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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:
July 09, 2020

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2006-FC082-R1

FCC ID:	**A3LSMN980F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMN981B report.

Model:	SM-N980F/DS
Additional Model	SM-N980F
EUT Type:	Mobile Phone
Average Output Power:	Ant.1 (SISO): 16.16 dBm Ant 2 (SISO): 16.92 dBm Ant 1&2 (MIMO): 19.56 dBm
Frequency Range:	2 412 MHz ~ 2 472 MHz (US Only: 2 412 MHz ~ 2 462 MHz)
Modulation type:	OFDMA
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. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

REVIEWED BY

Report prepared by : Jung Ki Lim
Engineer of Telecommunication Testing Center

Report approved by : Kwon Jeong
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.

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2006-FC082	June 30, 2020	- First Approval Report
HCT-RF-2006-FC082-R1	July 09, 2020	- Added the antenna information (page 5.) - Edit typo (Page 6.) - A table of test results for the 6 dB BW test on page 34,35 is revised. - Added the Tone and RU Setting (page 28, 29.)

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1. EUT DESCRIPTION

Model	SM-N980F/DS		
Additional Model	SM-N980F		
EUT Type	Mobile Phone		
Power Supply	DC 3.88 V		
Battery Information	Model: EB-BN-980ABY Type: Li-ion Battery		
Travel Adapter Information	Model : EP-TA800 Manufacture: SOLUM		
Data Cable Information	Model : EP-DG980BBE Manufacture: RFTech		
Ear-jack Information	Model : YBD-19HS-026 Manufacture: ALMUS		
Frequency Range	2 412 MHz ~ 2 472 MHz(US Only: 2 412 MHz ~ 2 462 MHz)		
Antenna Information	Ant 1 : SUB ANTENNA #2 , Ant 2: WIFI ANTENNA #2		
Max. RF Output Power	Peak Power (For information only)	Ant. 1 (SISO)	24.92 dBm
		Ant.2 (SISO)	25.11 dBm
		Ant.1&2 (MIMO)	28.02 dBm
	Average Power	Ant. 1 (SISO)	16.16 dBm
		Ant.2 (SISO)	16.92 dBm
		Ant.1&2 (MIMO)	19.56 dBm
Modulation Type	OFDMA		
Number of Channels	13 Channels		
Antenna Specification	Antenna type: LDS Peak Gain : Ant.1: -0.63 dBi, Ant.2: 0.43 dBi		
Date(s) of Tests	May 12, 2020 ~ June 23, 2020		

ANTENNA CONFIGURATIONS

1. The device employs MIMO technology. Below are the possible configurations

Configurations	SISO		SDM	CDD
	Ant1	Ant2	Ant1 + Ant2	Ant1 + Ant2
802.11ax	O	O	O	O

Note:

1. O = Support, X = Not Support
2. SISO = Single Input Single Output
3. SDM = Spatial Diversity Multiplexing
4. CDD = Cyclic Delay Diversity

2.This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna.

	5GHz WIFI		2.4GHz WIFI		Test case
	Ant1	Ant2	Ant1	Ant2	
2.4 GHz + 5 GHz RSDB Only	A			B	O
		A	B		O
	A		B		-
		A		B	-
2.4 GHz + 5 GHz RSDB & MIMO	A	A	B		-
	A	A		B	-
	A		B	B	-
		A	B	B	-
2.4 GHz + 5 GHz RSDB MIMO	A	A	B	B	O

3. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) f) (ii)

Directional gain =

- $$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

Ant Gain (dBi)		N_{ANT}/ N_{SS}	Directional Gain (dBi)
ANT1	-0.63	2 / 2	2.93
ANT2	0.43		

2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 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 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 6.6.5 of ANSI C63.10. (Version: 2013)

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."

(1) The antennas of this E.U.T are permanently attached.

(2) 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.

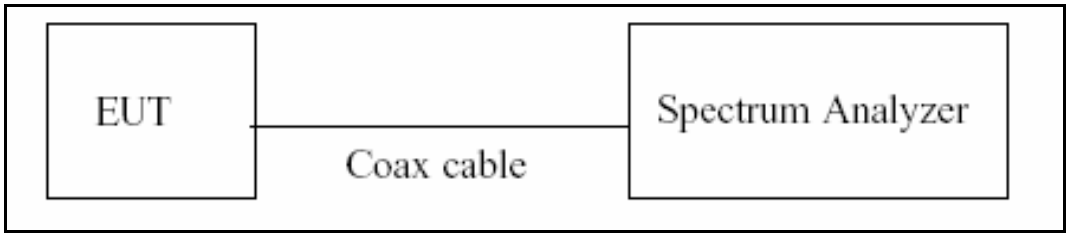
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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)	5.05

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.

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*.

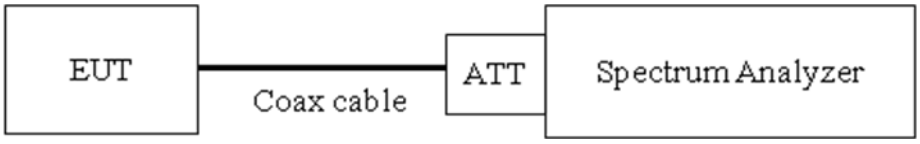
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

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 11.8.1 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.

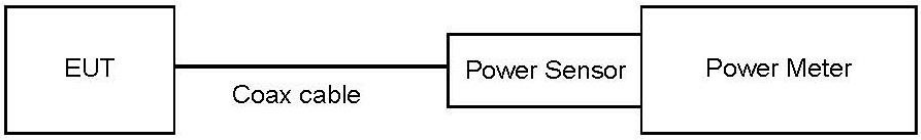
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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 11.9.1.3 in ANSI 63.10-2013)

: Measure the peak power of the transmitter.

▪ Average Power (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

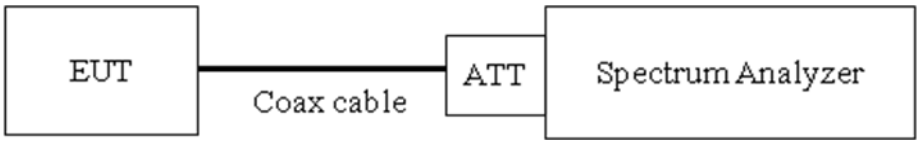
▪ Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm 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 v05r02, 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) Set span to at least 1.5 times the OBW.
3) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x RBW.
5) Sweep = auto couple
6) Detector = power averaging (rms) or sample detector (when rms not available).
7) Ensure that the number of measurement points in the sweep ≥[2 ×span / RBW].
8) Employ trace averaging (rms) modeover a minimum of 100 traces
9) Use the peak marker function to determine the maximum amplitude level.
10) 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.
11) if then duty factor shall be added to adjust the result if the duty cycle is less than 98%

Sample Calculation

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

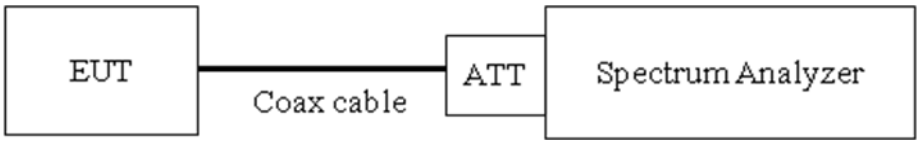
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (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 20 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 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 x 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	20.07
100	20.10
200	20.15
300	20.20
400	20.23
500	20.24
600	20.24
700	20.26
800	20.27
900	20.29
1000	20.30
2000	20.44
2400	20.48
2500	20.50
3000	20.55
4000	20.63
5000	20.74
6000	20.76
7000	20.83
8000	20.88
9000	20.94
10000	21.00
11000	21.05
12000	21.13
13000	21.22
14000	21.19
15000	21.24
16000	21.25
17000	21.28
18000	21.33
19000	21.35
20000	21.39
21000	21.51
22000	21.58
23000	21.58
24000	21.62
25000	21.71
26000	21.72

Note : 1. 2 400 ~ 2 500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss

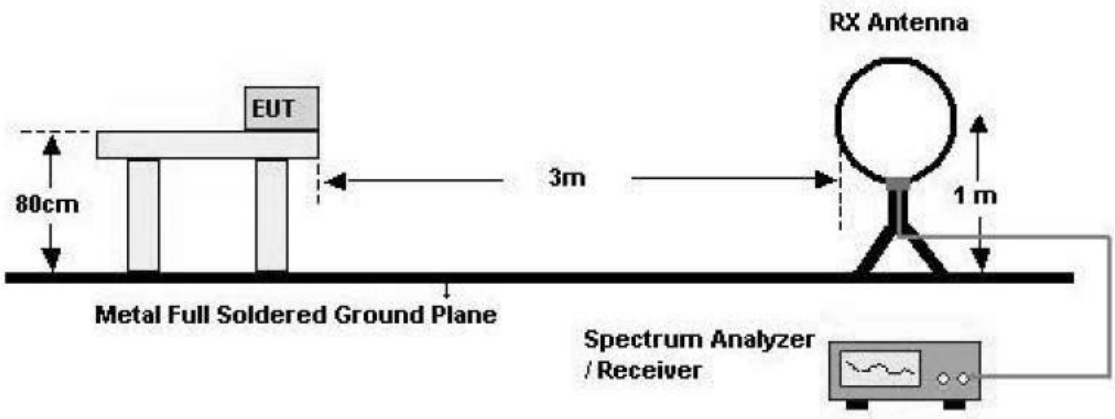
7.6. Radiated Test

Limit

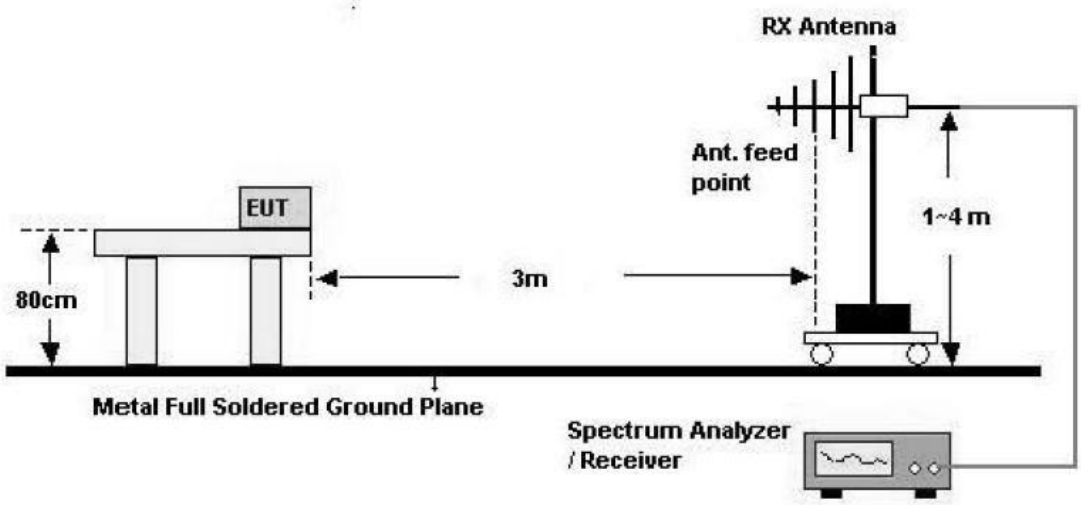
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

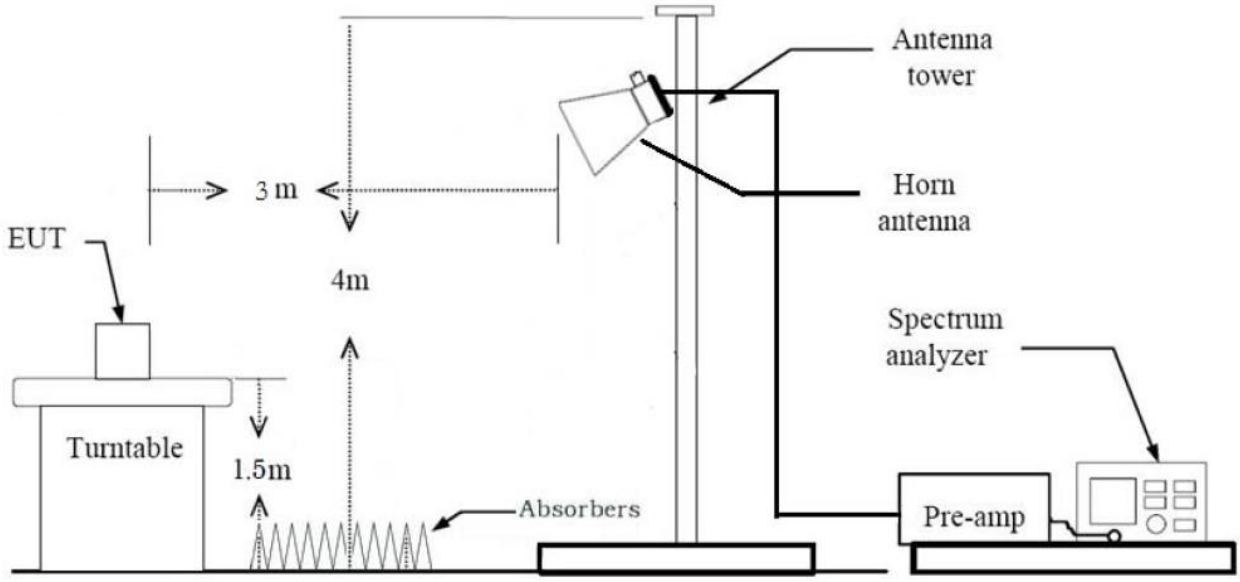
Below 30 MHz



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 and Parallel to the ground plane 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) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(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 x RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
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.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
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. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 3 x 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
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. 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.

