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FCC DTS REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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Date of Issue:
December 29, 2018
Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
Report No.: HCT-RF-1812-FC042-R1

FCC ID:	**A3LSMM105F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model:	SM-M105F/DS
EUT Type:	Mobile Phone
Max. Average Output Power:	802.11b : 18.175 dBm 802.11g : 16.714 dBm 802.11n(HT20) : 16.550 dBm
Frequency Range:	2412 MHz - 2472 MHz
Modulation type:	CCK/DSSS/OFDM
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Jung Ki Lim
Engineer of Telecommunication testing center

Approved by : Jong Seok Lee
Manager of Telecommunication testing center

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1812-FC042	December 26, 2018	- First Approval Report
HCT-RF-1812-FC042-R1	December 29, 2018	- Page 4. Date(s) of Tests updated - Page 11. Test procedure update about Average PSD measurement - Page 33. PSD result table update - Page 40. Updated The Test Plot - Page 64. Revised the information of the test result table

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1. EUT DESCRIPTION

EUT DESCRIPTION

Model	SM-M105F/DS	
EUT Type	Mobile Phone	
Power Supply	DC 3.85 V	
Battery Information	Model: GH43-04898-A Type: Li-ion Battery	
Travel Adapter Information	Model: GH44-02878A Manufacture: SALCOMP	
Frequency Range	2412 MHz - 2472 MHz	
Max. RF Output Power	**Peak Power**	802.11b : 20.980 dBm 802.11g : 25.750dBm 802.11n(HT20) : 25.810 dBm
	Average Power	802.11b : 18.175 dBm 802.11g : 16.714 dBm 802.11n(HT20) : 16.550 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n	
Number of Channels	13 Channels	
Antenna	BT/WLAN antenna	
Antenna Specification	Type : LDS Antenna Peak Gain : -0.51 dBi	
Date(s) of Tests	December 10, 2018 ~ December 29, 2018	

2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05 dated August 24, 2018 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpse of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

Conducted Antenna Terminal

See Section from 8.3.(KDB 558074 v05)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.
* The E.U.T Complies with the requirement of §15.203

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

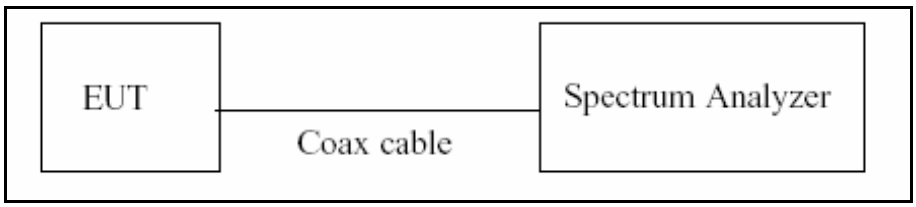
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.71

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method, 6.0)b) in KDB 558074 v05.

The largest availble value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

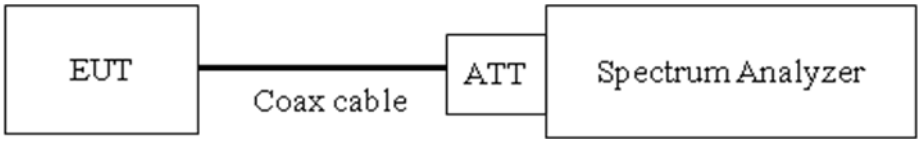
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10*log(1/Duty Cycle)

7.2. 6dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 8.2 in KDB 558074 v05, Procedure 11.8.2 in ANSI 63.10-2013)

1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Detector = Peak
4) Trace mode = max hold
5) Sweep = auto couple
6) Allow the trace to stabilize
7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration

Test Procedure

The transmitter output is connected to the Power Meter.

▪ Peak Power (Procedure 8.3.1.3 in KDB 558074 v05, Procedure 11.9.1.3 in ANSI 63.10-2013)
: Measure the peak power of the transmitter.

▪ Average Power (Procedure 8.3.2.3 in KDB 558074 v05, Procedure 11.9.2.3 in ANSI 63.10-2013)

1) Measure the duty cycle.
2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

▪ Total Power (Peak) = Reading Value + ATT loss + Cable loss

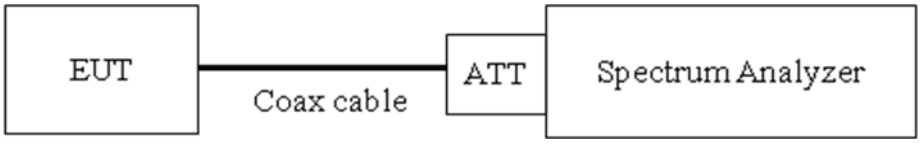
▪ Total Power (Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure in KDB 558074 v05, Procedure 11.10.3 in ANSI 63.10-2013.

The spectrum analyzer is set to :

1) Set analyzer center frequency to DTS channel center frequency.
2) Span = 1.5 times the DTS channel bandwidth.
3) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x RBW.
5) Sweep = auto couple
6) Detector = power average(rms)
7) Ensure that the number of measurement points ≥ 2*Span/RBW
8) Trace Mode = Average mode (a minimum of 100 traces.)
9) Allow trace to fully stabilize.
10) Measure the duty cycle(D) and Add Duty cycle factor[10 log(1/D), D=duty cycle)], to the measured Avrage PSD result
11) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

▪ Power Spectral Density(Avg) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

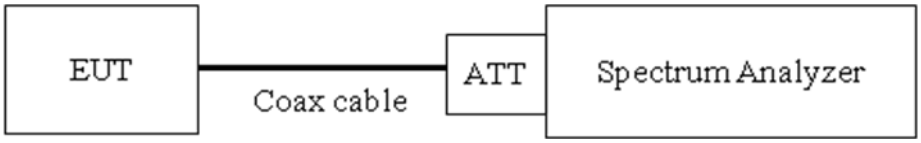
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 8.5 in KDB 558074 v05, Procedure 11.11 in ANSI 63.10-2013)

1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Set span to encompass the spectrum to be examined
4) Detector = Peak
5) Trace Mode = max hold
6) Sweep time = auto couple
7) Ensure that the number of measurement points ≥ 2*Span/RBW
8) Allow trace to fully stabilize.
9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

Factors for frequency

Freq(MHz)	Factor(dB)
30	11.40
100	9.93
200	10.29
300	10.23
400	10.33
500	10.35
600	10.32
700	10.36
800	10.37
900	10.38
1000	10.35
2000	10.38
2400*	10.40
2500*	10.45
3000	10.78
4000	10.99
5000	11.17
6000	11.16
7000	11.45
8000	11.42
9000	11.58
10000	11.66
11000	11.66
12000	11.78
13000	11.93
14000	12.00
15000	12.08
16000	12.14
17000	12.12
18000	12.18
19000	12.17
20000	12.24
21000	12.27
22000	12.41
23000	12.70
24000	12.44
25000	12.63
26000	12.12

Note : 1. '*' is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss

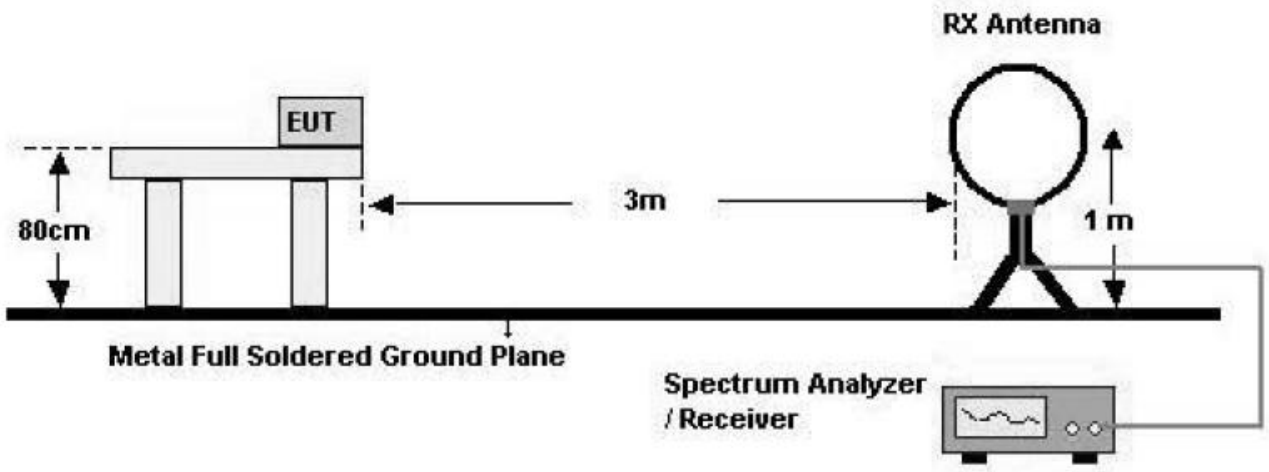
7.6. Radiated Test

Limit

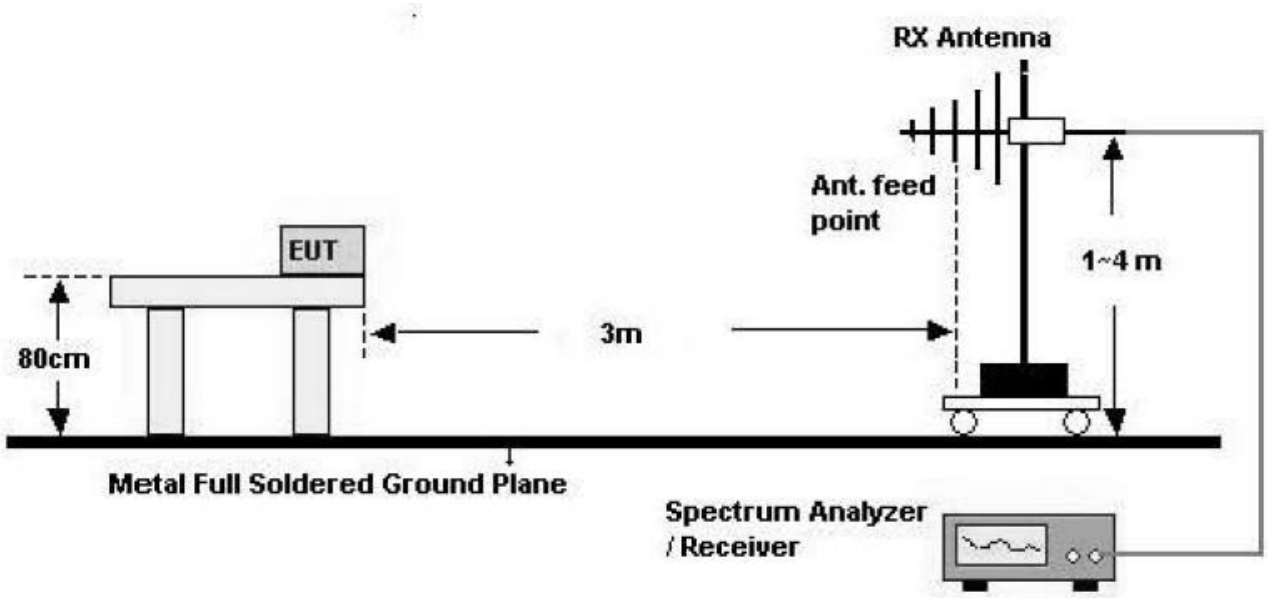
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

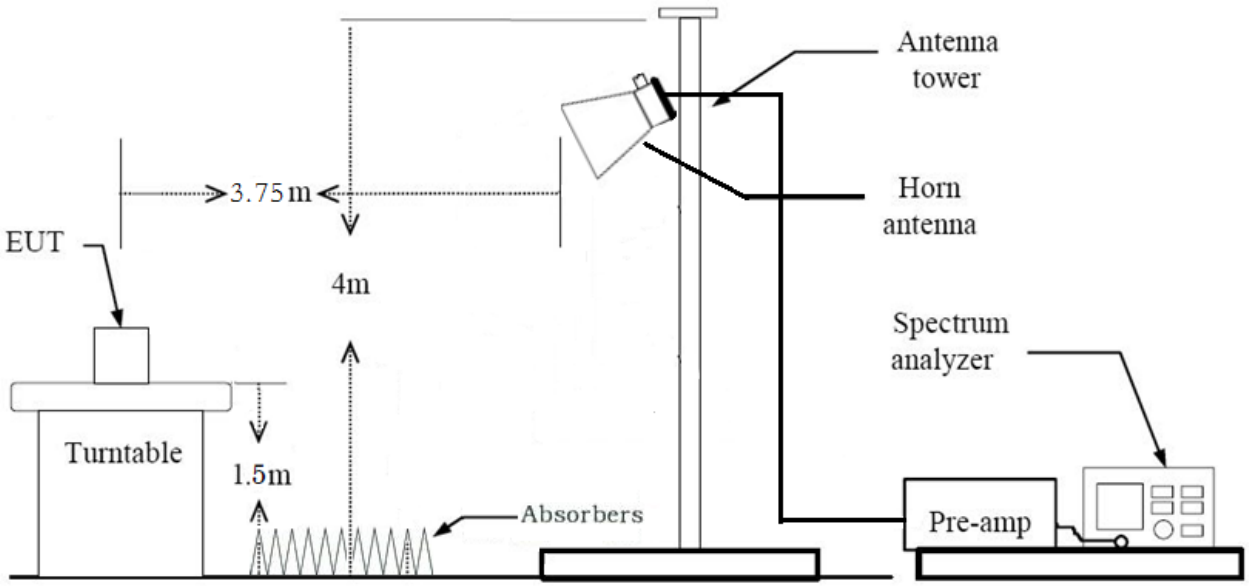
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
   *Distance extrapolation factor = 20*log (test distance / specific distance) (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. Spectrum Setting (Method 8.6 in KDB 558074 v05, Procedure 11.12 in ANSI 63.10-2013)
   (1) Measurement Type(Peak):
   - Measured Frequency Range : 1 GHz – 25 GHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 1 MHz
   - VBW ≥ 3*RBW

   (2) Measurement Type(Average): Duty cycle ≥ 98%
   - Measured Frequency Range : 1 GHz – 25 GHz
   - Detector = RMS
   - Averaging type = power (*i.e.*, RMS)
   - RBW = 1 MHz
   - VBW ≥ 3*RBW
   - Sweep time = auto.
   - Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle < 98%, duty cycle variations are less than ±2%

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3*RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

11. Total(Measurement Type : Peak)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle ≥ 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle < 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F) + Duty Cycle Factor

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
   *Distance extrapolation factor = 20*log (test distance / specific distance) (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. Spectrum Setting
   (1) Measurement Type(Peak):
   - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 1 MHz
   - VBW ≥ 3*RBW

   (2) Measurement Type(Average): Duty cycle ≥ 98%,
   - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
   - Detector = RMS
   - Averaging type = power (*i.e.*, RMS)
   - RBW = 1 MHz
   - VBW ≥ 3*RBW
   - Sweep time = auto.
   - Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle < 98%, duty cycle variations are less than ±2%

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3*RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

11. Total(Measurement Type : Peak)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle ≥ 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle < 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F) + Duty Cycle Factor

7.7. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + external accessories(earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : X
   - Radiated Restricted Band Edge : X
3. Duty cycle factor applies only 802.11g/n(Duty cycle < 98%).
4. All datarate of operation were investigated and the worst case datarate results are reported
   - 802.11b : 1Mbps
   - 802.11g : 6Mbps
   - 802.11n : MCS0

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone+Earphone+Travel Adapter, Stand alone+Travel Adapter
   - Worstcase : Stand alone+Travel Adapter

Conducted test

All datarate of operation were investigated and the worst case datarate results are reported
- 802.11b : 1 Mbps
- 802.11g : 6 Mbps
- 802.11n : MCS 1

8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		N/A
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§15.247(d)	Conducted > 30 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

9. TEST RESULT

9.1 DUTY CYCLE

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.618	8.709	0.990	0.045
	2	4.309	4.409	0.977	0.100
	5.5	1.628	1.723	0.945	0.247
	11	0.862	0.961	0.897	0.472
802.11g	6	1.429	1.530	0.934	0.297
	9	0.960	1.061	0.905	0.435
	12	0.724	0.825	0.877	0.568
	18	0.492	0.593	0.829	0.814
	24	0.372	0.474	0.786	1.046
	36	0.256	0.356	0.718	1.438
	48	0.196	0.297	0.659	1.809
	54	0.180	0.281	0.640	1.940
802.11n (HT20)	6.5 (MCS0)	1.336	1.436	0.930	0.315
	13 (MCS1)	0.688	0.790	0.871	0.598
	19.5 (MCS2)	0.473	0.573	0.824	0.840
	26 (MCS3)	0.364	0.465	0.783	1.063
	39 (MCS4)	0.256	0.357	0.717	1.443
	52 (MCS5)	0.200	0.301	0.665	1.774
	58.5 (MCS6)	0.184	0.285	0.648	1.886
	65 (MCS7)	0.168	0.269	0.625	2.041

