HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 **FAX: +82-31-645-6401**

FCC DTS REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
January 30, 2019

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1901-FC031

FCC ID:	**A3LSMM305F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model:	SM-M305M/DS
Additional Model:	SM-M305F/DS, SM-M305F, SM-M305M
EUT Type:	Mobile Phone
Peak Output Power:	802.11b : 24.81 dBm 802.11g : 25.50 dBm 802.11n(HT20) : 25.49 dBm
Frequency Range:	2412 MHz - 2462 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

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1901-FC031	January 30, 2019	- First Approval Report

Table of Contents

1. EUT DESCRIPTION 4
2. TEST METHODOLOGY 5
EUT CONFIGURATION 5
EUT EXERCISE 5
GENERAL TEST PROCEDURES 5
DESCRIPTION OF TEST MODES 5
3. INSTRUMENT CALIBRATION 6
4. FACILITIES AND ACCREDITATIONS 6
FACILITIES 6
EQUIPMENT 6
5. ANTENNA REQUIREMENTS 6
6. MEASUREMENT UNCERTAINTY 7
7. DESCRIPTION OF TESTS 8
8. SUMMARY TEST OF RESULTS 23
9. TEST RESULT 24
9.1 DUTY CYCLE 24
9.2 6dB BANDWIDTH 27
9.3 OUTPUT POWER 30
9.4 POWER SPECTRAL DENSITY 36
9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS 39
9.6 RADIATED SPURIOUS EMISSIONS 50
9.7 RADIATED RESTRICTED BAND EDGES 61
9.8 POWERLINE CONDUCTED EMISSIONS 70
9.9 CONFIRMATION OF GEO-LOCATION MECHANISM 74
10. LIST OF TEST EQUIPMENT 77
11. ANNEX A_ TEST SETUP PHOTO 79

1. EUT DESCRIPTION

Model	SM-M305M/DS
Additional Model	SM-M305F/DS, SM-M305F, SM-M305M
EUT Type	Mobile Phone
Power Supply	DC 3.85 V
Battery Information	Model: EB-BG580ABU Type: Li-ion battery
Travel Adapter Information	Model : EP-TA200 Manufacture: ELENTEC
Frequency Range	2412 MHz - 2462 MHz
Max. RF Output Power	**Peak Power** 802.11b : 24.81 dBm 802.11g : 25.50 dBm 802.11n(HT20) : 25.49 dBm **Average Power** 802.11b : 19.31 dBm 802.11g : 17.48 dBm 802.11n(HT20) : 17.39 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n
Number of Channels	11 Channels
Antenna Specification	Antenna type: LDS Peak Gain : -2.36 dBi
Date(s) of Tests	January 09, 2019 ~ January 25, 2019

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.

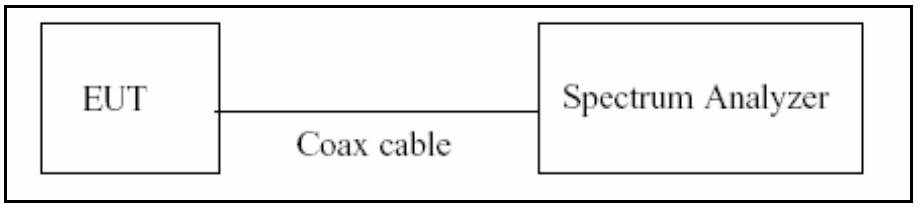
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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*.

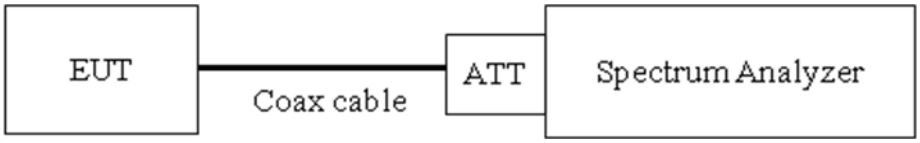
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10*log(1/Duty Cycle)

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)

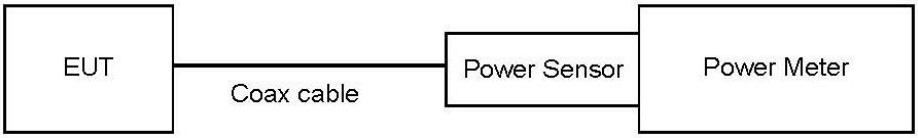
1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Detector = Peak
4) Trace mode = max hold
5) Sweep = auto couple
6) Allow the trace to stabilize
7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

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

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

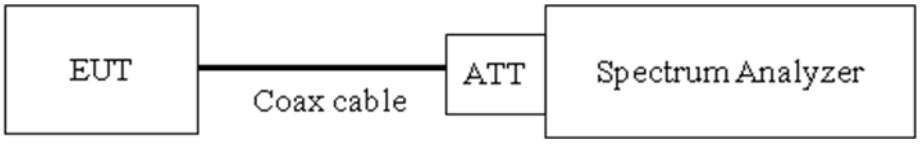
▪ Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

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 8.4 in KDB 558074 v05, Procedure 11.10 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 = peak
7) Trace Mode = max hold
8) Allow trace to fully stabilize.
9) Use the peak marker function to determine the maximum amplitude level within the RBW.
   If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

▪ Power Spectral Density = Reading Value + ATT loss + Cable loss

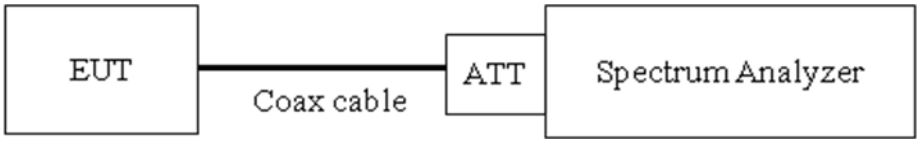
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (Peak) 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 > 20 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	11.30
100	9.83
200	10.19
300	10.13
400	10.23
500	10.25
600	10.32
700	10.35
800	10.35
900	10.34
1000	10.39
2000	10.64
2400*	10.65
2500*	10.67
3000	10.68
4000	10.89
5000	11.07
6000	11.06
7000	11.35
8000	11.32
9000	11.48
10000	11.56
11000	11.56
12000	11.68
13000	11.83
14000	11.90
15000	11.98
16000	12.04
17000	12.02
18000	12.08
19000	12.07
20000	12.14
21000	12.17
22000	12.31
23000	12.60
24000	12.34
25000	12.53
26000	12.02

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

2. Factor = Attenuator loss + Cable loss

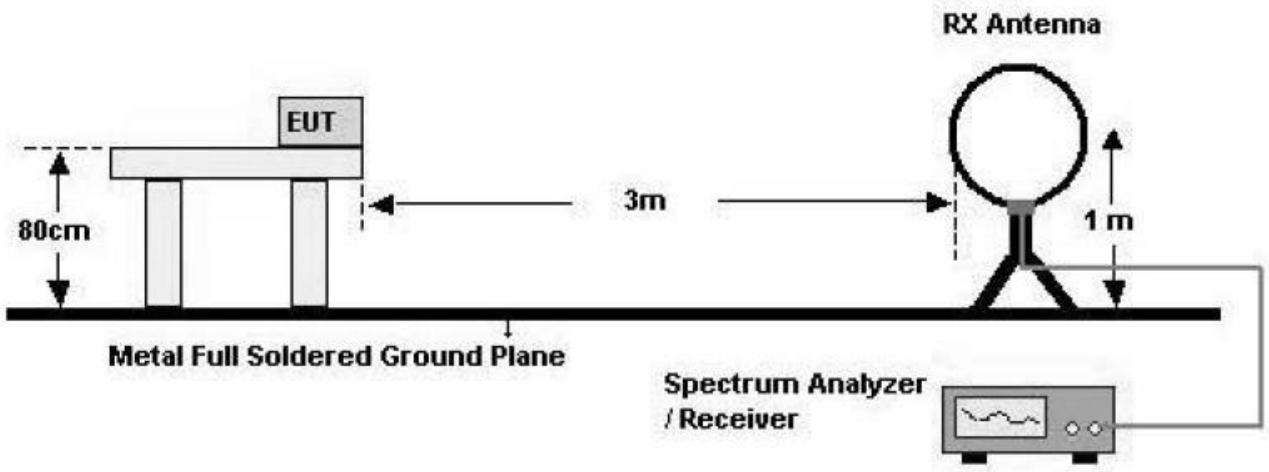
7.6. Radiated Test

Limit

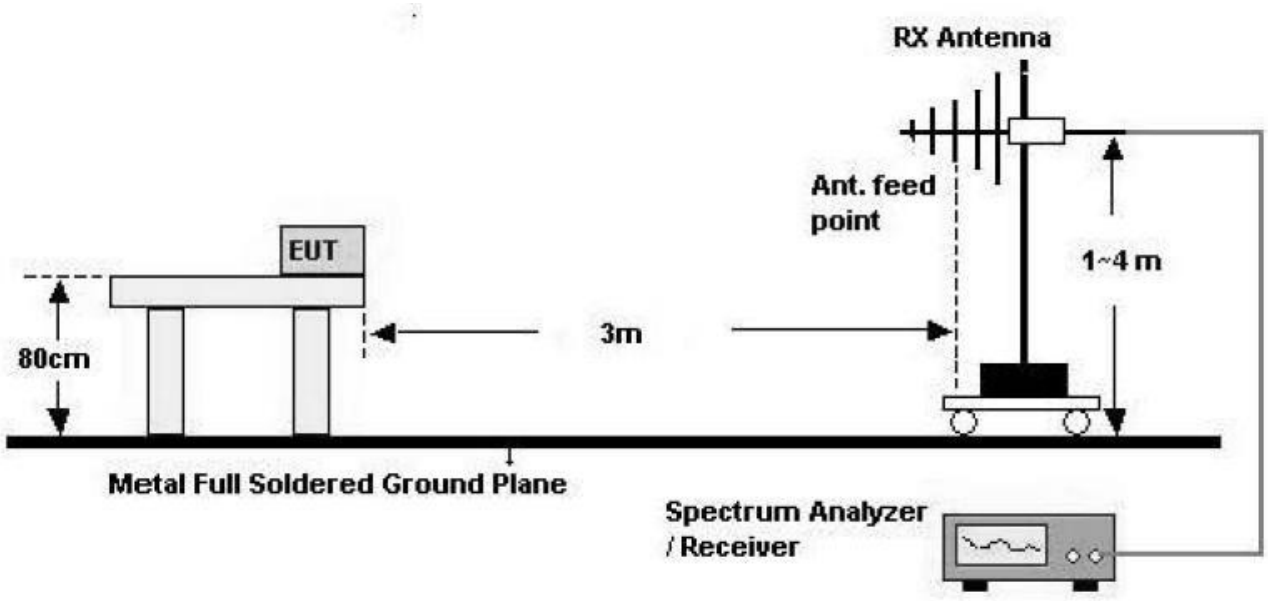
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

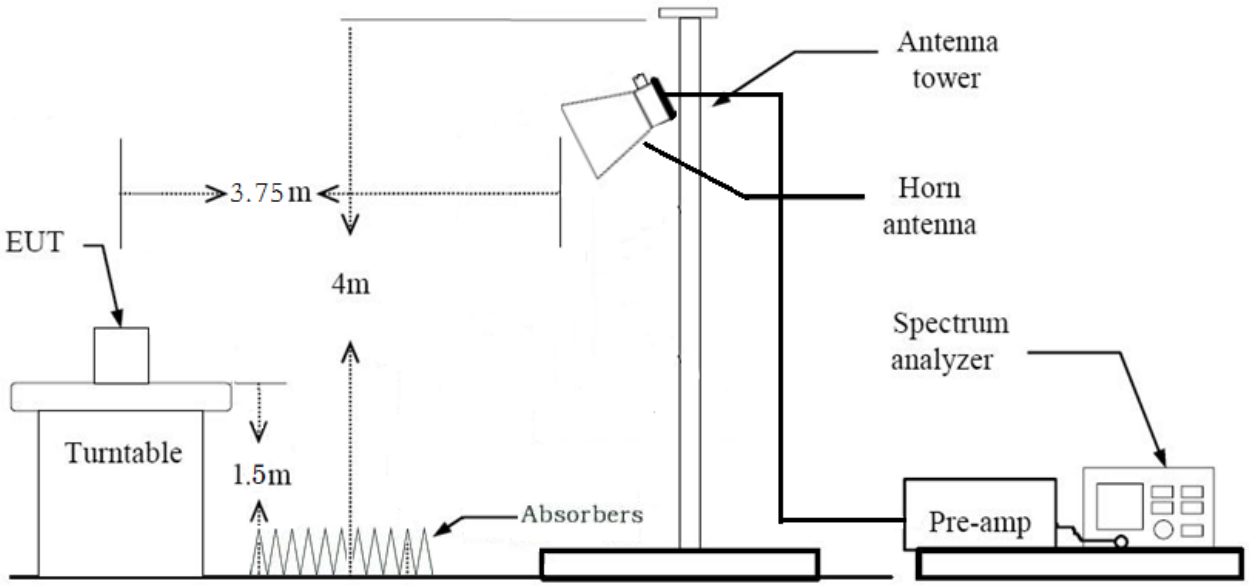
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40*log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40*log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3*RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. 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)

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Spectrum Setting
   (1) Measurement Type(Peak):
   - Measured Frequency Range : 30 MHz – 1 GHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 100 kHz
   - VBW ≥ 3*RBW

   (2) Measurement Type(Quasi-peak):
   - Measured Frequency Range : 30 MHz – 1 GHz
   - Detector = Quasi-Peak
   - RBW = 120 kHz

   *In general, (1) is used mainly
6. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

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 data rate of operation were investigated and the test results are worst case in lowest datarate of each mode.
   - 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

1. The EUT was configured with data rate of highest power.

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		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§15.247(d)	Conducted > 20 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