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 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, 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 x 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 x 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 x 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.

9. 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.
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
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 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. 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 x 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 x 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 x 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.

9. 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.
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total(Measurement Type : Peak)
    = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

    Total(Measurement Type : Average, Duty cycle ≥ 98%)
    = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

    Total(Measurement Type : Average, Duty cycle < 98%)
    = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + 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[(a)]	56 to 46[(a)]
0.50 to 5	56	46
5 to 30	60	50

[(a)]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. Test RU offset for Tones

BW (MHz)	Tones (T)	RU offset	Test RU offset		
			Low	Mid	High
20	26	0~8	0	4	8
	52	37~40	37	38	40
	106	53~54	53	-	54
	242	61	-	61	-

7.9. Worst case configuration and mode

Conducted test

1. All data rate of operation were investigated and the worst case results are reported.
   (Worst case : MCS0)
2. SM-N980F/DS, SM-N980F were tested and the worst case results are reported.
(Worst case : SM-N980F/DS)
3. Bandedge (Conducted)
 : All Mode(Channel, Tone, RU Offset) of operation were investigated and the worst case configuration results are reported

Tone	Channel	RU Index
26	1	0
	11	8
52	1	37
	11	40
106	1	53
	11	54
242	1, 11	61

Tone	Channel	RU Index
26	12, 13	8
52	12, 13	40
106	12, 13	54
242	12, 13	61

Radiated test

1. Full RU(Resource Unit) mode and SU(Single Unit) mode have no difference in physical waveform.
   This Report has been described only Full RU(Resource Unit) mode with worst output power
2. 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
3. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge : X
4. All data rate of operation were investigated and the worst case results are reported.
   (Worst case : MCS0)
5. All Antenna of operation were investigated and the worst case results are reported
   - Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(SDM), Ant1+Ant2(CDD)
   - Worstcase : Ant1+Ant2(CDD)
6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
7. SM-N980F/DS, SM-N980F were tested and the worst case results are reported.
(Worst case : SM-N980F/DS)
8. All mode(Tone, RU Offset) of operation were investigated and the worst case configuration results are reported

Test	Tone	RU Offset
RSE	Worst case(Highest Power) : 26 T	0, 8
	Worst case(Highest PSD) : 26T	0, 8
	Additional Tone : 52T	37, 40
Bandedge	Worst case(Highest Power) : 242T	Low Edge: 61 High Edge: 61
	Worst case(Highest PSD) : 26T	Low Edge: 0 High Edge: 8
	Additional Tone : 52, 106T	Low Edge: 37, 53 High Edge: 40, 54

* * Duty cycle factor applie only 106, 242Tone.(Duty cycle < 98%).

Radiated test(DBS)

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. SM-N980F/DS, SM-N980F were tested and the worst case results are reported.

(Worst case : SM-N980F/DS)

3. EUT Axis
   - Radiated Spurious Emissions : Y
4. Test case

RSDB	5GHz WIFI		2.4GHz WIFI		Test case
	Ant1	Ant2	Ant1	Ant2	
2.4 GHz + 5 GHz RSDB Only	A			B	Case1
		A	B		Case2
	A		B		-
		A		B	-
2.4 GHz + 5 GHz RSDB & MIMO	A	A	B		-
	A	A		B	-
	A		B	B	-
		A	B	B	-
2.4 GHz + 5 GHz RSDB MIMO	A	A	B	B	Case3

5. The following tables show the worst case configurations determined during testing.

(Worst case: The lowest margin condition the channels and modes were selected for test.)

Test case	Description	2.4 GHz Emission	5 GHz Emission
1	Antenna	Ant 2	Ant 1
	Channel	6	159
	Data Rate	1Mbps	MCS0
	Mode	802.11b	802.11ax(HE40)(26 Tone)(RU 9)

Test case	Description	2.4 GHz Emission	5 GHz Emission
2	Antenna	Ant 1	Ant 2
	Channel	1	159
	Data Rate	1Mbps	MCS0
	Mode	802.11b	802.11ax(HE40)(26 Tone)(RU 9)

Test case	Description	2.4 GHz Emission	5 GHz Emission
3	Antenna	Ant 1 + Ant 2	Ant 1 + Ant 2
	Channel	1	159
	Data Rate	MCS0	MCS0
	Mode	802.11ax(HE20)(26Tone)(RU 8)	802.11ax(HE40)(26 Tone)(RU 9)

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone, etc)+Travel Adapter, Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter
2. SM-N980F/DS, SM-N980F were tested and the worst case results are reported.

(Worst case : SM-N980F/DS)

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 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 > 30 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 7.7		PASS (Note1)
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

Note:

1. Please refer to the SM-N980F/DS [DTS] Test Report.

9. TEST RESULT

9.1 DUTY CYCLE

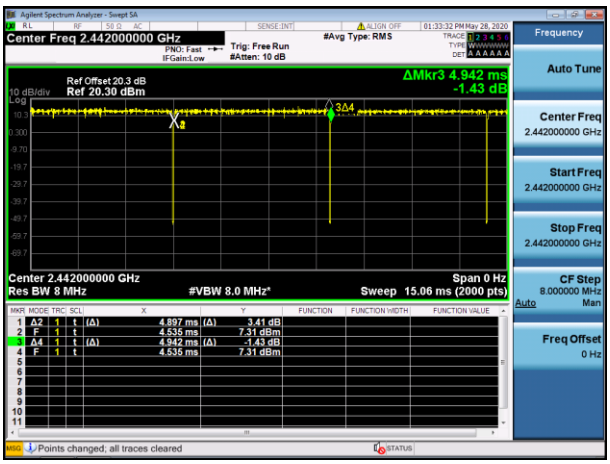
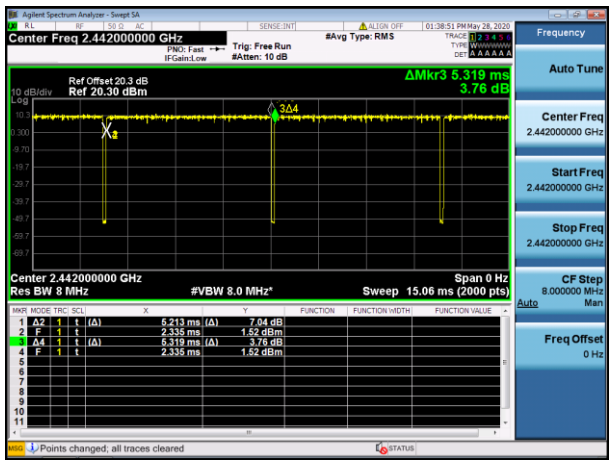
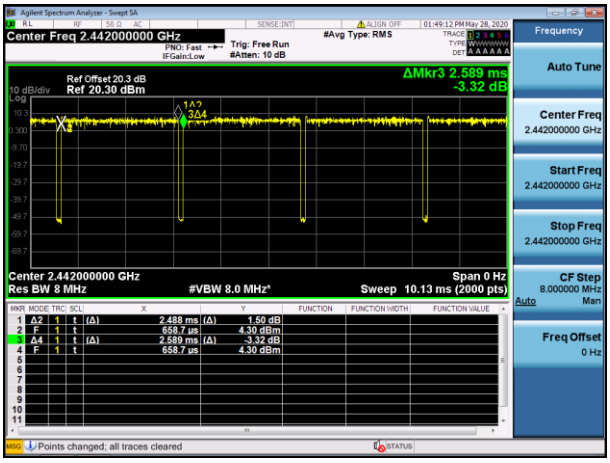
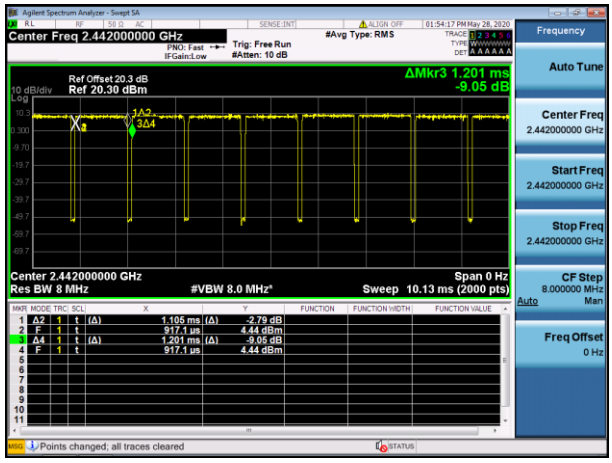
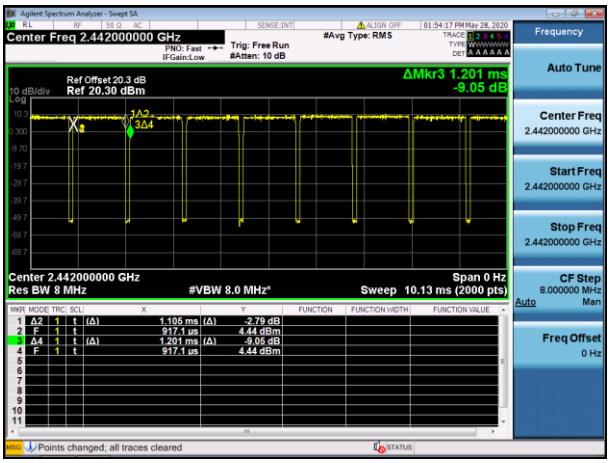
Mode	Tone (T)	Data Rate	On Time (ms)	Total Time (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ax (HE20)	26	MCS0	4.897	4.942	0.991	0.04
		MCS1	5.215	5.315	0.981	0.08
		MCS2	3.500	3.604	0.971	0.13
		MCS3	2.640	2.741	0.963	0.16
		MCS4	1.778	1.880	0.946	0.24
		MCS5	1.348	1.454	0.927	0.33
		MCS6	1.206	1.307	0.922	0.35
		MCS7	1.105	1.206	0.916	0.38
		MCS8	0.922	1.023	0.901	0.45
		MCS9	0.841	0.942	0.892	0.49
	52	MCS0	5.213	5.319	0.980	0.09
		MCS1	2.640	2.741	0.963	0.16
		MCS2	1.783	1.885	0.946	0.24
		MCS3	1.353	1.454	0.930	0.31
		MCS4	0.922	1.023	0.901	0.45
		MCS5	0.709	0.811	0.875	0.58
		MCS6	0.638	0.740	0.863	0.64
		MCS7	0.583	0.684	0.852	0.70
		MCS8	0.497	0.598	0.831	0.81
		MCS9	0.456	0.557	0.818	0.87
	106	MCS0	2.488	2.589	0.961	0.17
		MCS1	1.277	1.378	0.926	0.33
		MCS2	0.871	0.973	0.896	0.48
		MCS3	0.669	0.770	0.868	0.61
		MCS4	0.471	0.573	0.823	0.85
		MCS5	0.370	0.471	0.785	1.05
		MCS6	0.334	0.436	0.767	1.15
		MCS7	0.309	0.410	0.753	1.23
		MCS8	0.269	0.370	0.726	1.39
		MCS9	0.248	0.350	0.710	1.49

