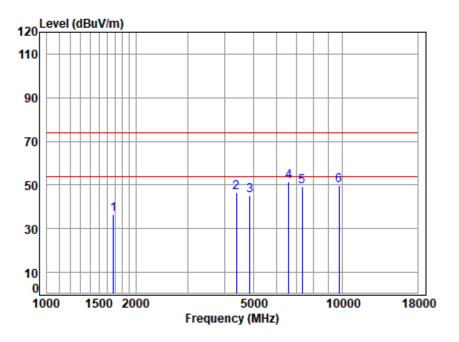
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Mode:a; Polarization: Vertical; Modulation: 802.11n; bandwidth: 20MHz; Channel: middle



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2437 TX RSE

Note : 2.4G WIFI 11N20

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1677.621	5.25	26.58	40.62	45.08	36.29	74.00	-37.71	peak
2	4392.376	7.44	33.42	42.47	48.12	46.51	74.00	-27.49	peak
3	4874.000	7.96	34.05	42.82	45.86	45.05	74.00	-28.95	peak
4	6602.265	11.24	35.66	41.89	46.36	51.37	74.00	-22.63	peak
5	7311.000	10.05	36.15	41.53	44.71	49.38	74.00	-24.62	peak
6	9748.000	10.82	37.75	38.37	39.66	49.86	74.00	-24.14	peak



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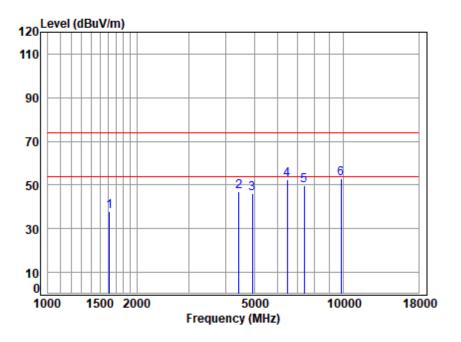
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Mode:a; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 20996CR Job No

Mode : 2462 TX RSE

Note : 2.4G WIFI 11N20

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	——dB	
1	1615.754	5.33	26.32	40.58	46.87	37.94	74.00	-36.06	peak
2	4430.628	7.48	33.48	42.50	48.40	46.86	74.00	-27.14	peak
3	4924.000	8.01	34.11	42.85	47.04	46.31	74.00	-27.69	peak
4	6470.026	11.48	35.57	41.97	47.48	52.56	74.00	-21.44	peak
5	7386.000	10.03	36.21	41.49	45.06	49.81	74.00	-24.19	peak
6	9848,000	10.87	37.81	38.22	42.63	53.09	74.00	-20.91	neak



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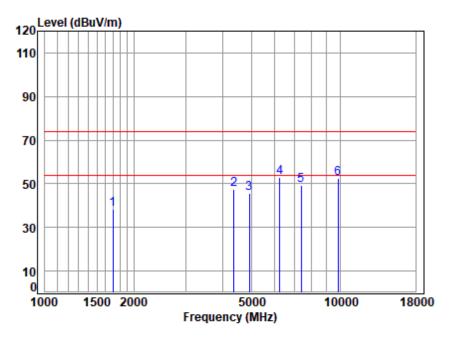
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Mode:a; Polarization: Vertical; Modulation: 802.11n; bandwidth: 20MHz; Channel: High



Site : chamber Condition: 3m VERTICAL Job No : 20996CR

Mode : 2462 TX RSE

: 2.4G WIFI 11N20 Note

				_					
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1702.042	5.23	26.68	40.63	46.99	38.27	74.00	-35.73	peak
2	4367.058	7.41	33.37	42.45	48.96	47.29	74.00	-26.71	peak
3	4924.000	8.01	34.11	42.85	46.42	45.69	74.00	-28.31	peak
4	6249.464	11.06	35.35	42.09	48.82	53.14	74.00	-20.86	peak
5	7386.000	10.03	36.21	41.49	44.59	49.34	74.00	-24.66	peak
6	9848.000	10.87	37.81	38.22	41.83	52.29	74.00	-21.71	peak



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8 **Photographs**

8.1 Test Setup

Refer to Setup Photos

8.2 EUT Constructional Details (EUT Photos)

Refer to EUT external and internal photos



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Appendix 9

9.1 Appendix 15.247

1.6dB Bandwidth

Test Mode	Test	Ant	EBW[MHz]	Limit[MHz]	Verdict
11B	2412	Ant1	8.160	>=0.5	PASS
11B	2437	Ant1	8.220	>=0.5	PASS
11B	2462	Ant1	8.130	>=0.5	PASS
11G	2412	Ant1	16.320	>=0.5	PASS
11G	2437	Ant1	16.500	>=0.5	PASS
11G	2462	Ant1	16.500	>=0.5	PASS
11N20SISO	2412	Ant1	17.760 >=0		PASS
11N20SISO	2437	Ant1	17.790 >=0.5		PASS
11N20SISO	2462	Ant1	17.790	>=0.5	PASS