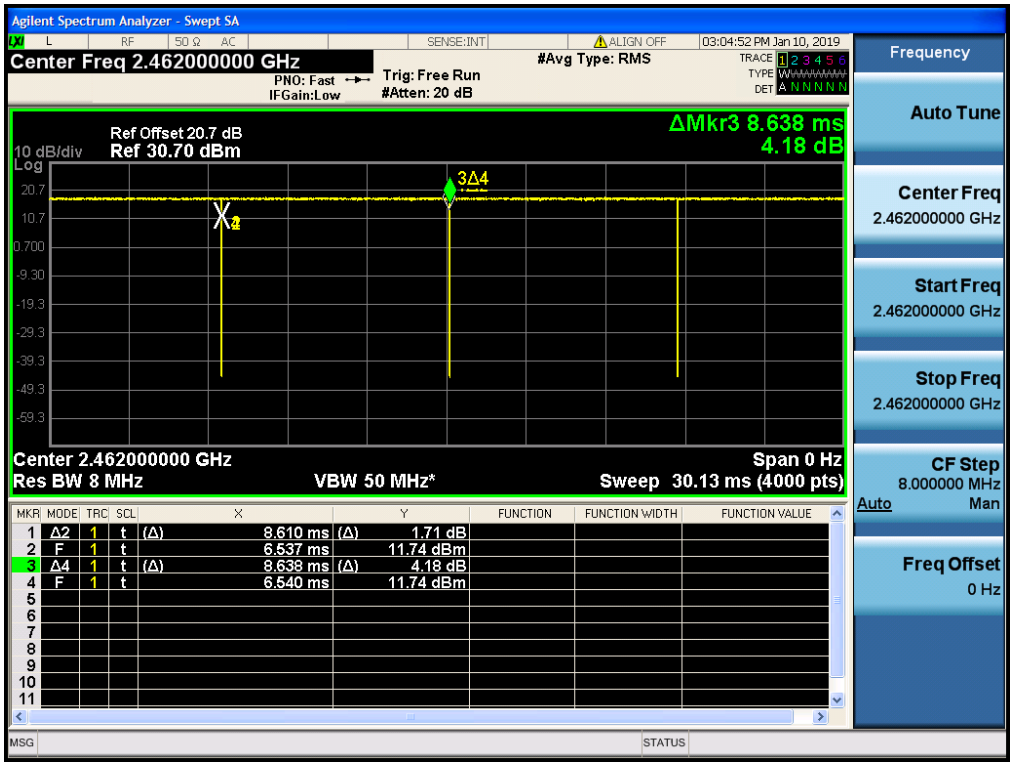
9. TEST RESULT

9.1 DUTY CYCLE

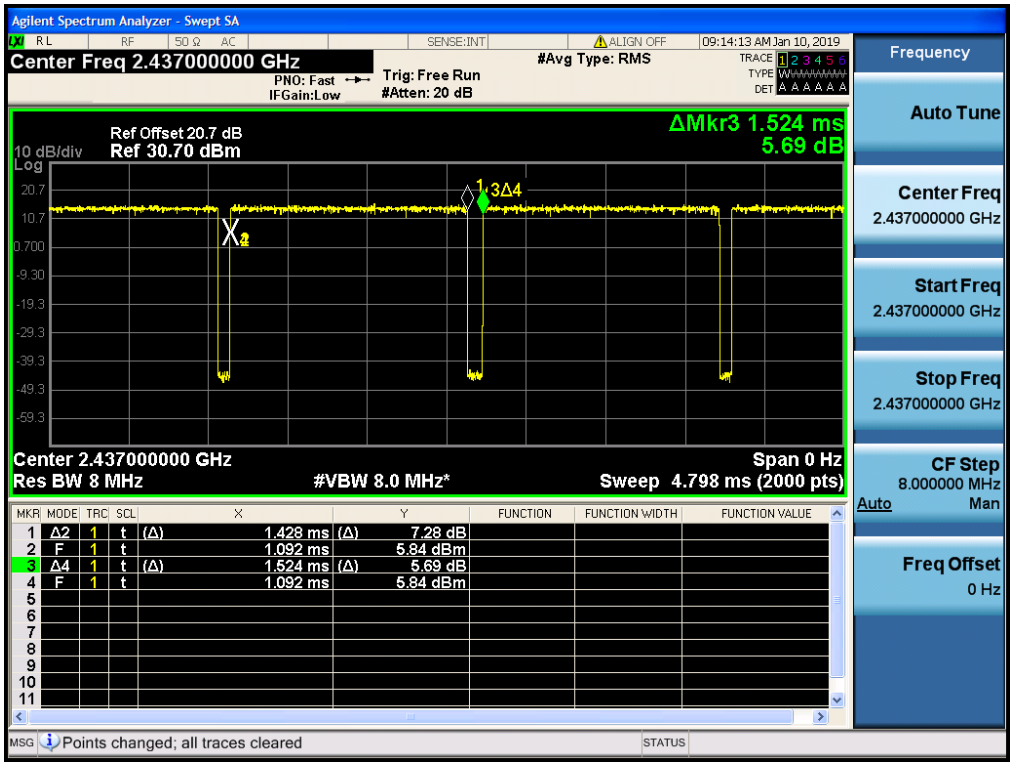
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.610	8.638	0.997	0.014
	2	4.401	4.432	0.993	0.030
	5.5	1.724	1.752	0.984	0.070
	11	0.960	0.988	0.972	0.122
802.11g	6	1.428	1.524	0.937	0.283
	9	0.960	1.055	0.910	0.410
	12	0.727	0.819	0.888	0.518
	18	0.494	0.587	0.842	0.747
	24	0.374	0.487	0.768	1.146
	36	0.256	0.371	0.689	1.620
	48	0.198	0.311	0.637	1.961
	54	0.180	0.295	0.610	2.146
802.11n (HT20)	6.5 (MCS0)	1.335	1.432	0.932	0.304
	13 (MCS1)	0.690	0.803	0.859	0.658
	19.5 (MCS2)	0.474	0.567	0.836	0.776
	26 (MCS3)	0.364	0.459	0.794	1.002
	39 (MCS4)	0.259	0.351	0.737	1.327
	52 (MCS5)	0.202	0.335	0.603	2.197
	58.5 (MCS6)	0.186	0.299	0.623	2.054
	65 (MCS7)	0.170	0.283	0.601	2.213

▣ Test Plots

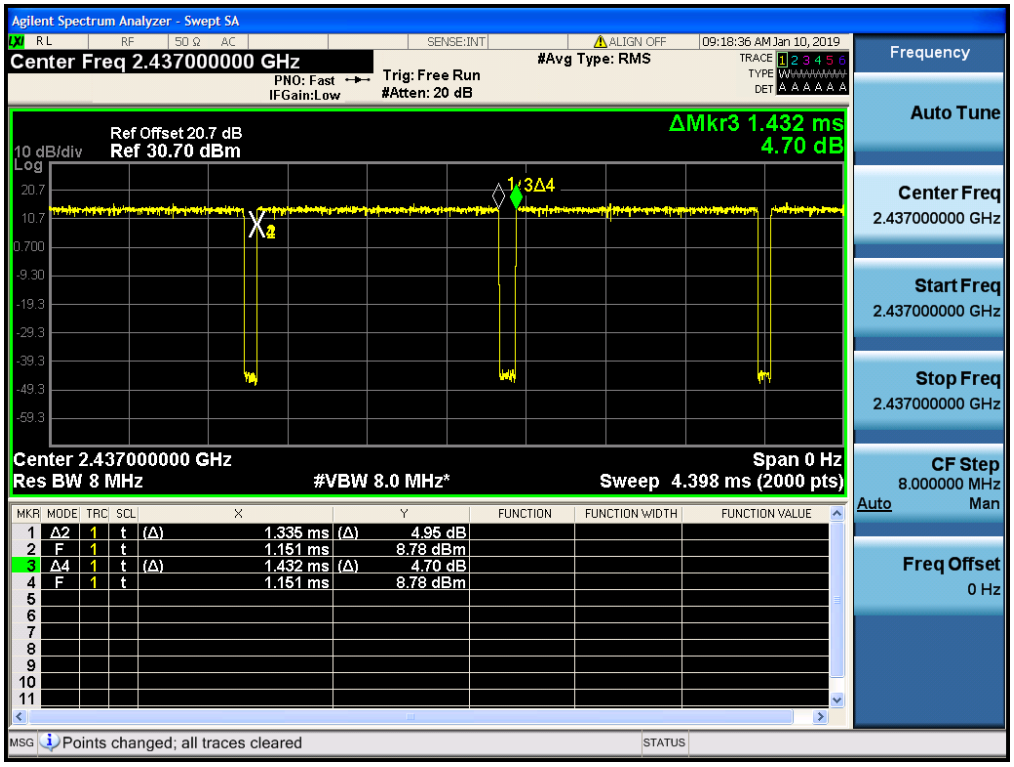
Duty cycle plot (802.11b(1Mbps))



Duty cycle plot (802.11g(6Mbps))



Duty cycle plot (802.11n(MCS0))



Note:

In order to simplify the report, attached plots were only the most lowest datarate.

9.2 6dB BANDWIDTH

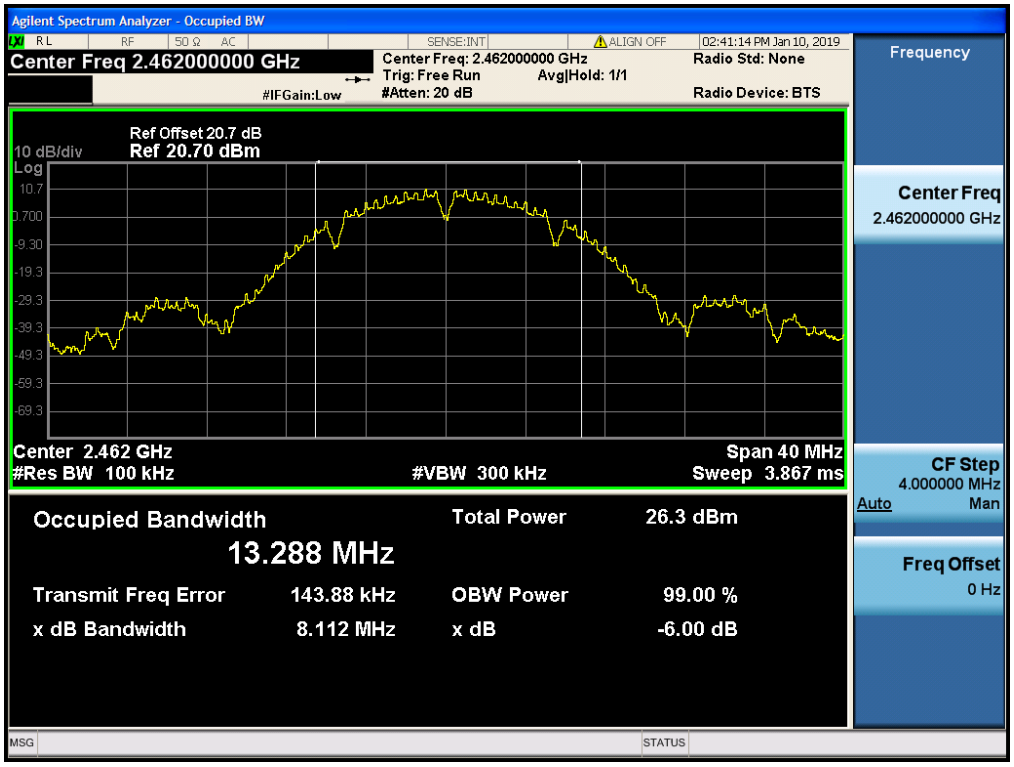
802.11b Mode		6 dB Bandwidth [MHz]	99% bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.			
2412	1	8.10	13.326	> 0.5
2437	6	8.11	13.411	> 0.5
2462	11	8.11	13.288	> 0.5

802.11g Mode		6 dB Bandwidth [MHz]	99% bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.			
2412	1	15.16	18.193	> 0.5
2437	6	15.15	18.109	> 0.5
2462	11	15.45	18.074	> 0.5

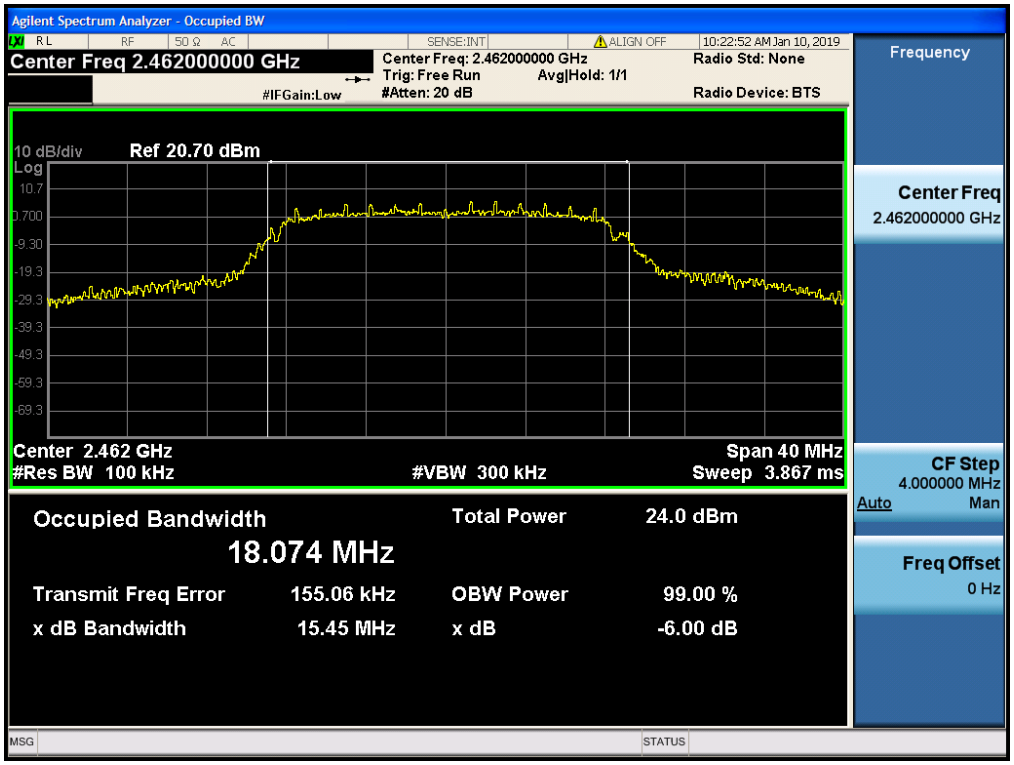
802.11n Mode		6 dB Bandwidth [MHz]	99% bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.			
2412	1	15.15	19.428	> 0.5
2437	6	15.12	19.376	> 0.5
2462	11	15.18	19.262	> 0.5

▣ Test Plots

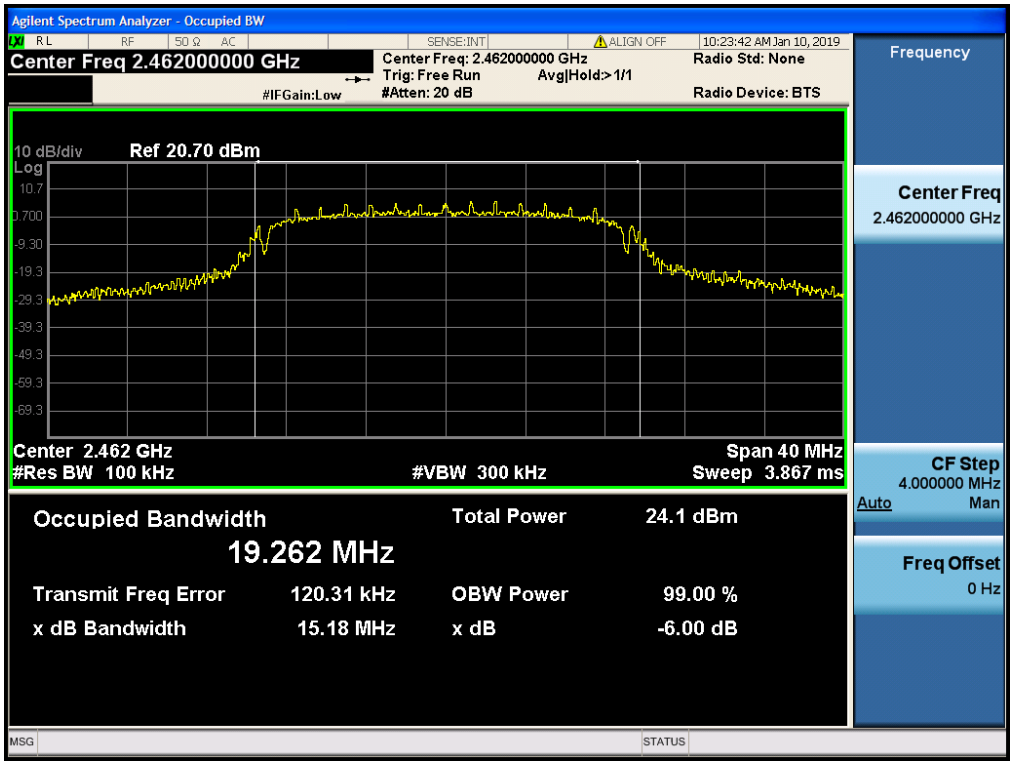
6dB Bandwidth plot (802.11b-CH 11)



6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n_HT20-CH 11)



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, 20.7 dB is offset for 2.4 GHz Band.

802.11b Mode		Power Level Setting	Data Rate [Mbps]	Measured Power[dBm]	Limit [dBm]
Frequency [MHz]	Channel No.				
2412	1	15	1	21.56	30
			2	21.98	30
			5.5	23.32	30
			11	24.79	30
2437	6	14	1	21.14	30
			2	21.62	30
			5.5	22.92	30
			11	24.62	30
2462	11	15	1	21.39	30
			2	21.65	30
			5.5	23.12	30
			11	24.81	30

802.11g Mode		Power Level Setting	Data Rate [Mbps]	Measured Power[dBm]	Limit [dBm]
Frequency[MHz]	Channel No.				
2412	1	15	6	24.65	30
			9	24.67	30
			12	24.20	30
			18	24.36	30
			24	24.99	30
			36	24.98	30
			48	23.86	30
			54	24.06	30
2437	6	15	6	25.12	30
			9	25.21	30
			12	24.77	30
			18	24.88	30
			24	25.47	30
			36	25.50	30
			48	24.36	30
			54	24.53	30
2462	11	15	6	24.50	30
			9	24.57	30
			12	24.15	30
			18	24.27	30
			24	24.92	30
			36	24.90	30
			48	23.70	30
			54	23.92	30

802.11n Mode		Power Level Setting	MCS Index	Measured Power[dBm]	Limit [dBm]
Frequency[MHz]	Channel No.				
2412	1	15	0	24.61	30
			1	24.51	30
			2	24.38	30
			3	24.44	30
			4	24.86	30
			5	23.58	30
			6	23.26	30
			7	23.55	30
2437	6	15	0	25.14	30
			1	24.91	30
			2	25.01	30
			3	25.40	30
			4	25.49	30
			5	23.77	30
			6	24.04	30
			7	23.89	30
2462	11	15	0	24.46	30
			1	24.27	30
			2	24.44	30
			3	24.80	30
			4	24.89	30
			5	23.10	30
			6	23.34	30
			7	23.20	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, 20.7 dB is offset for 2.4 GHz Band.