9.2 6dB BANDWIDTH

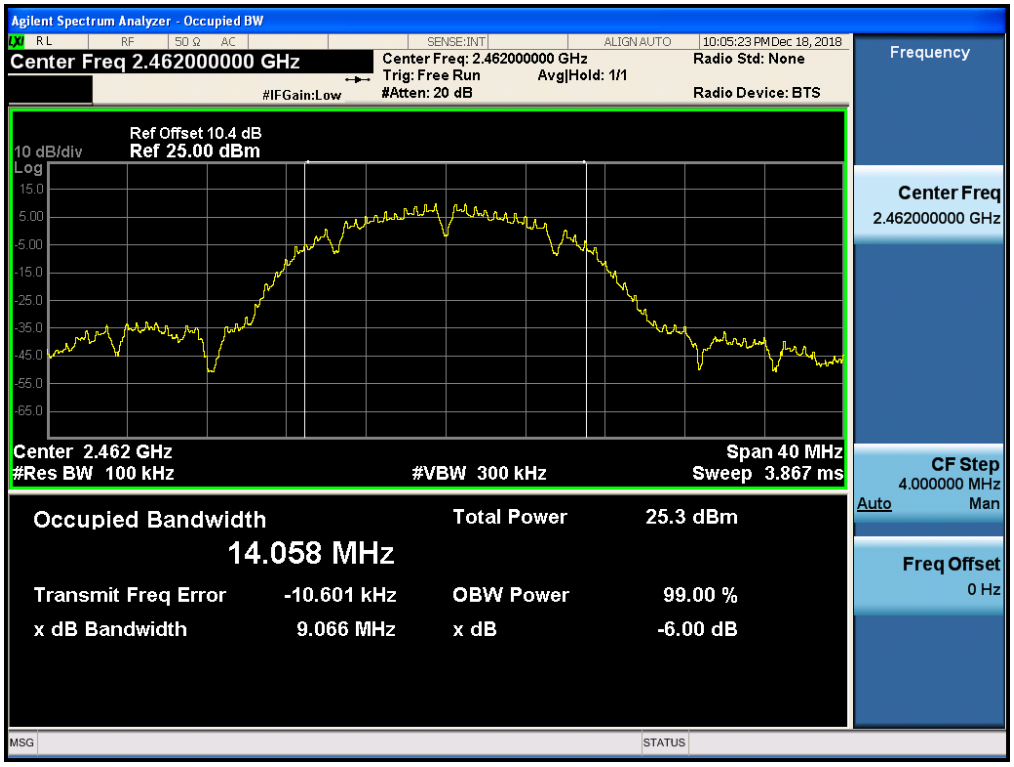
802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.553	0.5
2437	6	9.064	0.5
2462	11	9.066	0.5
2467	12	9.065	0.5
2472	13	9.073	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.830	0.5
2437	6	15.140	0.5
2462	11	16.060	0.5
2467	12	15.130	0.5
2472	13	15.490	0.5

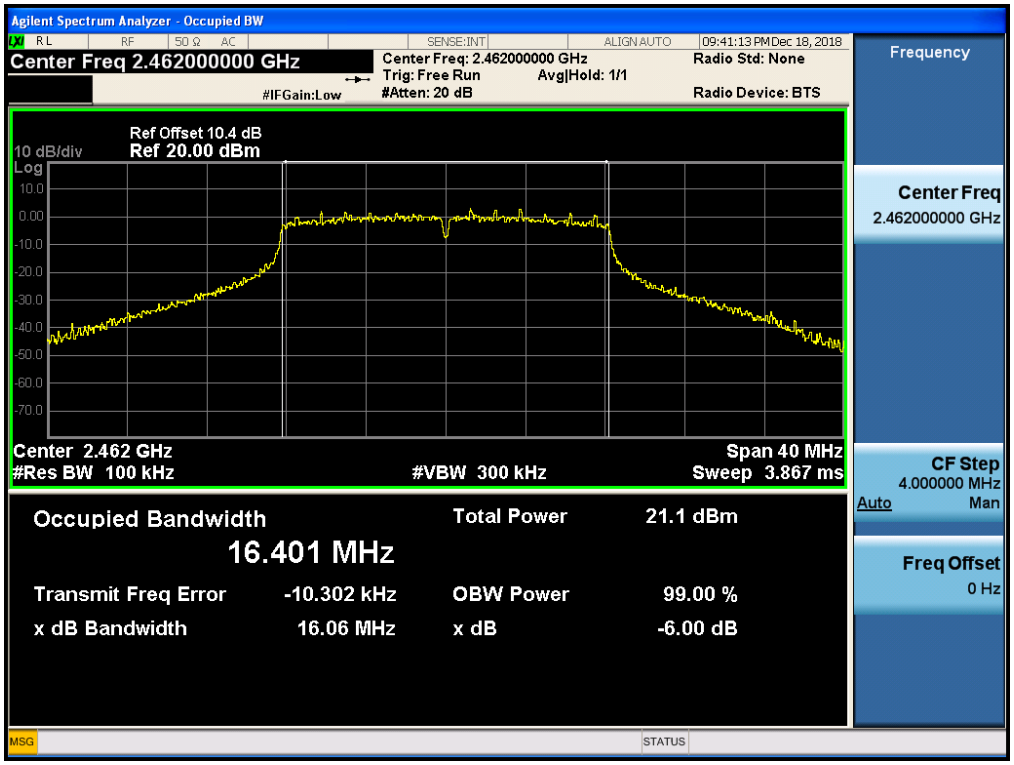
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.260	0.5
2437	6	15.070	0.5
2462	11	16.160	0.5
2467	12	15.150	0.5
2472	13	15.150	0.5

▣ Test Plots

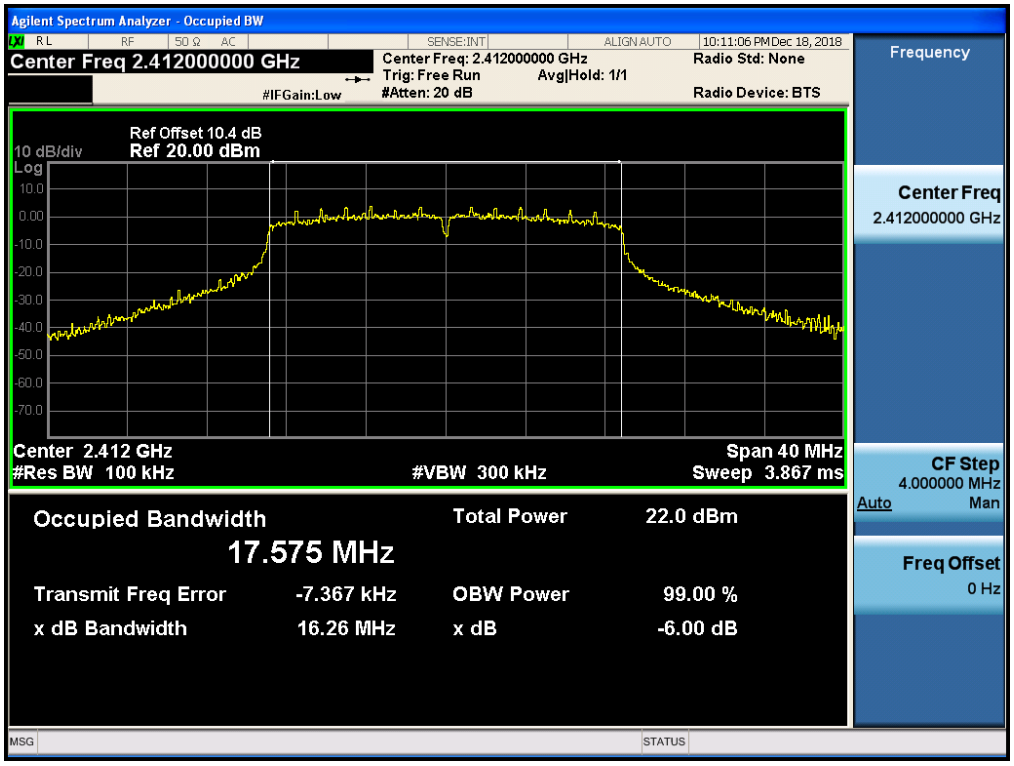
6dB Bandwidth plot (802.11b-CH 11)



6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n_HT20-CH 1)



Note:

In order to simplify the report, attached plots were only the most narrow 6 dB BW channel.

9.3 OUTPUT POWER

Peak Power

1. Power Meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.40 dB is offset for 2.4 GHz Band.

802.11b Mode		Data Rate [Mbps]	Measured Power[dBm]	Limit [dBm]
Frequency [MHz]	Channel No.			
2412	1	1	20.70	30
		2	20.63	30
		5.5	20.60	30
		11	20.66	30
2437	6	1	20.51	30
		2	20.31	30
		5.5	20.27	30
		11	20.46	30
2462	11	1	20.98	30
		2	20.86	30
		5.5	20.93	30
		11	20.73	30
2467	12	1	8.07	30
		2	8.03	30
		5.5	7.79	30
		11	7.87	30
2472	13	1	-3.53	30
		2	-3.48	30
		5.5	-3.68	30
		11	-3.90	30

802.11g Mode		Data Rate [Mbps]	Measured Power[dBm]	Limit [dBm]
Frequency[MHz]	Channel No.			
2412	1	6	25.14	30
		9	24.82	30
		12	24.66	30
		18	24.61	30
		24	24.57	30
		36	24.75	30
		48	24.54	30
		54	24.38	30
2437	6	6	25.75	30
		9	25.64	30
		12	25.41	30
		18	25.34	30
		24	25.48	30
		36	25.26	30
		48	25.40	30
		54	25.24	30
2462	11	6	24.51	30
		9	24.64	30
		12	24.56	30
		18	24.36	30
		24	24.51	30
		36	24.57	30
		48	24.35	30
		54	24.40	30
2467	12	6	16.69	30
		9	17.37	30
		12	15.80	30
		18	15.26	30
		24	15.86	30
		36	15.44	30
		48	15.21	30
		54	15.54	30
2472	13	6	6.59	30
		9	6.55	30
		12	6.51	30
		18	6.28	30
		24	6.14	30
		36	6.02	30
		48	6.00	30
		54	5.78	30

802.11n Mode		MCS Index	Measured Power[dBm]	Limit [dBm]
Frequency[MHz]	Channel No.			
2412	1	0	25.11	30
		1	24.61	30
		2	24.44	30
		3	24.86	30
		4	24.81	30
		5	25.13	30
		6	24.49	30
		7	24.65	30
2437	6	0	25.64	30
		1	25.81	30
		2	25.75	30
		3	25.50	30
		4	25.38	30
		5	25.78	30
		6	25.45	30
		7	25.41	30
2462	11	0	24.84	30
		1	25.06	30
		2	24.19	30
		3	24.68	30
		4	24.30	30
		5	25.18	30
		6	24.43	30
		7	24.23	30
2467	12	0	16.80	30
		1	17.04	30
		2	17.10	30
		3	15.76	30
		4	15.35	30
		5	16.95	30
		6	15.74	30
		7	15.29	30
2472	13	0	6.75	30
		1	7.24	30
		2	6.92	30
		3	6.35	30
		4	5.97	30
		5	6.75	30
		6	5.72	30
		7	5.61	30

Average Power

1. Power Meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.40 dB is offset for 2.4 GHz Band.

802.11b Mode		Data Rate [Mbps]	Measured Power[dBm]	Duty Cycle Factor [dB]	Measured Power(dBm) + Duty Cycle Factor[dB]	Limit [dBm]
Frequency [MHz]	Channel No.					
2412	1	1	18.130	0.045	18.175	30
		2	17.880	0.100	17.980	30
		5.5	17.760	0.247	18.007	30
		11	17.540	0.472	18.012	30
2437	6	1	17.730	0.045	17.775	30
		2	17.360	0.100	17.460	30
		5.5	17.240	0.247	17.487	30
		11	17.020	0.472	17.492	30
2462	11	1	18.010	0.045	18.055	30
		2	17.920	0.100	18.020	30
		5.5	17.710	0.247	17.957	30
		11	17.400	0.472	17.872	30
2467	12	1	4.830	0.045	4.875	30
		2	4.770	0.100	4.870	30
		5.5	4.570	0.247	4.817	30
		11	4.380	0.472	4.852	30
2472	13	1	-6.580	0.045	-6.535	30
		2	-6.620	0.100	-6.520	30
		5.5	-6.840	0.247	-6.593	30
		11	-7.430	0.472	-6.958	30

802.11g Mode		Data Rate [Mbps]	Measured Power[dBm]	Duty Cycle Factor [dB]	Measured Power(dBm) + Duty Cycle Factor[dB]	Limit [dBm]
Frequency [MHz]	Channel No.					
2412	1	6	14.780	0.297	15.077	30
		9	14.670	0.435	15.105	30
		12	14.530	0.568	15.098	30
		18	14.290	0.814	15.104	30
		24	14.040	1.046	15.086	30
		36	13.680	1.438	15.118	30
		48	13.260	1.809	15.069	30
		54	13.100	1.940	15.040	30
2437	6	6	16.380	0.297	16.677	30
		9	16.250	0.435	16.685	30
		12	16.040	0.568	16.608	30
		18	15.900	0.814	16.714	30
		24	15.560	1.046	16.606	30
		36	15.170	1.438	16.608	30
		48	14.820	1.809	16.629	30
		54	14.700	1.940	16.640	30
2462	11	6	13.910	0.297	14.207	30
		9	13.770	0.435	14.205	30
		12	13.650	0.568	14.218	30
		18	13.300	0.814	14.114	30
		24	13.130	1.046	14.176	30
		36	12.720	1.438	14.158	30
		48	12.270	1.809	14.079	30
		54	12.150	1.940	14.090	30
2467	12	6	4.450	0.297	4.747	30
		9	4.530	0.435	4.965	30
		12	4.310	0.568	4.878	30
		18	4.180	0.814	4.994	30
		24	3.850	1.046	4.896	30
		36	3.460	1.438	4.898	30
		48	3.150	1.809	4.959	30
		54	2.850	1.940	4.790	30
2472	13	6	-5.780	0.297	-5.483	30
		9	-6.020	0.435	-5.585	30
		12	-6.270	0.568	-5.702	30
		18	-6.000	0.814	-5.186	30
		24	-6.490	1.046	-5.444	30
		36	-7.130	1.438	-5.692	30
		48	-7.110	1.809	-5.301	30
		54	-7.750	1.940	-5.810	30

802.11n Mode		MCS Index	Measured Power[dBm]	Duty Cycle Factor [dB]	Measured Power(dBm) + Duty Cycle Factor[dB]	Limit [dBm]
Frequency [MHz]	Channel No.					
2412	1	0	14.630	0.315	14.945	30
		1	14.360	0.598	14.958	30
		2	14.090	0.840	14.930	30
		3	13.830	1.063	14.893	30
		4	13.490	1.443	14.933	30
		5	13.120	1.774	14.894	30
		6	13.080	1.886	14.966	30
		7	12.930	2.041	14.971	30
2437	6	0	16.210	0.315	16.525	30
		1	15.860	0.598	16.458	30
		2	15.710	0.840	16.550	30
		3	15.400	1.063	16.463	30
		4	15.040	1.443	16.483	30
		5	14.680	1.774	16.454	30
		6	14.600	1.886	16.486	30
		7	14.420	2.041	16.461	30
2462	11	0	13.650	0.315	13.965	30
		1	13.370	0.598	13.968	30
		2	13.140	0.840	13.980	30
		3	12.950	1.063	14.013	30
		4	12.530	1.443	13.973	30
		5	12.280	1.774	14.054	30
		6	12.100	1.886	13.986	30
		7	11.950	2.041	13.991	30
2467	12	0	4.400	0.315	4.715	30
		1	4.100	0.598	4.698	30
		2	3.860	0.840	4.700	30
		3	3.590	1.063	4.653	30
		4	3.290	1.443	4.733	30
		5	2.950	1.774	4.724	30
		6	2.880	1.886	4.766	30
		7	2.630	2.041	4.671	30
2472	13	0	-6.370	0.315	-6.055	30
		1	-6.310	0.598	-5.712	30
		2	-6.010	0.840	-5.170	30
		3	-6.610	1.063	-5.547	30
		4	-6.900	1.443	-5.457	30
		5	-7.170	1.774	-5.396	30
		6	-7.670	1.886	-5.784	30
		7	-7.750	2.041	-5.709	30

9.4 POWER SPECTRAL DENSITY

	Frequency (MHz)	Channel No.	Test Result				
			Average Worst Rate (Mbps)	Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11b	2412	1	1Mbps	-12.756	0.000	-12.756	8
	2437	6	1Mbps	-13.379	0.000	-13.379	8
	2462	11	1Mbps	-13.339	0.000	-13.339	8
	2467	12	1Mbps	-26.584	0.000	-26.584	8
	2472	13	2Mbps	-37.927	0.100	-37.827	8

	Frequency (MHz)	Channel No.	Test Result				
			Average Worst Rate (Mbps)	Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11g	2412	1	36Mbps	-18.929	1.438	-17.491	8
	2437	6	18Mbps	-17.176	0.814	-16.362	8
	2462	11	12Mbps	-19.914	0.568	-19.346	8
	2467	12	18Mbps	-28.716	0.814	-27.902	8
	2472	13	18Mbps	-39.467	0.814	-38.653	8

	Frequency (MHz)	Channel No.	Test Result				
			Average Worst Rate (Mbps)	Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11n	2412	1	MCS7	-16.939	2.041	-14.898	8
	2437	6	MCS2	-16.468	0.840	-15.628	8
	2462	11	MCS5	-17.737	1.774	-15.963	8
	2467	12	MCS6	-27.162	1.886	-25.276	8
	2472	13	MCS2	-38.235	0.840	-37.395	8

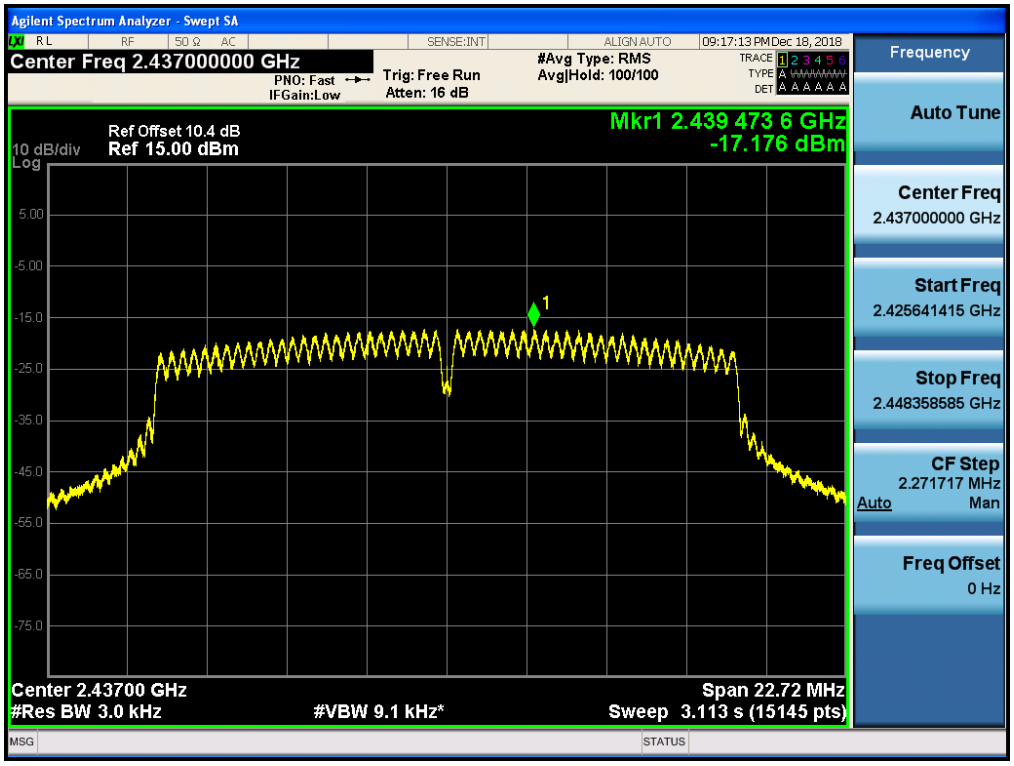
Note :

1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.40 dB is offset for 2.4 GHz Band.