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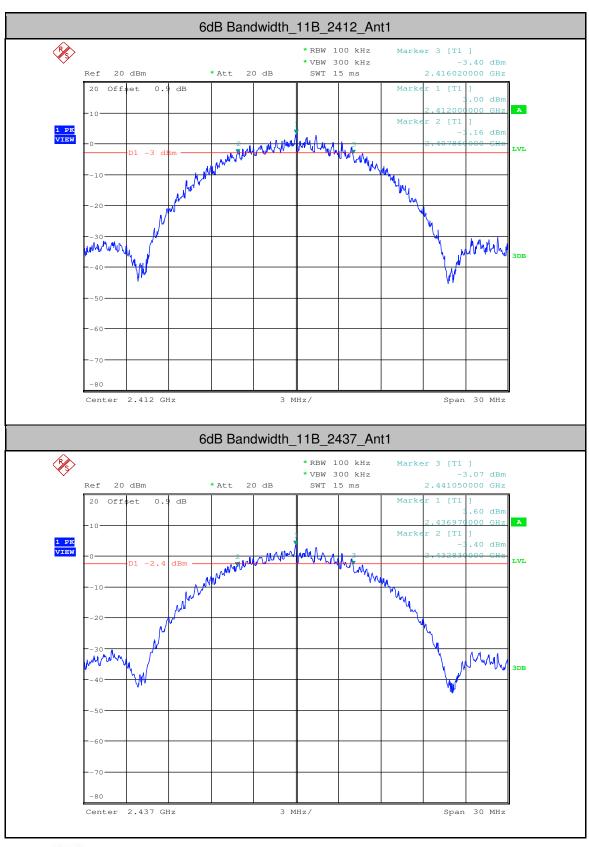
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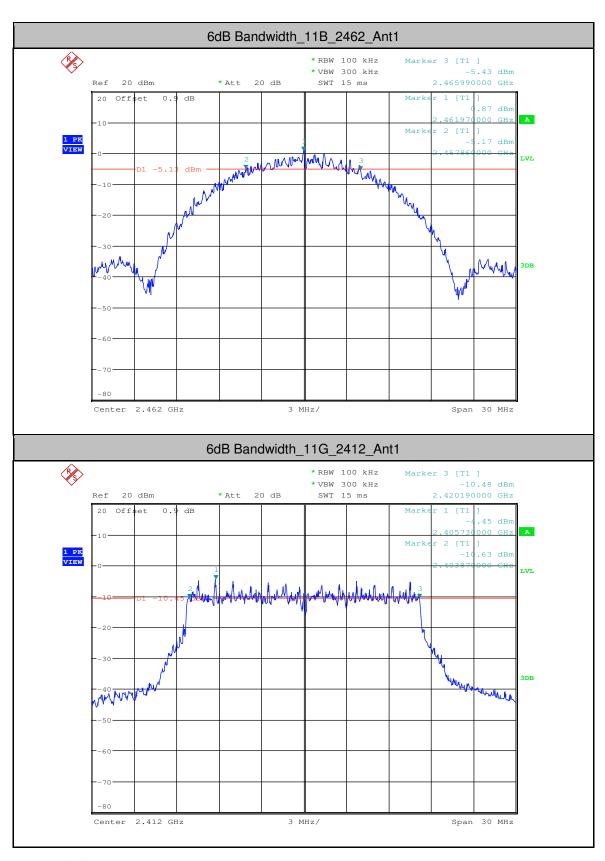
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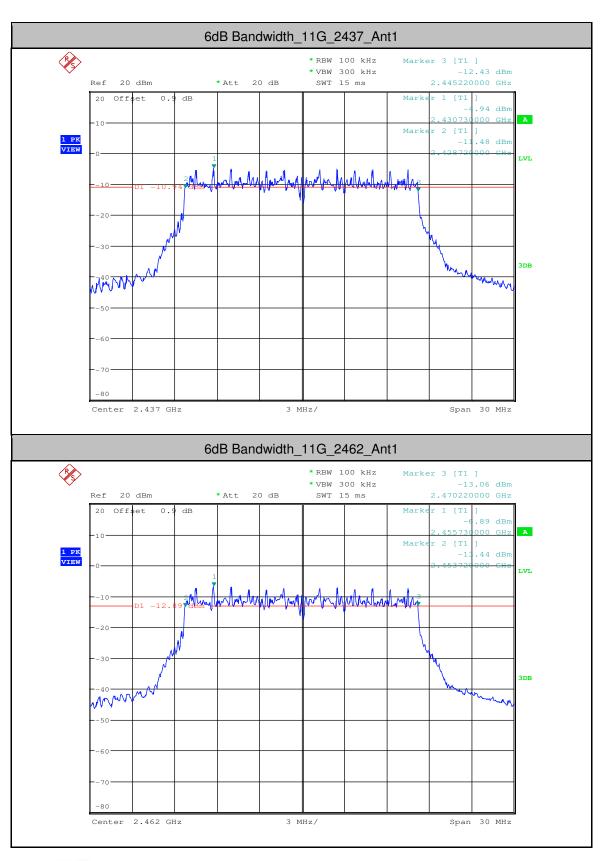
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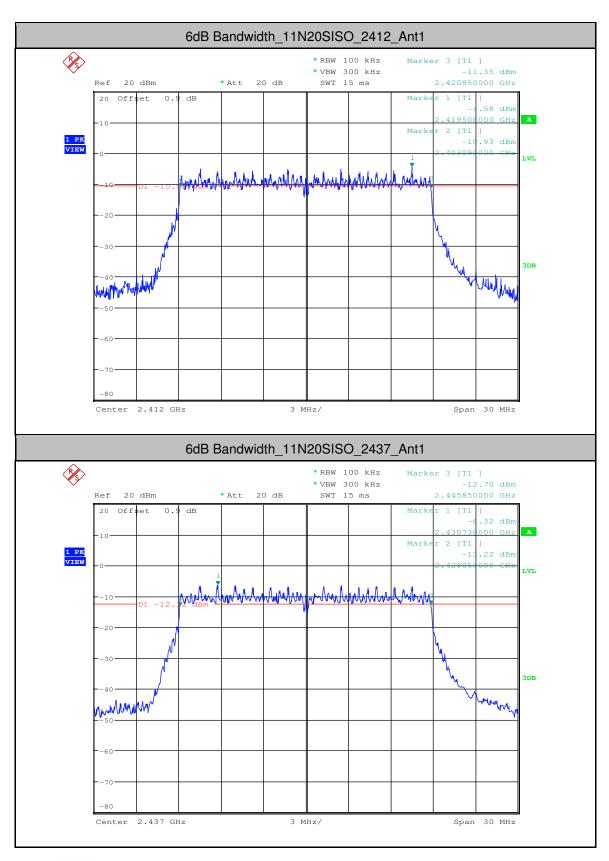
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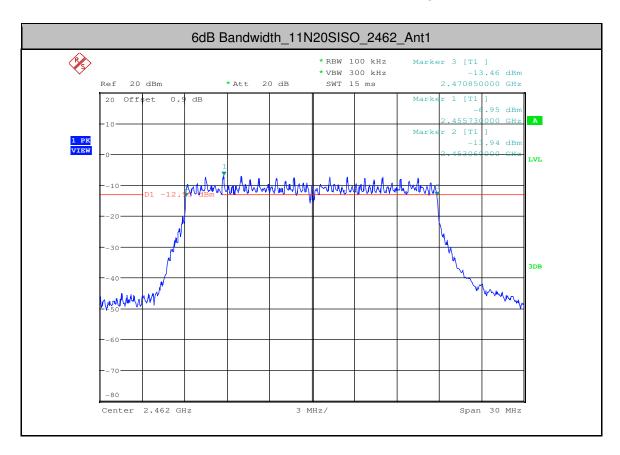
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2.Maximum peak conducted output power

Test Mode	Test Channel	Ant	Power[dBm]	Limit[dBm]	Verdict
11B	2412	Ant1	17.8	<30	PASS
11B	2437	Ant1	18.09	<30	PASS
11B	2462	Ant1	15.57	<30	PASS
11G	2412	Ant1	13.64	<30	PASS
11G	2437	Ant1	13.29	<30	PASS
11G	2462	Ant1	14.82	<30	PASS
11N20SISO	2412	Ant1	16.24	<30	PASS
11N20SISO	2437	Ant1	13.88	<30	PASS
11N20SISO	2462	Ant1	15.14	<30	PASS