Mode	Tone (T)	Data Rate	On Time (ms)	Total Time (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ax (HE20)	242	MCS0	1.105	1.201	0.920	0.36
		MCS1	0.593	0.694	0.854	0.69
		MCS2	0.415	0.517	0.804	0.95
		MCS3	0.329	0.431	0.765	1.17
		MCS4	0.238	0.339	0.701	1.54
		MCS5	0.193	0.294	0.655	1.84
		MCS6	0.182	0.284	0.643	1.92
		MCS7	0.167	0.269	0.623	2.06
		MCS8	0.157	0.258	0.608	2.16
		MCS9	0.147	0.248	0.592	2.28
802.11ax(SU)	BW 20	MCS0	1.105	1.201	0.920	0.36
		MCS1	0.578	0.679	0.851	0.70
		MCS2	0.405	0.507	0.800	0.97
		MCS3	0.319	0.421	0.759	1.20
		MCS4	0.233	0.334	0.697	1.57
		MCS5	0.193	0.294	0.655	1.84
		MCS6	0.182	0.279	0.655	1.84
		MCS7	0.167	0.269	0.623	2.06
		MCS8	0.152	0.253	0.600	2.22
		MCS9	0.142	0.238	0.596	2.25

▣ Test Plots

Note:

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

26 Tone MCS0	52 Tone MCS0
	
106 Tone MCS0	**242 Tone MCS0**
	
SU MCS0	
	

9.2 6dB BANDWIDTH

[ANT1]

BW	Frequency [MHz]	Channel No.	RU Index	6dB BW (MHz)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	2.105	12.05	17.18	-	-
			Mid	2.685	4.11	-	19.07	19.03
			High	2.047	7.01	17.12	-	-
	2437	6	Low	2.086	17.07	18.13	-	-
			Mid	2.701	12.90	-	19.07	19.07
			High	2.077	4.09	18.13	-	-
	2462	11	Low	2.132	12.04	17.20	-	-
			Mid	2.674	4.10	-	19.13	19.13
			High	2.097	17.04	17.16	-	-
	2467	12	Low	2.102	17.03	17.18	-	-
			Mid	2.684	10.39	-	19.14	19.11
			High	2.069	15.76	17.16	-	-
	2472	13	Low	2.115	15.80	17.18	-	-
			Mid	2.677	7.89	-	18.94	18.94
			High	2.083	8.20	17.03	-	-

Limit : > 500kHz

[ANT2]

BW	Frequency [MHz]	Channel No.	RU Index	6dB BW (MHz)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	2.125	17.05	17.21	-	-
			Mid	2.692	12.54	-	19.13	19.10
			High	2.104	8.28	17.16	-	-
	2437	6	Low	2.130	12.03	17.17	-	-
			Mid	2.692	6.65	-	19.04	19.05
			High	2.078	8.28	17.17	-	-
	2462	11	Low	2.125	14.55	17.17	-	-
			Mid	2.704	4.08	-	19.09	19.11
			High	2.098	17.02	17.16	-	-
	2467	12	Low	2.084	14.51	17.16	-	-
			Mid	2.676	6.67	-	19.13	19.08
			High	2.089	8.28	17.14	-	-
	2472	13	Low	2.126	17.02	17.17	-	-
			Mid	2.685	4.07	-	19.09	19.03
			High	2.148	8.26	17.13	-	-

Limit : > 500kHz

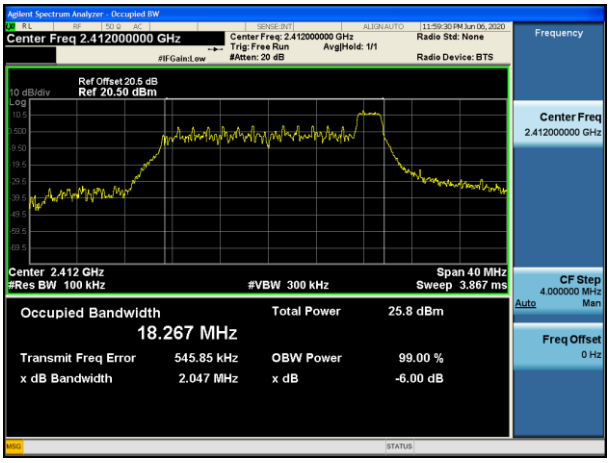
▣ Test Plots

Note:

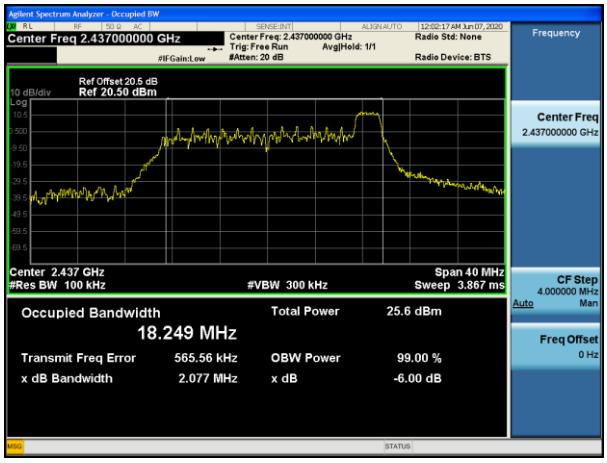
In order to simplify the report, attached plots were only the most narrow 6 dB BW channel.

[ANT1]

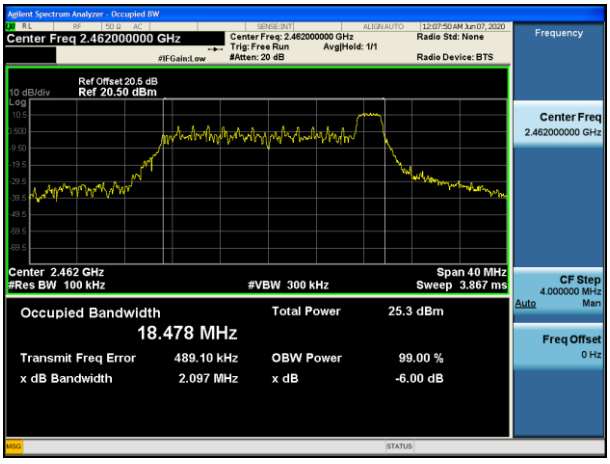
BW20M Ch.1(2412MHz) RU 8



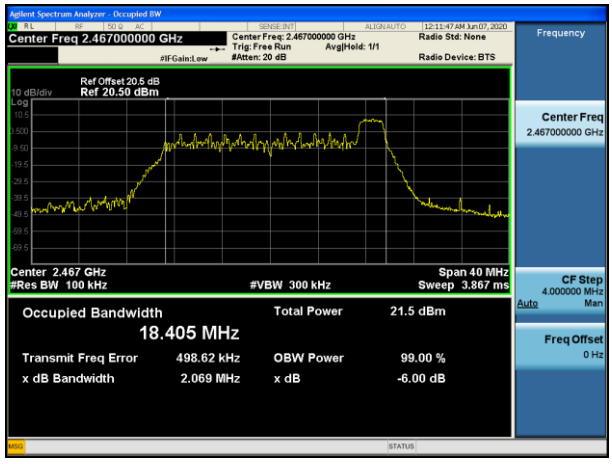
BW20M Ch.6(2437MHz) RU 8



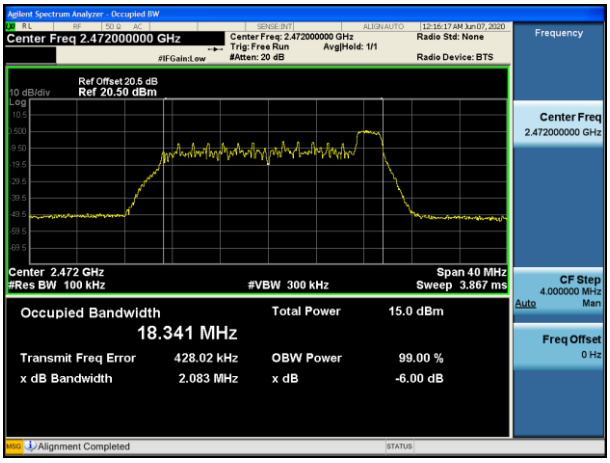
BW20M Ch.11(2462MHz) RU 8



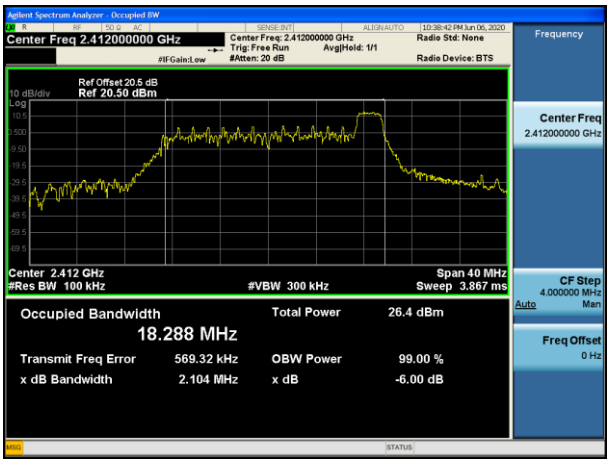
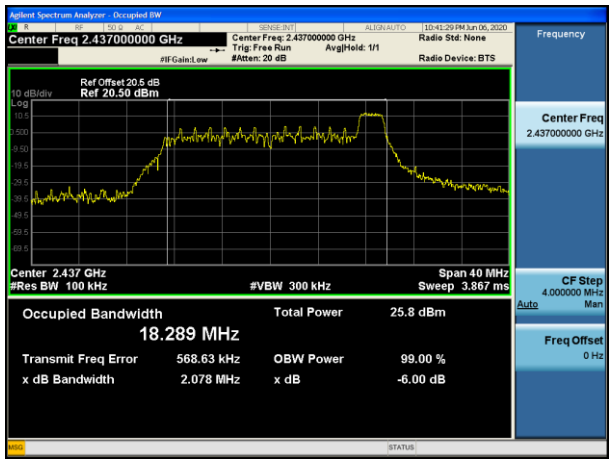
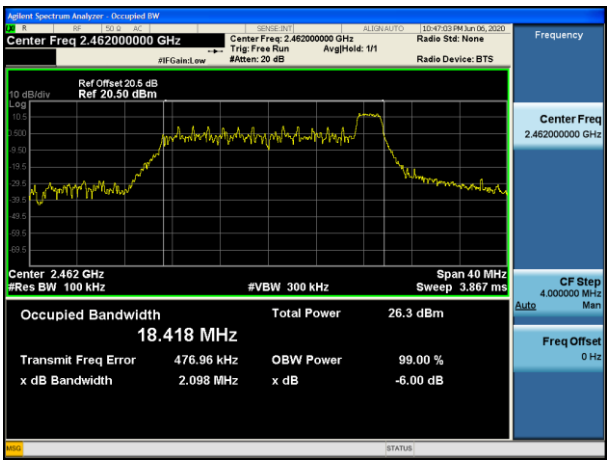
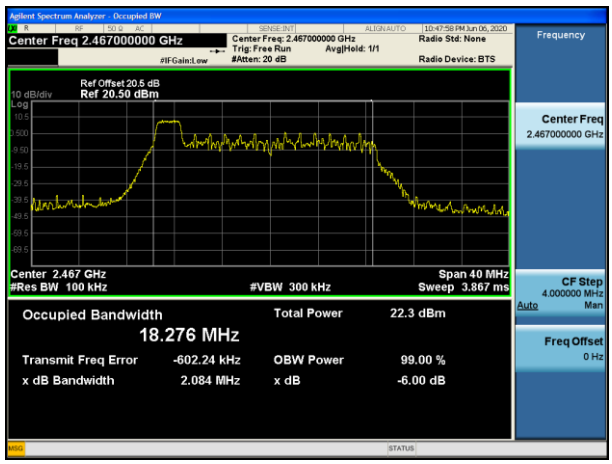
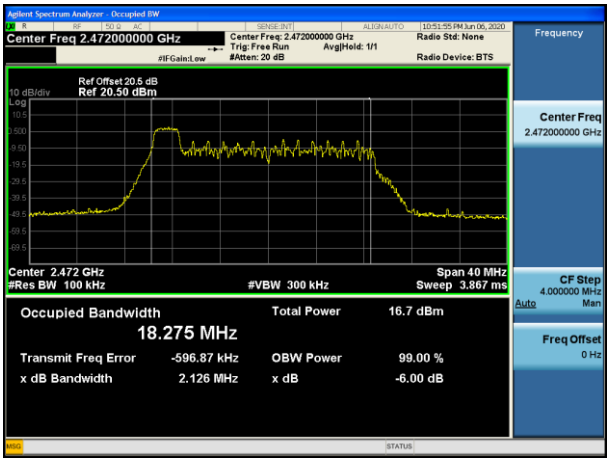
BW20M Ch.12(2467MHz) RU 8