802.11b Mode		Power Level Setting	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	15	1	19.05	0.014	19.06	30
			2	19.12	0.030	19.15	30
			5.5	19.13	0.070	19.20	30
			11	19.18	0.122	19.31	30
2437	6	14	1	18.80	0.014	18.81	30
			2	18.64	0.030	18.67	30
			5.5	18.81	0.070	18.88	30
			11	18.90	0.122	19.02	30
2462	11	15	1	19.04	0.014	19.05	30
			2	18.73	0.030	18.76	30
			5.5	18.83	0.070	18.90	30
			11	18.66	0.122	18.78	30

802.11g Mode		Power Level Setting	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	15	6	16.55	0.283	16.84	30
			9	16.42	0.410	16.83	30
			12	16.23	0.518	16.75	30
			18	16.08	0.747	16.83	30
			24	15.81	1.146	16.96	30
			36	15.42	1.620	17.04	30
			48	13.82	1.961	15.78	30
			54	13.83	2.146	15.98	30
2437	6	15	6	17.20	0.283	17.48	30
			9	17.05	0.410	17.46	30
			12	16.92	0.518	17.44	30
			18	16.73	0.747	17.48	30
			24	16.22	1.146	17.37	30
			36	15.80	1.620	17.42	30
			48	14.43	1.961	16.39	30
			54	14.25	2.146	16.40	30
2462	11	15	6	16.53	0.283	16.82	30
			9	16.39	0.410	16.80	30
			12	16.24	0.518	16.76	30
			18	16.08	0.747	16.83	30
			24	15.80	1.146	16.95	30
			36	15.43	1.620	17.05	30
			48	13.90	1.961	15.86	30
			54	13.80	2.146	15.95	30

802.11n Mode		Power Level Setting	MCS Index	Measured Power[dBm]	Duty Cycle Factor [dB]	Measured Power(dBm) + Duty Cycle Factor[dB]	Limit [dBm]
Frequency [MHz]	Channel No.						
2412	1	15	0	16.38	0.304	16.68	30
			1	16.41	0.658	17.06	30
			2	15.99	0.776	16.76	30
			3	15.85	1.002	16.85	30
			4	15.63	1.327	16.96	30
			5	13.40	2.197	15.60	30
			6	13.16	2.054	15.22	30
			7	13.29	2.213	15.51	30
2437	6	15	0	17.02	0.304	17.32	30
			1	16.73	0.658	17.39	30
			2	16.56	0.776	17.34	30
			3	16.37	1.002	17.37	30
			4	16.03	1.327	17.36	30
			5	14.13	2.197	16.32	30
			6	14.00	2.054	16.05	30
			7	13.88	2.213	16.09	30
2462	11	15	0	16.37	0.304	16.67	30
			1	16.11	0.658	16.77	30
			2	15.96	0.776	16.74	30
			3	15.74	1.002	16.74	30
			4	15.46	1.327	16.79	30
			5	13.37	2.197	15.57	30
			6	13.28	2.054	15.34	30
			7	13.16	2.213	15.38	30

9.4 POWER SPECTRAL DENSITY

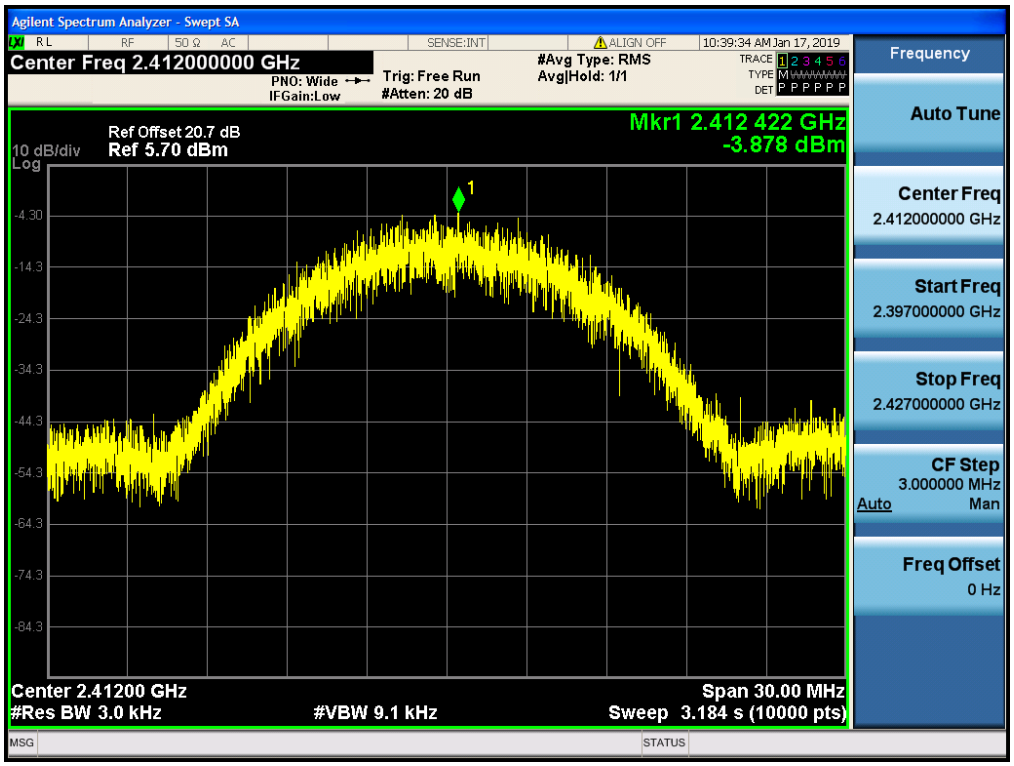
Mode	Frequency (MHz)	Channel No.	Test Result	
			PSD (dBm)	Limit (dBm)
802.11b	2412	1	-3.878	8
	2437	6	-4.398	8
	2462	11	-5.449	8
802.11g	2412	1	-9.060	8
	2437	6	-9.951	8
	2462	11	-8.979	8
802.11n (HT20)	2412	1	-9.779	8
	2437	6	-8.259	8
	2462	11	-8.686	8

Note :

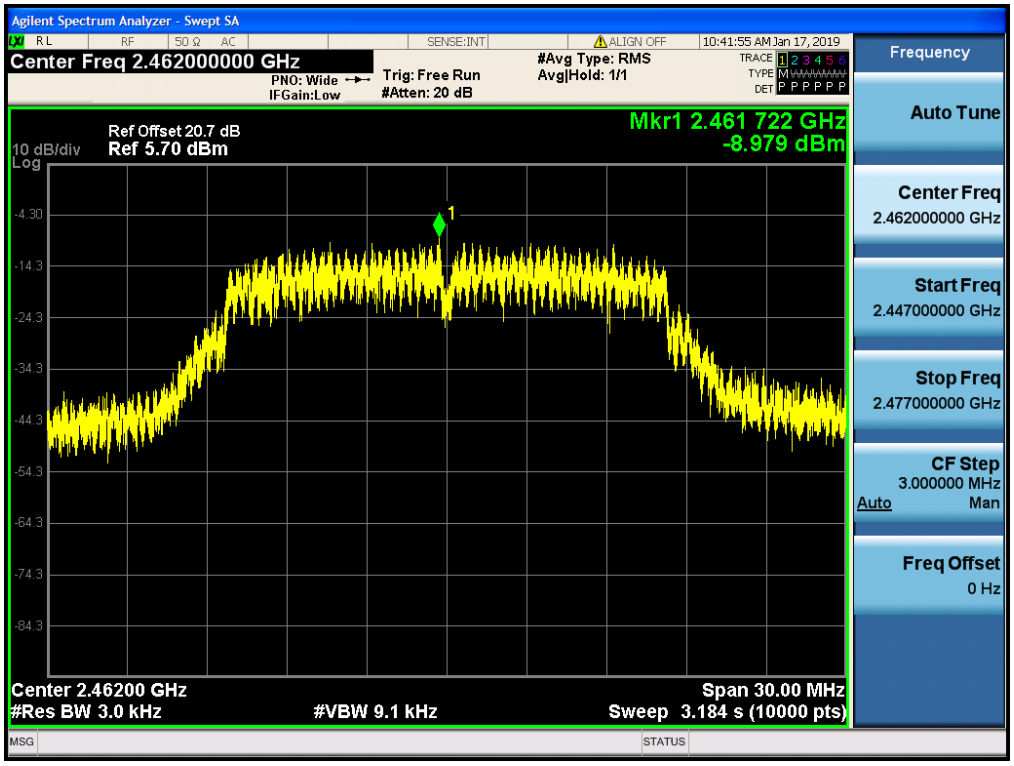
1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 20.7 dB is offset for 2.4 GHz Band.

▣ Test Plots

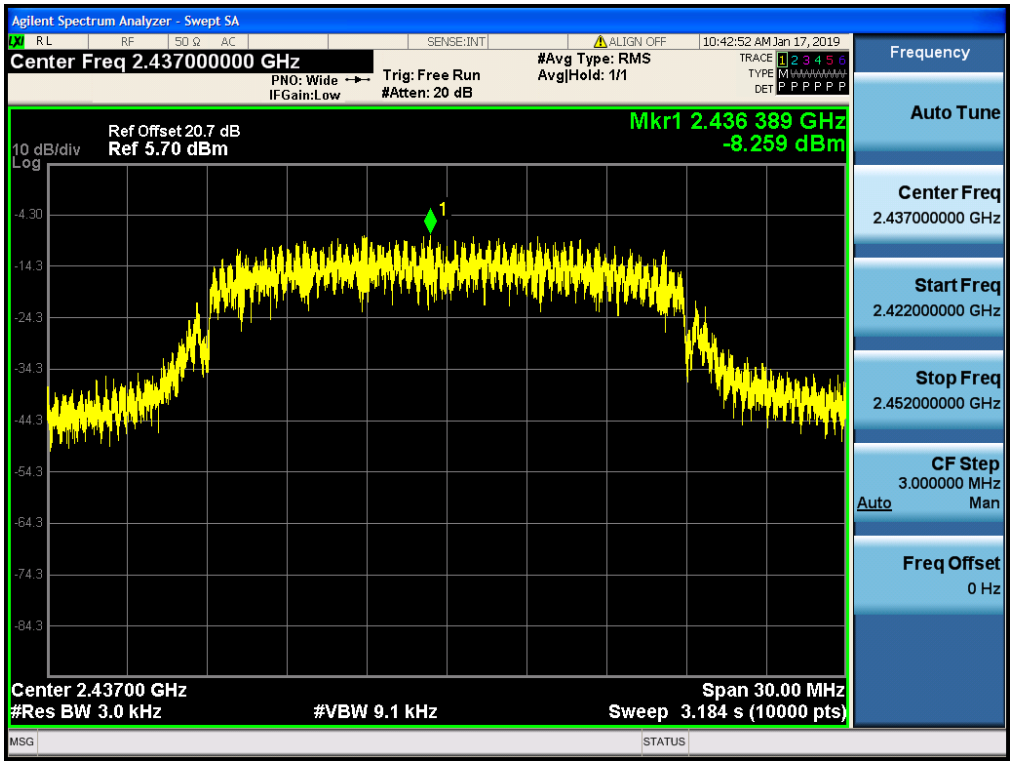
Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11g-CH 11)



Power Spectral Density (802.11n_HT20 -CH 6)



Note :

In order to simplify the report, attached plots were only the worstcase PSD channel.

9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

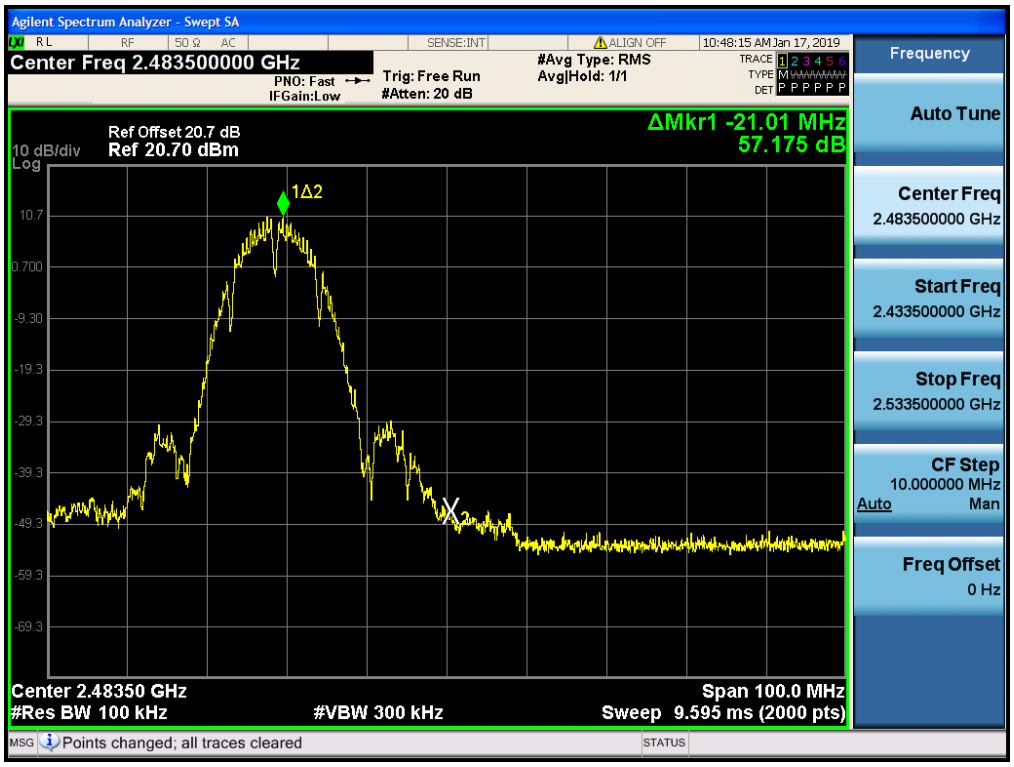
Test Result : please refer to the plot below.

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

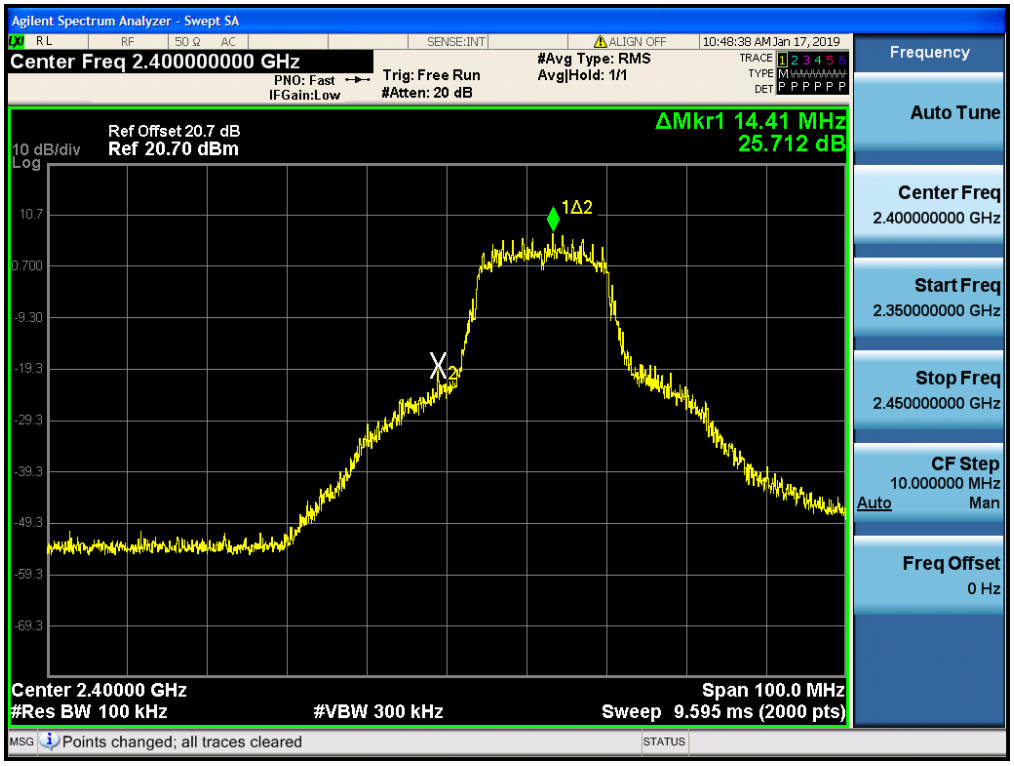
▣ Test Plots(BandEdge)

Band Edge (802.11b-CH1)

Band Edge (802.11b-CH11)



Band Edge (802.11g-CH1)



Band Edge (802.11g-CH11)