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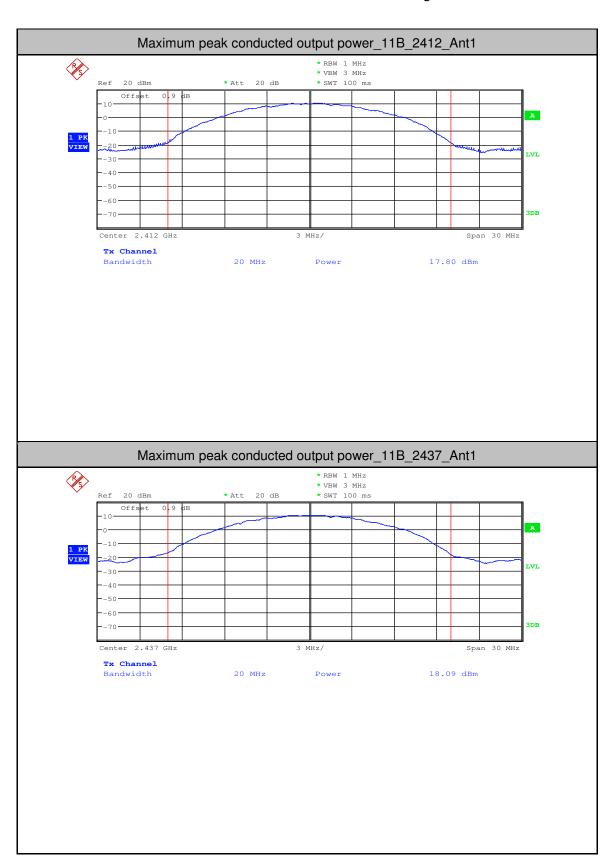
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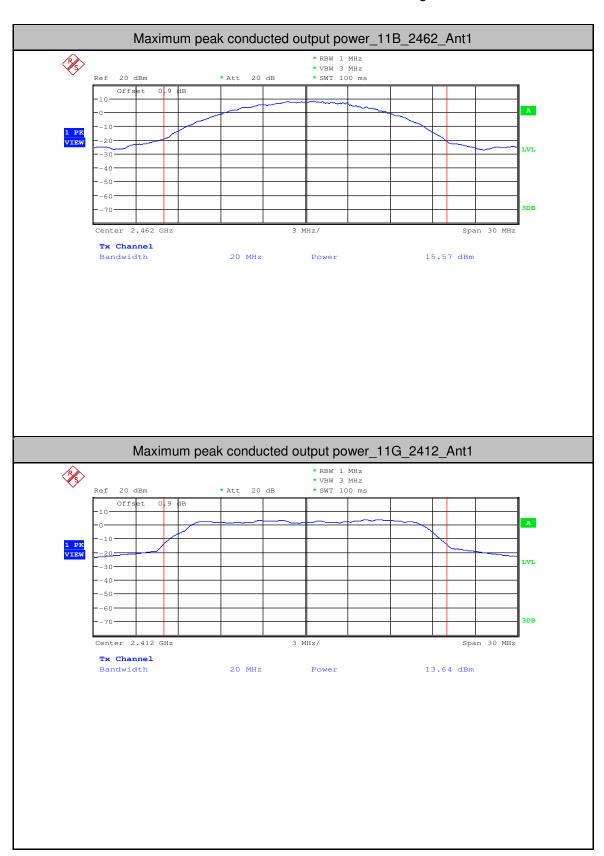
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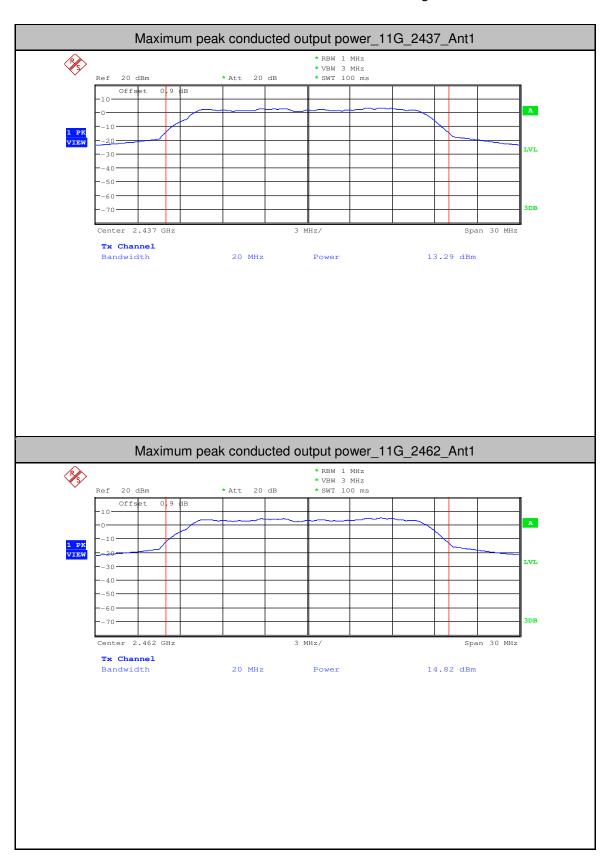
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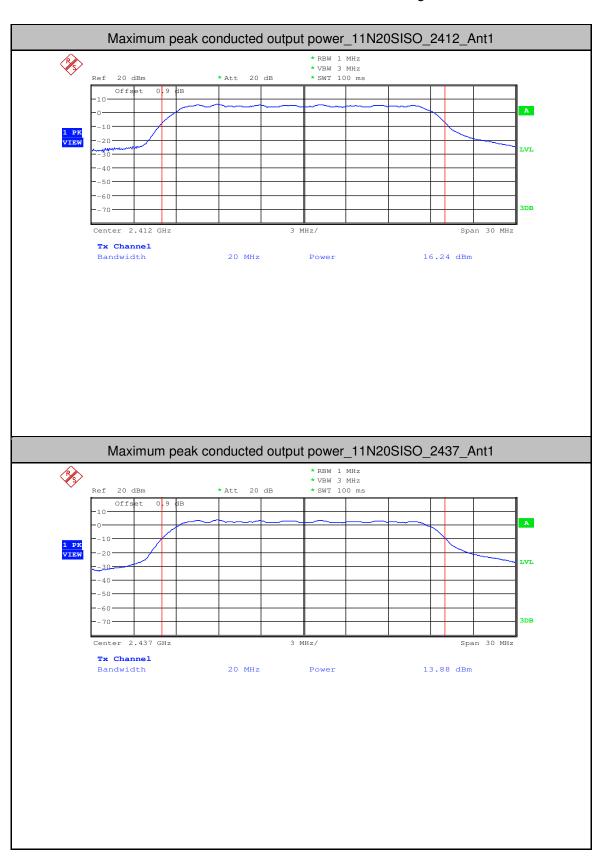
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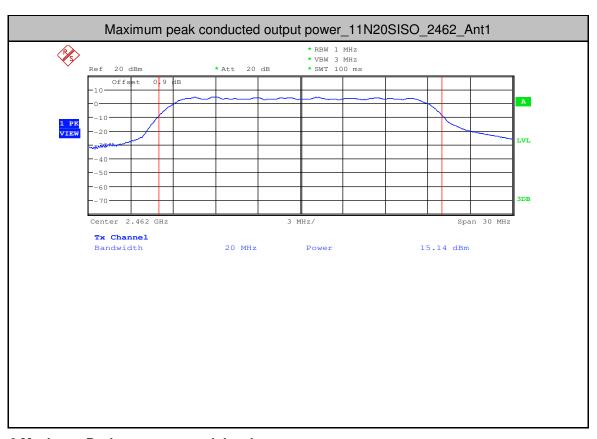
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3. Maximum Peak power spectral density

Test Mode	Test Channel	Ant	PSD[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	2412	Ant1	-8.1	<8.00	PASS
11B	2437	Ant1	-8.82	<8.00	PASS
11B	2462	Ant1	-11.24	<8.00	PASS
11G	2412	Ant1	-12.11	<8.00	PASS
11G	2437	Ant1	-12.7	<8.00	PASS
11G	2462	Ant1	-11.17	<8.00	PASS
11N20SISO	2412	Ant1	-10.95	<8.00	PASS
11N20SISO	2437	Ant1	-12.08	<8.00	PASS
11N20SISO	2462	Ant1	-10.74	<8.00	PASS