BW20M Ch.13(2472MHz) RU 8



[ANT2]

BW20M Ch.1(2412MHz) RU 8	BW20M Ch.6(2437MHz) RU 8
	
BW20M Ch.11(2462MHz) RU 8	**BW20M Ch.12(2467MHz) RU 0**
	
BW20M Ch.13(2472MHz) RU 0	
	

9.3 OUTPUT POWER

Power Level Setting

802.11ax Mode	Frequency [MHz]	Channel No.	26 T	52T	106T	242 T
Low	2412	1	16	16	15	14
Mid	2417	2	16	16	16	16
	2437	6	16	16	16	16
	2457	10	16	16	16	15
High	2462	11	14	16	16	14
	2467	12	11	11	11	11
	2472	13	7	7	7	7

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, 20.50 dB is offset for 2.4 GHz Band

[ANT1]

BW	Frequency [MHz]	Channel No.	RU Index	Total Peak Power (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	24.42	24.39	22.69	-	-
			Mid	24.75	24.51	-	21.32	21.27
			High	24.92	24.62	23.03	-	-
	2437	6	Low	24.37	23.88	22.97	-	-
			Mid	24.27	23.96	-	22.52	22.49
			High	24.80	24.33	23.31	-	-
	2462	11	Low	23.02	24.56	23.53	-	-
			Mid	22.21	24.18	-	20.83	20.81
			High	22.38	24.20	23.19	-	-
	2467	12	Low	18.21	17.57	17.01	-	-
			Mid	17.98	17.38	-	16.62	16.31
			High	18.57	17.72	17.10	-	-
	2472	13	Low	14.76	14.33	13.94	-	-
			Mid	14.92	14.45	-	12.77	12.75
			High	14.43	14.37	14.03	-	-

Limit : 30dBm

[ANT2]

BW	Frequency [MHz]	Channel No.	RU Index	Total Peak Power (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	24.48	24.30	22.55	-	-
			Mid	24.72	24.18	-	20.99	20.89
			High	25.11	24.77	22.92	-	-
	2437	6	Low	24.80	24.31	23.72	-	-
			Mid	24.99	24.33	-	22.97	22.91
			High	25.04	24.46	23.75	-	-
	2462	11	Low	23.46	24.95	24.33	-	-
			Mid	23.09	24.88	-	21.37	21.14
			High	23.20	24.94	24.26	-	-
	2467	12	Low	18.81	18.36	17.84	-	-
			Mid	18.74	18.29	-	16.96	16.93
			High	18.95	18.50	18.01	-	-
	2472	13	Low	15.31	15.18	14.47	-	-
			Mid	15.34	14.96	-	13.54	13.53
			High	15.67	15.14	14.85	-	-

Limit : 30dBm

[MIMO]

BW	Frequency [MHz]	Channel No.	RU Index	Total Peak Power (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	27.46	27.36	25.63	-	-
			Mid	27.75	27.36	-	24.17	24.09
			High	28.02	27.70	25.98	-	-
	2437	6	Low	27.60	27.11	26.37	-	-
			Mid	27.65	27.16	-	25.76	25.72
			High	27.93	27.41	26.55	-	-
	2462	11	Low	26.26	27.77	26.96	-	-
			Mid	25.68	27.55	-	24.12	23.99
			High	25.82	27.60	26.77	-	-
	2467	12	Low	21.53	20.99	20.46	-	-
			Mid	21.39	20.87	-	19.80	19.64
			High	21.77	21.13	20.58	-	-
	2472	13	Low	18.06	17.78	17.22	-	-
			Mid	18.14	17.72	-	16.18	16.17
			High	18.11	17.78	17.47	-	-

Limit : 30dBm

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, 20.50 dB is offset for 2.4 GHz Band

[ANT1]

BW	Frequency [MHz]	Channel No.	RU Index	Total Average Power (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	15.52	15.66	14.52	-	-
			Mid	16.15	16.04	-	14.44	14.21
			High	16.16	16.11	14.93	-	-
	2437	6	Low	15.28	15.16	15.23	-	-
			Mid	15.74	15.55	-	15.75	15.50
			High	16.14	16.12	15.44	-	-
	2462	11	Low	14.38	16.02	15.49	-	-
			Mid	13.67	15.77	-	13.94	13.69
			High	13.73	15.59	15.51	-	-
	2467	12	Low	9.40	9.16	9.44	-	-
			Mid	9.50	9.15	-	9.78	9.46
			High	9.81	9.42	9.46	-	-
	2472	13	Low	6.06	6.14	5.96	-	-
			Mid	6.67	6.15	-	6.24	6.02
			High	5.95	5.84	6.24	-	-

Limit : 30dBm

[ANT2]

BW	Frequency [MHz]	Channel No.	RU Index	Total Average Power (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	15.77	15.77	14.46	-	-
			Mid	16.40	15.94	-	14.09	13.89
			High	16.92	16.55	15.14	-	-
	2437	6	Low	15.74	15.65	15.63	-	-
			Mid	16.20	16.01	-	16.00	15.80
			High	16.24	16.02	15.70	-	-
	2462	11	Low	14.82	16.59	16.43	-	-
			Mid	14.73	16.58	-	14.49	14.26
			High	14.66	16.41	16.44	-	-
	2467	12	Low	10.11	9.89	9.95	-	-
			Mid	10.32	10.04	-	10.14	9.94
			High	10.40	10.09	10.14	-	-
	2472	13	Low	6.94	6.57	6.56	-	-
			Mid	7.09	6.87	-	6.93	6.72
			High	7.08	6.86	6.86	-	-

Limit : 30dBm

[MIMO]

BW	Frequency [MHz]	Channel No.	RU Index	Total Average Power (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	18.65	18.73	17.50	-	-
			Mid	19.29	19.00	-	17.28	17.06
			High	19.56	19.34	18.05	-	-
	2437	6	Low	18.52	18.42	18.44	-	-
			Mid	18.98	18.79	-	18.89	18.67
			High	19.20	19.08	18.59	-	-
	2462	11	Low	17.62	19.32	18.99	-	-
			Mid	17.25	19.21	-	17.23	17.00
			High	17.23	19.03	19.01	-	-
	2467	12	Low	12.78	12.55	12.71	-	-
			Mid	12.94	12.63	-	12.97	12.72
			High	13.12	12.78	12.82	-	-
	2472	13	Low	9.53	9.37	9.28	-	-
			Mid	9.89	9.53	-	9.61	9.40
			High	9.56	9.39	9.57	-	-

Limit : 30dBm

9.4 POWER SPECTRAL DENSITY

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. 20.50 dB is offset for 2.4 GHz Band.
4. Total PSD = Reading Value + Duty Cycle Factor

[ANT1]

BW	Frequency [MHz]	Channel No.	RU Index	Total PSD (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	-2.06	-4.99	-8.55	-	-
			Mid	-1.51	-4.73	-	-12.47	-12.35
			High	-1.41	-4.62	-8.39	-	-
	2437	6	Low	-2.71	-5.79	-8.63	-	-
			Mid	-2.41	-5.56	-	-11.33	-10.76
			High	-1.53	-5.05	-7.64	-	-
	2462	11	Low	-3.39	-4.41	-7.80	-	-
			Mid	-3.92	-4.79	-	-13.05	-13.34
			High	-4.28	-5.47	-8.21	-	-
	2467	12	Low	-8.61	-11.34	-14.23	-	-
			Mid	-8.53	-11.28	-	-17.91	-16.67
			High	-7.83	-11.15	-14.39	-	-
	2472	13	Low	-11.48	-14.35	-17.16	-	-
			Mid	-10.79	-14.38	-	-19.59	-20.08
			High	-11.91	-13.84	-16.78	-	-

Limit : 8dBm

[ANT2]

BW	Frequency [MHz]	Channel No.	RU Index	Total PSD (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	-1.49	-4.68	-8.40	-	-
			Mid	-1.18	-4.45	-	-12.46	-12.12
			High	-0.74	-3.67	-7.90	-	-
	2437	6	Low	-2.13	-4.64	-7.45	-	-
			Mid	-1.14	-4.17	-	-10.46	-9.99
			High	-1.67	-4.12	-7.01	-	-
	2462	11	Low	-2.93	-3.78	-6.84	-	-
			Mid	-2.47	-3.93	-	-11.61	-11.64
			High	-3.31	-3.90	-7.27	-	-
	2467	12	Low	-7.06	-10.48	-13.13	-	-
			Mid	-7.52	-10.49	-	-16.19	-16.55
			High	-7.14	-10.12	-13.13	-	-
	2472	13	Low	-10.27	-13.50	-16.24	-	-
			Mid	-10.17	-13.43	-	-19.06	-19.30
			High	-10.51	-13.14	-15.96	-	-

Limit : 8dBm

[MIMO]

BW	Frequency [MHz]	Channel No.	RU Index	Total PSD (dBm)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	1.24	-1.82	-5.46	-	-
			Mid	1.67	-1.58	-	-9.45	-9.22
			High	1.95	-1.11	-5.13	-	-
	2437	6	Low	0.60	-2.17	-4.99	-	-
			Mid	1.28	-1.80	-	-7.86	-7.35
			High	1.41	-1.55	-4.31	-	-
	2462	11	Low	-0.14	-1.07	-4.28	-	-
			Mid	-0.12	-1.33	-	-9.26	-9.40
			High	-0.76	-1.60	-4.70	-	-
	2467	12	Low	-4.76	-7.88	-10.63	-	-
			Mid	-4.98	-7.85	-	-13.96	-13.60
			High	-4.46	-7.59	-10.70	-	-
	2472	13	Low	-7.82	-10.89	-13.67	-	-
			Mid	-7.46	-10.87	-	-16.30	-16.66
			High	-8.14	-10.46	-13.34	-	-