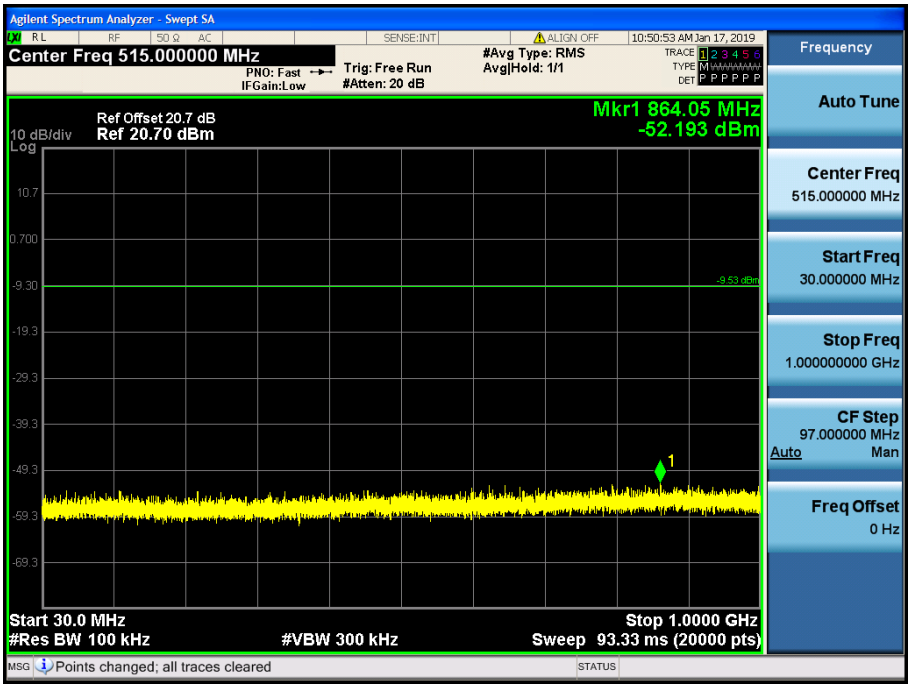
Band Edge (802.11n_HT20-CH1)

Band Edge (802.11n_HT20-CH11)

▣ Test Plots(Conducted Spurious Emission)

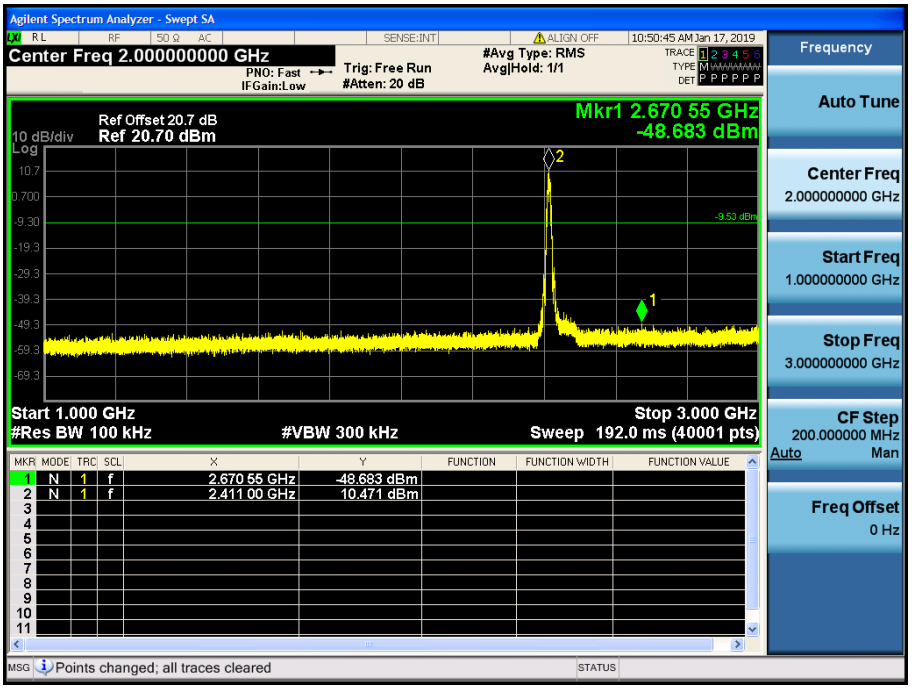
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



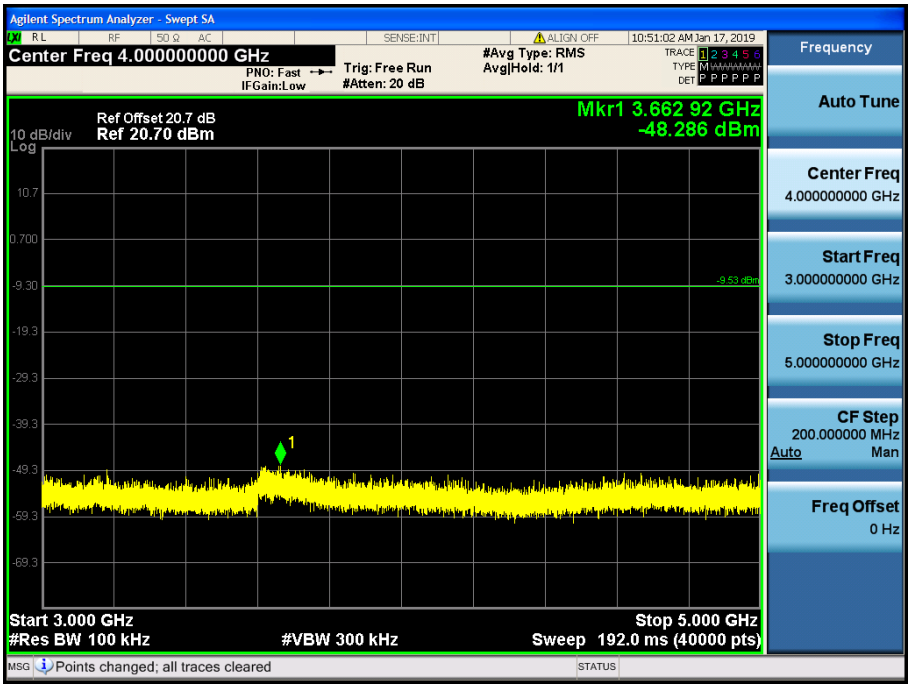
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



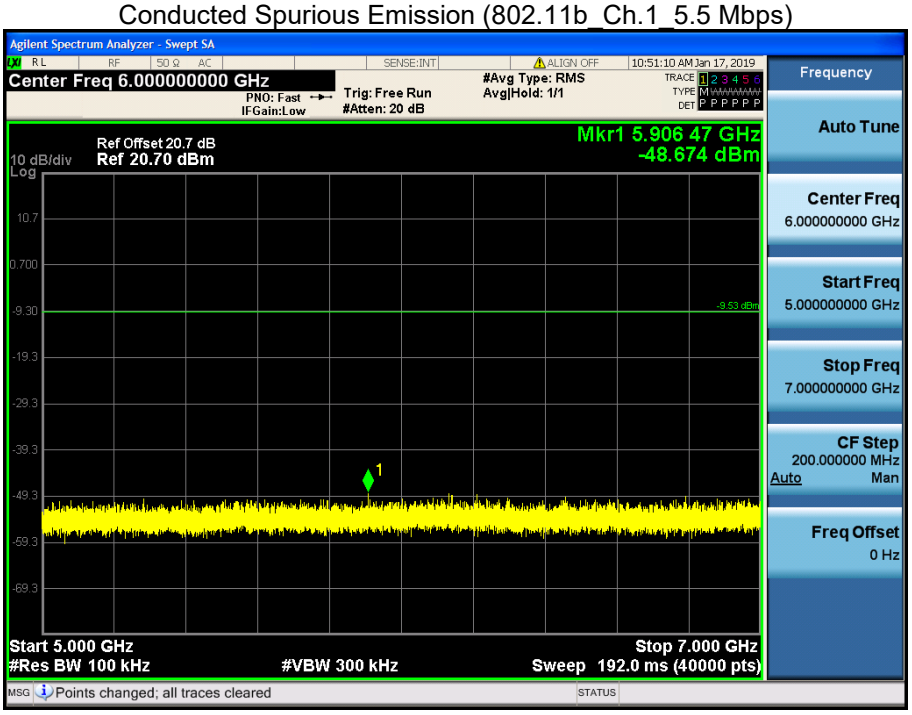
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



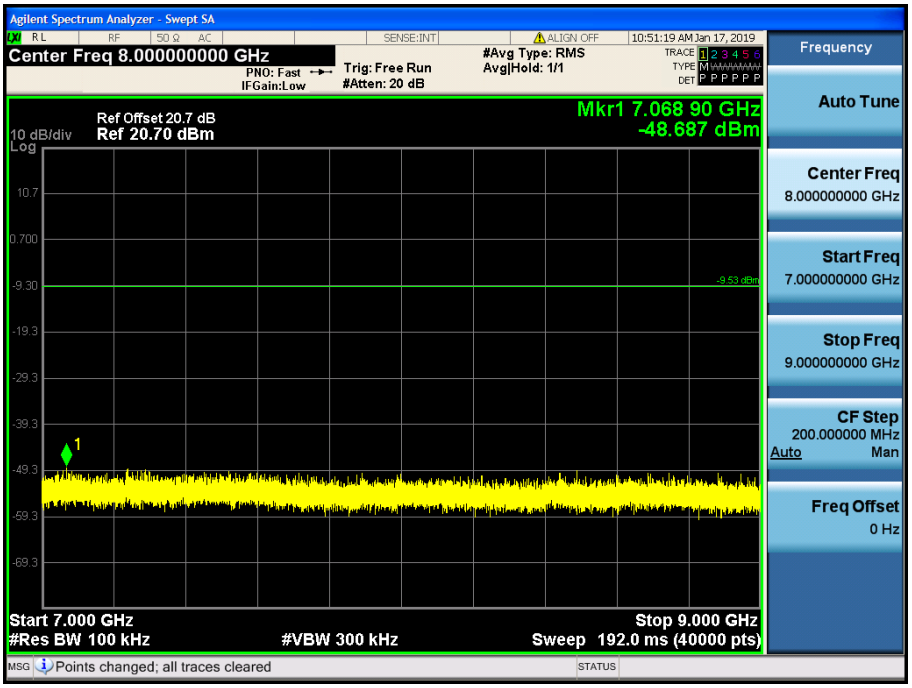
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



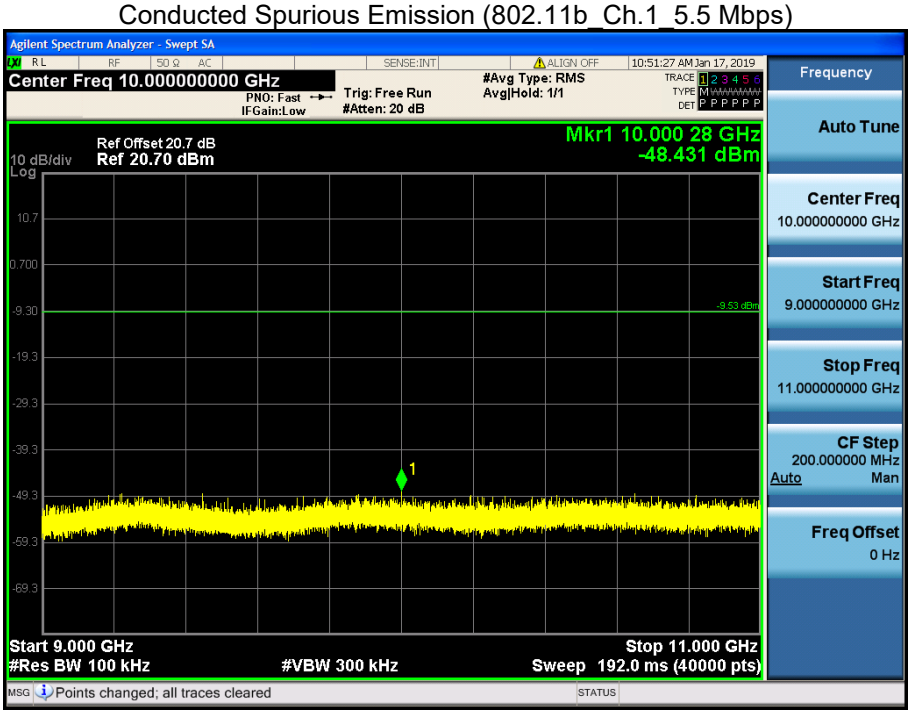
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



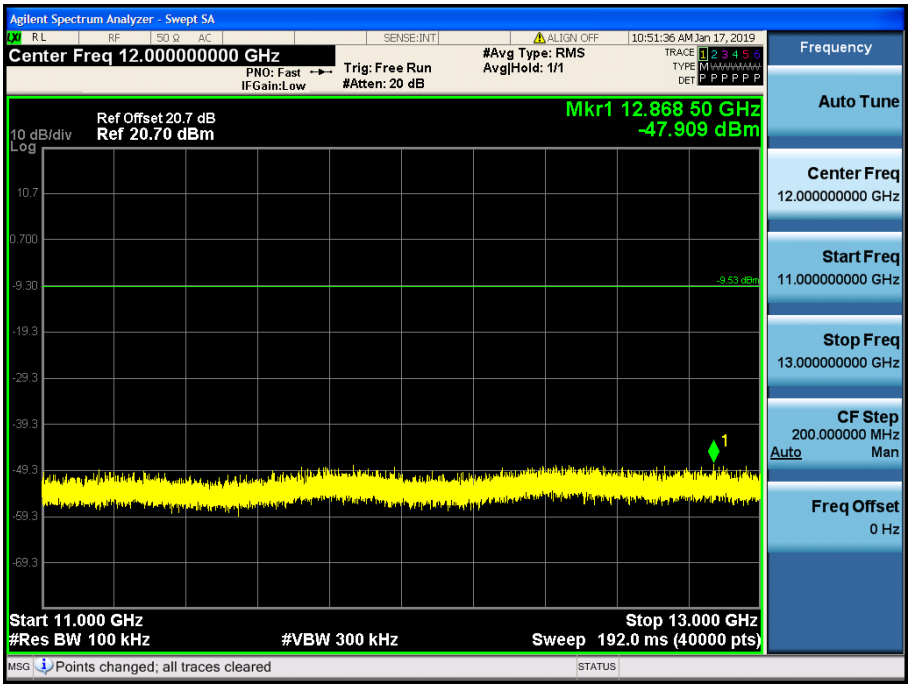
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



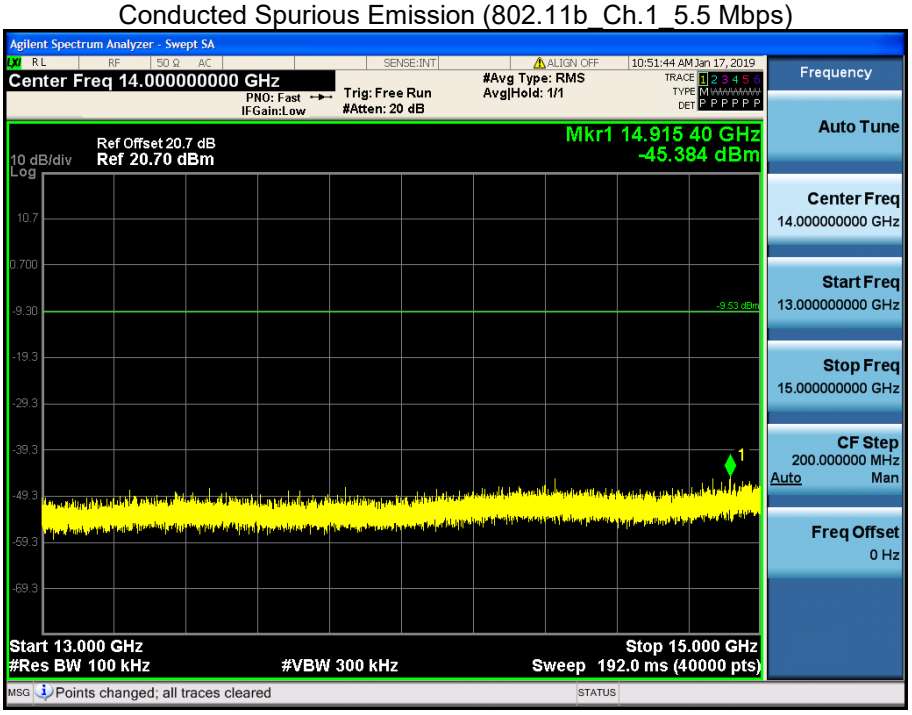
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