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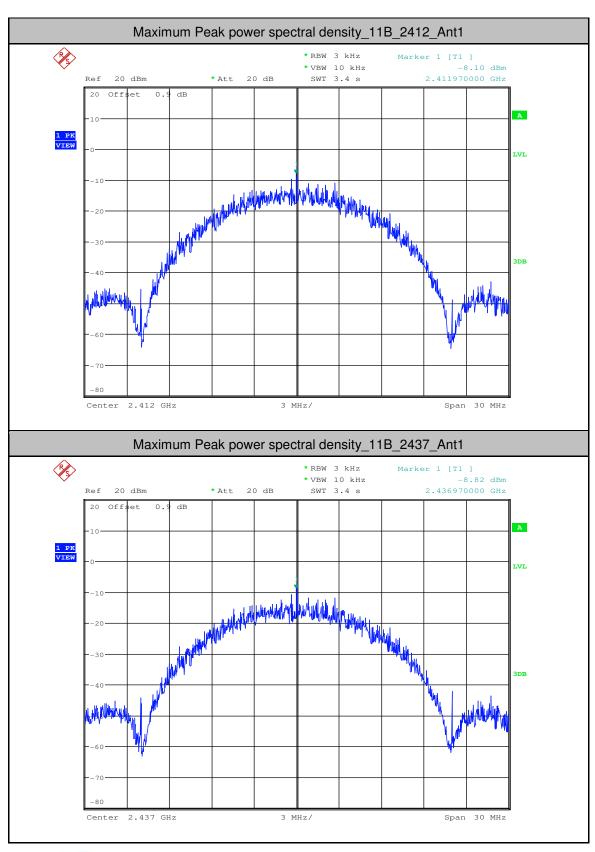
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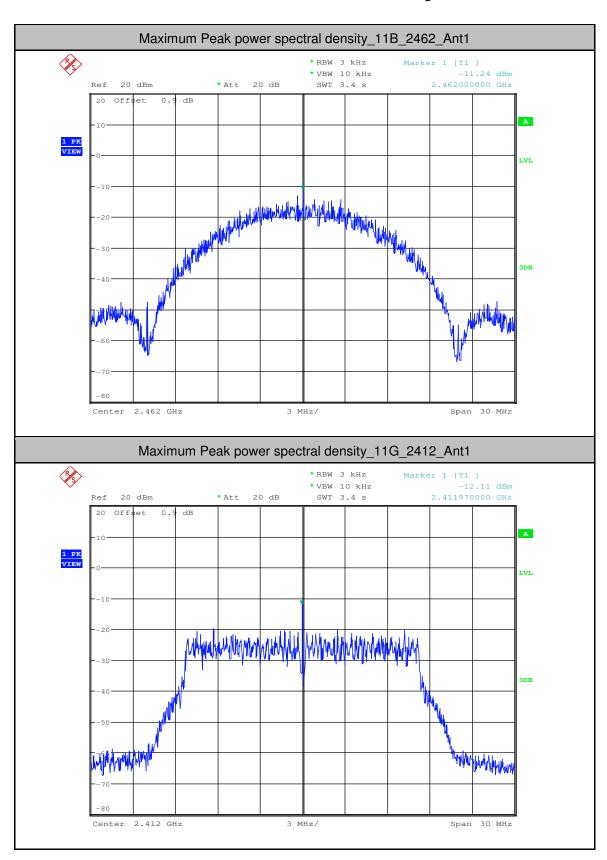
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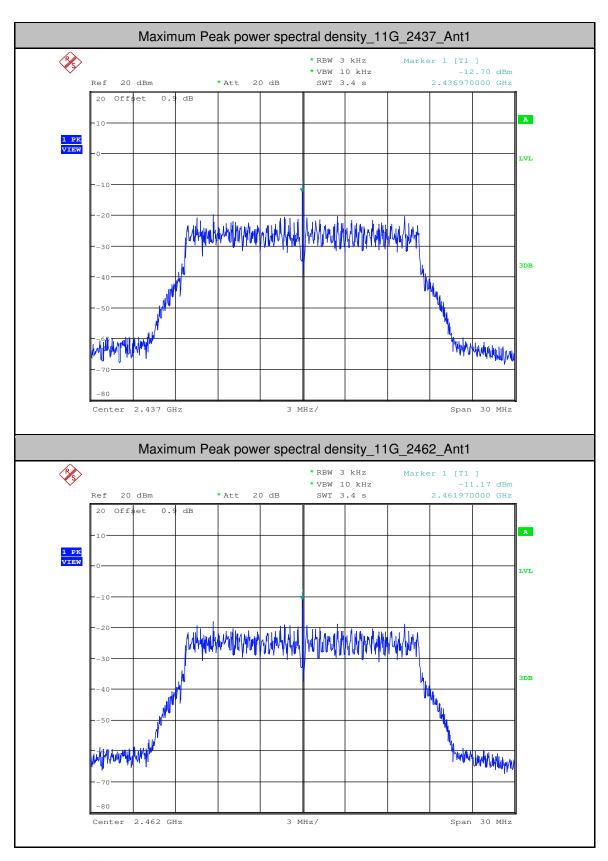
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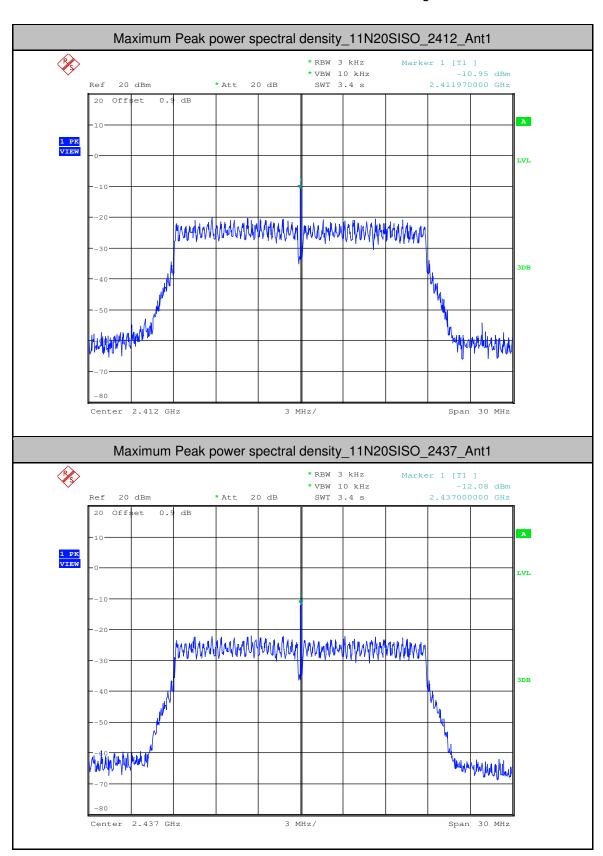
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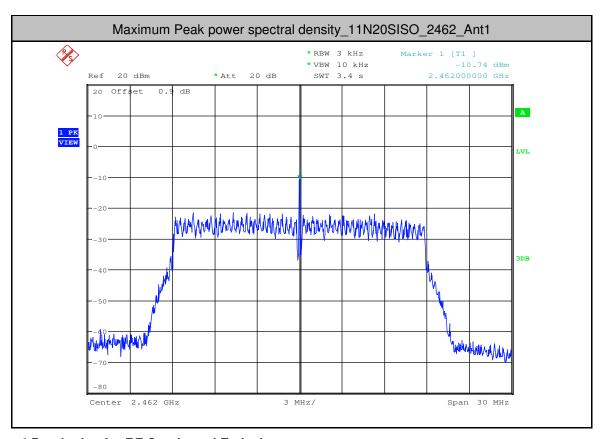
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4.Band-edge for RF Conducted Emissions

Test Mode	Test Channel	Ant	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B	2412	Ant1	3.490	-46.392	<-16.51	PASS
11B	2462	Ant1	0.840	-50.382	<-19.16	PASS
11G	2412	Ant1	-6.050	-46.389	<-26.05	PASS
11G	2462	Ant1	-4.790	-46.259	<-24.79	PASS
11N20SISO	2412	Ant1	-6.260	-51.327	<-26.26	PASS
11N20SISO	2462	Ant1	-6.960	-51.367	<-26.96	PASS