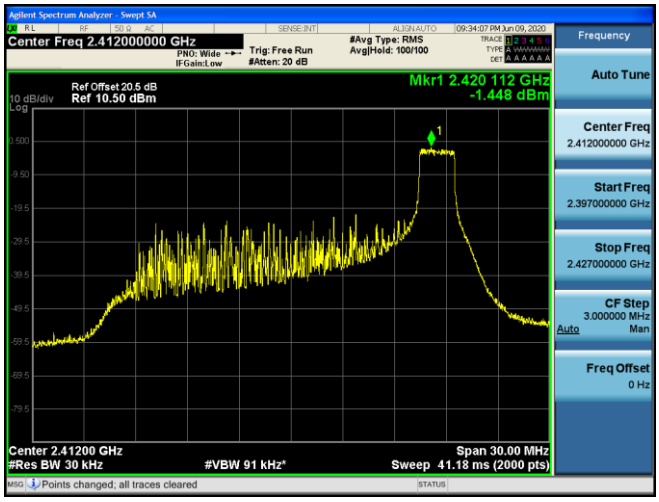
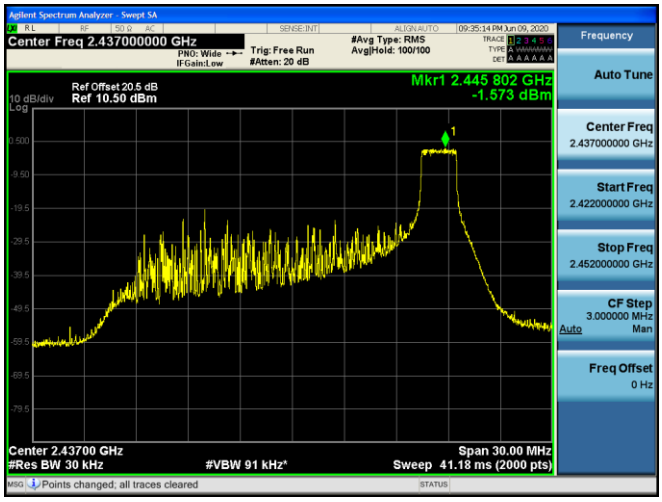
Limit : 8dBm

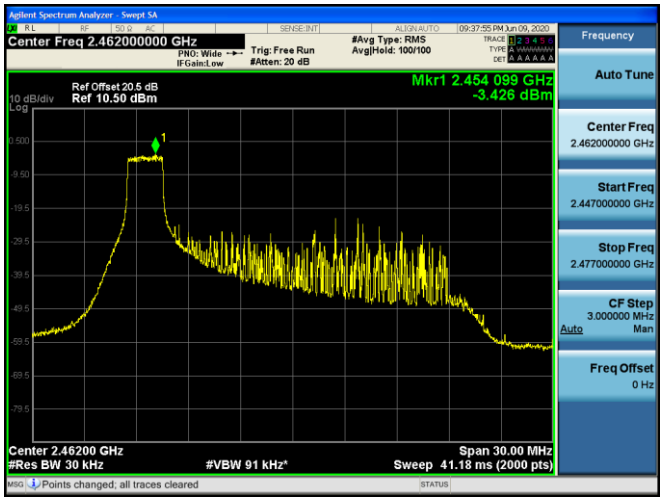
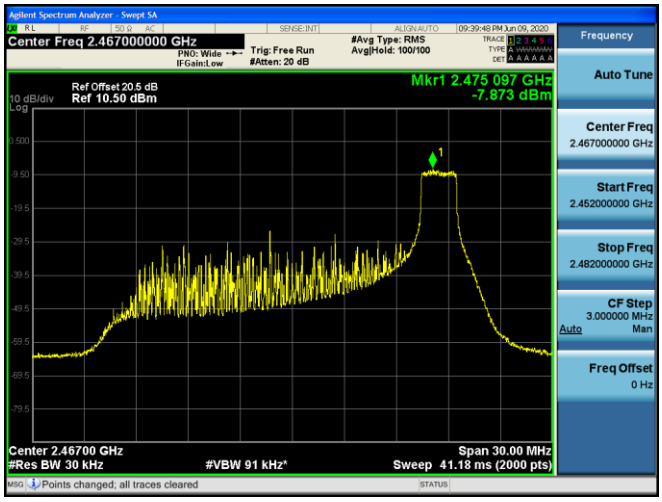
▣ Test Plots

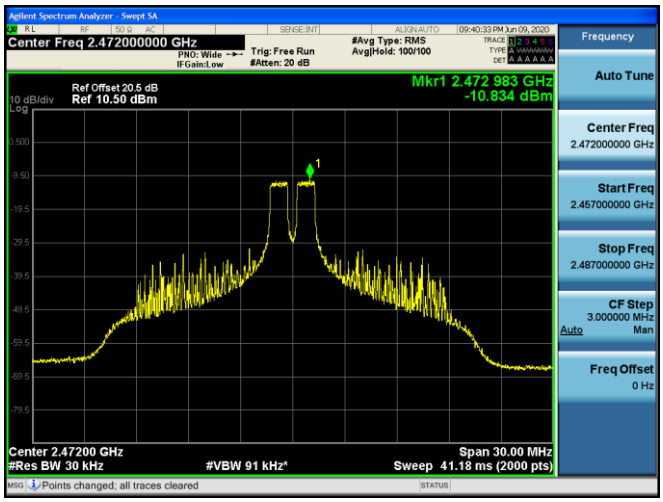
Note:

1. In order to simplify the report, attached plots were only the worstcase PSD channel.
2. Total PSD(dBm) = Reading Value + Duty Cycle Factor

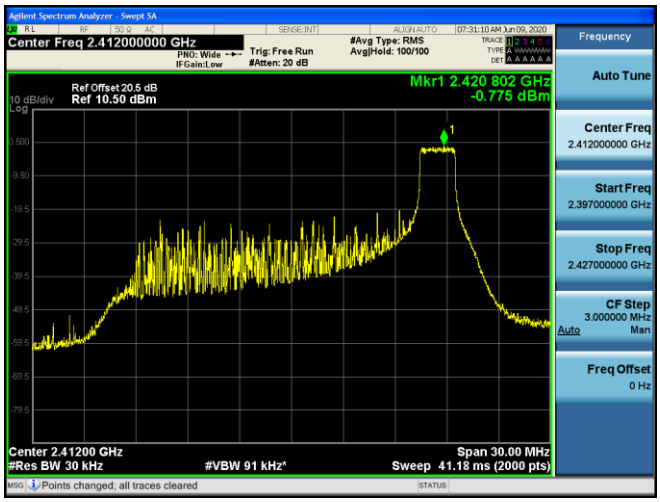
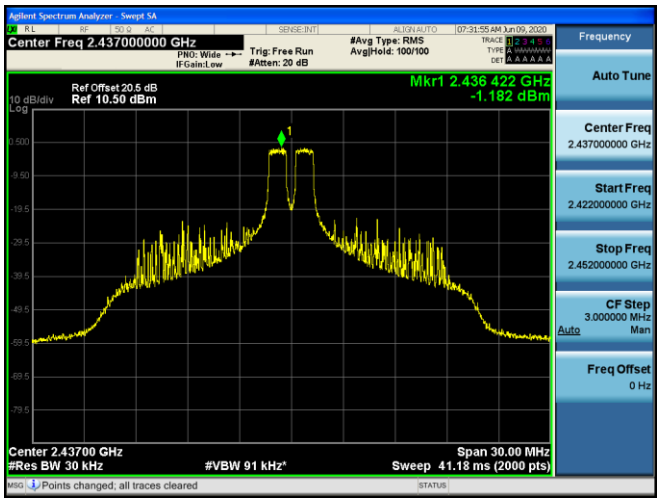
[ANT1]

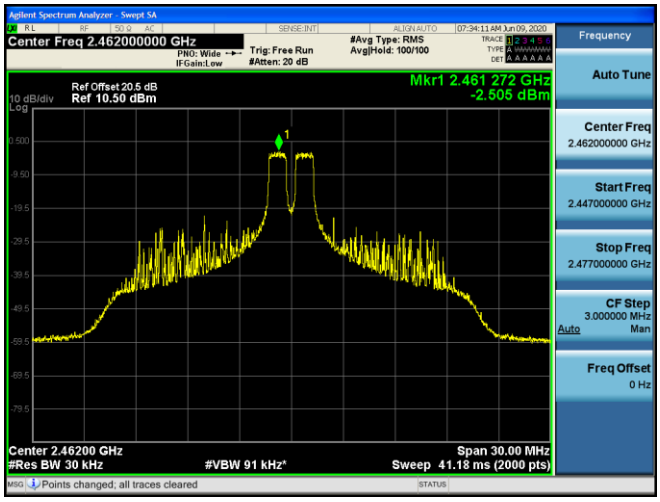
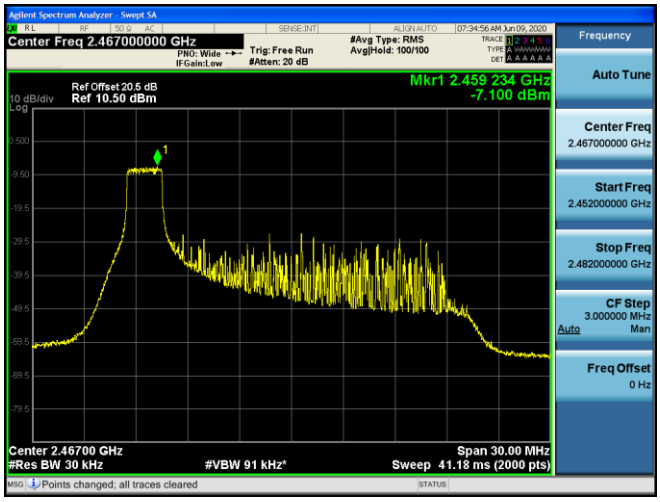
BW20M Ch.1(2412MHz) RU 8			BW20M Ch.6(2437MHz) RU 8		
					
Reading Value (dBm)	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**	**Reading Value (dBm)**	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**
-1.448	0.04	-1.41	-1.573	0.04	-1.53

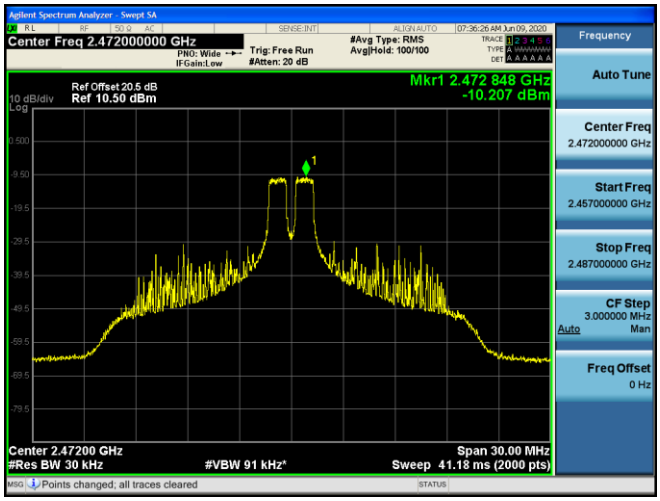
BW20M Ch.11(2462MHz) RU 0			BW20M Ch.12(2467MHz) RU 8		
					
Reading Value (dBm)	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**	**Reading Value (dBm)**	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**
-3.426	0.04	-3.39	-7.873	0.04	-7.83

BW20M Ch.13(2472MHz) RU 4		
		
Reading Value (dBm)	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**
-10.834	0.04	-10.79

[ANT2]

BW20M Ch.1(2412MHz) RU 8			BW20M Ch.6(2437MHz) RU 4		
					
Reading Value (dBm)	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**	**Reading Value (dBm)**	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**
-0.775	0.04	-0.74	-1.182	0.04	-1.14

BW20M Ch.11(2462MHz) RU 4			BW20M Ch.12(2467MHz) RU 0		
					
Reading Value (dBm)	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**	**Reading Value (dBm)**	**Duty Cycle Factor (dB)**	**Total PSD (dBm)**
-2.505	0.04	-2.47	-7.100	0.04	-7.06

BW20M Ch.13(2472MHz) RU 4


Reading Value (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)
-10.207	0.04	-10.17

9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Band Edge

[ANT1]

BW	Frequency [MHz]	Channel No.	RU Index	Measured Position	Result (dB)		
					26 T	52 T	106 T
HE20	2412	1	Low	Lowest Bandedge	35.136	35.239	34.569
	2462	11	High	Highest Bandedge	55.591	53.699	52.467
	2467	12	High	Highest Bandedge	49.188	45.784	44.841
	2472	13	High	Highest Bandedge	40.250	36.823	34.020

Limit : 30 dB

BW	Frequency [MHz]	Channel No.	RU Index	Measured Position	Result (dB)	
					242 T	SU
HE20	2412	1	Mid	Lowest Bandedge	35.732	36.505
	2462	11		Highest Bandedge	44.276	40.838
	2467	12		Highest Bandedge	39.338	41.935
	2472	13		Highest Bandedge	42.570	40.597

Limit : 30 dB

[ANT2]