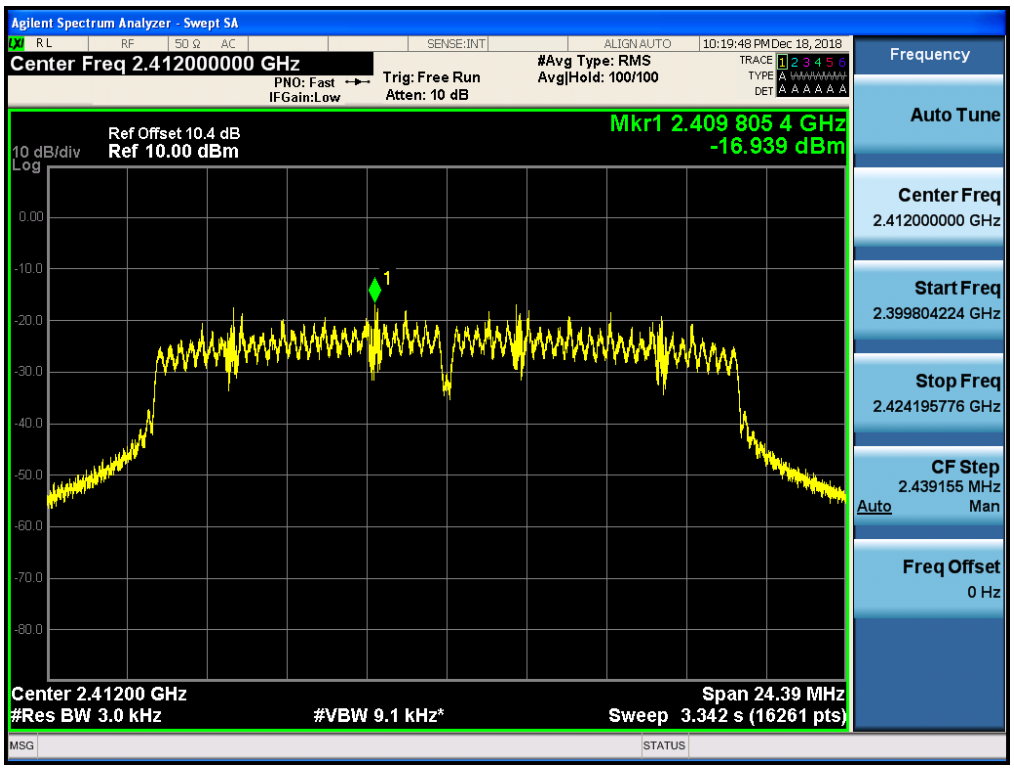
▣ Test Plots [Ant1]

Power Spectral Density (802.11b-CH 1)

Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20 -CH 1)



9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Note:

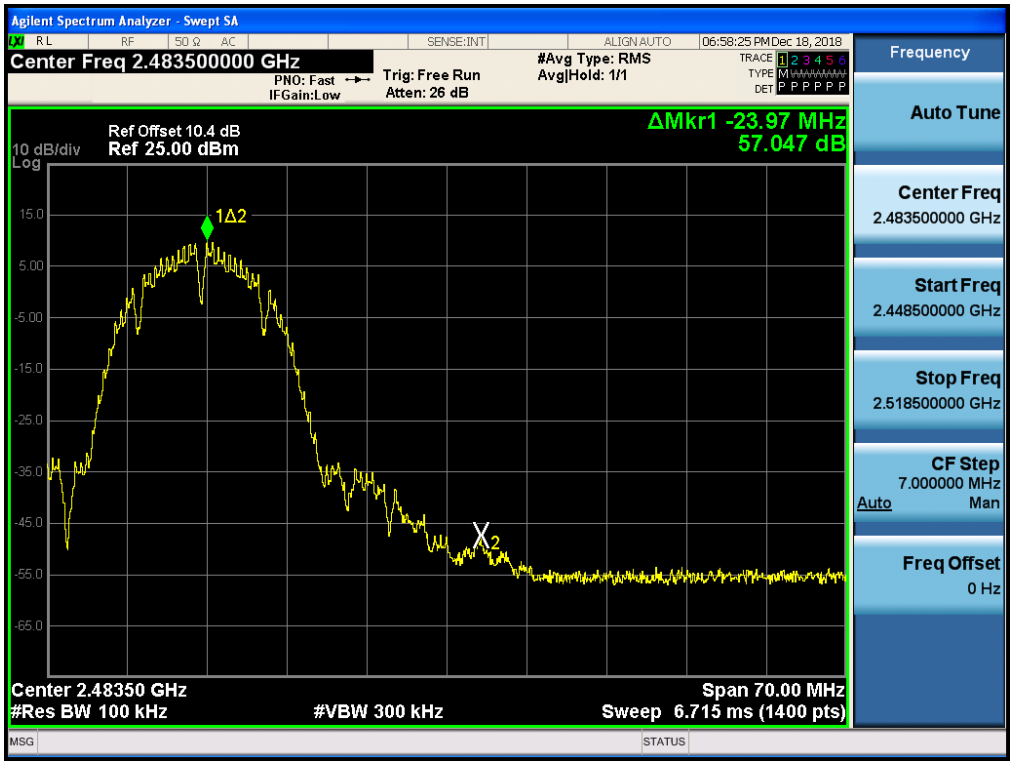
Test Result : please refer to the plot below.

In order to simplify the report, attached plots were only the worst case channel and data rate.

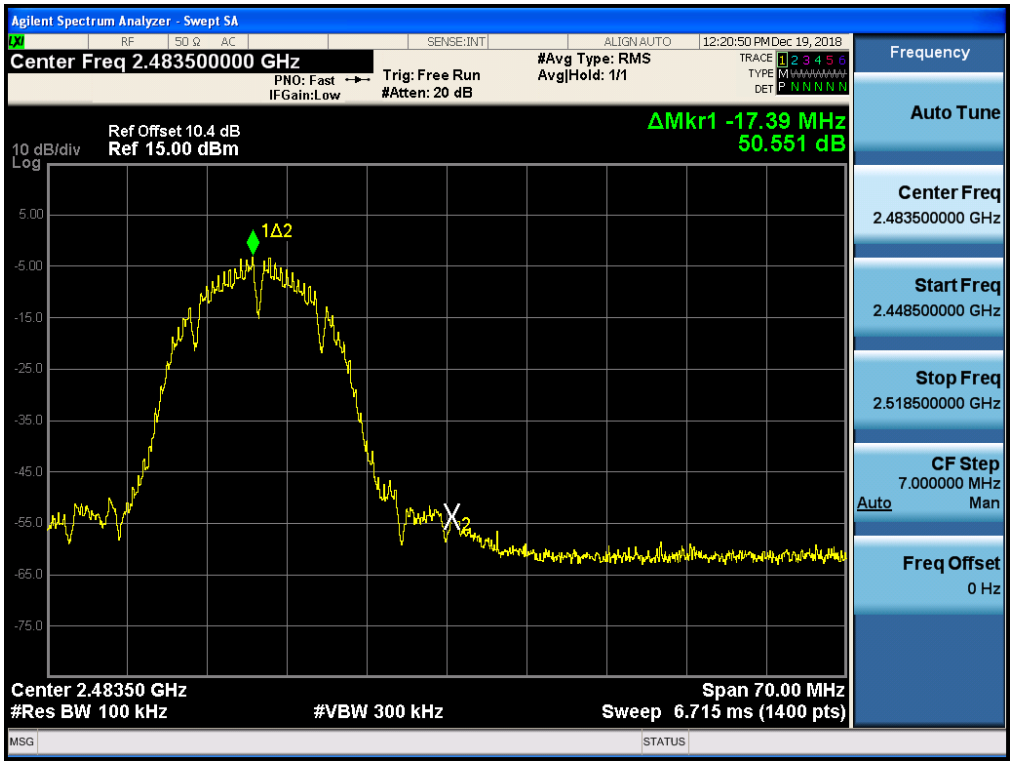
▣ Test Plots(BandEdge)

Band Edge (802.11b-CH1)

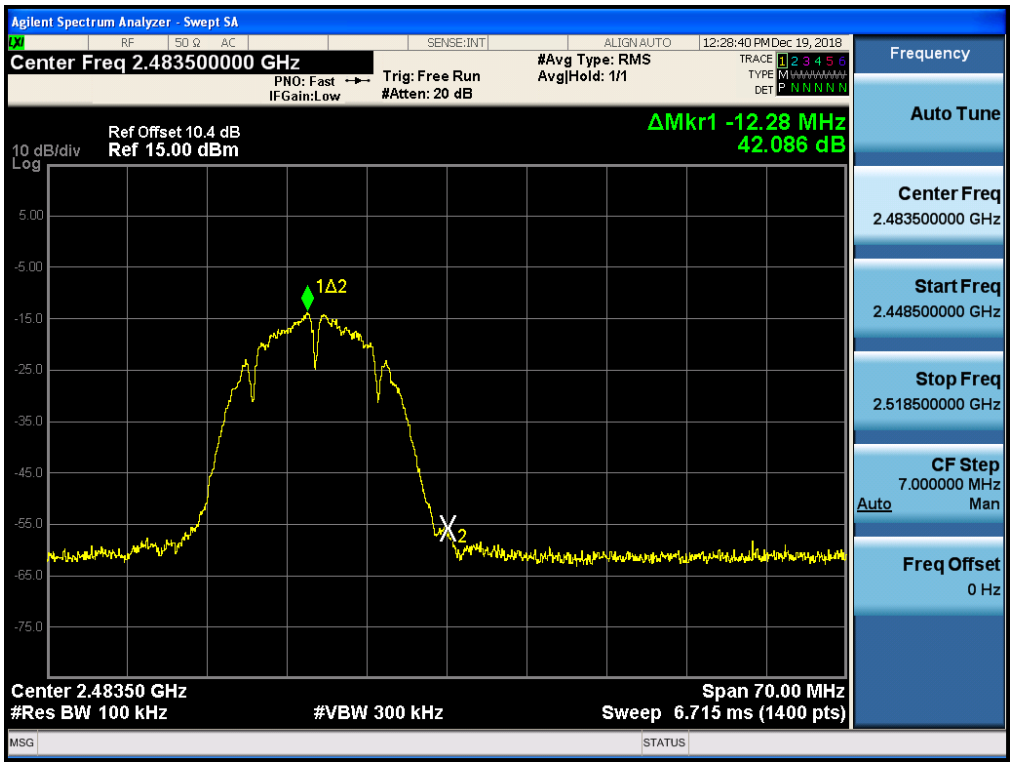
Band Edge (802.11b-CH11)



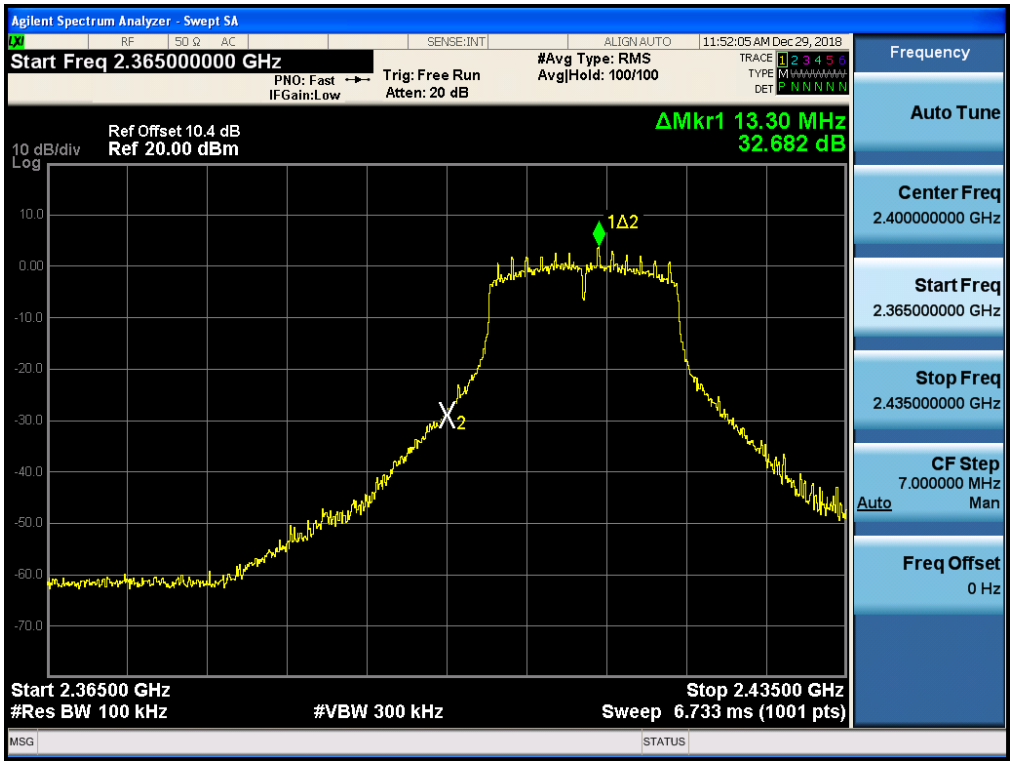
Band Edge (802.11b-CH12)



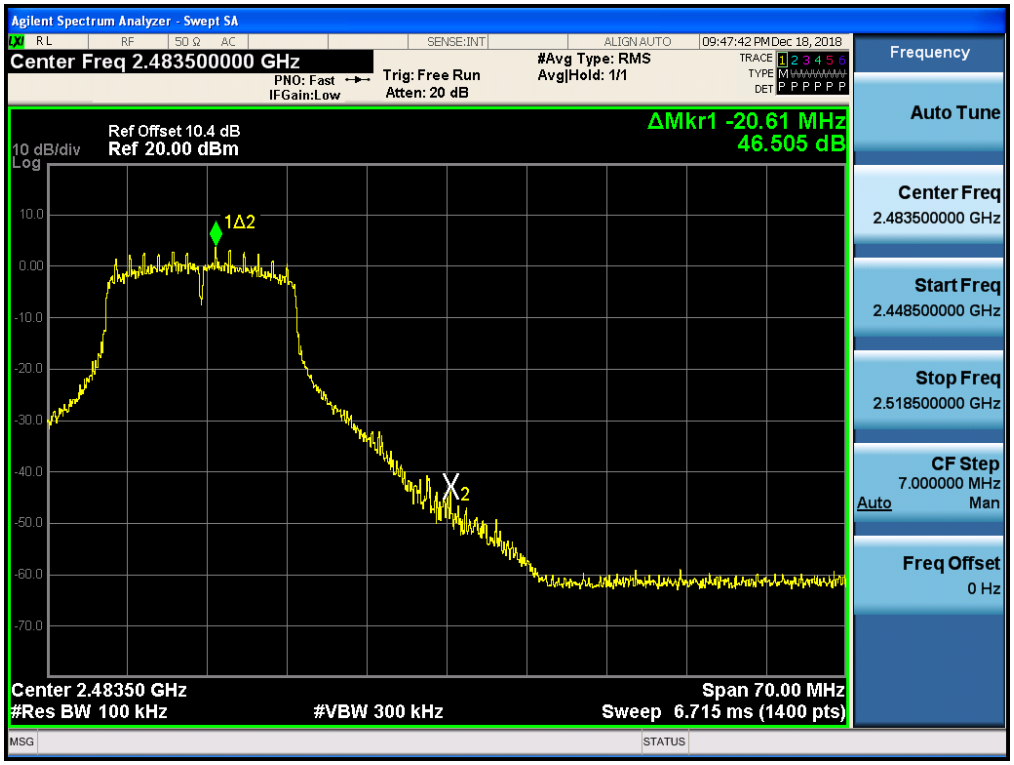
Band Edge (802.11b-CH13)