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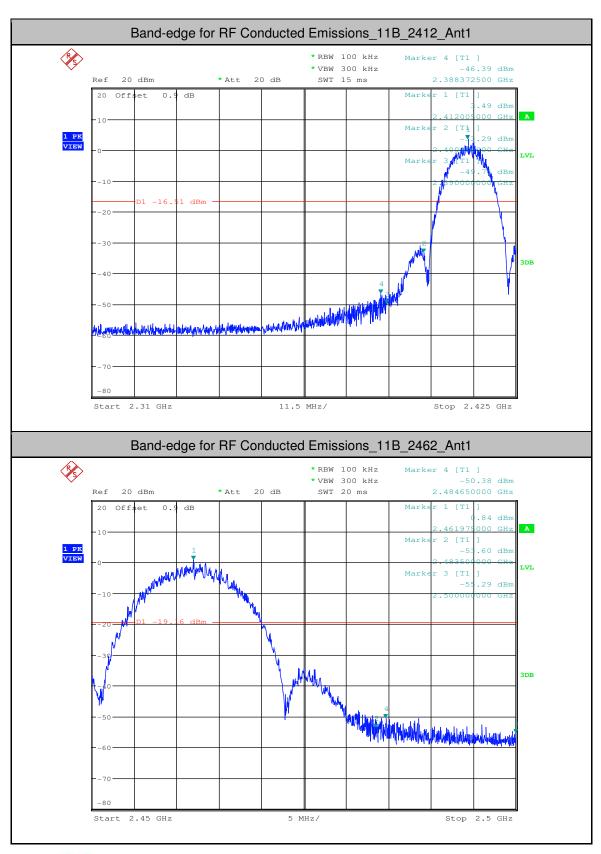
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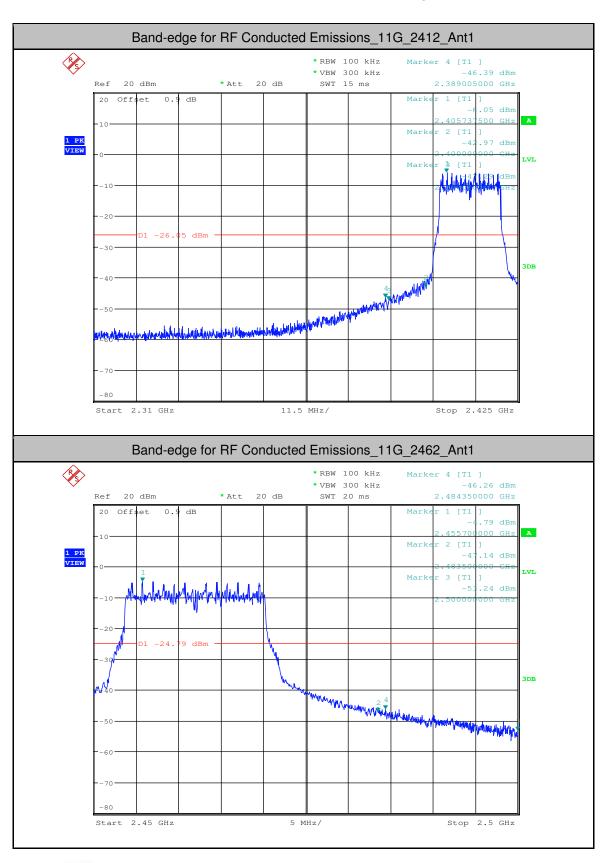
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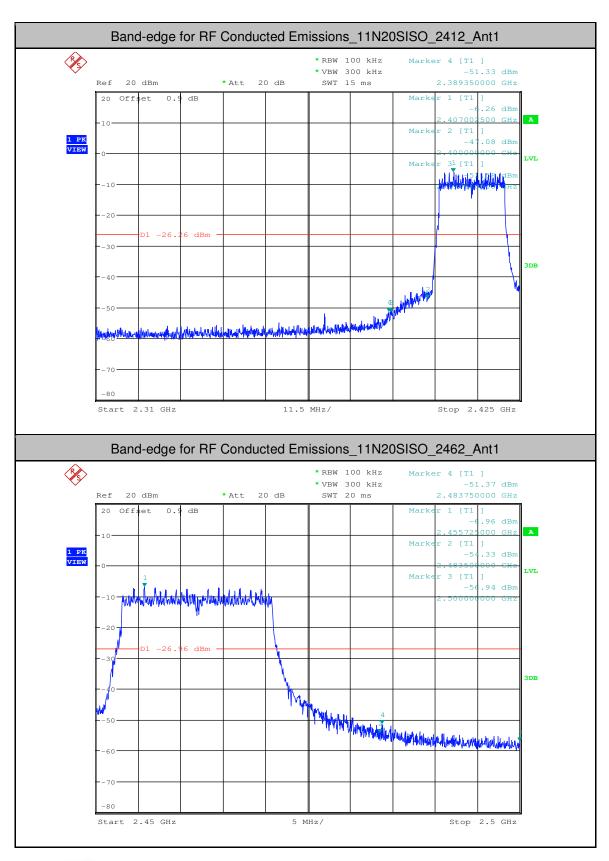
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5.RF Conducted Spurious Emissions

Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	2412	30	10000	100	300	3.18	-38.150	<-16.82	PASS
11B	2412	10000	25000	100	300	3.18	-56.370	<-16.82	PASS
11B	2437	30	10000	100	300	2.1	-39.060	<-17.9	PASS
11B	2437	10000	25000	100	300	2.1	-55.990	<-17.9	PASS
11B	2462	30	10000	100	300	1.25	-46.300	<-18.75	PASS
11B	2462	10000	25000	100	300	1.25	-56.040	<-18.75	PASS
11G	2412	30	10000	100	300	-6.02	-50.940	<-26.02	PASS
11G	2412	10000	25000	100	300	-6.02	-55.610	<-26.02	PASS
11G	2437	30	10000	100	300	-6.41	-53.590	<-26.41	PASS
11G	2437	10000	25000	100	300	-6.41	-55.720	<-26.41	PASS
11G	2462	30	10000	100	300	-4.94	-49.680	<-24.94	PASS
11G	2462	10000	25000	100	300	-4.94	-56.040	<-24.94	PASS
11N20SISO	2412	30	10000	100	300	-4.5	-50.460	<-24.5	PASS
11N20SISO	2412	10000	25000	100	300	-4.5	-56.160	<-24.5	PASS
11N20SISO	2437	30	10000	100	300	-6.51	-54.840	<-26.51	PASS
11N20SISO	2437	10000	25000	100	300	-6.51	-55.440	<-26.51	PASS
11N20SISO	2462	30	10000	100	300	-7.09	-56.200	<-27.09	PASS
11N20SISO	2462	10000	25000	100	300	-7.09	-55.280	<-27.09	PASS