BW	Frequency [MHz]	Channel No.	RU Index	Measured Position	Result (dB)		
					26 T	52 T	106 T
HE20	2412	1	Low	Lowest Bandedge	38.190	33.916	35.839
	2462	11	High	Highest Bandedge	46.868	45.552	44.865
	2467	12	High	Highest Bandedge	43.212	42.338	39.913
	2472	13	High	Highest Bandedge	40.167	35.282	35.367

Limit : 30 dB

BW	Frequency [MHz]	Channel No.	RU Index	Measured Position	Result (dB)	
					242 T	SU
HE20	2412	1	Mid	Lowest Bandedge	36.290	34.468
	2462	11		Highest Bandedge	36.803	37.393
	2467	12		Highest Bandedge	37.560	36.052
	2472	13		Highest Bandedge	37.481	36.031

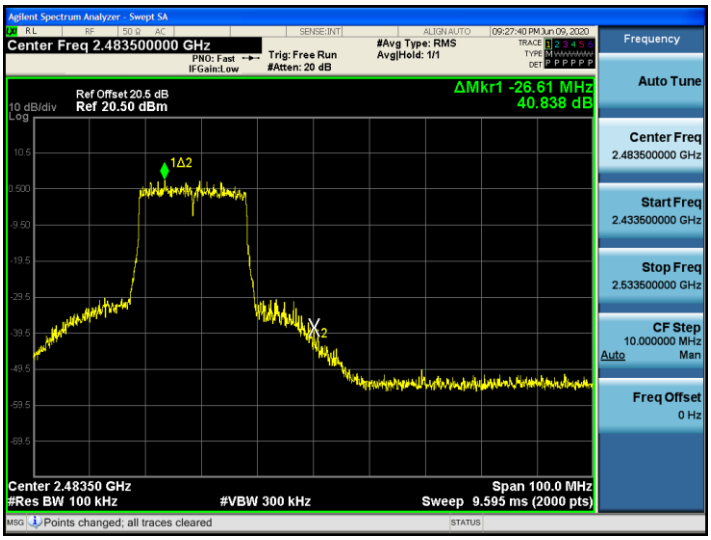
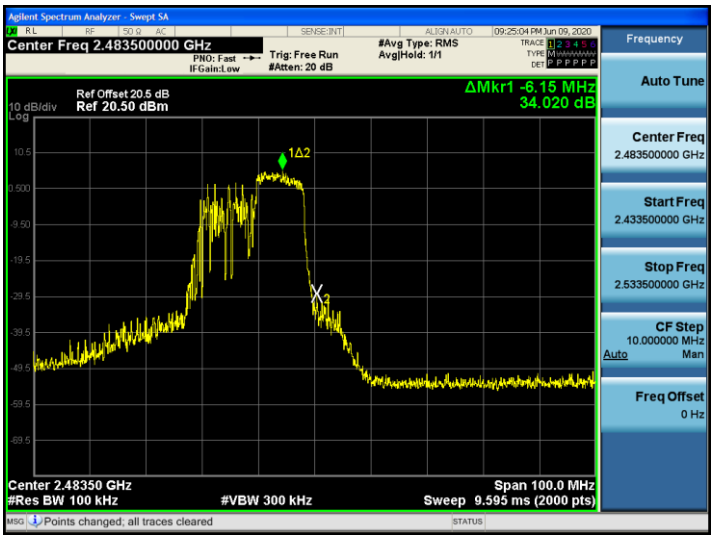
Limit : 30 dB

▣ Test Plots

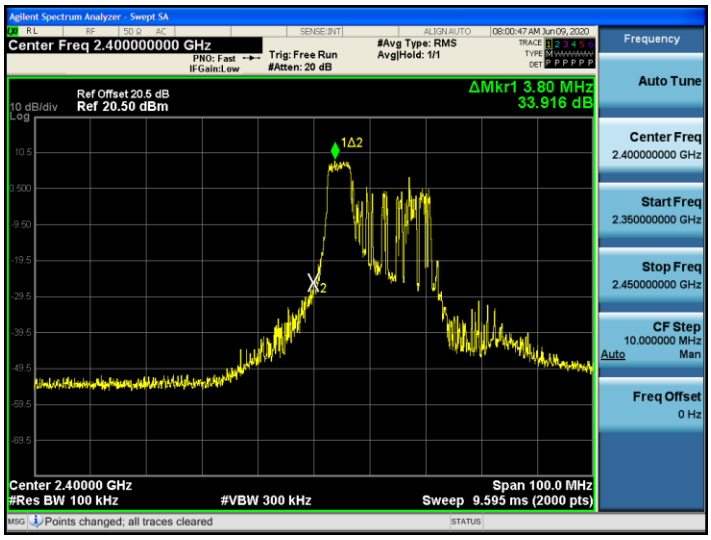
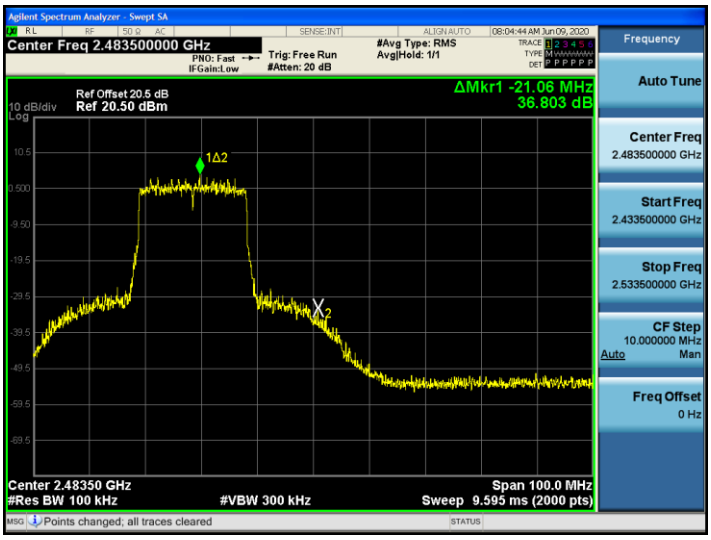
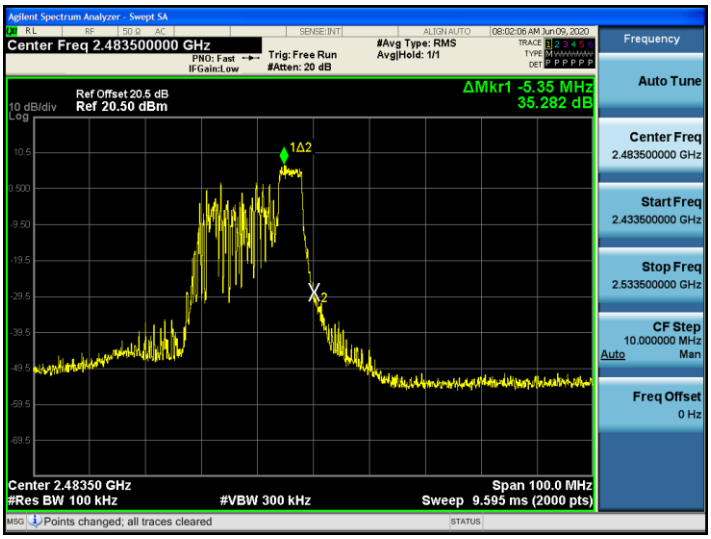
Note:

In order to simplify the report, attached plots were only the worst case.

[ANT1]

BW20M Ch.1(2412MHz) RU 53	BW20M Ch.11(2462MHz) SU
	
BW20M Ch.12(2467MHz) RU 61	**BW20M Ch.13(2472MHz) RU 54**
	

[ANT2]

BW20M Ch.1(2412MHz) RU 37	BW20M Ch.11(2462MHz) RU 61
	
BW20M Ch.12(2467MHz) SU	**BW20M Ch.13(2472MHz) RU 40**
	

Conducted Spurious Emissions

[ANT1]

BW	Frequency [MHz]	Channel No.	RU Index	Result (dB)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	46.717	46.735	41.596	-	-
			Mid	49.072	44.850	-	38.767	38.408
			High	48.627	46.045	41.706	-	-
	2437	6	Low	46.479	44.705	41.101	-	-
			Mid	48.084	44.316	-	40.032	38.404
			High	47.502	46.329	42.686	-	-
	2462	11	Low	46.548	44.783	42.957	-	-
			Mid	45.277	44.683	-	37.846	37.007
			High	45.628	44.643	41.955	-	-
	2467	12	Low	40.775	38.790	34.589	-	-
			Mid	41.399	39.465	-	32.918	33.653
			High	40.962	39.021	35.271	-	-
	2472	13	Low	40.587	35.403	32.675	-	-
			Mid	38.039	36.105	-	31.328	30.529
			High	37.024	35.982	34.027	-	-

Limit : 30 dBc

[ANT2]

BW	Frequency [MHz]	Channel No.	RU Index	Result (dB)				
				26 T	52 T	106 T	242 T	SU
HE20	2412	1	Low	46.767	44.585	41.309	-	-
			Mid	47.744	45.428	-	36.640	37.330
			High	49.343	45.486	42.146	-	-
	2437	6	Low	46.692	44.851	41.580	-	-
			Mid	48.627	45.367	-	40.420	40.579
			High	47.637	45.273	42.682	-	-
	2462	11	Low	46.589	46.919	42.272	-	-
			Mid	46.133	45.416	-	39.198	40.161
			High	45.956	45.725	42.747	-	-
	2467	12	Low	40.614	39.530	36.898	-	-
			Mid	42.646	39.614	-	33.638	34.439
			High	41.817	39.667	36.423	-	-
	2472	13	Low	38.902	34.323	32.766	-	-
			Mid	39.016	35.530	-	32.435	31.528
			High	39.872	35.295	34.301	-	-

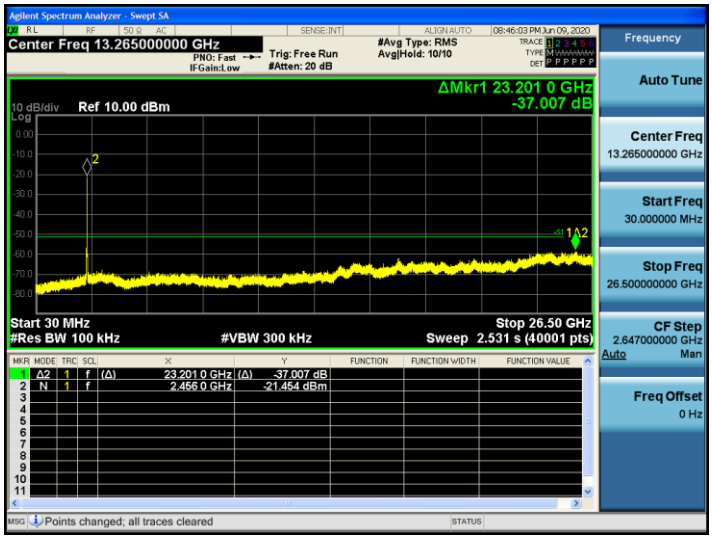
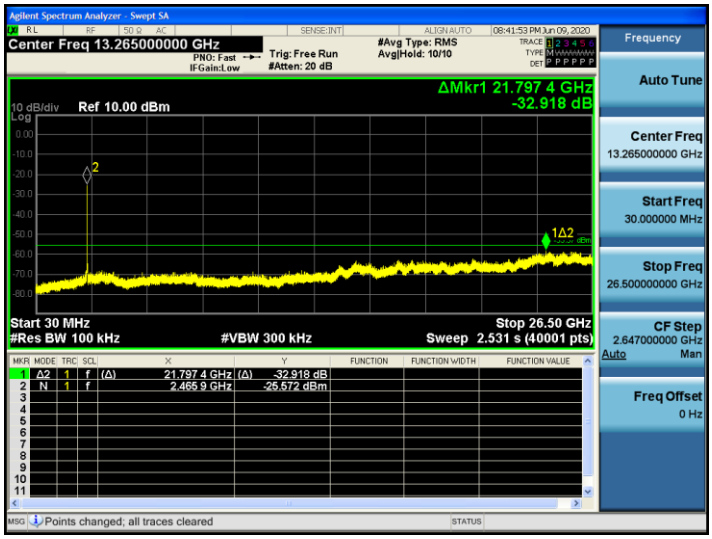
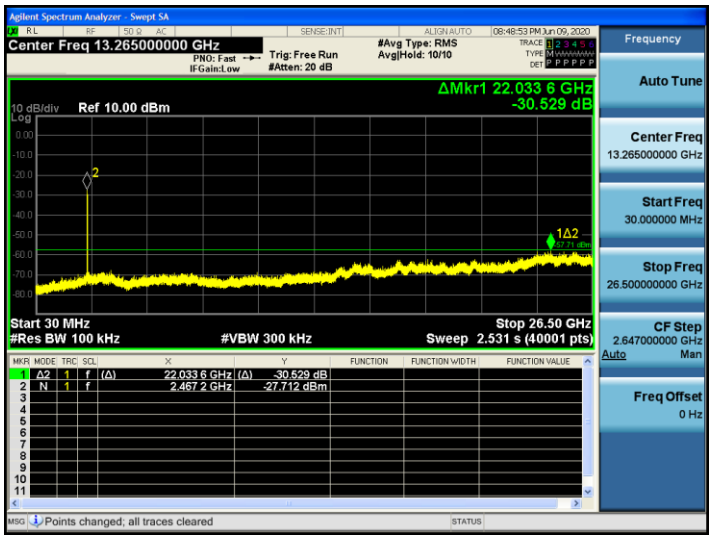
Limit : 30 dBc