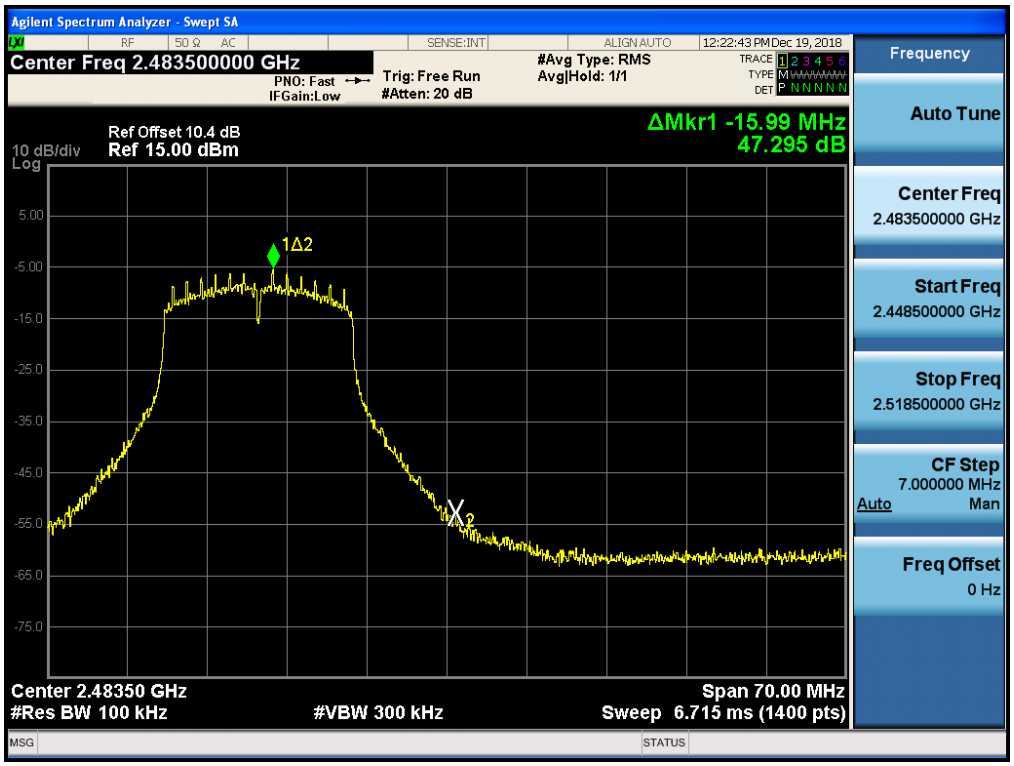
Band Edge (802.11g-CH1)



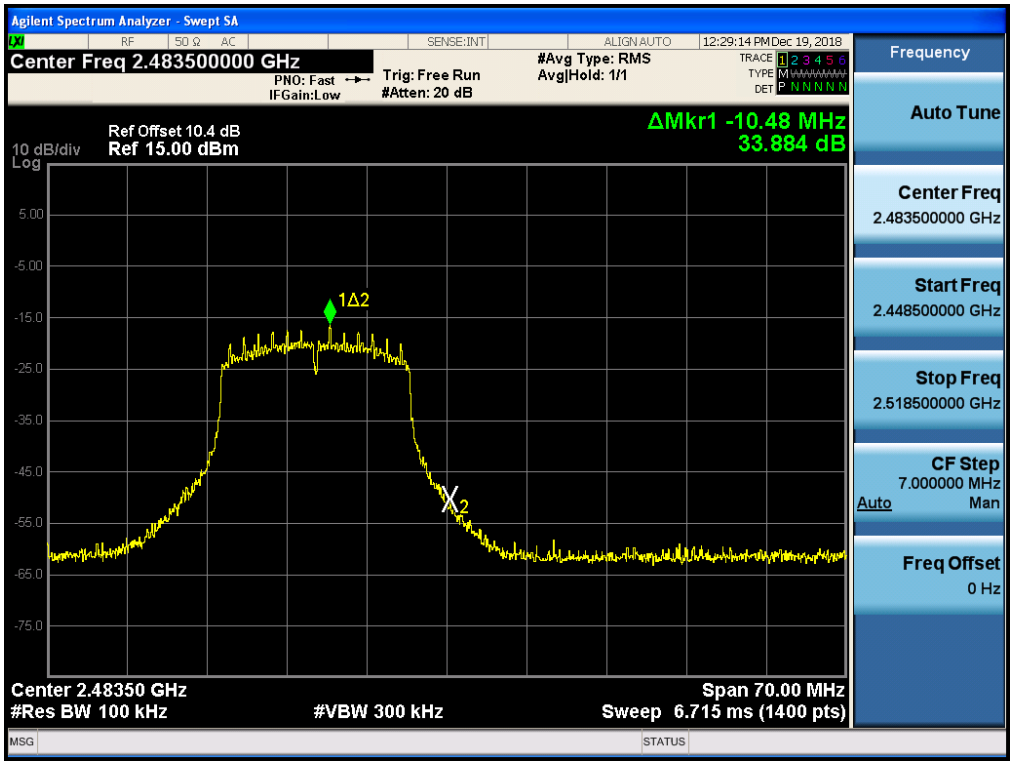
Band Edge (802.11g-CH11)



Band Edge (802.11g-CH12)

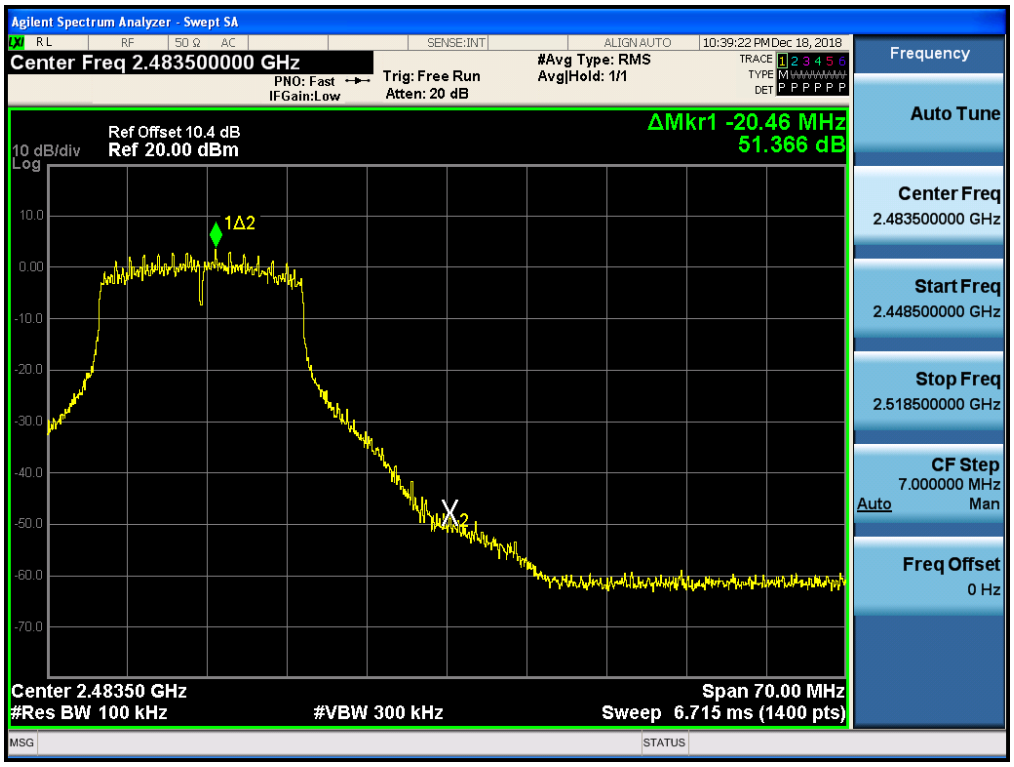


Band Edge (802.11g-CH13)

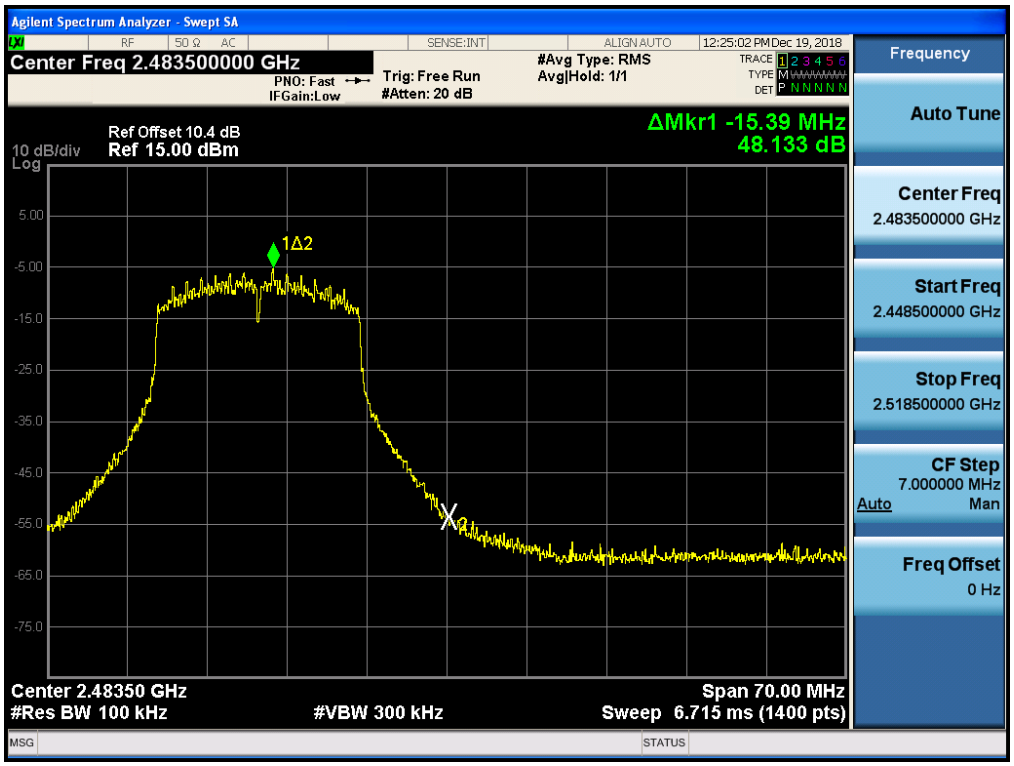


Band Edge (802.11n_HT20-CH1)

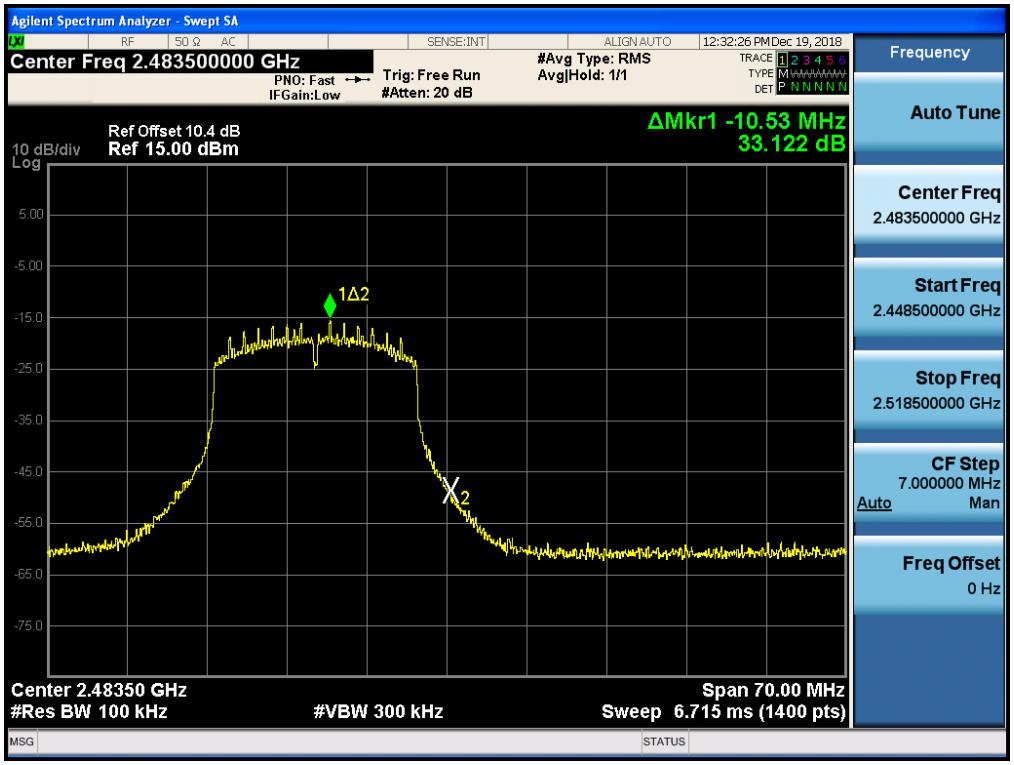
Band Edge (802.11n_HT20-CH11)



Band Edge (802.11n_HT20-CH12)



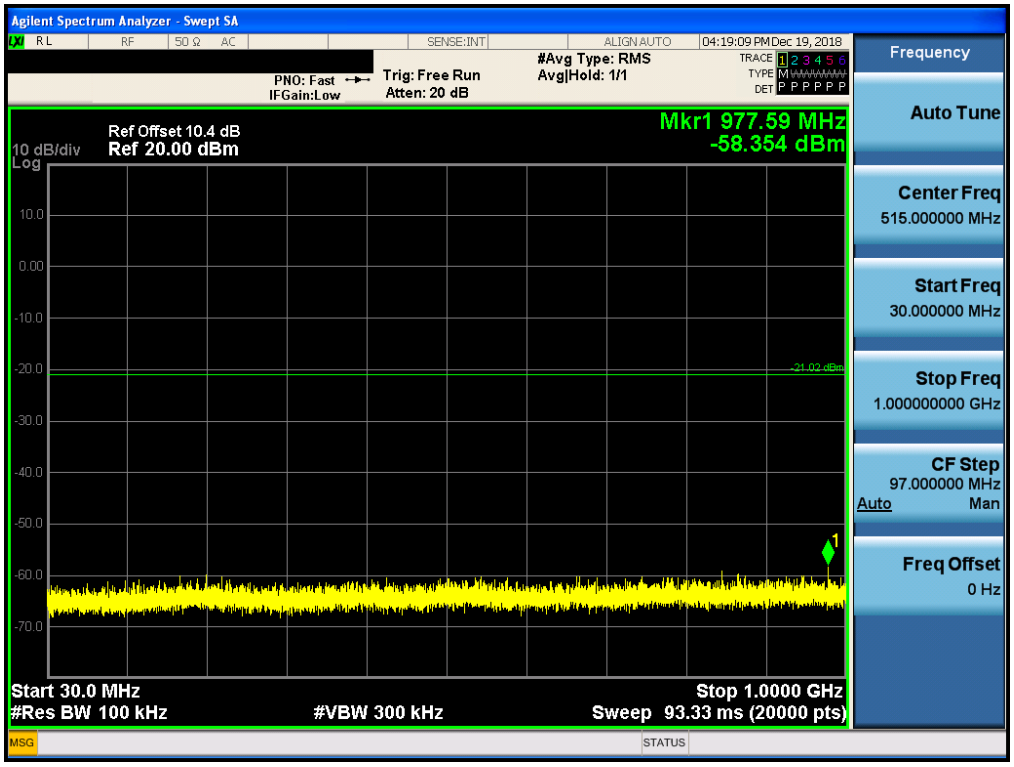
Band Edge (802.11n_HT20-CH13)



▣ Test Plots(Conducted Spurious Emission)

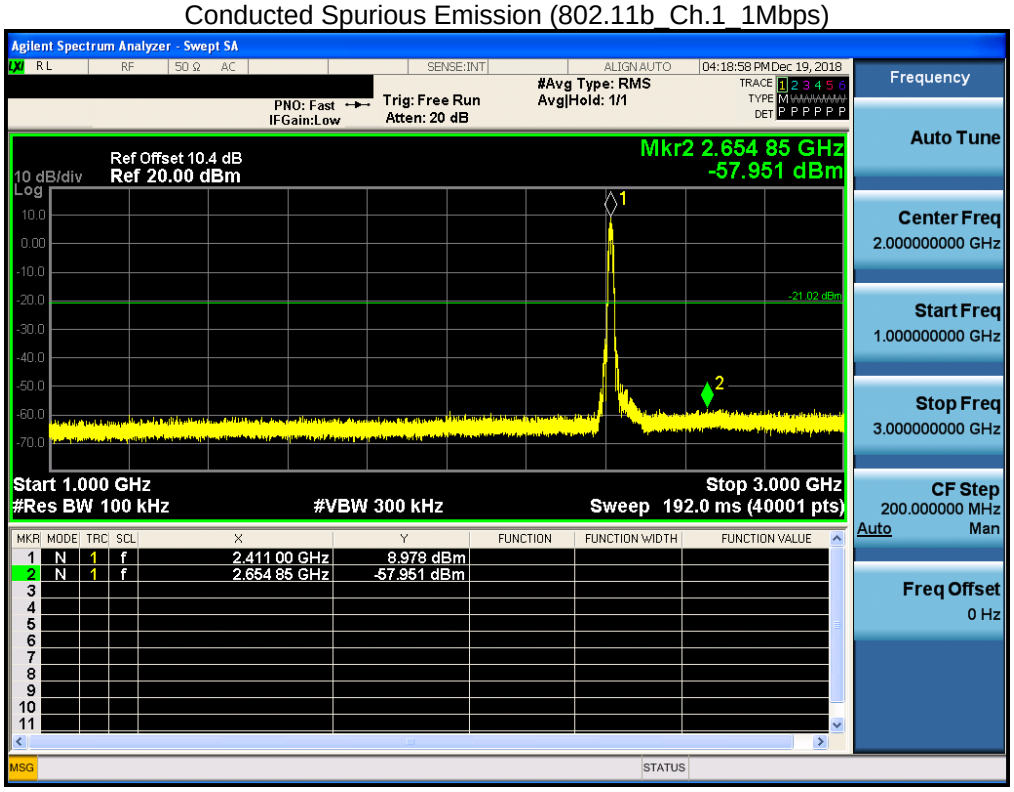
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