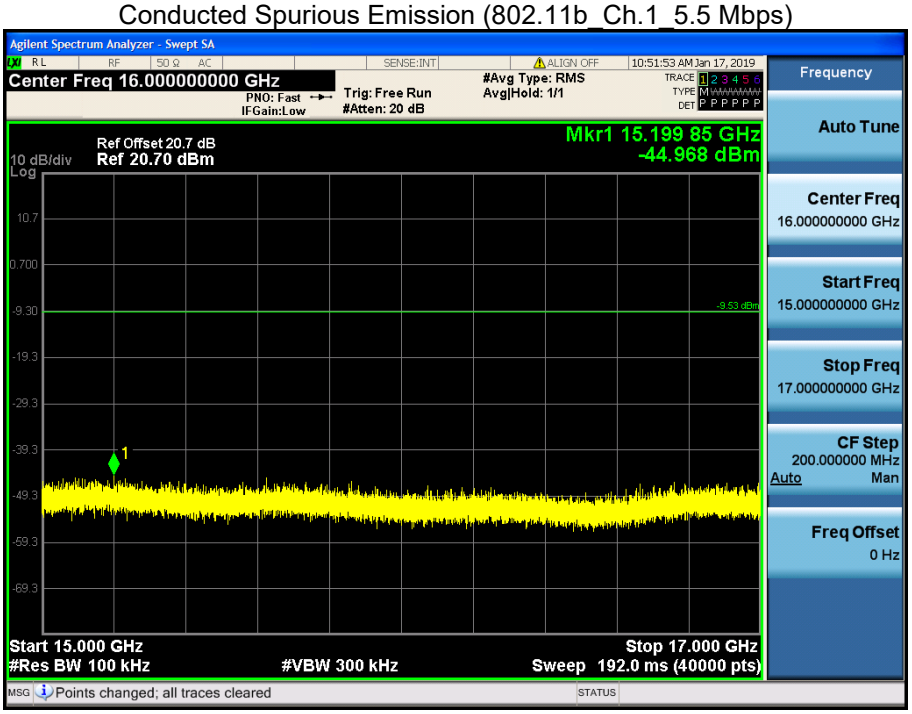
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



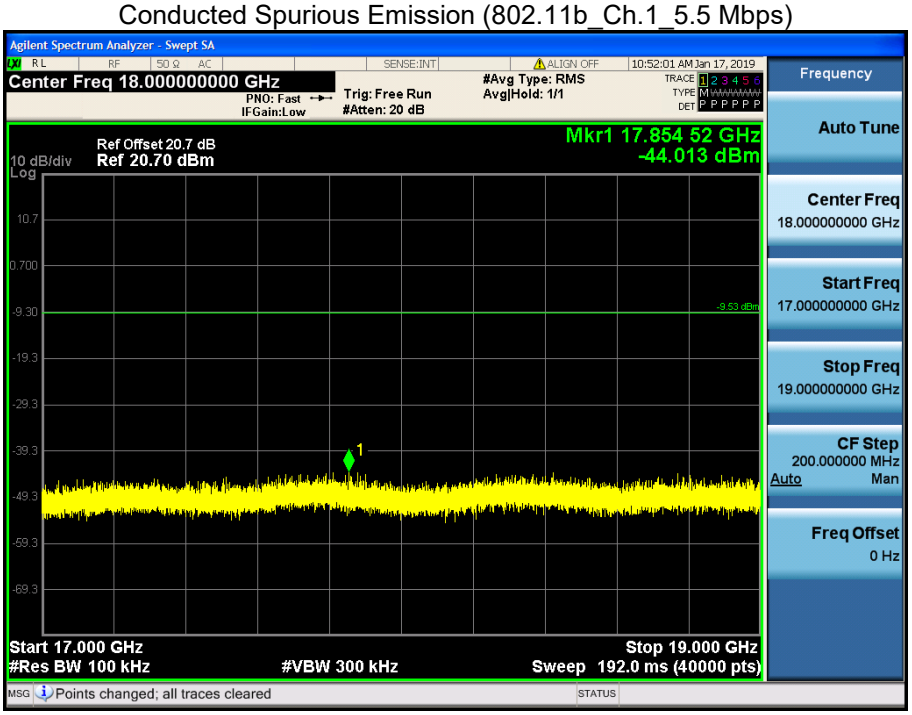
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



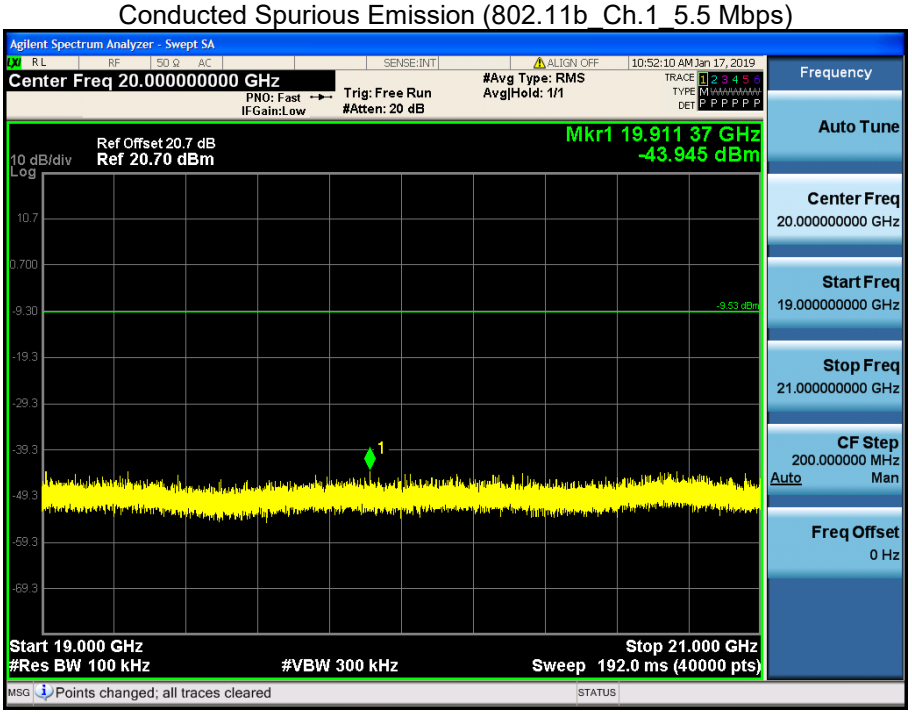
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



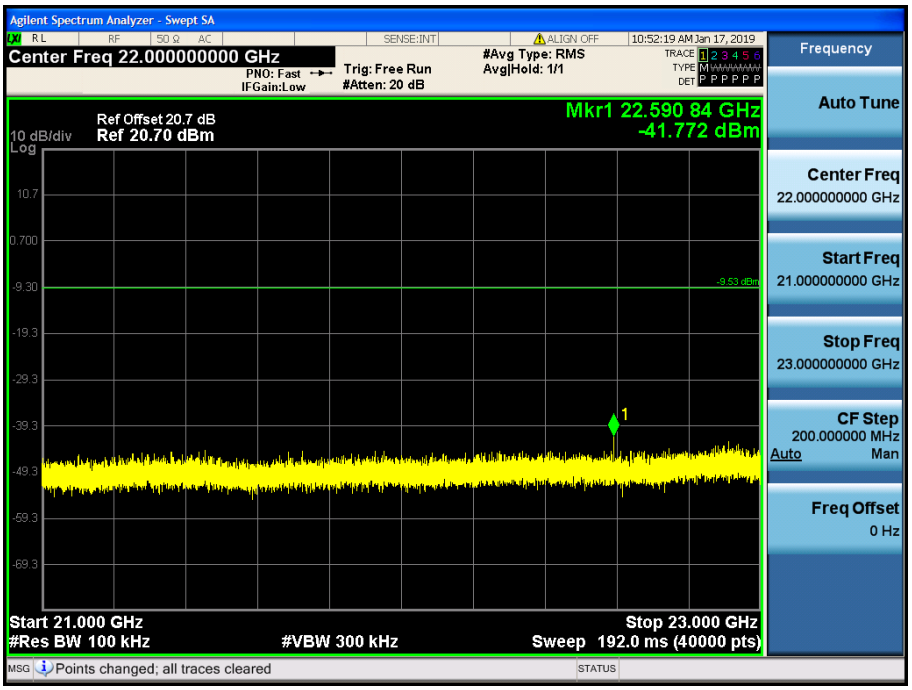
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)

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	53.15	0.81	V	53.96	73.98	20.03	PK
4824	46.81	0.81	V	47.62	53.98	6.36	AV
7236	46.95	9.47	V	56.42	73.98	17.56	PK
7236	36.95	9.47	V	46.42	53.98	7.56	AV
4824	54.57	0.81	H	55.38	73.98	18.61	PK
4824	48.17	0.81	H	48.98	53.98	5.01	AV
7236	47.16	9.47	H	56.63	73.98	17.35	PK
7236	37.43	9.47	H	46.90	53.98	7.08	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	50.98	0.00	0.81	V	51.79	73.98	22.20	PK
4824	38.65	0.28	0.81	V	39.74	53.98	14.24	AV
7236	44.89	0.00	9.47	V	54.36	73.98	19.62	PK
7236	33.51	0.28	9.47	V	43.26	53.98	10.72	AV
4824	51.36	0.00	0.81	H	52.17	73.98	21.82	PK
4824	38.77	0.28	0.81	H	39.86	53.98	14.12	AV
7236	45.23	0.00	9.47	H	54.70	73.98	19.28	PK
7236	33.62	0.28	9.47	H	43.37	53.98	10.61	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	50.50	0.00	0.81	V	51.31	73.98	22.68	PK
4824	38.69	0.31	0.81	V	39.80	53.98	14.18	AV
7236	45.78	0.00	9.47	V	55.25	73.98	18.73	PK
7236	33.57	0.31	9.47	V	43.35	53.98	10.64	AV
4824	50.91	0.00	0.81	H	51.72	73.98	22.27	PK
4824	38.73	0.31	0.81	H	39.84	53.98	14.14	AV
7236	46.04	0.00	9.47	H	55.51	73.98	18.47	PK
7236	33.62	0.31	9.47	H	43.40	53.98	10.59	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	52.22	1.02	V	53.24	73.98	20.75	PK
4874	46.10	1.02	V	47.12	53.98	6.86	AV
7311	47.62	9.16	V	56.78	73.98	17.20	PK
7311	36.88	9.16	V	46.04	53.98	7.94	AV
4874	53.23	1.02	H	54.25	73.98	19.74	PK
4874	46.50	1.02	H	47.52	53.98	6.47	AV
7311	47.95	9.16	H	57.11	73.98	16.87	PK
7311	37.00	9.16	H	46.16	53.98	7.82	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	49.67	0.00	1.02	V	50.69	73.98	23.30	PK
4874	37.61	0.28	1.02	V	38.91	53.98	15.07	AV
7311	45.28	0.00	9.16	V	54.44	73.98	19.54	PK
7311	34.35	0.28	9.16	V	43.79	53.98	10.19	AV
4874	50.10	0.00	1.02	H	51.12	73.98	22.87	PK
4874	37.69	0.28	1.02	H	38.99	53.98	14.99	AV
7311	46.77	0.00	9.16	H	55.93	73.98	18.05	PK
7311	34.50	0.28	9.16	H	43.94	53.98	10.04	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	48.61	0.00	1.02	V	49.63	73.98	24.36	PK
4874	37.51	0.31	1.02	V	38.83	53.98	15.15	AV
7311	45.97	0.00	9.16	V	55.13	73.98	18.85	PK
7311	34.40	0.31	9.16	V	43.87	53.98	10.12	AV
4874	49.03	0.00	1.02	H	50.05	73.98	23.94	PK
4874	37.60	0.31	1.02	H	38.92	53.98	15.06	AV
7311	47.25	0.00	9.16	H	56.41	73.98	17.57	PK
7311	34.42	0.31	9.16	H	43.89	53.98	10.10	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	52.47	0.96	V	53.43	73.98	20.56	PK
4924	45.59	0.96	V	46.55	53.98	7.44	AV
7386	46.71	9.18	V	55.89	73.98	18.09	PK
7386	35.30	9.18	V	44.48	53.98	9.50	AV
4924	53.58	0.96	H	54.54	73.98	19.45	PK
4924	47.01	0.96	H	47.97	53.98	6.02	AV
7386	47.16	9.18	H	56.34	73.98	17.64	PK
7386	35.41	9.18	H	44.59	53.98	9.39	AV

Operation Mode: 802.11g

Transfer Rate: 6 Mbps

Operating Frequency 2462

Channel No. 11 Ch

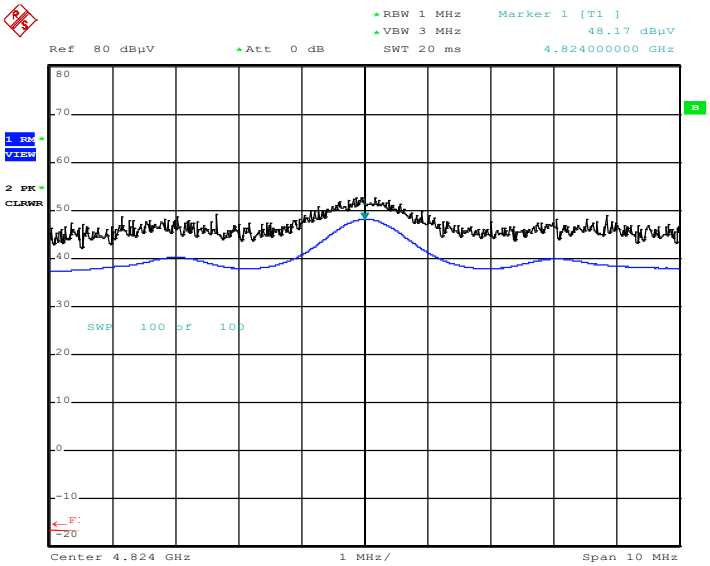
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	50.15	0.00	0.96	V	51.11	73.98	22.88	PK
4924	38.25	0.28	0.96	V	39.49	53.98	14.49	AV
7386	45.35	0.00	9.18	V	54.53	73.98	19.45	PK
7386	33.80	0.28	9.18	V	43.26	53.98	10.72	AV
4924	50.56	0.00	0.96	H	51.52	73.98	22.47	PK
4924	38.33	0.28	0.96	H	39.57	53.98	14.41	AV
7386	45.57	0.00	9.18	H	54.75	73.98	19.23	PK
7386	33.87	0.28	9.18	H	43.33	53.98	10.65	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	50.51	0.00	0.96	V	51.47	73.98	22.52	PK
4924	38.26	0.31	0.96	V	39.52	53.98	14.46	AV
7386	45.76	0.00	9.18	V	54.94	73.98	19.04	PK
7386	33.75	0.31	9.18	V	43.24	53.98	10.75	AV
4924	50.60	0.00	0.96	H	51.56	73.98	22.43	PK
4924	38.35	0.31	0.96	H	39.61	53.98	14.37	AV
7386	46.14	0.00	9.18	H	55.32	73.98	18.66	PK
7386	33.90	0.31	9.18	H	43.39	53.98	10.60	AV

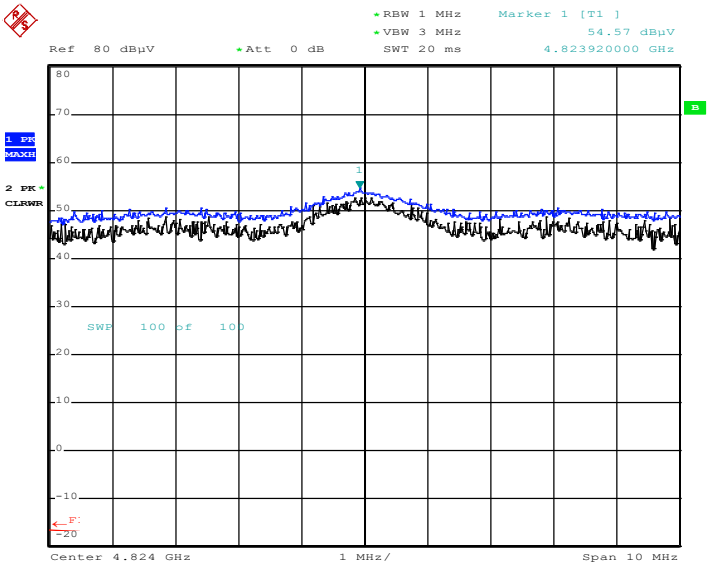
▣ Test Plots

Radiated Spurious Emissions plot – Average Reading (802.11b, Ch.1 2nd Harmonic, X-H)