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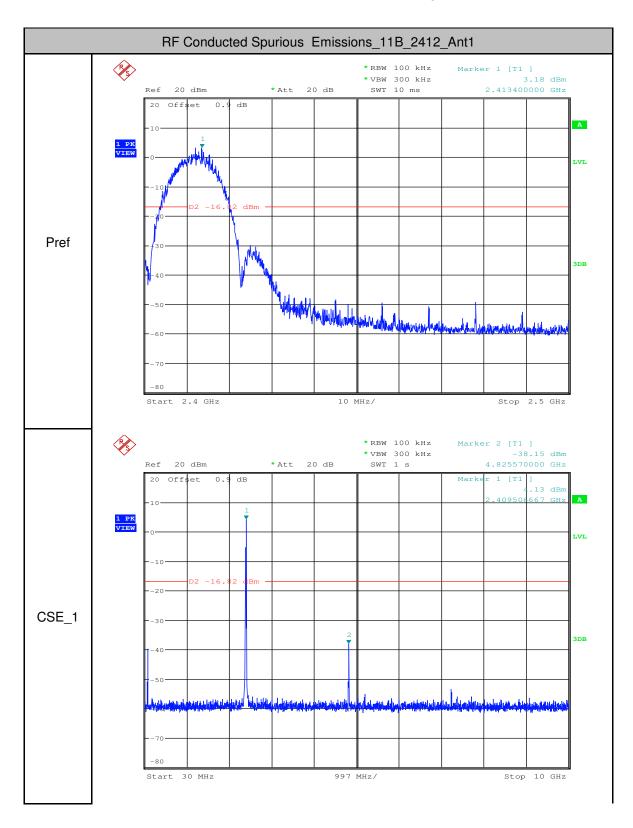
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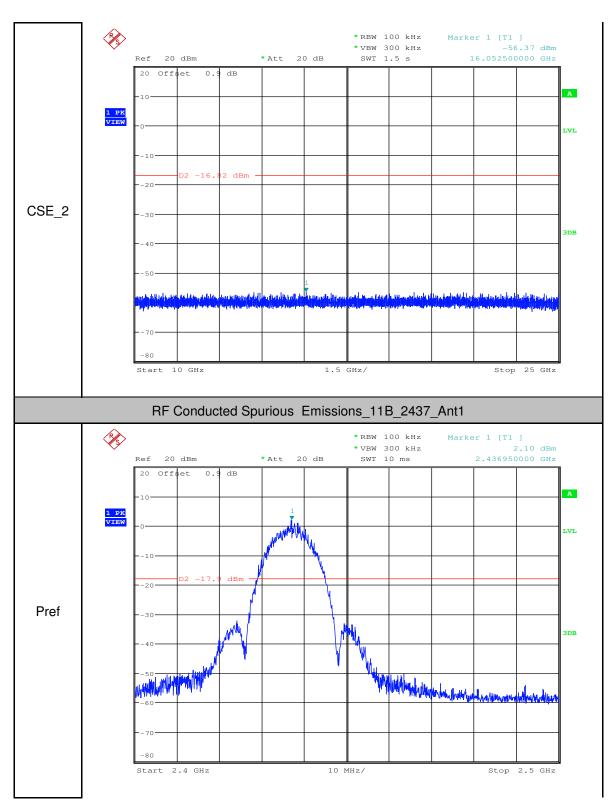
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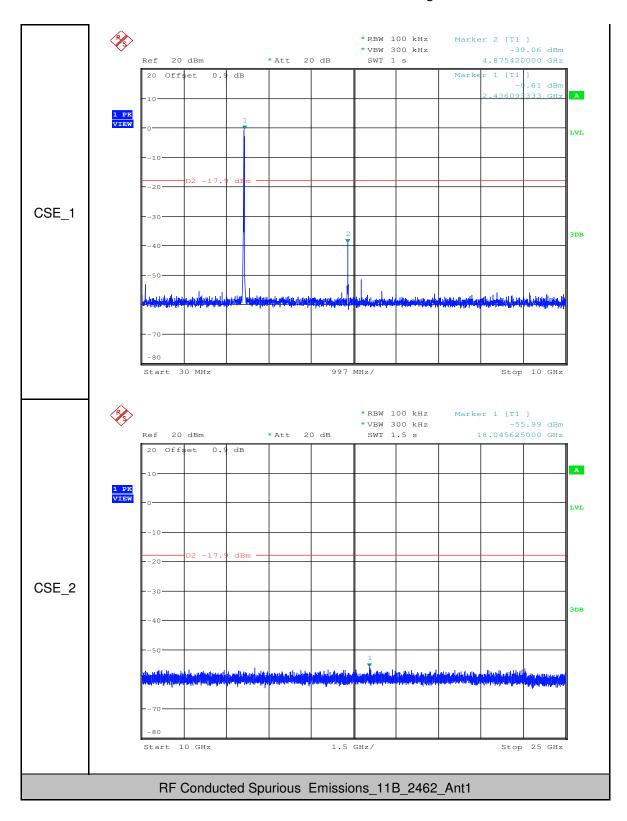
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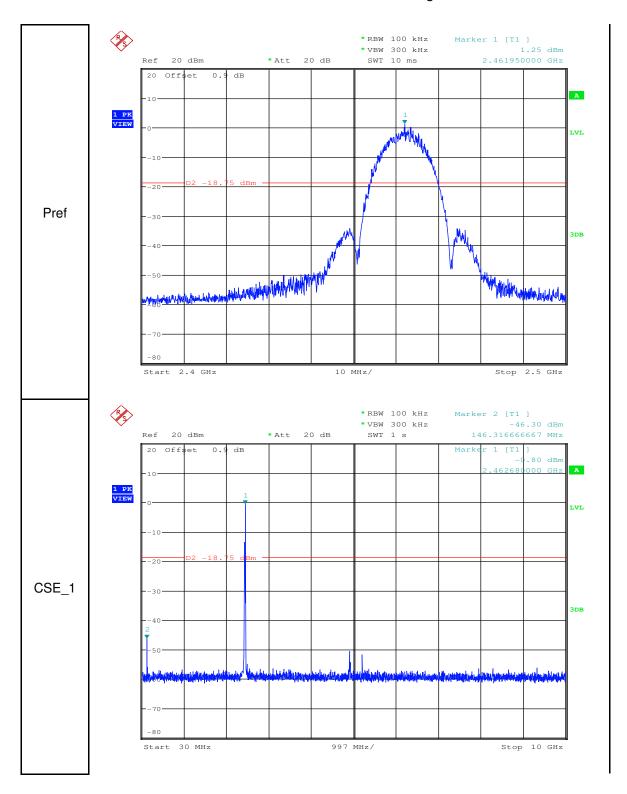
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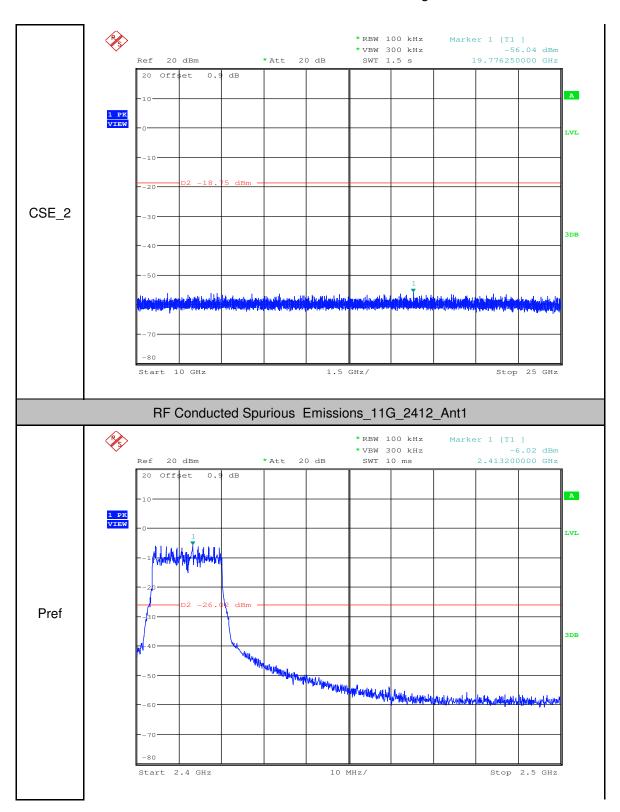