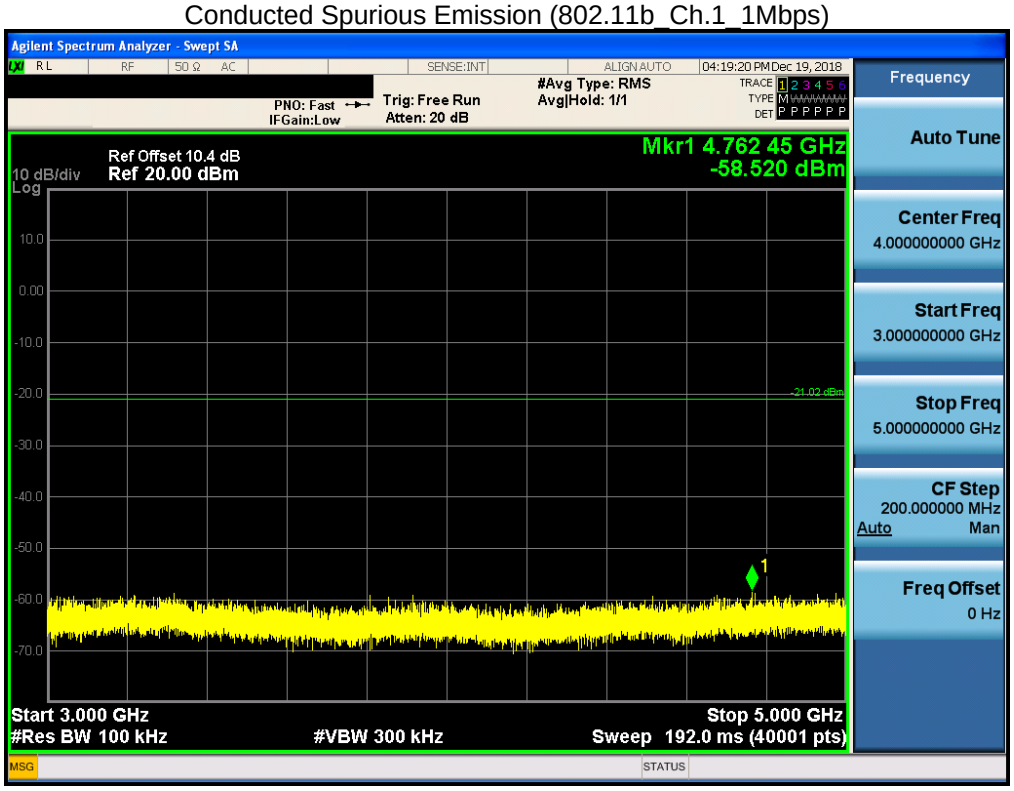
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



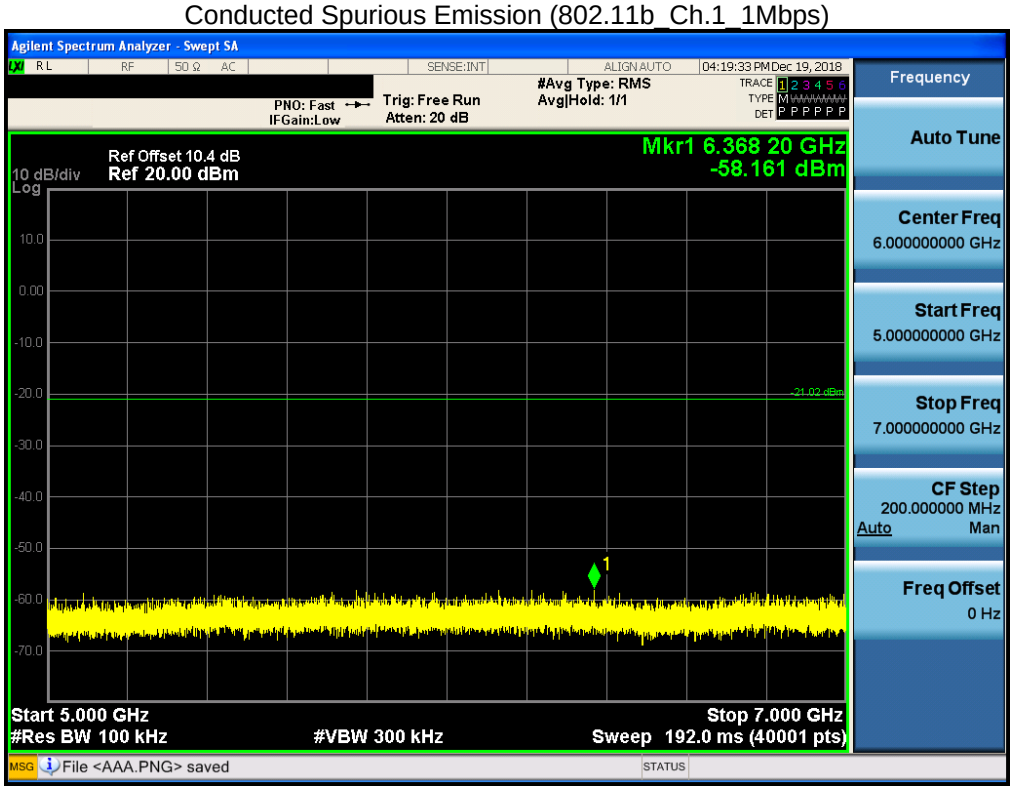
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



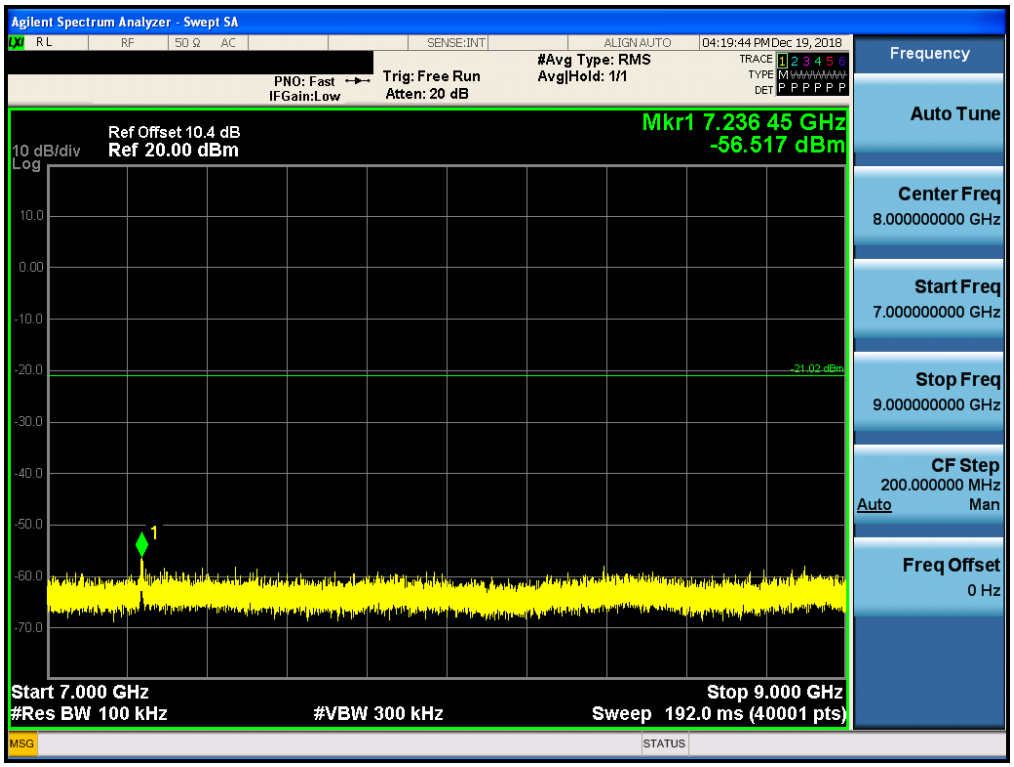
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



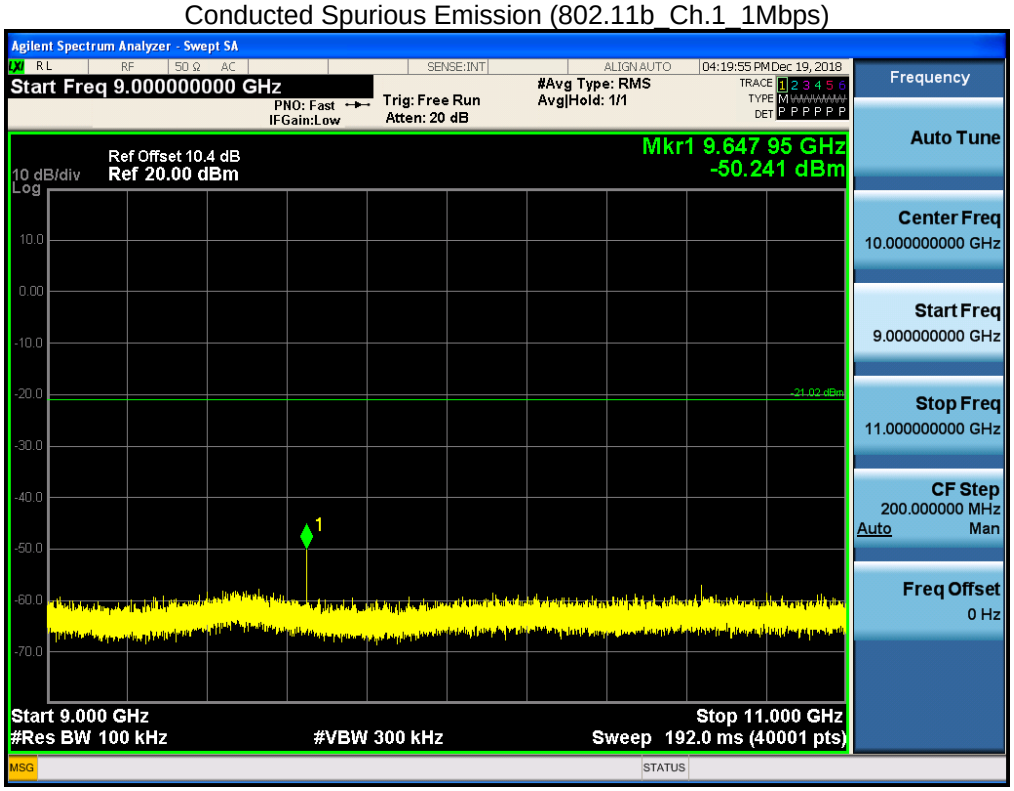
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



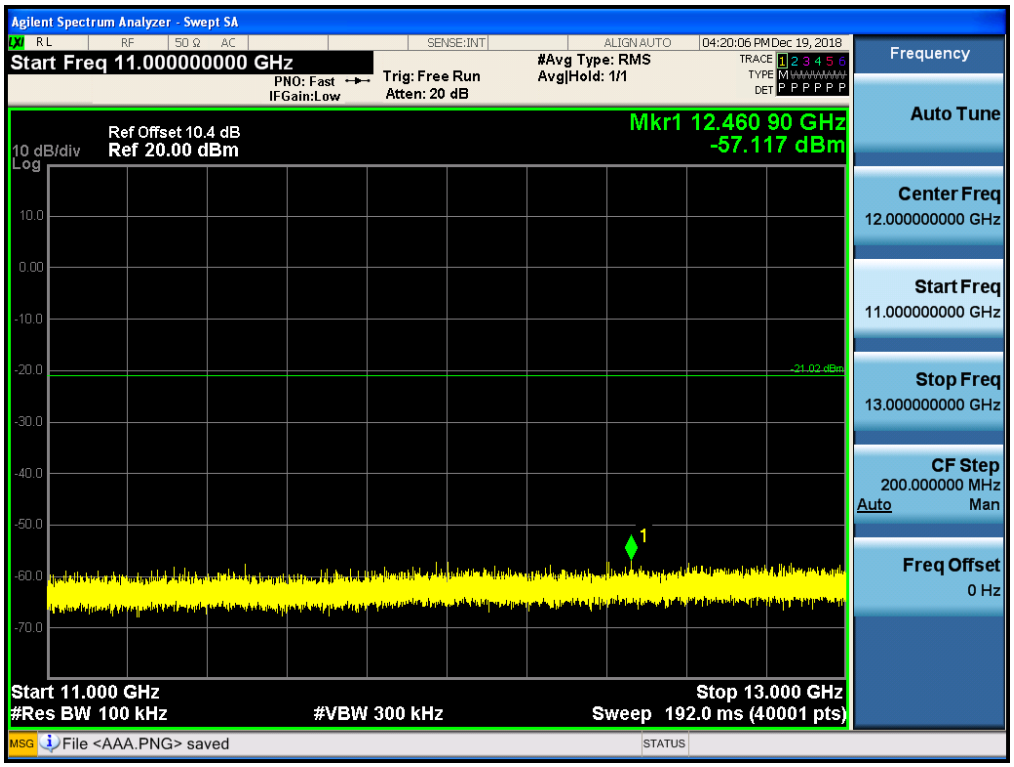
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



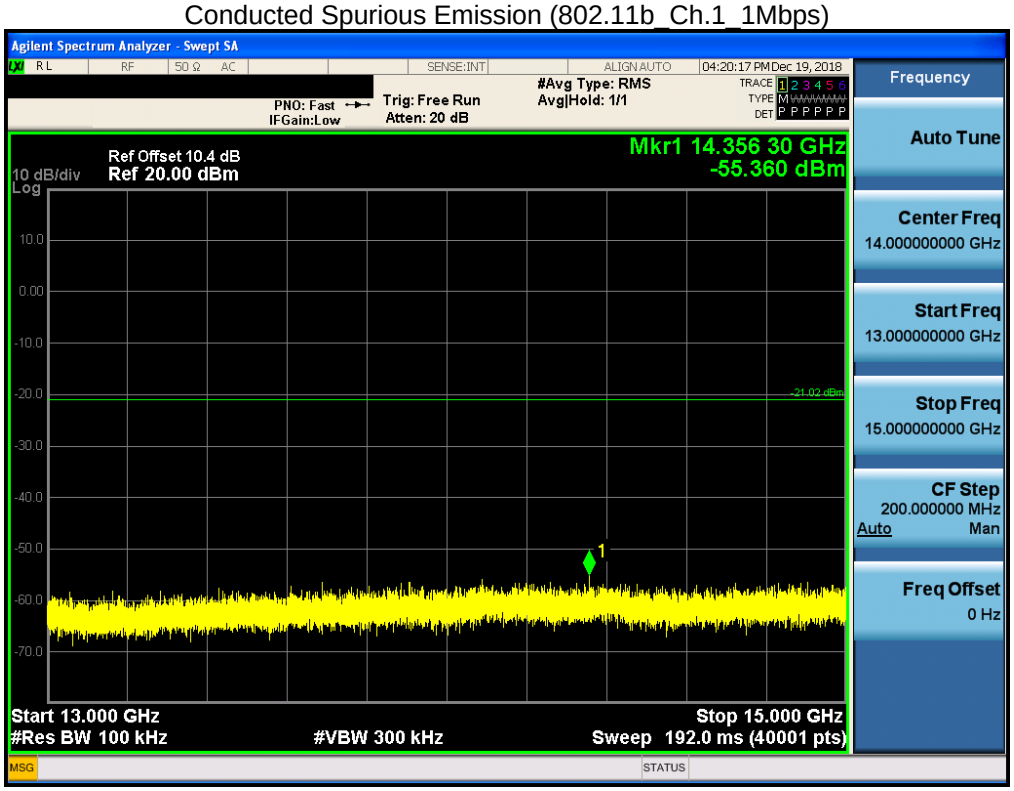
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



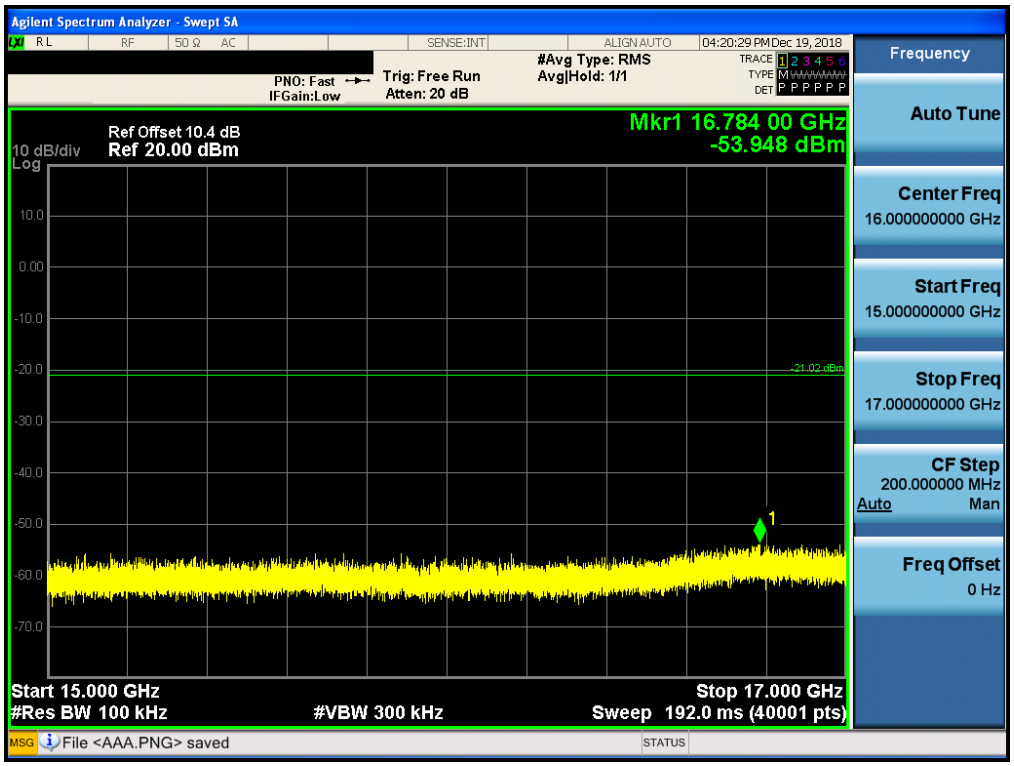
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