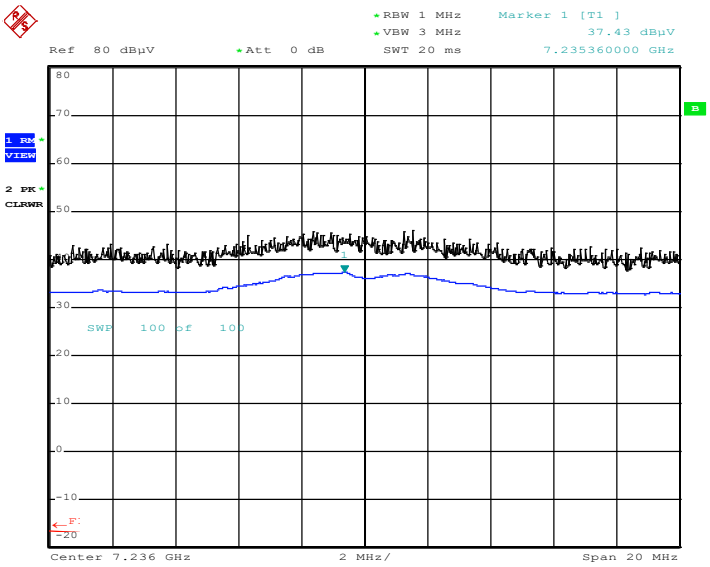
Date: 10.JAN.2019 12:55:07

Radiated Spurious Emissions plot – Peak Reading (802.11b, Ch.1 2nd Harmonic, X-H)



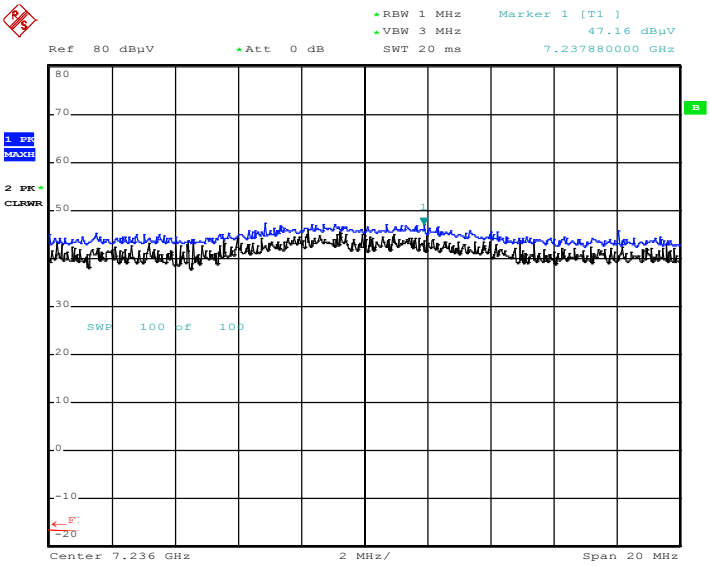
Date: 10.JAN.2019 12:55:32

Radiated Spurious Emissions plot – Average Reading (802.11b, Ch.1 3rd Harmonic, Y-H)



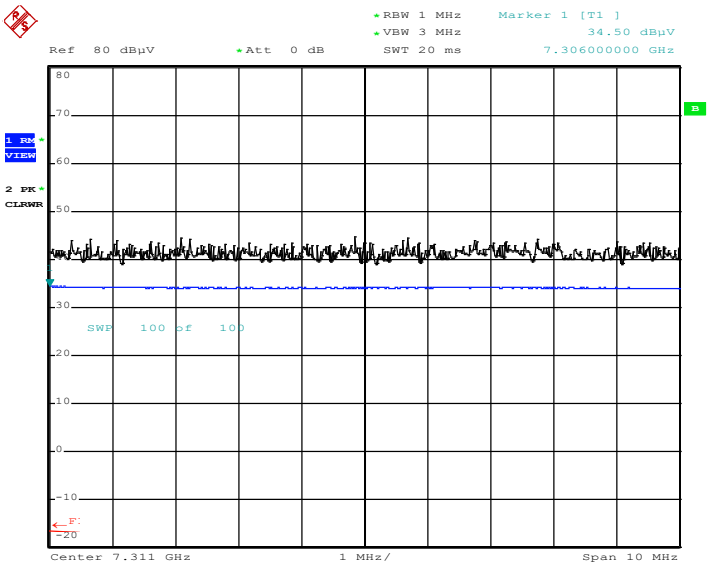
Date: 10.JAN.2019 13:12:45

Radiated Spurious Emissions plot – Peak Reading (802.11b, Ch.1 3rd Harmonic, Y-H)



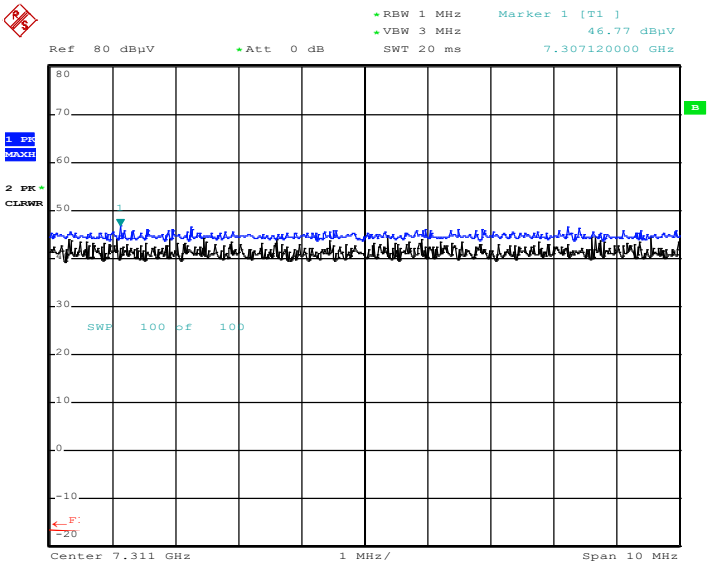
Date: 10.JAN.2019 13:13:03

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



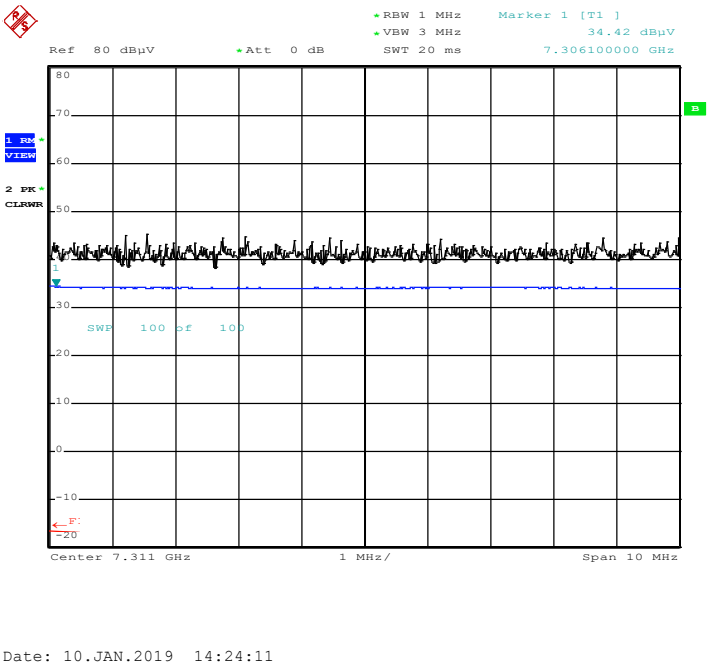
Date: 10.JAN.2019 14:23:14

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



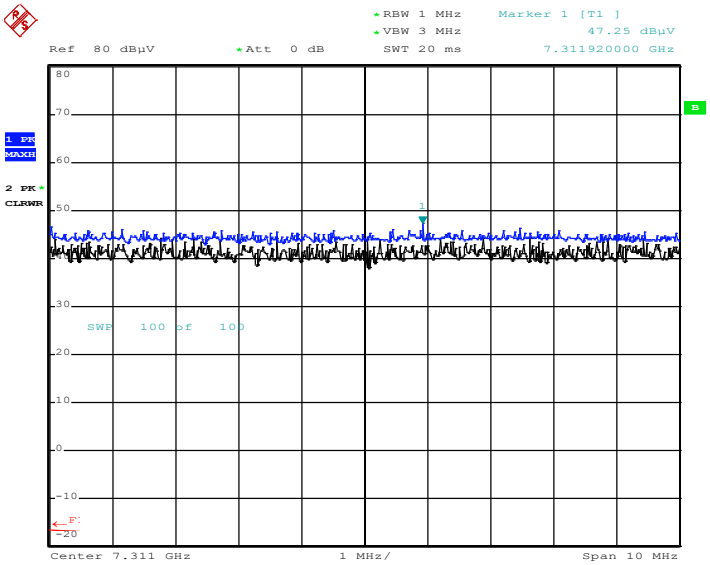
Date: 10.JAN.2019 14:23:40

Radiated Spurious Emissions plot – Average Reading (802.11n, Ch.6 3rd Harmonic, Y-H)



Date: 10.JAN.2019 14:24:11

Radiated Spurious Emissions plot – Peak Reading (802.11n, Ch.6 3rd Harmonic, Y-H)



Date: 10.JAN.2019 14:24:26

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	53.03	1.06	H	54.09	73.98	19.89	PK
2390.0	42.94	1.06	H	44.00	53.98	9.98	AV
2390.0	52.88	1.06	V	53.94	73.98	20.04	PK
2390.0	42.89	1.06	V	43.95	53.98	10.03	AV
2483.5	53.10	1.12	H	54.22	73.98	19.77	PK
2483.5	42.85	1.12	H	43.97	53.98	10.02	AV
2483.5	52.67	1.12	V	53.79	73.98	20.20	PK
2483.5	42.80	1.12	V	43.92	53.98	10.07	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	68.05	0.00	1.06	H	69.11	73.98	4.87	PK
2390.0	50.28	0.28	1.06	H	51.62	53.98	2.36	AV
2390.0	66.19	0.00	1.06	V	67.25	73.98	6.73	PK
2390.0	49.75	0.28	1.06	V	51.09	53.98	2.89	AV
2483.5	68.24	0.00	1.12	H	69.36	73.98	4.63	PK
2483.5	49.19	0.28	1.12	H	50.59	53.98	3.39	AV
2483.5	67.74	0.00	1.12	V	68.86	73.98	5.13	PK
2483.5	49.05	0.28	1.12	V	50.45	53.98	3.53	AV

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

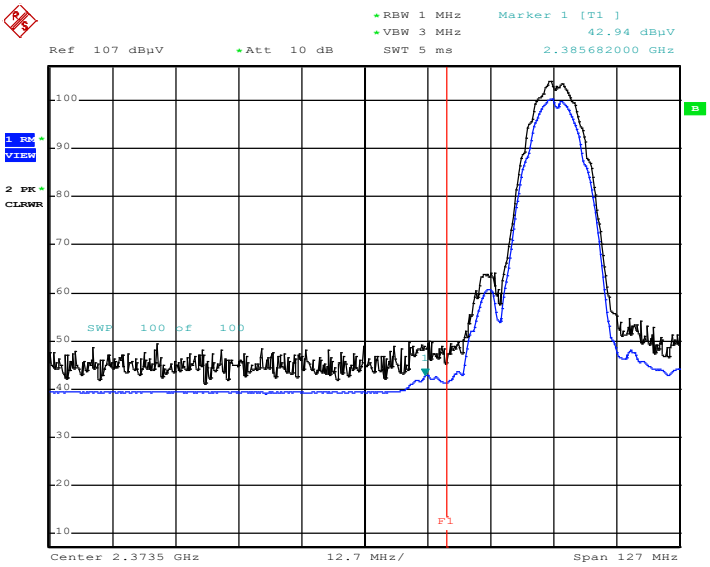
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
*2389~2390	62.28	0.00	1.06	H	63.34	73.98	10.64	PK
*2389~2390	49.31	0.31	1.06	H	50.68	53.98	3.30	AV
2389.0	69.15	0.00	1.06	H	70.21	73.98	3.77	PK
2389.0	48.57	0.31	1.06	H	49.94	53.98	4.04	AV
*2389~2390	61.82	0.00	1.12	V	62.94	73.98	11.05	PK
*2389~2390	49.38	0.31	1.12	V	50.80	53.98	3.18	AV
2390.0	68.60	0.00	1.12	V	69.72	73.98	4.27	PK
2390.0	49.47	0.31	1.12	V	50.89	53.98	3.09	AV
2483.5	69.94	0.00	1.12	H	71.06	73.98	2.93	PK
2483.5	50.39	0.31	1.12	H	51.81	53.98	2.17	AV
2483.5	69.78	0.00	1.12	V	70.90	73.98	3.09	PK
2483.5	50.20	0.31	1.12	V	51.62	53.98	2.36	AV

[NOTE]

1. * : Procedure 11.13.3 (Integration method) in ANSI 63.10-2013

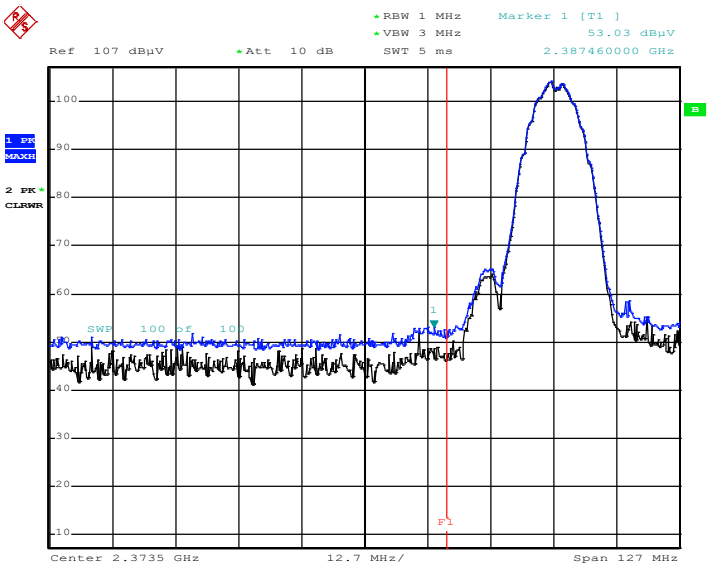
▣ Test Plots (Worst case : X-H)

Radiated Restricted Band Edges plot – Average Reading (802.11b Ch.1)



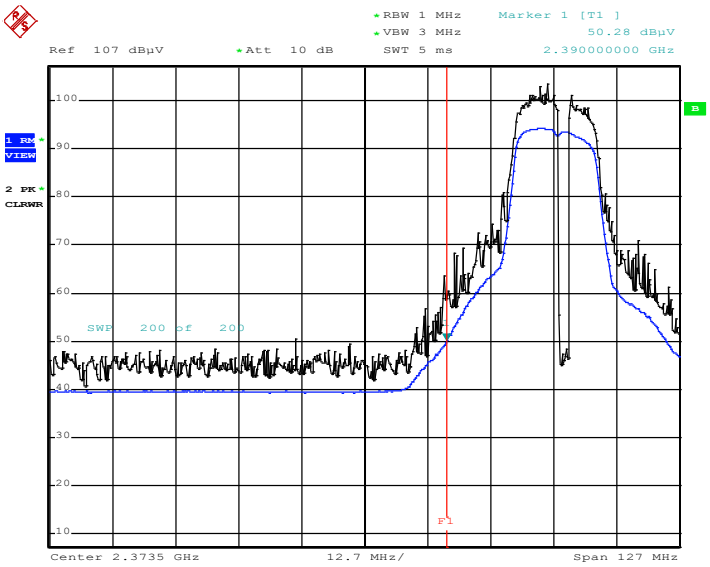
Date: 10.JAN.2019 10:57:45

Radiated Restricted Band Edges plot – Peak Reading (802.11b Ch.1)



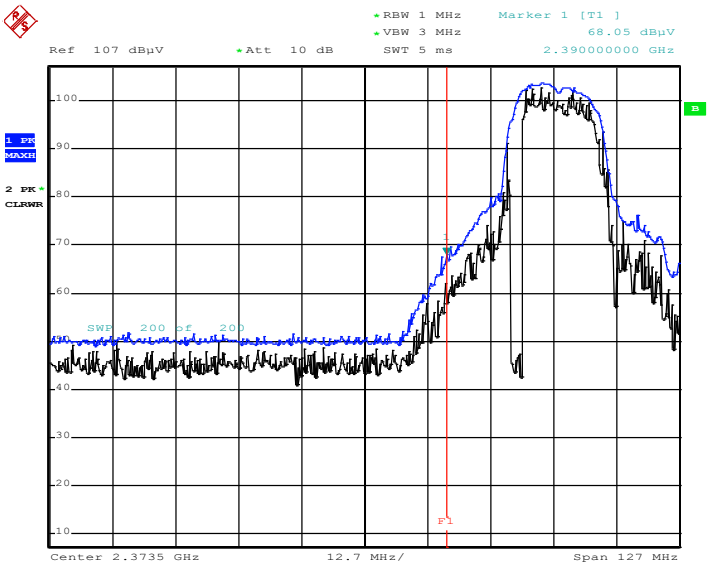
Date: 10.JAN.2019 10:56:48

Radiated Restricted Band Edges plot – Average Reading (802.11g Ch.1)