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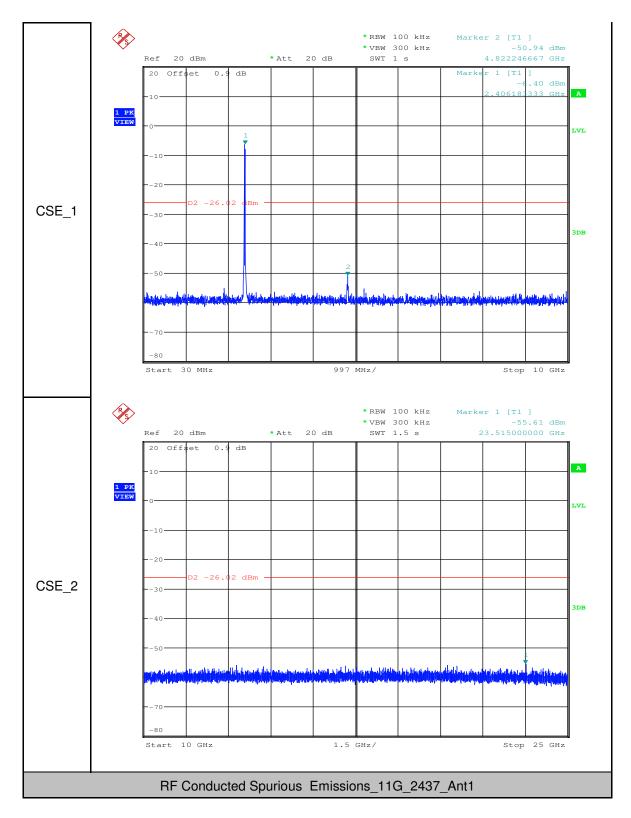
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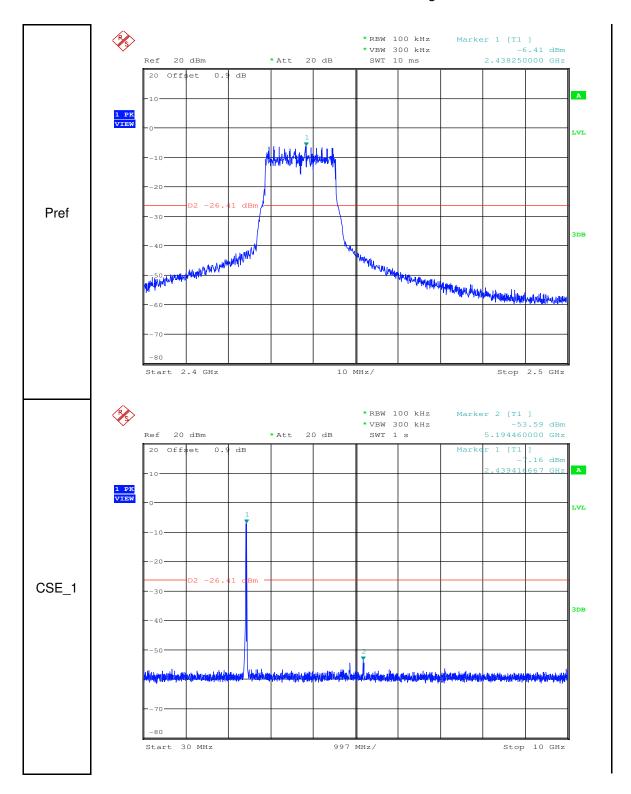
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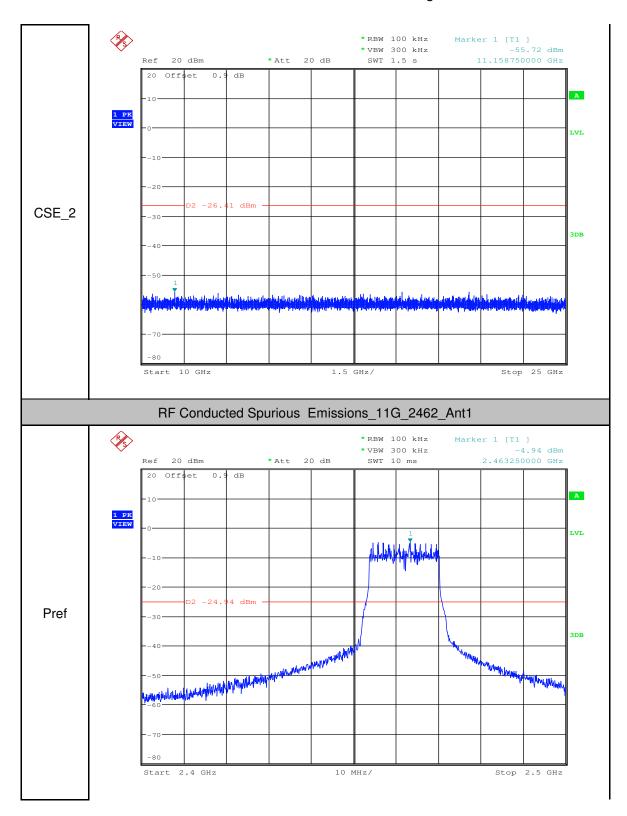
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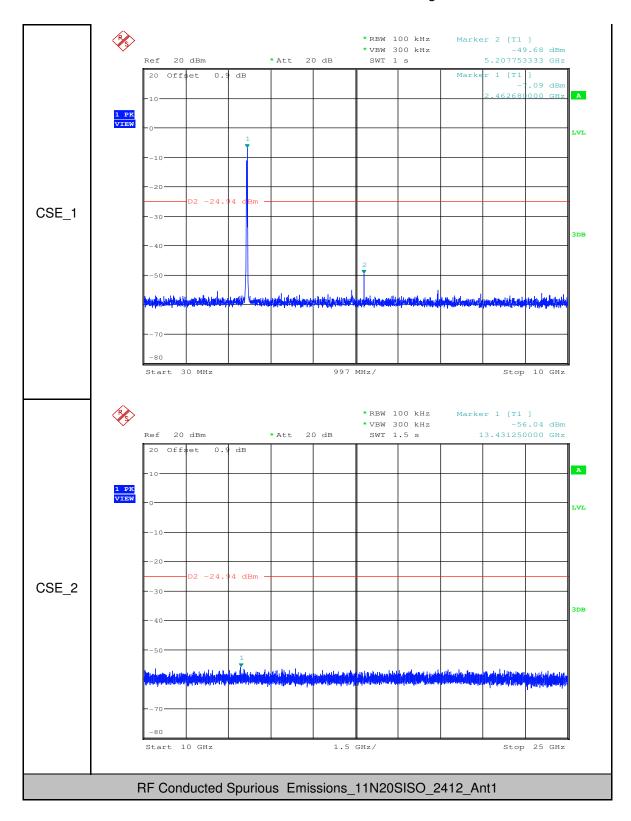
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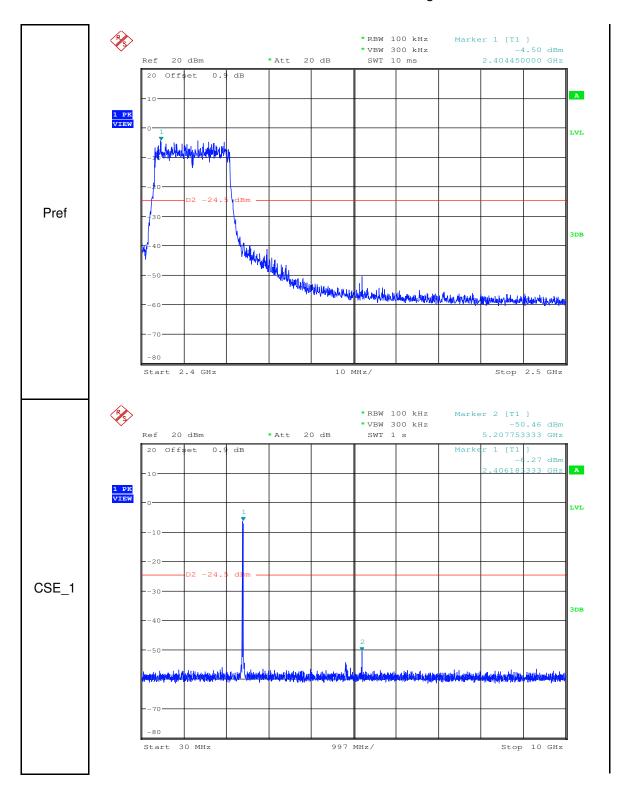