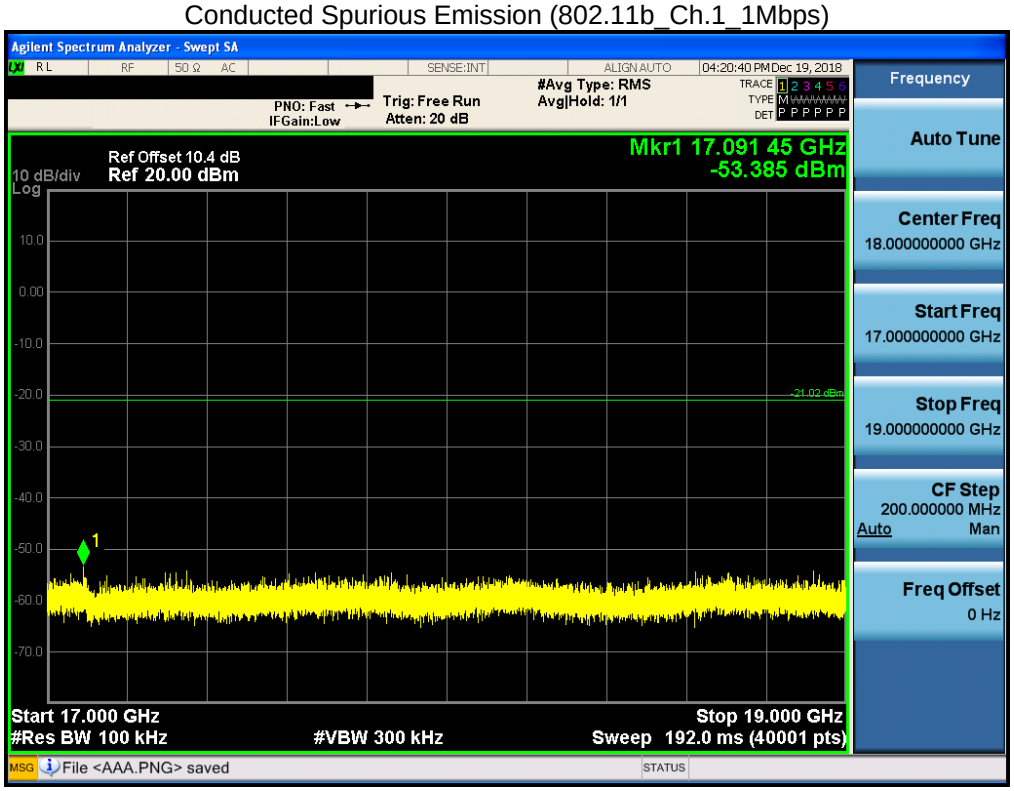
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



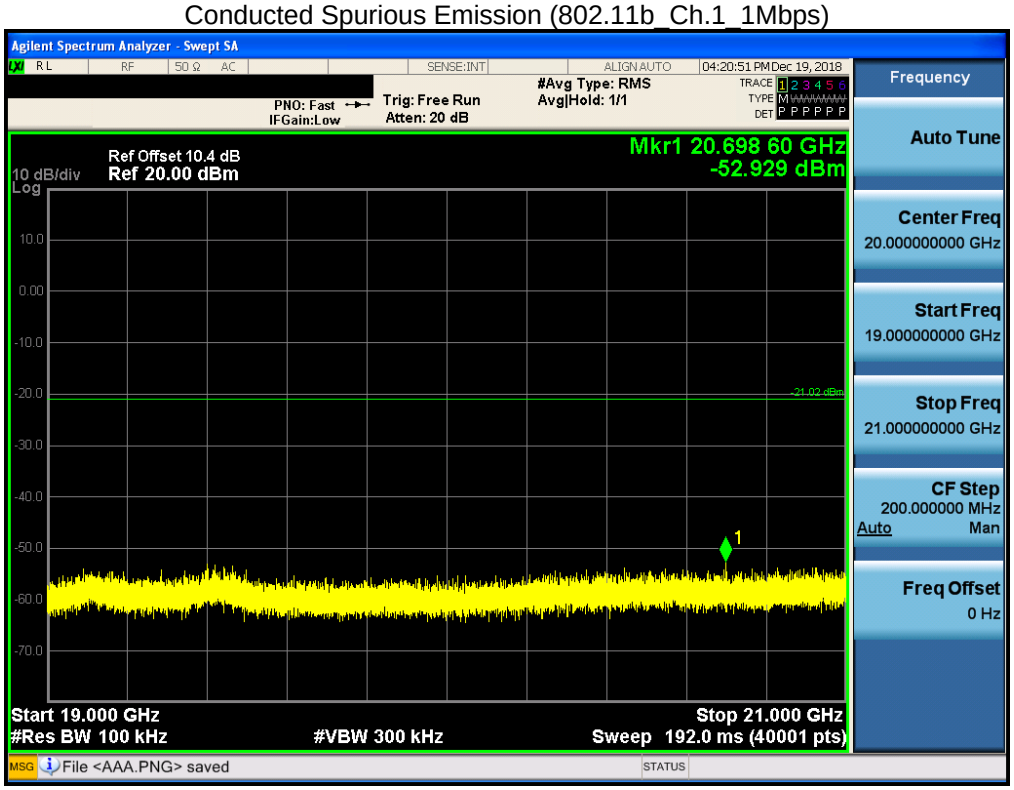
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



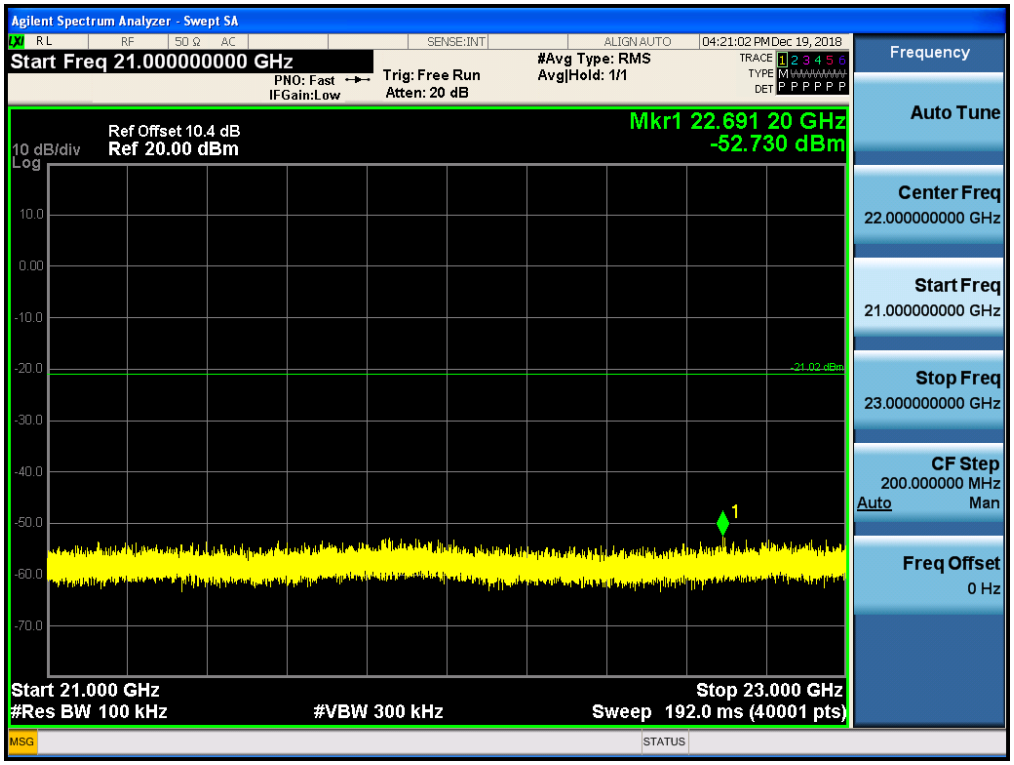
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



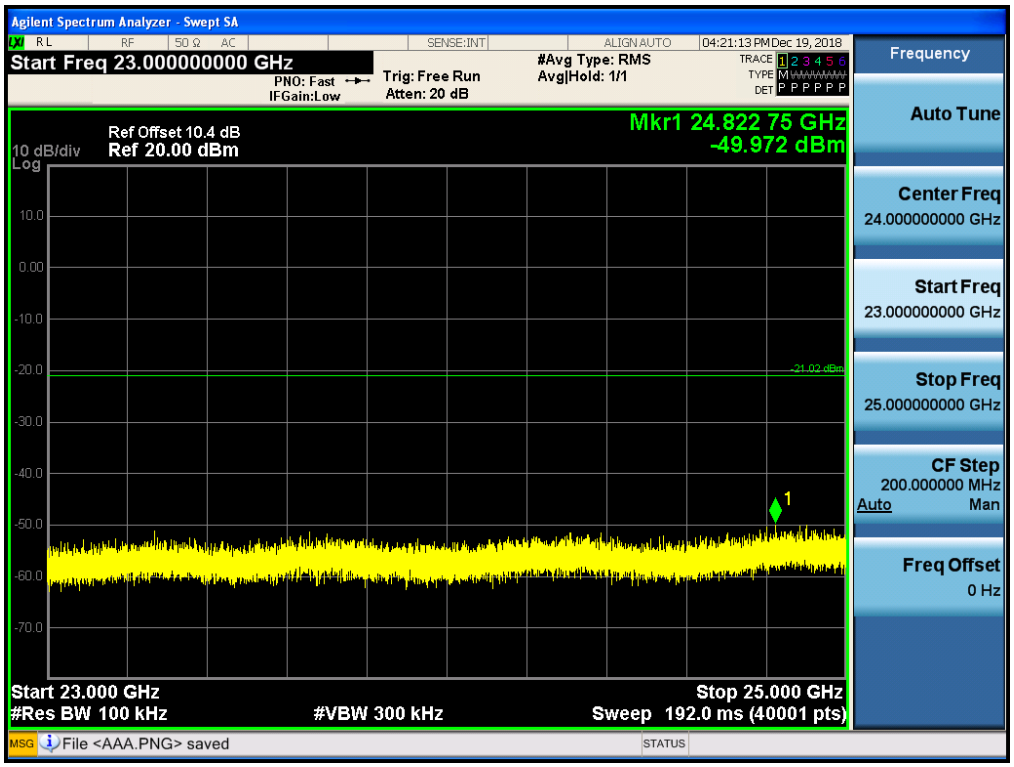
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b_Ch.1_1Mbps)



9.6 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = 40*log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor
4. The test results for below 30 MHz is correlated to an open site.
   The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

Operation Mode: 802.11b

Transfer Rate: 1 Mbps

Operating Frequency 2412

Channel No. 01 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	50.27	1.95	V	52.22	73.98	21.76	PK
4824	37.54	1.95	V	39.49	53.98	14.49	AV
7236	49.07	9.86	V	58.93	73.98	15.05	PK
7236	37.61	9.86	V	47.47	53.98	6.51	AV
4824	50.82	1.95	H	52.77	73.98	21.21	PK
4824	38.61	1.95	H	40.56	53.98	13.42	AV
7236	49.84	9.86	H	59.70	73.98	14.28	PK
7236	37.86	9.86	H	47.72	53.98	6.26	AV

Operation Mode: 802.11g

Transfer Rate: 6 Mbps

Operating Frequency 2412

Channel No. 01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	49.77	0.00	1.95	V	51.72	73.98	22.26	PK
4824	37.52	0.30	1.95	V	39.77	53.98	14.21	AV
7236	48.19	0.00	9.86	V	58.05	73.98	15.93	PK
7236	36.58	0.30	9.86	V	46.74	53.98	7.24	AV
4824	50.46	0.00	1.95	H	52.41	73.98	21.57	PK
4824	38.64	0.30	1.95	H	40.89	53.98	13.09	AV
7236	49.50	0.00	9.86	H	59.36	73.98	14.62	PK
7236	37.77	0.30	9.86	H	47.93	53.98	6.05	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	50.19	0.00	1.95	V	52.14	73.98	21.84	PK
4824	37.64	0.32	1.95	V	39.91	53.98	14.08	AV
7236	48.90	0.00	9.86	V	58.76	73.98	15.22	PK
7236	36.28	0.32	9.86	V	46.46	53.98	7.53	AV
4824	50.32	0.00	1.95	H	52.27	73.98	21.71	PK
4824	38.72	0.32	1.95	H	40.99	53.98	13.00	AV
7236	49.81	0.00	9.86	H	59.67	73.98	14.31	PK
7236	37.75	0.32	9.86	H	47.93	53.98	6.06	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	50.73	2.33	V	53.06	73.98	20.92	PK
4874	38.05	2.33	V	40.38	53.98	13.60	AV
7311	48.75	10.14	V	58.89	73.98	15.09	PK
7311	36.51	10.14	V	46.65	53.98	7.33	AV
4874	51.70	2.33	H	54.03	73.98	19.95	PK
4874	38.74	2.33	H	41.07	53.98	12.91	AV
7311	50.19	10.14	H	60.33	73.98	13.65	PK
7311	37.82	10.14	H	47.96	53.98	6.02	AV

Operation Mode: 802.11g

Transfer Rate: 6 Mbps

Operating Frequency 2437

Channel No. 06 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	49.76	0.00	2.33	V	52.09	73.98	21.89	PK
4874	38.44	0.30	2.33	V	41.07	53.98	12.91	AV
7311	48.31	0.00	10.14	V	58.45	73.98	15.53	PK
7311	36.84	0.30	10.14	V	47.28	53.98	6.70	AV
4874	50.99	0.00	2.33	H	53.32	73.98	20.66	PK
4874	38.62	0.30	2.33	H	41.25	53.98	12.73	AV
7311	50.23	0.00	10.14	H	60.37	73.98	13.61	PK
7311	37.92	0.30	10.14	H	48.36	53.98	5.62	AV

Operation Mode: 802.11n (HT20)

Transfer MCS Index: 0

Operating Frequency 2437

Channel No. 06 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	50.44	0.00	2.33	V	52.77	73.98	21.21	PK
4874	38.12	0.32	2.33	V	40.77	53.98	13.22	AV
7311	49.65	0.00	10.14	V	59.79	73.98	14.19	PK
7311	37.05	0.32	10.14	V	47.51	53.98	6.48	AV
4874	50.88	0.00	2.33	H	53.21	73.98	20.77	PK
4874	38.59	0.32	2.33	H	41.24	53.98	12.75	AV
7311	50.23	0.00	10.14	H	60.37	73.98	13.61	PK
7311	37.82	0.32	10.14	H	48.28	53.98	5.71	AV

Operation Mode: 802.11b

Transfer Rate: 1 Mbps

Operating Frequency 2462

Channel No. 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	48.64	2.28	V	50.92	73.98	23.06	PK
4924	36.42	2.28	V	38.70	53.98	15.28	AV
7386	48.88	9.81	V	58.69	73.98	15.29	PK
7386	36.81	9.81	V	46.62	53.98	7.36	AV
4924	50.36	2.28	H	52.64	73.98	21.34	PK
4924	37.81	2.28	H	40.09	53.98	13.89	AV
7386	49.25	9.81	H	59.06	73.98	14.92	PK
7386	36.89	9.81	H	46.70	53.98	7.28	AV