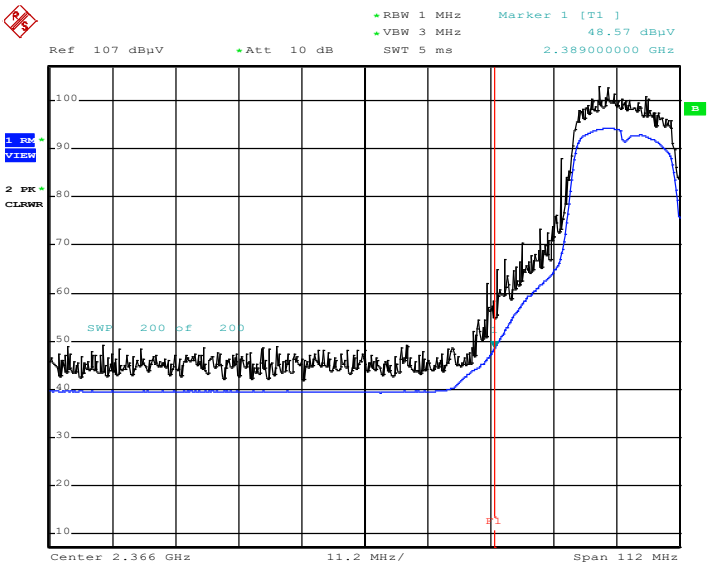
Date: 10.JAN.2019 10:53:31

Radiated Restricted Band Edges plot – Peak Reading (802.11g Ch.1)



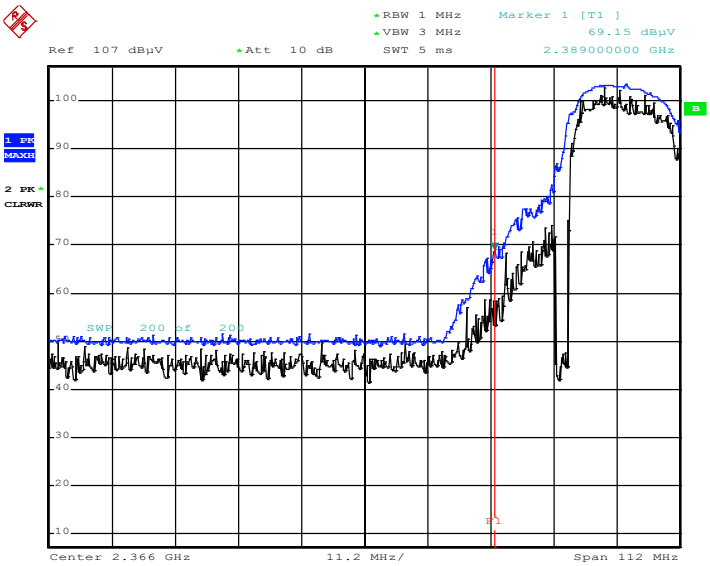
Date: 10.JAN.2019 10:54:20

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.1) - 2310 MHz ~ 2389 MHz



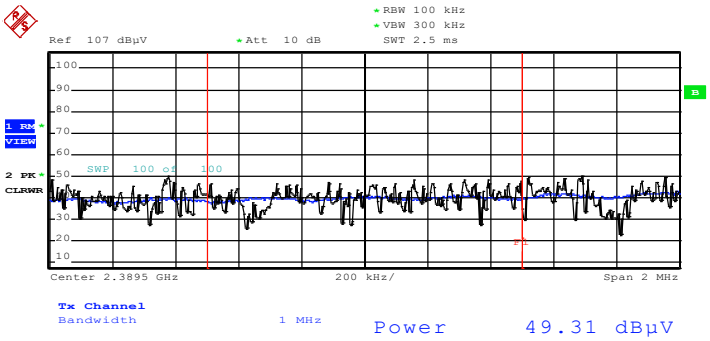
Date: 10.JAN.2019 11:04:26

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.1) - 2310 MHz ~ 2389 MHz



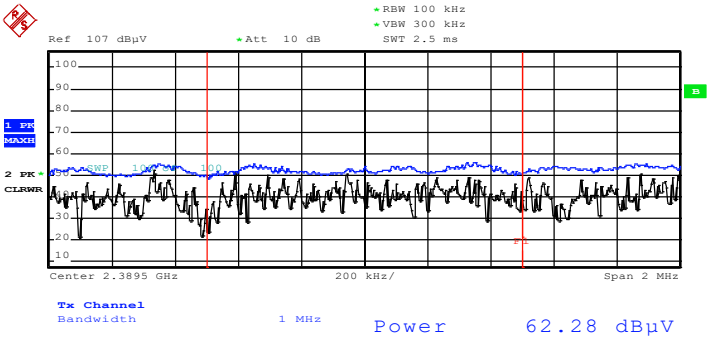
Date: 10.JAN.2019 11:05:31

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.1) - 2389 MHz ~ 2390 MHz



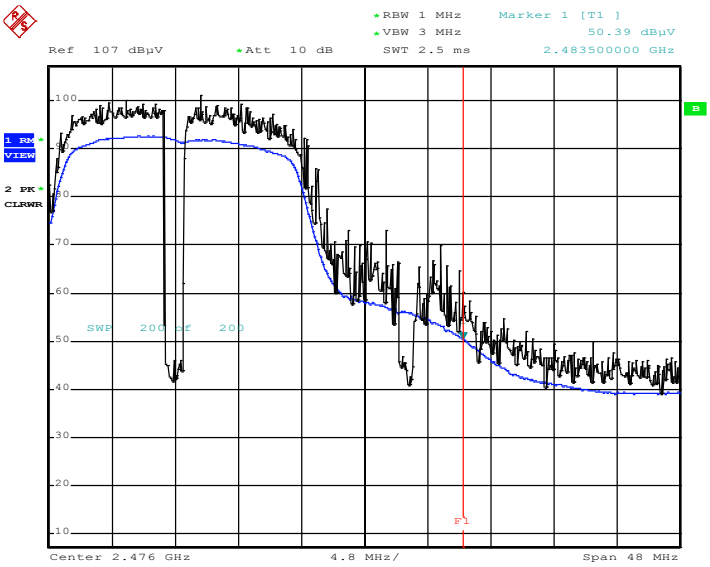
Date: 10.JAN.2019 11:01:26

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.1) - 2389 MHz ~ 2390 MHz



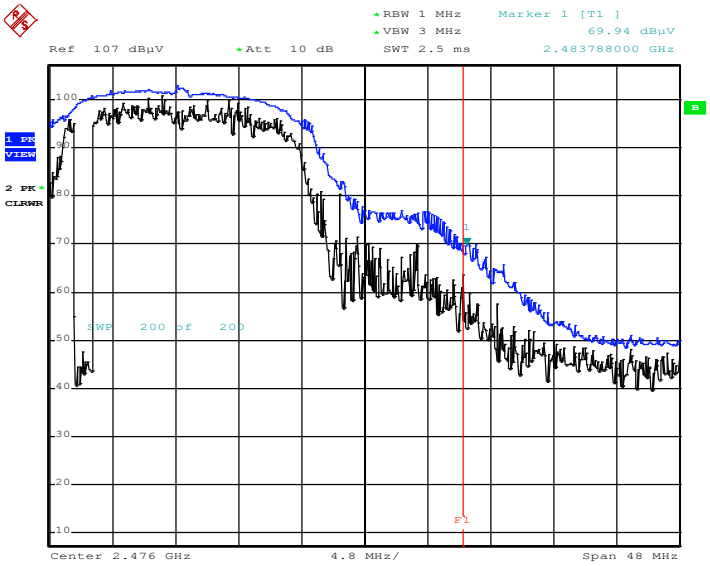
Date: 10.JAN.2019 11:02:51

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.11)



Date: 10.JAN.2019 09:59:37

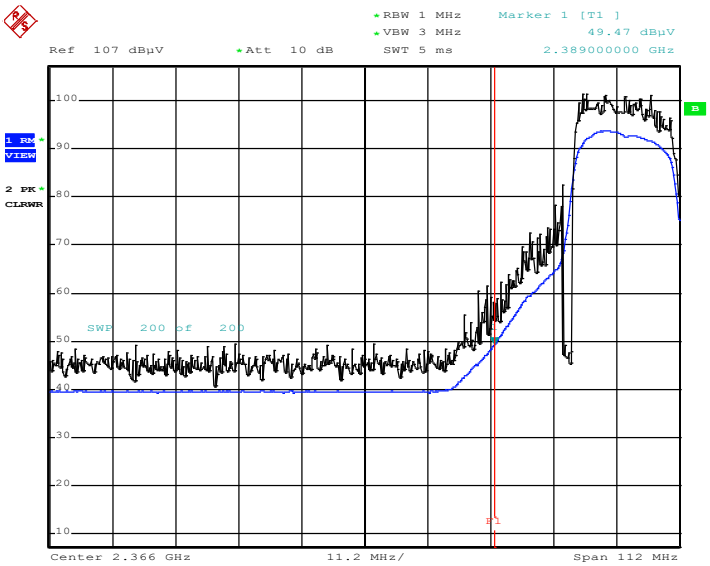
Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.11)



Date: 10.JAN.2019 10:00:37

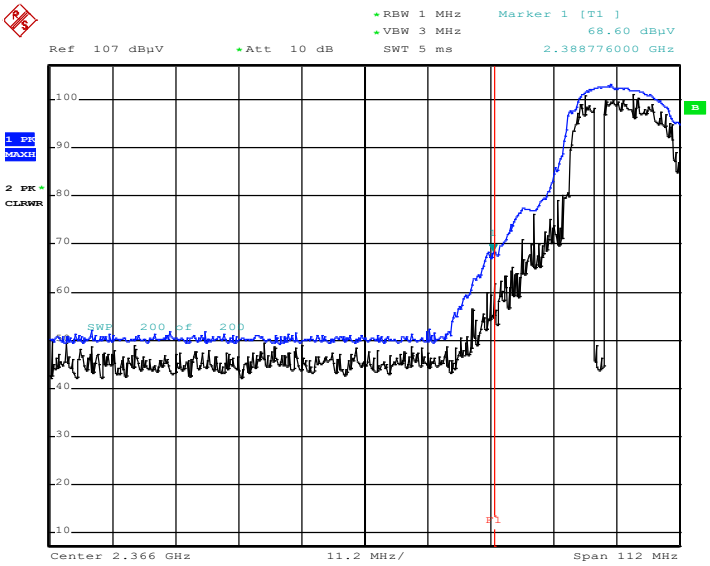
▣ Test Plots (Worst case : Z-V)

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.1) - 2310 MHz ~ 2389 MHz



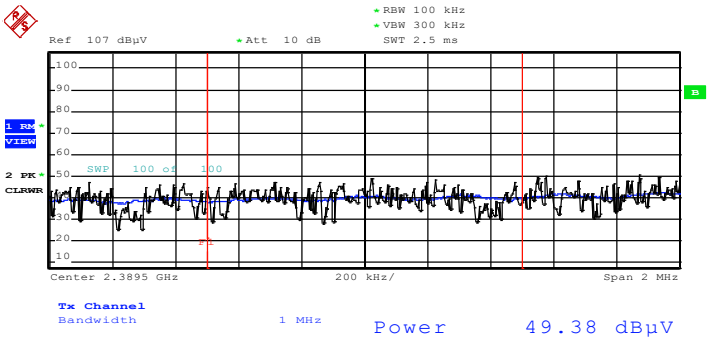
Date: 10.JAN.2019 11:14:12

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.1) - 2310 MHz ~ 2389 MHz



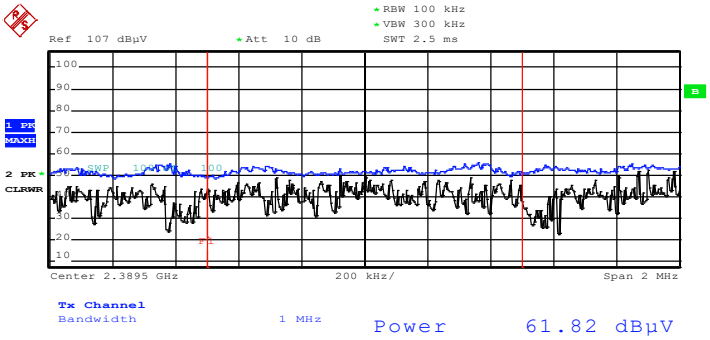
Date: 10.JAN.2019 11:15:25

Radiated Restricted Band Edges plot – Average Reading (802.11n Ch.1) - 2389 MHz ~ 2390 MHz



Date: 10.JAN.2019 11:16:33

Radiated Restricted Band Edges plot – Peak Reading (802.11n Ch.1) - 2389 MHz ~ 2390 MHz



Date: 10.JAN.2019 11:17:37

Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

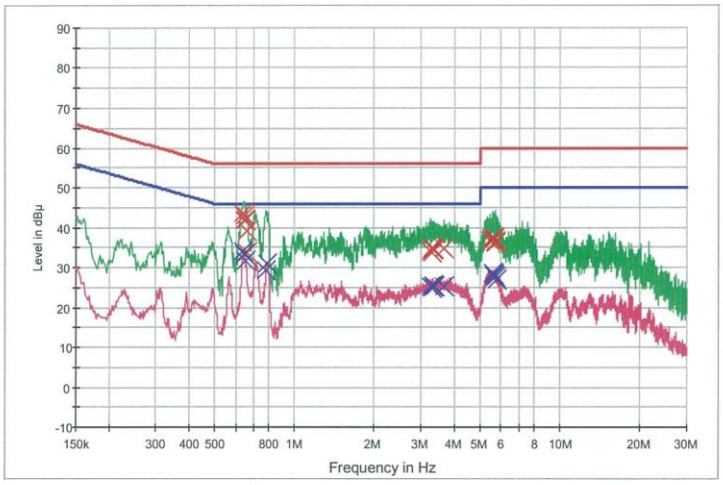
Test 1 / 2

HCT TEST Report

Common Information

EUT:	SM-M305M/DS
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	2.4GWLAN-L1

FCC CLASS B_Exten Cable



FCC CLASS B_QP
Preview Result 2-AVG
FCC CLASS B_ AV
Final Result 1-QPK
Preview Result 1-PK+
Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.642000	43.6	9.000	Off	L1	9.8	12.4	56.0
0.646000	42.7	9.000	Off	L1	9.8	13.3	56.0
0.650000	41.7	9.000	Off	L1	9.8	14.3	56.0
0.654000	41.8	9.000	Off	L1	9.8	14.2	56.0
0.660000	39.2	9.000	Off	L1	9.8	16.8	56.0
0.664000	33.7	9.000	Off	L1	9.8	22.3	56.0
3.268000	33.9	9.000	Off	L1	9.9	22.1	56.0
3.282000	33.7	9.000	Off	L1	9.9	22.3	56.0
3.292000	34.7	9.000	Off	L1	9.9	21.3	56.0
3.322000	34.7	9.000	Off	L1	9.9	21.3	56.0
3.346000	34.5	9.000	Off	L1	9.9	21.5	56.0
3.646000	34.9	9.000	Off	L1	9.9	21.1	56.0
5.458000	36.9	9.000	Off	L1	10.0	23.1	60.0
5.556000	37.0	9.000	Off	L1	10.1	23.0	60.0
5.606000	37.1	9.000	Off	L1	10.1	22.9	60.0
5.636000	37.4	9.000	Off	L1	10.1	22.6	60.0
5.702000	36.4	9.000	Off	L1	10.1	23.6	60.0
5.730000	36.2	9.000	Off	L1	10.1	23.8	60.0

2019-01-21 오전 9:02:27

Test 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.640000	33.9	9.000	Off	L1	9.8	12.1	46.0
0.646000	33.4	9.000	Off	L1	9.8	12.6	46.0
0.654000	31.7	9.000	Off	L1	9.8	14.3	46.0
0.782000	29.4	9.000	Off	L1	9.8	16.6	46.0
0.788000	31.0	9.000	Off	L1	9.8	15.0	46.0
0.792000	30.9	9.000	Off	L1	9.8	15.1	46.0
3.268000	25.3	9.000	Off	L1	9.9	20.7	46.0
3.292000	24.9	9.000	Off	L1	9.9	21.1	46.0
3.322000	25.4	9.000	Off	L1	9.9	20.6	46.0
3.346000	25.6	9.000	Off	L1	9.9	20.4	46.0
3.364000	25.4	9.000	Off	L1	9.9	20.6	46.0
3.646000	25.4	9.000	Off	L1	9.9	20.6	46.0
5.556000	28.5	9.000	Off	L1	10.1	21.5	50.0
5.606000	28.0	9.000	Off	L1	10.1	22.0	50.0
5.622000	28.0	9.000	Off	L1	10.1	22.0	50.0
5.636000	28.2	9.000	Off	L1	10.1	21.8	50.0
5.692000	27.5	9.000	Off	L1	10.1	22.5	50.0
5.758000	27.0	9.000	Off	L1	10.1	23.0	50.0