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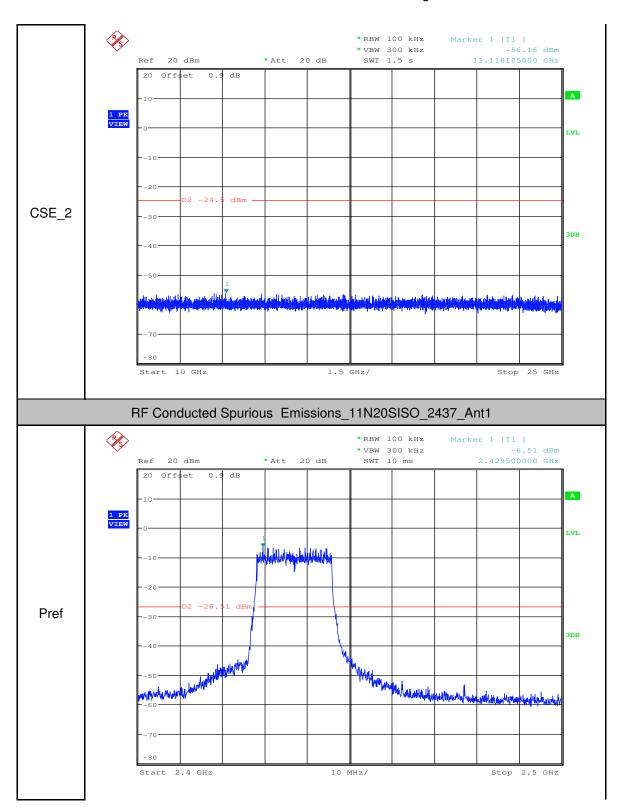
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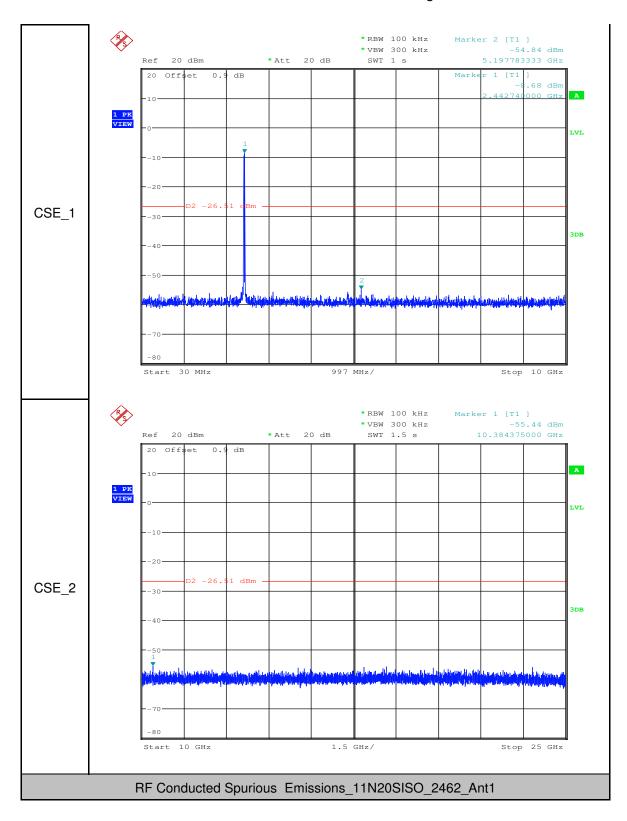
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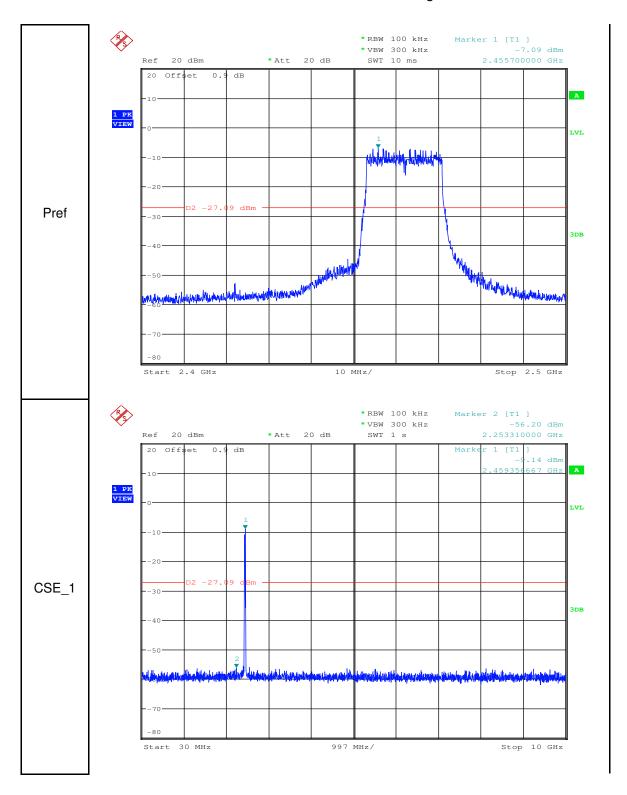
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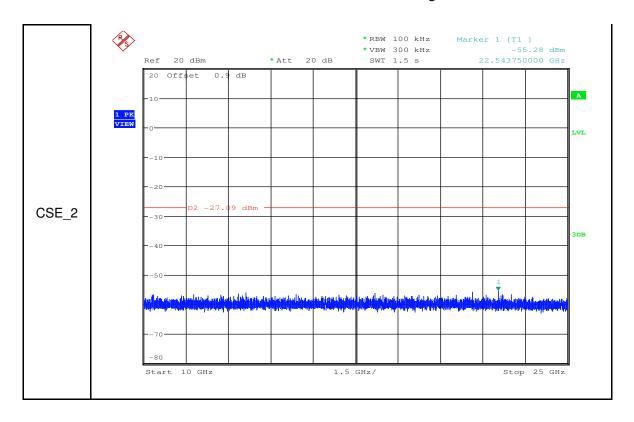
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