Operation Mode: 802.11g

Transfer Rate: 6 Mbps

Operating Frequency 2462

Channel No. 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	49.84	0.00	2.28	V	52.12	73.98	21.86	PK
4924	37.96	0.30	2.28	V	40.54	53.98	13.44	AV
7386	48.81	0.00	9.81	V	58.62	73.98	15.36	PK
7386	35.74	0.30	9.81	V	45.85	53.98	8.13	AV
4924	50.45	0.00	2.28	H	52.73	73.98	21.25	PK
4924	38.03	0.30	2.28	H	40.61	53.98	13.37	AV
7386	49.02	0.00	9.81	H	58.83	73.98	15.15	PK
7386	36.96	0.30	9.81	H	47.07	53.98	6.91	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	49.92	0.00	2.28	V	52.20	73.98	21.78	PK
4924	36.51	0.32	2.28	V	39.11	53.98	14.88	AV
7386	48.66	0.00	9.81	V	58.47	73.98	15.51	PK
7386	35.44	0.32	9.81	V	45.57	53.98	8.42	AV
4924	51.28	0.00	2.28	H	53.56	73.98	20.42	PK
4924	37.96	0.32	2.28	H	40.56	53.98	13.43	AV
7386	49.67	0.00	9.81	H	59.48	73.98	14.50	PK
7386	36.83	0.32	9.81	H	46.96	53.98	7.03	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2467
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4934	50.36	2.21	V	52.57	73.98	21.41	PK
4934	37.52	2.21	V	39.73	53.98	14.25	AV
7401	47.25	9.78	V	57.03	73.98	16.95	PK
7401	36.52	9.78	V	46.30	53.98	7.68	AV
4934	50.64	2.21	H	52.85	73.98	21.13	PK
4934	38.16	2.21	H	40.37	53.98	13.61	AV
7401	49.64	9.78	H	59.42	73.98	14.56	PK
7401	37.39	9.78	H	47.17	53.98	6.81	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2467
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4934	50.01	0.00	2.21	V	52.22	73.98	21.76	PK
4934	38.15	0.30	2.21	V	40.66	53.98	13.32	AV
7401	49.16	0.00	9.78	V	58.94	73.98	15.04	PK
7401	36.74	0.30	9.78	V	46.82	53.98	7.16	AV
4934	50.21	0.00	2.21	H	52.42	73.98	21.56	PK
4934	38.32	0.30	2.21	H	40.83	53.98	13.15	AV
7401	49.66	0.00	9.78	H	59.44	73.98	14.54	PK
7401	37.30	0.30	9.78	H	47.38	53.98	6.60	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2467
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4934	49.78	0.00	2.21	V	51.99	73.98	21.99	PK
4934	37.34	0.32	2.21	V	39.87	53.98	14.12	AV
7401	49.39	0.00	9.78	V	59.17	73.98	14.81	PK
7401	37.02	0.32	9.78	V	47.12	53.98	6.86	AV
4934	50.29	0.00	2.21	H	52.50	73.98	21.48	PK
4934	38.03	0.32	2.21	H	40.56	53.98	13.43	AV
7401	49.87	0.00	9.78	H	59.65	73.98	14.33	PK
7401	37.35	0.32	9.78	H	47.45	53.98	6.54	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2472
Channel No.	13 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4944	49.99	2.35	V	52.34	73.98	21.64	PK
4944	37.54	2.35	V	39.89	53.98	14.09	AV
7416	49.80	9.80	V	59.60	73.98	14.38	PK
7416	36.81	9.80	V	46.61	53.98	7.37	AV
4944	50.41	2.35	H	52.76	73.98	21.22	PK
4944	38.45	2.35	H	40.80	53.98	13.18	AV
7416	49.93	9.80	H	59.73	73.98	14.25	PK
7416	37.45	9.80	H	47.25	53.98	6.73	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2472
Channel No.	13 Ch

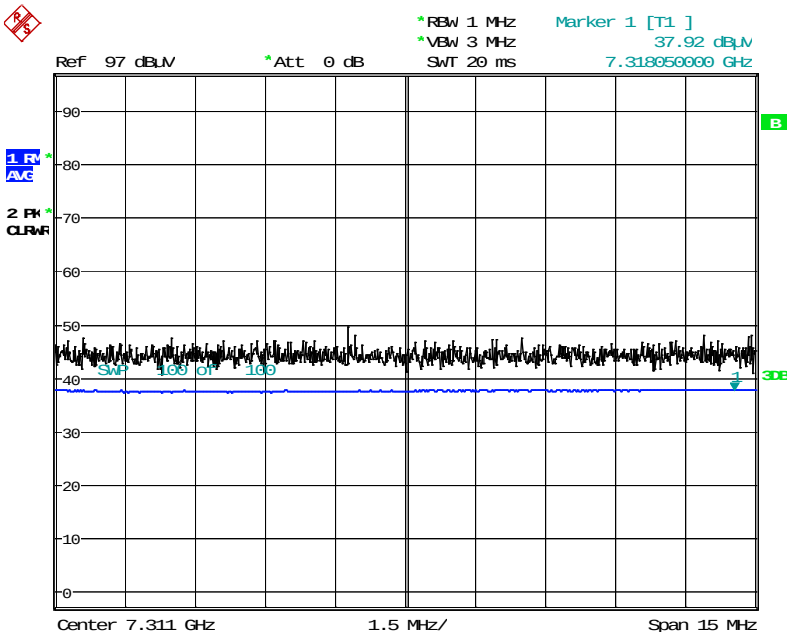
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4944	50.39	0.00	2.35	V	52.74	73.98	21.24	PK
4944	38.27	0.30	2.35	V	40.92	53.98	13.06	AV
7416	48.62	0.00	9.80	V	58.42	73.98	15.56	PK
7416	36.99	0.30	9.80	V	47.09	53.98	6.89	AV
4944	50.50	0.00	2.35	H	52.85	73.98	21.13	PK
4944	38.58	0.30	2.35	H	41.23	53.98	12.75	AV
7416	49.19	0.00	9.80	H	58.99	73.98	14.99	PK
7416	37.41	0.30	9.80	H	47.51	53.98	6.47	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2472
Channel No.	13 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4944	48.54	0.00	2.35	V	50.89	73.98	23.09	PK
4944	38.17	0.32	2.35	V	40.84	53.98	13.15	AV
7416	48.63	0.00	9.80	V	58.43	73.98	15.55	PK
7416	36.55	0.32	9.80	V	46.67	53.98	7.32	AV
4944	50.71	0.00	2.35	H	53.06	73.98	20.92	PK
4944	38.46	0.32	2.35	H	41.13	53.98	12.86	AV
7416	49.57	0.00	9.80	H	59.37	73.98	14.61	PK
7416	37.47	0.32	9.80	H	47.59	53.98	6.40	AV

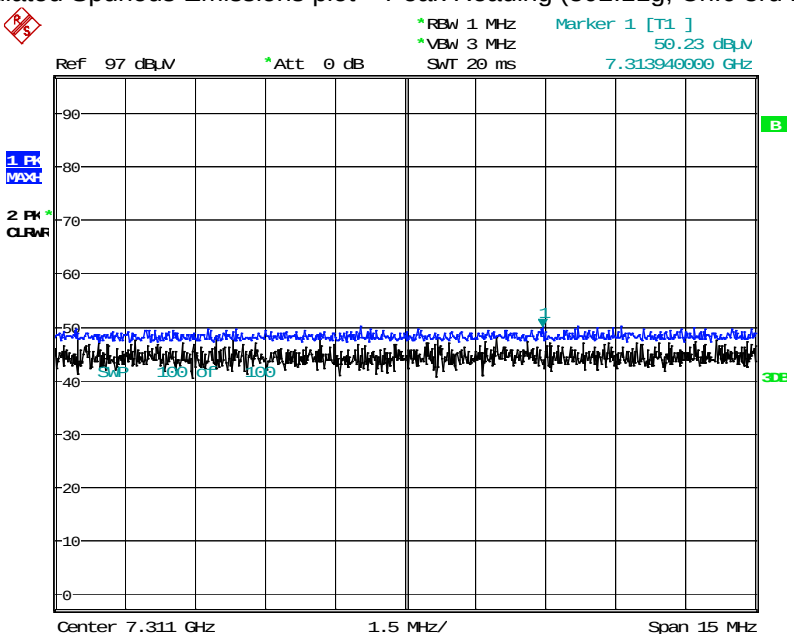
▣ Test Plots

Radiated Spurious Emissions plot – Average Reading (802.11g, Ch.6 3rd Harmonic, V)



Date: 9.FEB.2003 16:04:53

Radiated Spurious Emissions plot – Peak Reading (802.11g, Ch.6 3rd Harmonic, V)



Date: 9.FEB.2003 16:03:00

Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	56.59	0.85	H	57.44	73.98	16.54	PK
2390.0	45.57	0.85	H	46.42	53.98	7.56	AV
2390.0	55.62	0.85	V	56.47	73.98	17.51	PK
2390.0	44.73	0.85	V	45.58	53.98	8.40	AV
2483.5	56.21	1.13	H	57.34	73.98	16.64	PK
2483.5	46.04	1.13	H	47.17	53.98	6.81	AV
2483.5	55.98	1.13	V	57.11	73.98	16.87	PK
2483.5	45.63	1.13	V	46.76	53.98	7.22	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	67.48	0.00	0.85	H	68.33	73.98	5.65	PK
2390.0	49.63	0.30	0.85	H	50.78	53.98	3.20	AV
2390.0	66.36	0.00	0.85	V	67.21	73.98	6.77	PK
2390.0	48.12	0.30	0.85	V	49.27	53.98	4.71	AV
2483.5	67.21	0.00	1.13	H	68.34	73.98	5.64	PK
2483.5	47.38	0.30	1.13	H	48.81	53.98	5.17	AV
2483.5	66.81	0.00	1.13	V	67.94	73.98	6.04	PK
2483.5	46.99	0.30	1.13	V	48.42	53.98	5.56	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	66.33	0.00	0.85	H	67.18	73.98	6.80	PK
2390.0	49.68	0.32	0.85	H	50.85	53.98	3.14	AV
2390.0	65.12	0.00	0.85	V	65.97	73.98	8.01	PK
2390.0	47.51	0.32	0.85	V	48.68	53.98	5.31	AV
2483.5	68.71	0.00	1.13	H	69.84	73.98	4.14	PK
2483.5	48.21	0.32	1.13	H	49.66	53.98	4.33	AV
2483.5	68.05	0.00	1.13	V	69.18	73.98	4.80	PK
2483.5	47.87	0.32	1.13	V	49.32	53.98	4.67	AV

Operation Mode:	802.11b
Transfer MCS Index:	1Mbps
Operating Frequency	2467 MHz
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	54.57	0.85	H	55.42	73.98	18.56	PK
2483.5	43.18	0.85	H	44.03	53.98	9.95	AV
2483.5	53.51	0.85	V	54.36	73.98	19.62	PK
2483.5	42.79	0.85	V	43.64	53.98	10.34	AV

Operation Mode:	802.11b
Transfer MCS Index:	1Mbps
Operating Frequency	2472 MHz
Channel No.	13 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	54.49	0.85	H	55.34	73.98	18.64	PK
2483.5	42.68	0.85	H	43.53	53.98	10.45	AV
2483.5	53.73	0.85	V	54.58	73.98	19.40	PK
2483.5	41.28	0.85	V	42.13	53.98	11.85	AV

Operation Mode:	802.11g
Transfer MCS Index:	6Mbps
Operating Frequency	2467 MHz
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	56.04	0.00	0.85	H	56.89	73.98	17.09	PK
2483.5	44.14	0.30	0.85	H	45.29	53.98	8.69	AV
2483.5	55.86	0.00	0.85	V	56.71	73.98	17.27	PK
2483.5	43.62	0.30	0.85	V	44.77	53.98	9.21	AV

Operation Mode:	802.11g
Transfer MCS Index:	6Mbps
Operating Frequency	2472 MHz
Channel No.	13 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	64.59	0.00	0.85	H	65.44	73.98	8.54	PK
2483.5	46.11	0.30	0.85	H	47.26	53.98	6.72	AV
2483.5	63.21	0.00	0.85	V	64.06	73.98	9.92	PK
2483.5	45.66	0.30	0.85	V	46.81	53.98	7.17	AV

Operation Mode: 802.11n

Transfer MCS Index: 0

Operating Frequency 2467 MHz

Channel No. 12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	57.25	0.00	0.85	H	58.10	73.98	15.88	PK
2483.5	44.38	0.32	0.85	H	45.55	53.98	8.44	AV
2483.5	56.44	0.00	0.85	V	57.29	73.98	16.69	PK
2483.5	44.03	0.32	0.85	V	45.20	53.98	8.79	AV

Operation Mode: 802.11n

Transfer MCS Index: 0

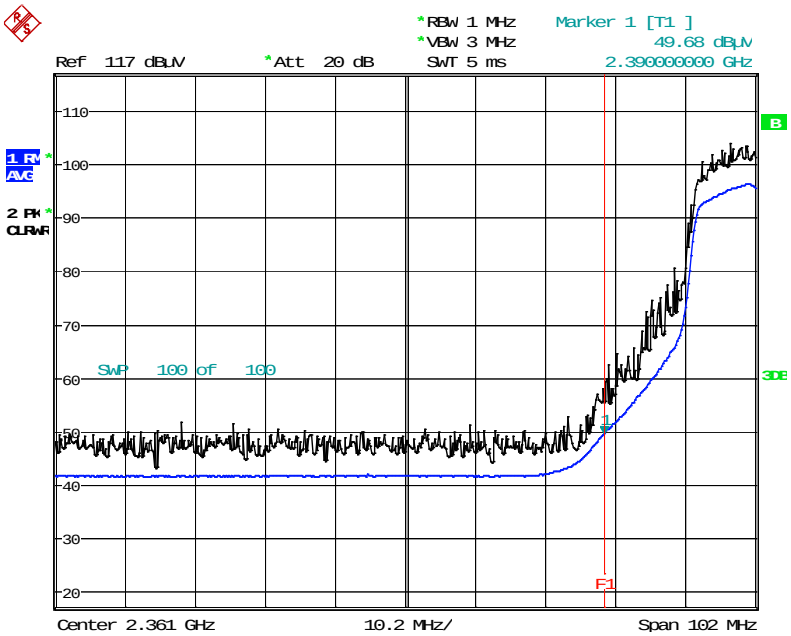
Operating Frequency 2472 MHz

Channel No. 13 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	65.31	0.00	0.85	H	66.16	73.98	7.82	PK
2483.5	47.15	0.32	0.85	H	48.32	53.98	5.67	AV
2483.5	64.81	0.00	0.85	V	65.66	73.98	8.32	PK
2483.5	47.05	0.32	0.85	V	48.22	53.98	5.77	AV

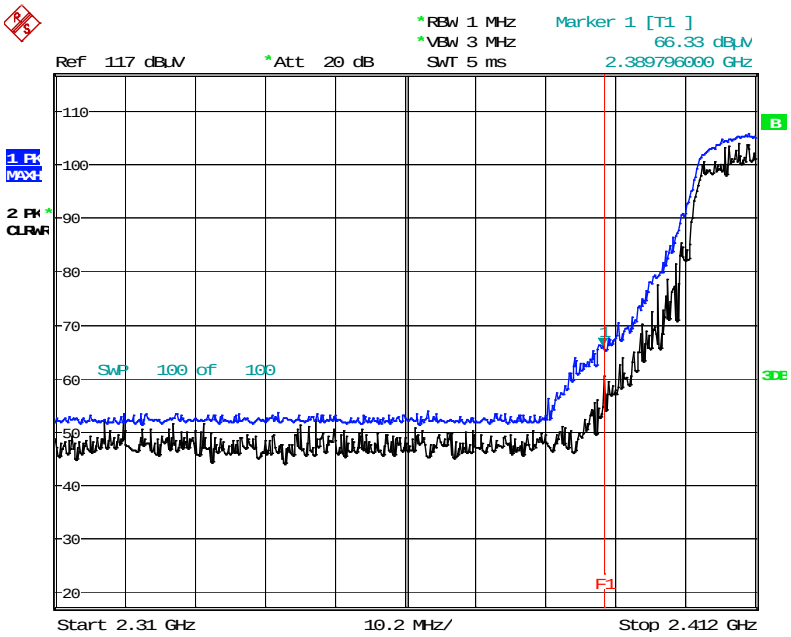
▣ Test Plots

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.1, X-H)



Date: 8.FEB.2003 16:02:01

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.1, X-H)



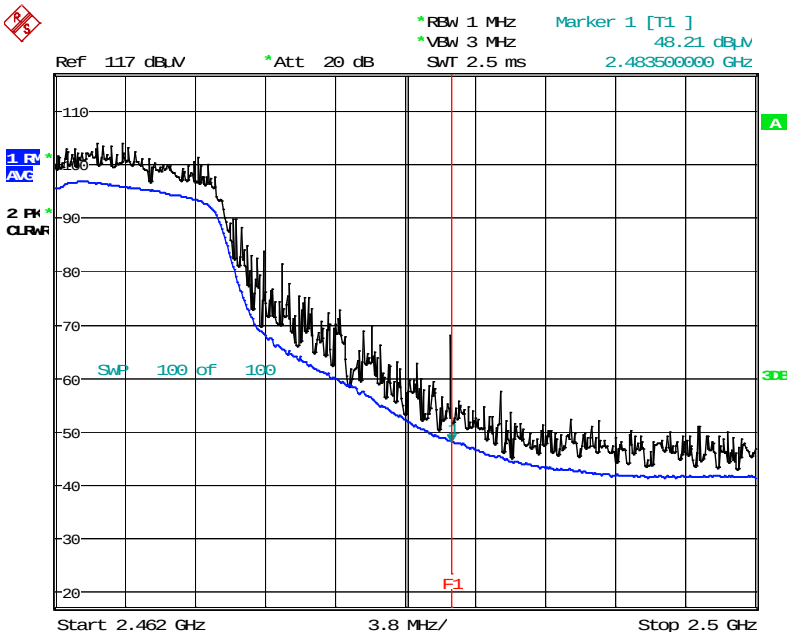
Date: 8.FEB.2003 16:03:11

Note:

Plot of worst case are only reported.