2019-01-21 오전 9:02:27

Conducted Emissions (Line 2)

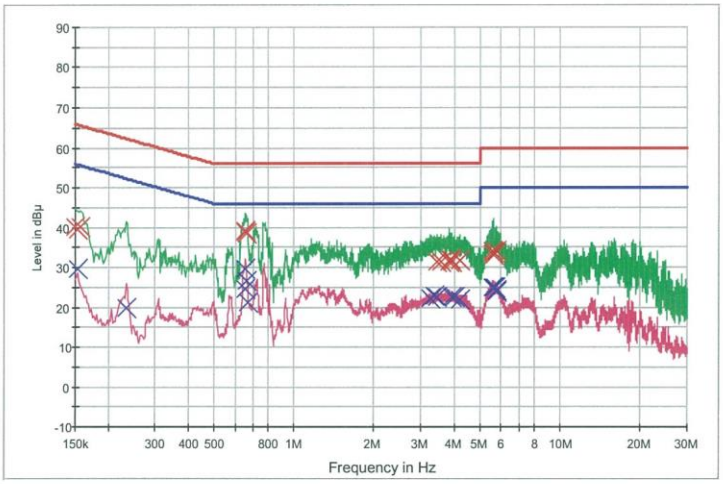
Test 1 / 2

HCT TEST Report

Common Information

EUT:	SM-M305M/DS
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	2.4GWLAN-N

FCC CLASS B_Exten Cable



FCC CLASS B_QP
Preview Result 2-AVG
FCC CLASS B_ AV
Final Result 1-QPK
Preview Result 1-PK+
Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.3	9.000	Off	N	9.8	25.7	66.0
0.154000	39.5	9.000	Off	N	9.8	26.2	65.8
0.158000	40.2	9.000	Off	N	9.8	25.4	65.6
0.654000	39.0	9.000	Off	N	9.9	17.0	56.0
0.658000	38.8	9.000	Off	N	9.9	17.2	56.0
0.662000	38.4	9.000	Off	N	9.9	17.6	56.0
3.464000	31.3	9.000	Off	N	10.1	24.8	56.0
3.554000	31.5	9.000	Off	N	10.1	24.5	56.0
3.824000	31.4	9.000	Off	N	10.2	24.6	56.0
3.896000	32.1	9.000	Off	N	10.2	23.9	56.0
3.932000	31.2	9.000	Off	N	10.2	24.8	56.0
4.194000	31.8	9.000	Off	N	10.2	24.2	56.0
5.580000	33.4	9.000	Off	N	10.3	26.6	60.0
5.584000	34.1	9.000	Off	N	10.3	25.9	60.0
5.604000	33.0	9.000	Off	N	10.3	27.0	60.0
5.614000	33.6	9.000	Off	N	10.3	26.4	60.0
5.618000	33.1	9.000	Off	N	10.3	26.9	60.0
5.764000	34.0	9.000	Off	N	10.3	26.0	60.0

2019-01-21 오전 8:50:18

Test 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	29.5	9.000	Off	N	9.8	26.2	55.8
0.234000	19.9	9.000	Off	N	9.9	32.4	52.3
0.654000	29.7	9.000	Off	N	9.9	16.3	46.0
0.658000	24.6	9.000	Off	N	9.9	21.4	46.0
0.662000	26.7	9.000	Off	N	9.9	19.3	46.0
0.672000	21.1	9.000	Off	N	9.9	24.9	46.0
3.238000	22.4	9.000	Off	N	10.1	23.6	46.0
3.368000	22.7	9.000	Off	N	10.1	23.3	46.0
3.464000	22.5	9.000	Off	N	10.1	23.5	46.0
3.932000	22.4	9.000	Off	N	10.2	23.6	46.0
4.032000	22.4	9.000	Off	N	10.2	23.6	46.0
4.194000	22.0	9.000	Off	N	10.2	24.0	46.0
5.584000	24.9	9.000	Off	N	10.3	25.1	50.0
5.618000	24.9	9.000	Off	N	10.3	25.1	50.0
5.670000	24.8	9.000	Off	N	10.3	25.2	50.0
5.674000	24.8	9.000	Off	N	10.3	25.2	50.0
5.764000	24.4	9.000	Off	N	10.3	25.6	50.0
5.800000	23.9	9.000	Off	N	10.3	26.1	50.0

2019-01-21 오전 8:50:18

9.9 CONFIRMATION OF GEO-LOCATION MECHANISM

The device uses a geo-location mechanism based on the Country in order to only enable certain WLAN DTS bands when the device is not in the USA.

WLAN	Country code = US	Country code = KR(Korea)
CH 12	Did not connect	Connected
CH 13	Did not connect	Connected

The verification tests confirmed the operational of the geo-location mechanism.

Setting the channel for Access point

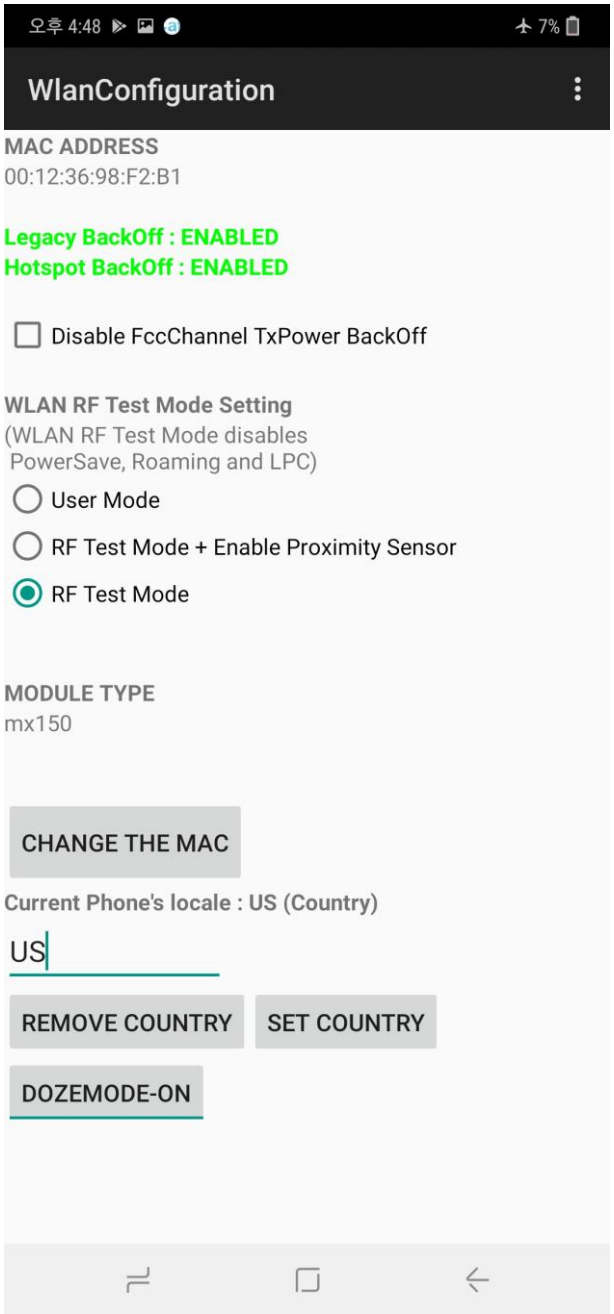
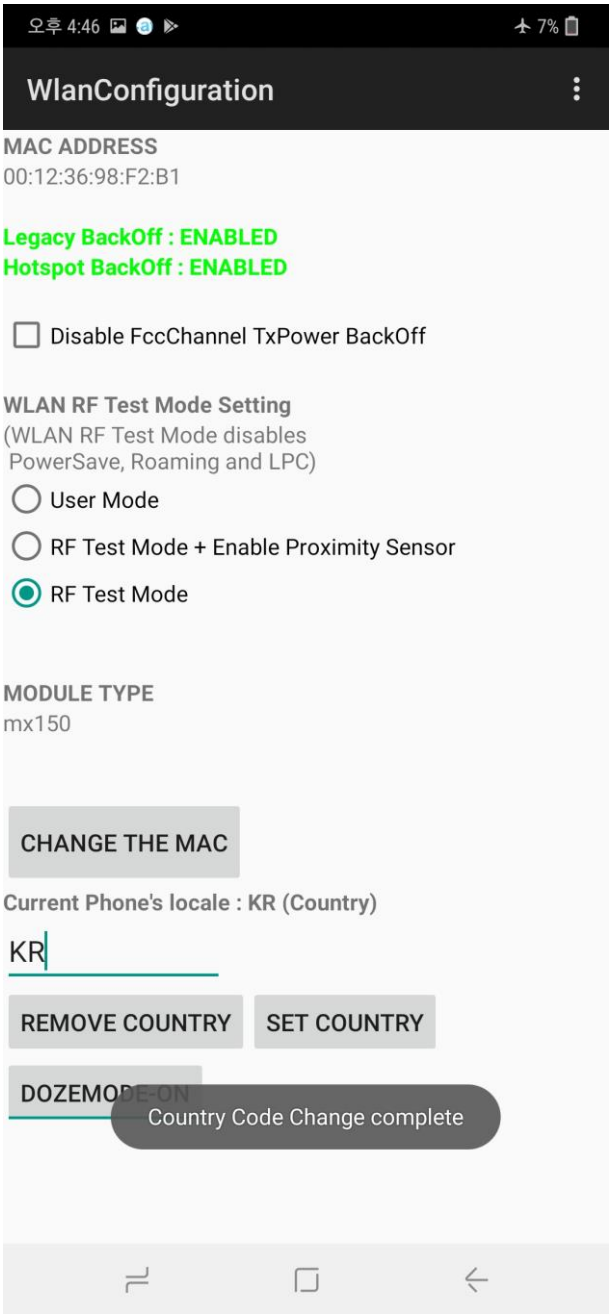
- SSID : ap_2g_ht20
- Ch.12 setting

```
Debug:~> wl -i radio_1 down
Debug:~> wl -i radio_1 chanspec 12
Chanspec set to 0x100c
Debug:~> wl -i radio_1 up
```

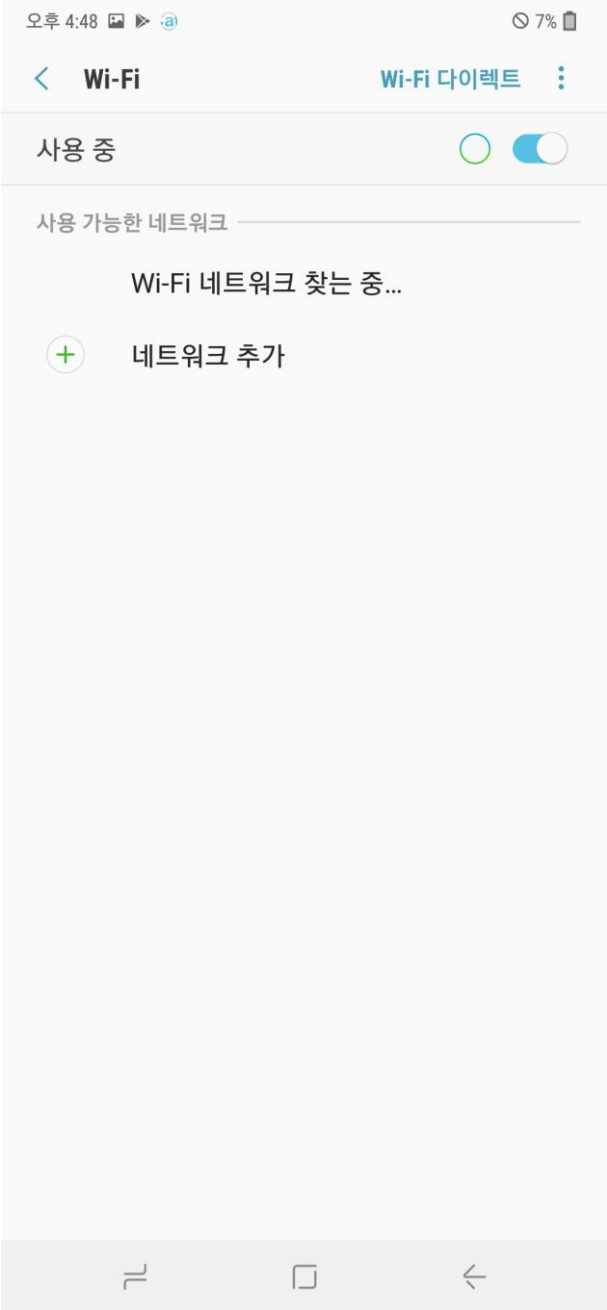
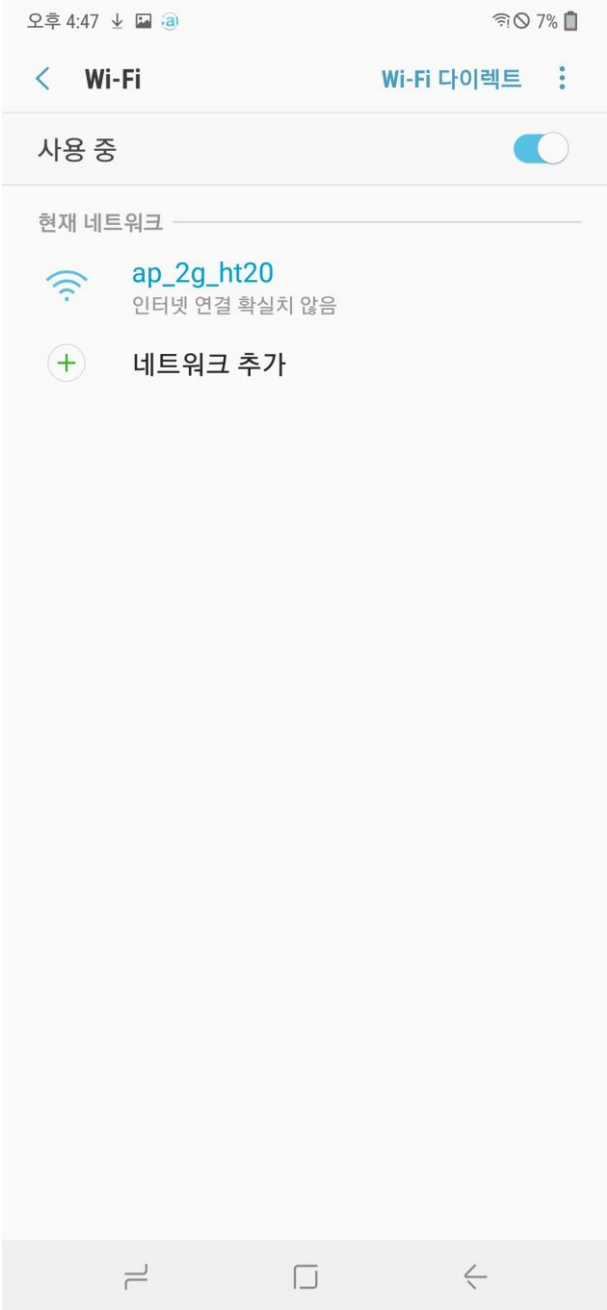
- Ch.13 setting

```
Debug:~> wl -i radio_1 down
Debug:~> wl -i radio_1 chanspec 13
Chanspec set to 0x100d
Debug:~> wl -i radio_1 up
```

Setting the country for product

Country code = US	Country code = KR(Korea)
	

Verification test

Did not connect (Country code = US)	Connected (Country code = KR)
	

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	MY51110085
Agilent	N9020A / Signal Analyzer	06/08/2018	Annual	MY52090906
Agilent	N9030A / Signal Analyzer	01/10/2019	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/26/2018	Annual	101231
Agilent	N1911A / Power Meter	04/16/2018	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/16/2018	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/20/2018	Annual	3116A03621
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	08/23/2018	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	VULB 9160 / TRILOG Antenna	08/09/2018	Biennial	9160-3368
Schwarzbeck	BBHA 9120D / Horn Antenna	05/02/2017	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/03/2018	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/28/2018	Annual	101068-SZ
Agilent	N9020A / Signal Analyzer	06/08/2018	Annual	MY51110085
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/07/2018	Annual	8
Wainwright Instruments	WHKX7.0/18G-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	01/03/2019	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/07/2018	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/17/2018	Annual	08285
Chang Woo Inc.	18N-20dB / Attenuator(20 dB)	05/09/2018	Annual	8
CERNEX	CBLU1183540 / Power Amplifier	07/10/2018	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/10/2018	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/03/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/29/2018	Annual	25956

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-1901-FC027-P
2	HCT-RF-1901-FC028-P
3	HCT-RF-1901-FC029-P
4	HCT-RF-1901-FC030-P
5	HCT-RF-1901-FC031-P