▣ Test Plots

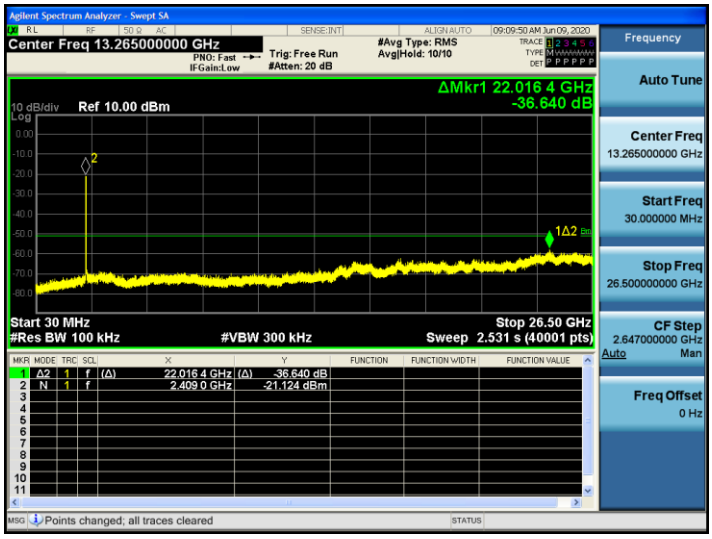
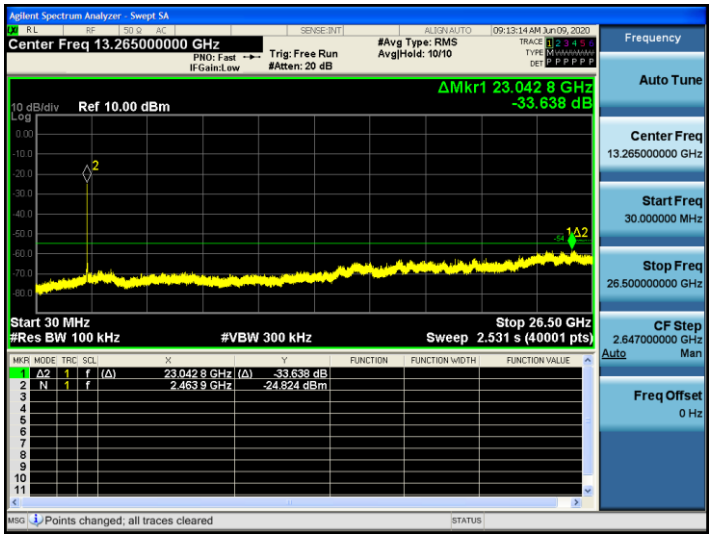
Note:

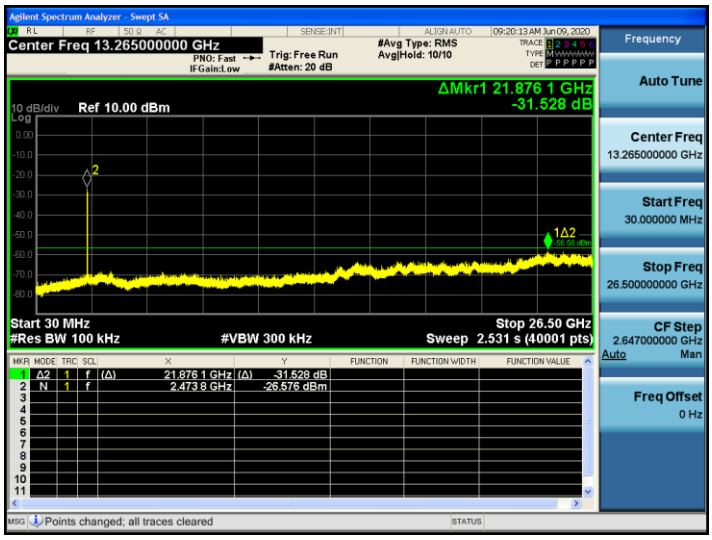
In order to simplify the report, attached plots were only the worst case.

[ANT1]

BW20M Ch.11(2462MHz) SU	BW20M Ch.12(2467MHz) RU 61
	
BW20M Ch.13(2472MHz) SU	
	

[ANT2]

BW20M Ch.1(2412MHz) RU 61	BW20M Ch.12(2467MHz) RU 61
	

BW20M Ch.13(2472MHz) SU


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 = 40log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor

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

1. 26 Tone

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	45.28	0.00	1.76	V	47.04	73.98	26.94	PK
4824	33.10	0.00	1.76	V	34.86	53.98	19.12	AV
7236	43.09	0.00	12.28	V	55.37	73.98	18.61	PK
7236	30.08	0.00	12.28	V	42.36	53.98	11.62	AV
4824	47.42	0.00	1.76	H	49.18	73.98	24.80	PK
4824	35.52	0.00	1.76	H	37.28	53.98	16.70	AV
7236	43.42	0.00	12.28	H	55.70	73.98	18.28	PK
7236	30.23	0.00	12.28	H	42.51	53.98	11.47	AV

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	43.74	0.00	1.96	V	45.70	73.98	28.28	PK
4874	33.11	0.00	1.96	V	35.07	53.98	18.91	AV
7311	42.85	0.00	11.45	V	54.30	73.98	19.68	PK
7311	28.07	0.00	11.45	V	39.52	53.98	14.46	AV
4874	44.70	0.00	1.96	H	46.66	73.98	27.32	PK
4874	33.48	0.00	1.96	H	35.44	53.98	18.54	AV
7311	43.35	0.00	11.45	H	54.80	73.98	19.18	PK
7311	28.25	0.00	11.45	H	39.70	53.98	14.28	AV

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	45.23	0.00	2.83	V	48.06	73.98	25.92	PK
4924	32.35	0.00	2.83	V	35.18	53.98	18.80	AV
7386	40.06	0.00	11.87	V	51.93	73.98	22.05	PK
7386	28.44	0.00	11.87	V	40.31	53.98	13.67	AV
4924	46.01	0.00	2.83	H	48.84	73.98	25.14	PK
4924	32.55	0.00	2.83	H	35.38	53.98	18.60	AV
7386	40.73	0.00	11.87	H	52.60	73.98	21.38	PK
7386	28.50	0.00	11.87	H	40.37	53.98	13.61	AV

Note:

Channel 12 and 13 are less powerful than channel 11 so the test for high channel was performed at channel 11.

2. 52 Tone

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	45.28	0.00	1.76	V	47.04	73.98	26.94	PK
4824	35.16	0.00	1.76	V	36.92	53.98	17.06	AV
7236	42.75	0.00	12.28	V	55.03	73.98	18.95	PK
7236	29.77	0.00	12.28	V	42.05	53.98	11.93	AV
4824	46.48	0.00	1.76	H	48.24	73.98	25.74	PK
4824	35.30	0.00	1.76	H	37.06	53.98	16.92	AV
7236	43.11	0.00	12.28	H	55.39	73.98	18.59	PK
7236	29.84	0.00	12.28	H	42.12	53.98	11.86	AV

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	43.15	0.00	1.96	V	45.11	73.98	28.87	PK
4874	32.05	0.00	1.96	V	34.01	53.98	19.97	AV
7311	41.86	0.00	11.45	V	53.31	73.98	20.67	PK
7311	29.09	0.00	11.45	V	40.54	53.98	13.44	AV
4874	43.88	0.00	1.96	H	45.84	73.98	28.14	PK
4874	32.37	0.00	1.96	H	34.33	53.98	19.65	AV
7311	43.04	0.00	11.45	H	54.49	73.98	19.49	PK
7311	29.29	0.00	11.45	H	40.74	53.98	13.24	AV

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	43.79	0.00	2.83	V	46.62	73.98	27.36	PK
4924	32.65	0.00	2.83	V	35.48	53.98	18.50	AV
7386	40.50	0.00	11.87	V	52.37	73.98	21.61	PK
7386	28.56	0.00	11.87	V	40.43	53.98	13.55	AV
4924	44.26	0.00	2.83	H	47.09	73.98	26.89	PK
4924	32.89	0.00	2.83	H	35.72	53.98	18.26	AV
7386	40.93	0.00	11.87	H	52.80	73.98	21.18	PK
7386	28.74	0.00	11.87	H	40.61	53.98	13.37	AV

Note:

Channel 12 and 13 are less powerful than channel 11 so the test for high channel was performed at channel 11.

3. DBS Mode

Test case1

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	42.55	1.96	V	44.51	73.98	29.47	PK
4874	31.02	1.96	V	32.98	53.98	21.00	AV
7311	39.74	11.45	V	51.19	73.98	22.79	PK
7311	27.56	11.45	V	39.01	53.98	14.97	AV
4874	42.61	1.96	H	44.57	73.98	29.41	PK
4874	31.30	1.96	H	33.26	53.98	20.72	AV
7311	40.22	11.45	H	51.67	73.98	22.31	PK
7311	28.05	11.45	H	39.50	53.98	14.48	AV

Test case2

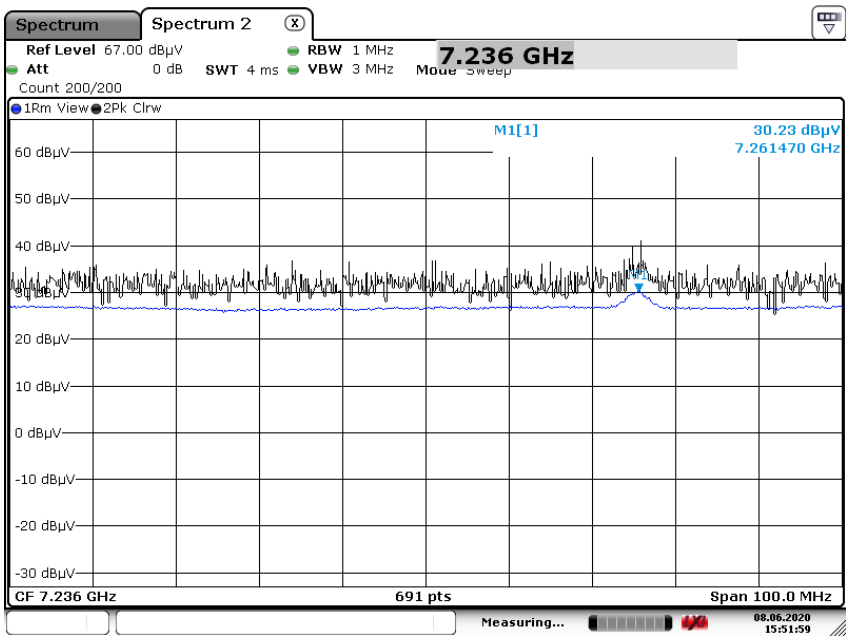
Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	42.42	1.76	V	44.18	73.98	29.80	PK
4824	31.10	1.76	V	32.86	53.98	21.12	AV
7236	38.69	12.28	V	50.97	73.98	23.01	PK
7236	27.34	12.28	V	39.62	53.98	14.36	AV
4824	41.84	1.76	H	43.60	73.98	30.38	PK
4824	27.84	1.76	H	29.60	53.98	24.38	AV
7236	38.08	12.28	H	50.36	73.98	23.62	PK
7236	27.12	12.28	H	39.40	53.98	14.58	AV