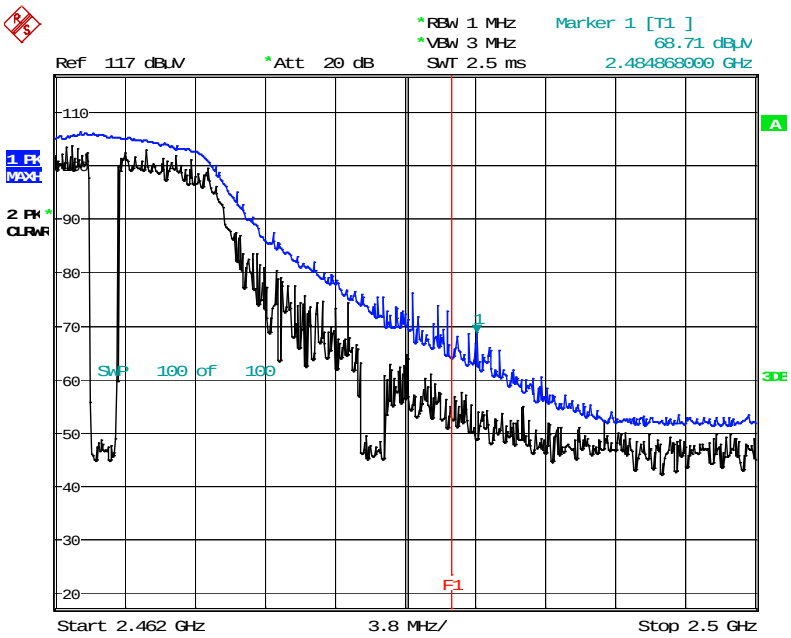
▣ Test Plots

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.11, X-H)



Date: 4.FEB.2003 15:58:30

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.11, X-H)



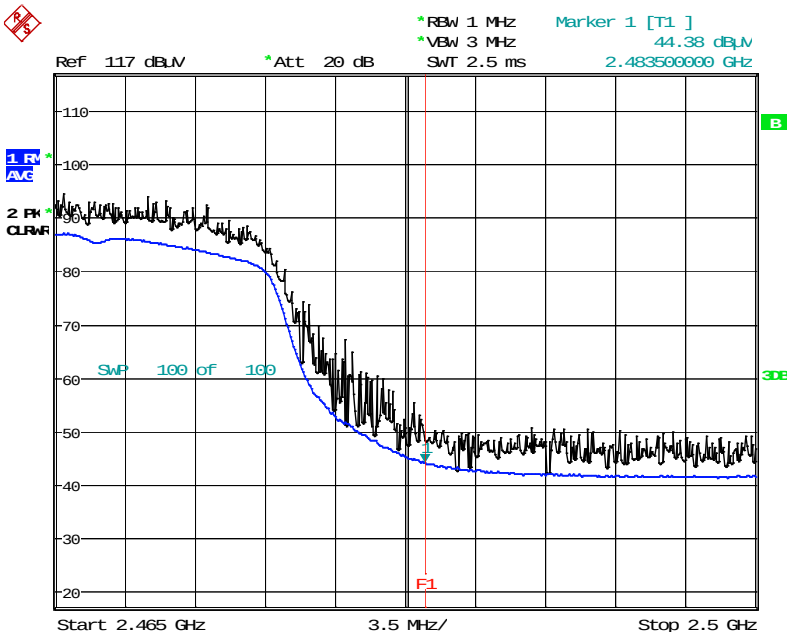
Date: 4.FEB.2003 15:58:15

Note:

Plot of worst case are only reported.

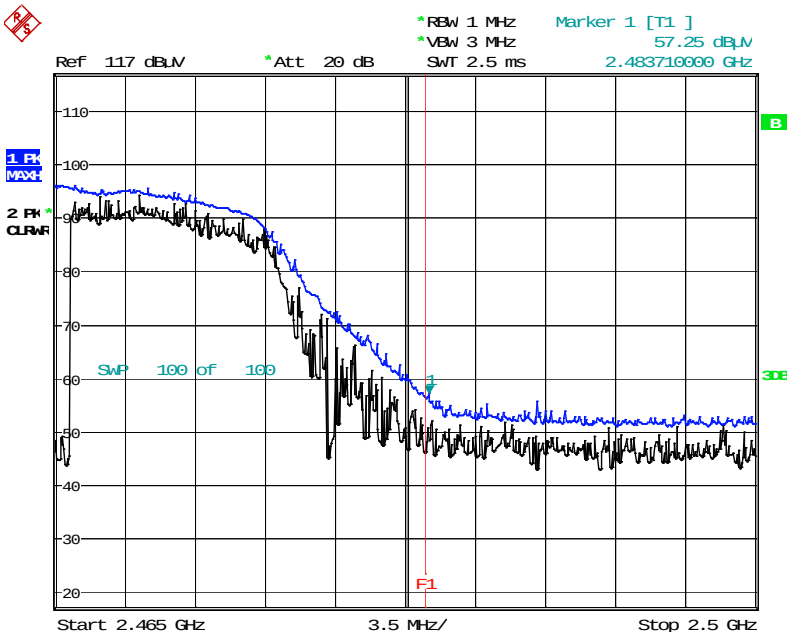
▣ Test Plots

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.12, X-H)



Date: 8.FEB.2003 14:42:05

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.12, X-H)



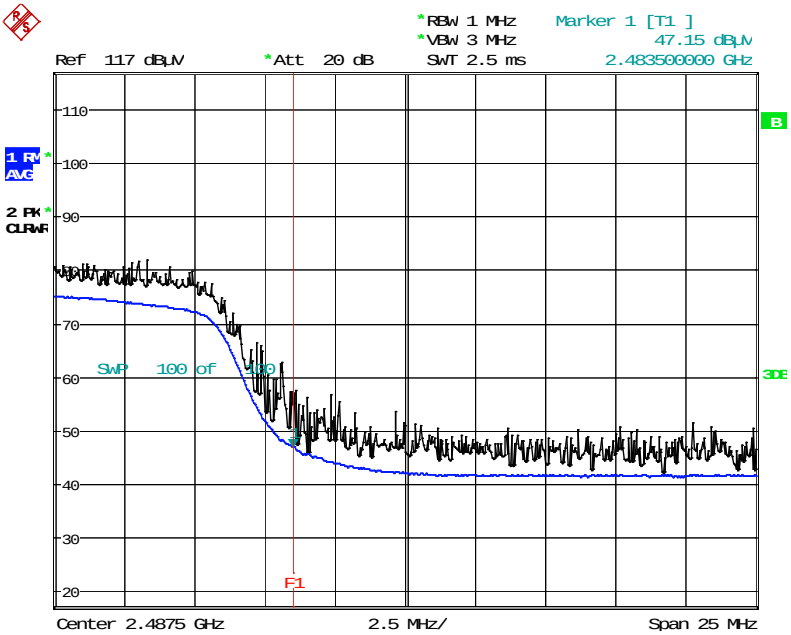
Date: 8.FEB.2003 14:41:25

Note:

Plot of worst case are only reported.

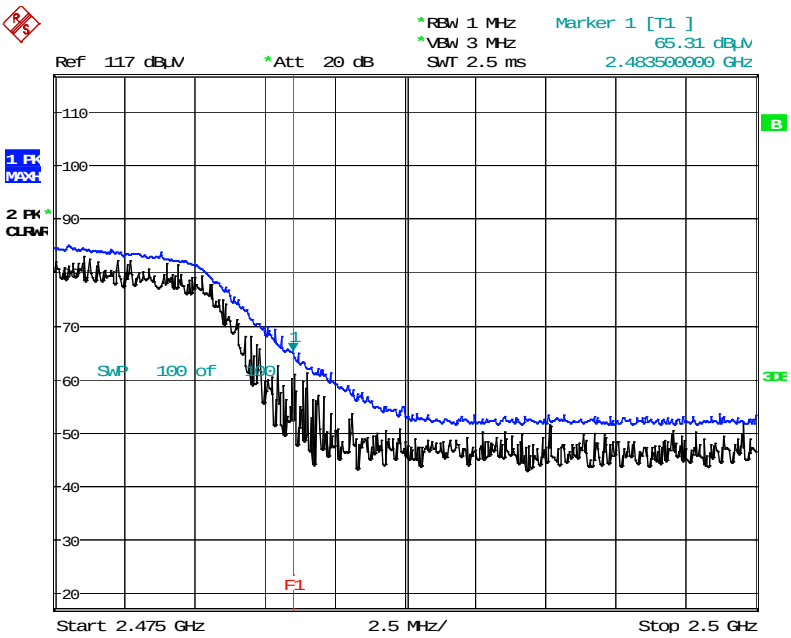
▣ Test Plots

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.13, X-H)



Date: 8.FEB.2003 14:15:06

Radiated Restricted Band Edges plot – Peak Reading (802.11b Ch.13, X-H)



Date: 8.FEB.2003 14:14:22

Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

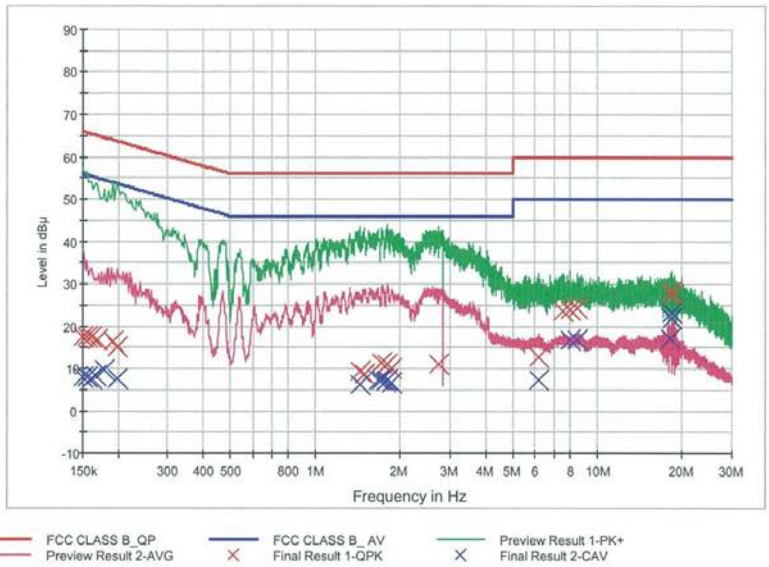
2.4GWLAN_L1 1 / 2

HCT TEST Report

Common Information

EUT:	SM-M105FDS
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	2.4G WLAN_L1

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	17.4	9.000	Off	L1	9.7	48.6	66.0
0.156000	17.5	9.000	Off	L1	9.7	48.1	65.7
0.160000	17.3	9.000	Off	L1	9.7	48.2	65.5
0.168000	16.9	9.000	Off	L1	9.7	48.2	65.1
0.192000	16.5	9.000	Off	L1	9.7	47.4	63.9
0.198000	14.9	9.000	Off	L1	9.7	48.8	63.7
1.440000	9.4	9.000	Off	L1	9.9	46.6	56.0
1.490000	8.8	9.000	Off	L1	9.9	47.2	56.0
1.706000	11.4	9.000	Off	L1	9.8	44.6	56.0
1.798000	11.2	9.000	Off	L1	9.8	44.8	56.0
1.856000	10.1	9.000	Off	L1	9.8	45.9	56.0
2.738000	10.9	9.000	Off	L1	9.9	45.1	56.0
6.180000	12.8	9.000	Off	L1	10.1	47.2	60.0
7.540000	23.6	9.000	Off	L1	10.1	36.4	60.0
8.022000	23.9	9.000	Off	L1	10.1	36.1	60.0
8.460000	24.4	9.000	Off	L1	10.1	35.6	60.0
18.416000	27.2	9.000	Off	L1	10.4	32.8	60.0
18.426000	28.5	9.000	Off	L1	10.4	31.5	60.0

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2.4GWLAN_L1 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	7.8	9.000	Off	L1	9.7	48.2	56.0
0.156000	8.0	9.000	Off	L1	9.7	47.7	55.7
0.160000	7.8	9.000	Off	L1	9.7	47.7	55.5
0.166000	8.2	9.000	Off	L1	9.7	47.0	55.2
0.178000	9.8	9.000	Off	L1	9.7	44.8	54.6
0.198000	7.5	9.000	Off	L1	9.7	46.2	53.7
1.440000	6.4	9.000	Off	L1	9.9	39.6	46.0
1.662000	7.3	9.000	Off	L1	9.8	38.7	46.0
1.706000	7.3	9.000	Off	L1	9.8	38.7	46.0
1.774000	7.1	9.000	Off	L1	9.8	38.9	46.0
1.800000	7.1	9.000	Off	L1	9.8	38.9	46.0
1.856000	6.7	9.000	Off	L1	9.8	39.3	46.0
6.180000	7.2	9.000	Off	L1	10.1	42.8	50.0
8.022000	16.9	9.000	Off	L1	10.1	33.1	50.0
8.460000	16.8	9.000	Off	L1	10.1	33.2	50.0
18.116000	17.0	9.000	Off	L1	10.4	33.0	50.0
18.358000	23.3	9.000	Off	L1	10.4	26.7	50.0
18.424000	21.8	9.000	Off	L1	10.4	28.2	50.0

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Conducted Emissions (Line 2)

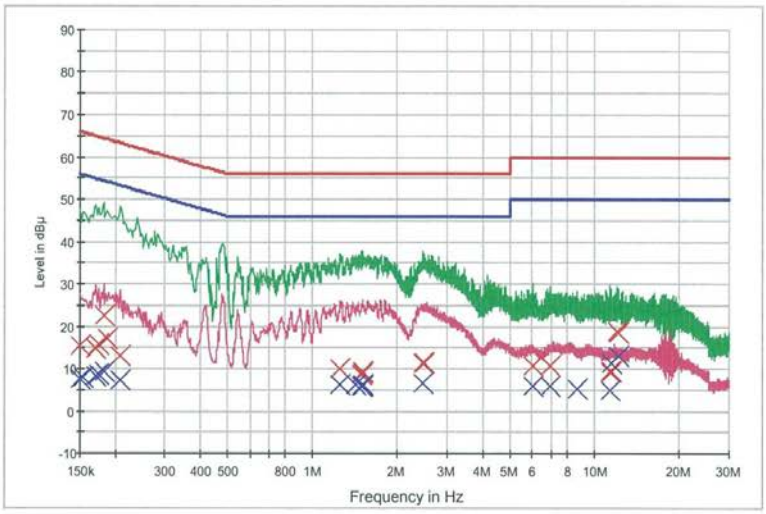
2.4GWLAN_N 1 / 2

HCT TEST Report

Common Information

EUT:	SM-M105FDS
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	2.4G WLAN_N

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	15.6	9.000	Off	N	9.7	50.4	66.0
0.170000	14.9	9.000	Off	N	9.7	50.1	65.0
0.174000	15.7	9.000	Off	N	9.7	49.1	64.8
0.182000	22.4	9.000	Off	N	9.7	42.0	64.4
0.188000	17.1	9.000	Off	N	9.7	47.0	64.1
0.208000	12.9	9.000	Off	N	9.7	50.4	63.3
1.252000	9.9	9.000	Off	N	9.8	46.1	56.0
1.484000	8.8	9.000	Off	N	9.9	47.2	56.0
1.502000	9.1	9.000	Off	N	9.9	46.9	56.0
1.508000	9.3	9.000	Off	N	9.9	46.7	56.0
2.456000	11.3	9.000	Off	N	9.9	44.7	56.0
2.484000	11.4	9.000	Off	N	9.9	44.6	56.0
6.032000	10.8	9.000	Off	N	10.1	49.2	60.0
6.992000	10.6	9.000	Off	N	10.1	49.4	60.0
11.400000	9.4	9.000	Off	N	10.3	50.6	60.0
11.460000	9.4	9.000	Off	N	10.3	50.6	60.0
12.072000	18.7	9.000	Off	N	10.3	41.3	60.0
12.198000	18.6	9.000	Off	N	10.4	41.4	60.0

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	7.6	9.000	Off	N	9.7	48.4	56.0
0.154000	7.8	9.000	Off	N	9.7	48.0	55.8
0.170000	8.2	9.000	Off	N	9.7	46.7	55.0
0.174000	8.7	9.000	Off	N	9.7	46.1	54.8
0.182000	9.3	9.000	Off	N	9.7	45.0	54.4
0.208000	7.3	9.000	Off	N	9.7	46.0	53.3
1.252000	6.2	9.000	Off	N	9.8	39.8	46.0
1.410000	6.4	9.000	Off	N	9.9	39.6	46.0
1.484000	6.0	9.000	Off	N	9.9	40.0	46.0
1.504000	6.1	9.000	Off	N	9.9	39.9	46.0
1.508000	6.1	9.000	Off	N	9.9	39.9	46.0
2.456000	6.5	9.000	Off	N	9.9	39.5	46.0
6.032000	6.0	9.000	Off	N	10.1	44.0	50.0
6.992000	6.0	9.000	Off	N	10.1	44.0	50.0
8.690000	5.2	9.000	Off	N	10.2	44.8	50.0
11.400000	4.9	9.000	Off	N	10.3	45.1	50.0
11.460000	11.3	9.000	Off	N	10.3	38.7	50.0
12.198000	13.2	9.000	Off	N	10.4	36.8	50.0

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10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/12/2018	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/27/2018	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/30/2018	Annual	0093008124
Agilent	N9020A / Signal Analyzer	06/08/2018	Annual	MY52090906
Agilent	N1911A / Power Meter	04/16/2018	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/16/2018	Annual	MY52260025
Hewlett Packard	11667B / Power Splitter	06/07/2018	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/26/2018	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/10/2018	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/09/2018	Annual	3368
Schwarzbeck	BBHA 9120D / Horn Antenna	06/30/2017	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 40 GHz) / Spectrum Analyzer	07/24/2019	Annual	100843
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	01/03/2018	Annual	F6
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/09/2018	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/29/2018	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2018	Annual	2
Weinschel	2-3 / Attenuator (3 dB)	10/10/2018	Annual	BR0617
H+S	5910-N-50-010 / Attenuator(10 dB)	11/08/2018	Annual	NONE
CERNEX	CBLU1183540B-01 / Power Amplifier	12/26/2017	Annual	25540
CERNEX	CBL06185030 / Power Amplifier	03/28/2018	Annual	28550
CERNEX	CBL18265035 / Power Amplifier	01/10/2018	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/29/2018	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	03/27/2018	Annual	3000C000276

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

11. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-1812-FC040-P
2	HCT-RF-1812-FC041-P
3	HCT-RF-1812-FC042-P