Test case3

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	49.20	1.76	V	50.96	73.98	23.02	PK
4824	37.44	1.76	V	39.20	53.98	14.78	AV
7236	43.65	12.28	V	55.93	73.98	18.05	PK
7236	29.09	12.28	V	41.37	53.98	12.61	AV
4824	50.70	1.76	H	52.46	73.98	21.52	PK
4824	37.62	1.76	H	39.38	53.98	14.60	AV
7236	44.97	12.28	H	57.25	73.98	16.73	PK
7236	29.55	12.28	H	41.83	53.98	12.15	AV

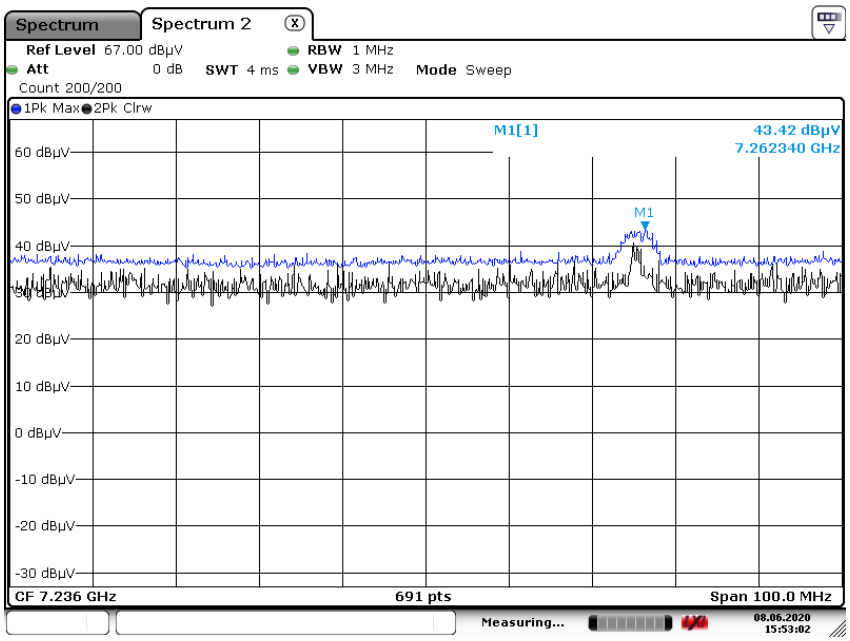
▣ Test Plots (26Tone) - Y-H

Radiated Spurious Emissions plot – Average Reading (802.11ax(HE20), Ch.1 3rd Harmonic, 26 Tone)



Date: 8.JUN.2020 15:51:58

Radiated Spurious Emissions plot – Peak Reading (802.11ax(HE20), Ch.1 3rd Harmonic, 26 Tone)



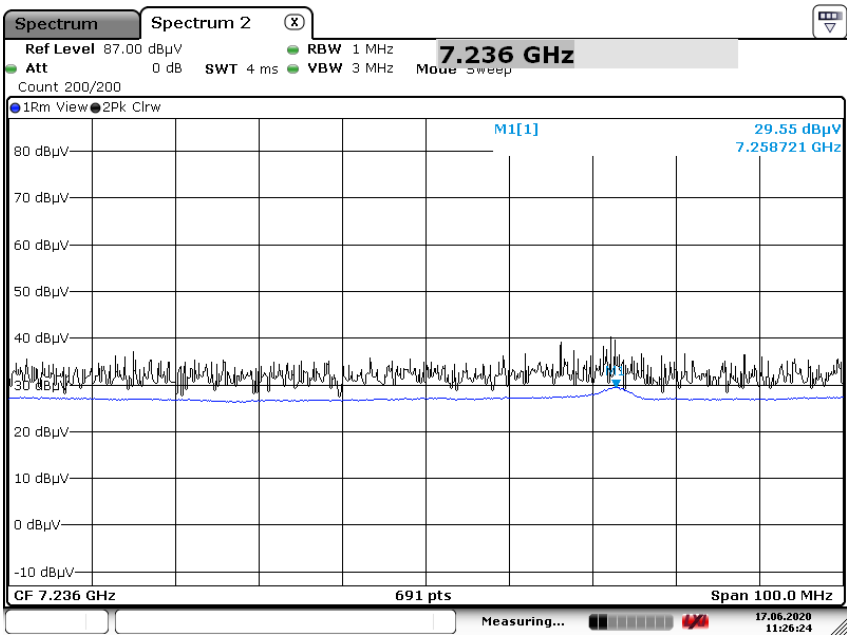
Date: 8.JUN.2020 15:53:02

Note:

Plot of worst case are only reported.

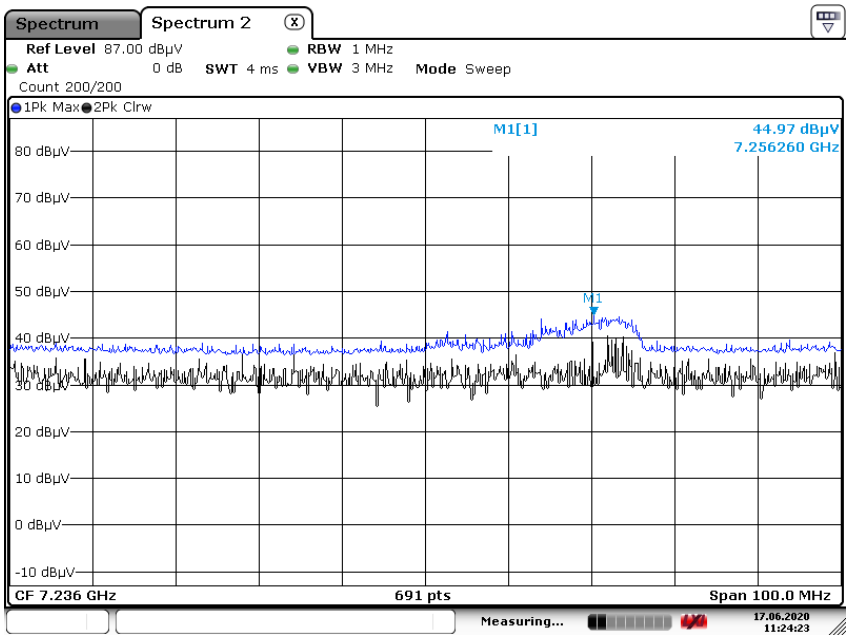
▣ Test Plots (DBS_ Test case3) - Y-H

Average Reading MIMO (802.11ax(HE20) ch. 1) & MIMO (802.11ax(HE40) ch.159)_3rd



Date: 17.JUN.2020 11:26:24

Peak Reading MIMO (802.11ax(HE20) ch. 1) & MIMO (802.11ax(HE40) ch.159)_3rd



Date: 17.JUN.2020 11:24:23

Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

1. 26 Tone

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	35.939	0.00	34.77	H	70.71	73.98	3.27	PK
2390.0	15.205	0.00	34.77	H	49.98	53.98	4.01	AV
2390.0	34.519	0.00	34.77	V	69.29	73.98	4.69	PK
2390.0	14.914	0.00	34.77	V	49.68	53.98	4.30	AV
# 2483.5~2484.5	29.860	0.00	34.25	H	64.11	73.98	9.87	PK
# 2484.5~2485.5	28.540	0.00	34.25	H	62.79	73.98	11.19	PK
2485.5	34.851	0.00	34.25	H	69.10	73.98	4.88	PK
2483.5	15.300	0.00	34.25	H	49.55	53.98	4.43	AV
# 2483.5~2484.5	29.140	0.00	34.25	V	63.39	73.98	10.59	PK
# 2484.5~2485.5	28.020	0.00	34.25	V	62.27	73.98	11.71	PK
2485.5	33.611	0.00	34.25	V	67.86	73.98	6.12	PK
2483.5	14.776	0.00	34.25	V	49.03	53.98	4.95	AV

Note : “#” integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode:	802.11ax(HE20)
Transfer Rate:	0
Operating Frequency	2457 MHz
Channel No.	10 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
# 2483.5~2484.5	29.590	0.00	34.25	H	63.84	73.98	10.14	PK
# 2484.5~2485.5	27.640	0.00	34.25	H	61.89	73.98	12.09	PK
2485.5	34.807	0.00	34.25	H	69.06	73.98	4.92	PK
2483.5	14.173	0.00	34.25	H	48.42	53.98	5.56	AV

Note : “#” integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2467 MHz
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	36.573	0.00	34.25	H	70.82	73.98	3.16	PK
2483.5	13.039	0.00	34.25	H	47.29	53.98	6.69	AV
2483.5	35.341	0.00	34.25	V	69.59	73.98	4.39	PK
2483.5	12.890	0.00	34.25	V	47.14	53.98	6.84	AV

Operation Mode:	802.11ax(HE20)
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 -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
# 2483.5~2484.5	29.870	0.00	34.25	H	64.12	73.98	9.86	PK
# 2483.5~2484.5	15.520	0.00	34.25	H	49.77	53.98	4.21	AV
2484.5	31.278	0.00	34.25	H	65.53	73.98	8.45	PK
2484.5	13.464	0.00	34.25	H	47.71	53.98	6.27	AV
# 2483.5~2484.5	28.891	0.00	34.25	V	63.14	73.98	10.84	PK
# 2483.5~2484.5	15.119	0.00	34.25	V	49.37	53.98	4.61	AV
2484.5	30.597	0.00	34.25	V	64.85	73.98	9.13	PK
2484.5	13.051	0.00	34.25	V	47.30	53.98	6.68	AV

Note :"#": integration method Used (ANSI C63.10 Section11.13.3)

2. 52 Tone

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	35.945	0.00	34.77	H	70.72	73.98	3.27	PK
2390.0	15.830	0.00	34.77	H	50.60	53.98	3.38	AV
2390.0	35.310	0.00	34.77	V	70.08	73.98	3.90	PK
2390.0	15.700	0.00	34.77	V	50.47	53.98	3.51	AV
# 2483.5~2484.5	33.220	0.00	34.25	H	67.47	73.98	6.51	PK
# 2484.5~2485.5	30.010	0.00	34.25	H	64.26	73.98	9.72	PK
2485.5	34.191	0.00	34.25	H	68.44	73.98	5.54	PK
2483.5	14.943	0.00	34.25	H	49.19	53.98	4.79	AV
# 2483.5~2484.5	32.466	0.00	34.25	V	66.72	73.98	7.26	PK
# 2484.5~2485.5	28.672	0.00	34.25	V	62.92	73.98	11.06	PK
2485.5	33.651	0.00	34.25	V	67.90	73.98	6.08	PK
2483.5	14.341	0.00	34.25	V	48.59	53.98	5.39	AV

Note :"#": integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode:	802.11ax(HE20)
Transfer Rate:	0
Operating Frequency	2457 MHz
Channel No.	10 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	36.943	0.00	34.25	H	71.19	73.98	2.79	PK
2483.5	13.160	0.00	34.25	H	47.41	53.98	6.57	AV
2483.5	36.332	0.00	34.25	V	70.58	73.98	3.40	PK
2483.5	12.849	0.00	34.25	V	47.10	53.98	6.88	AV

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2467 MHz
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	33.088	0.00	34.25	H	67.34	73.98	6.64	PK
2483.5	12.197	0.00	34.25	H	46.45	53.98	7.53	AV
2483.5	32.651	0.00	34.25	V	66.90	73.98	7.08	PK
2483.5	11.984	0.00	34.25	V	46.23	53.98	7.75	AV

Operation Mode:	802.11ax(HE20)
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 -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
# 2483.5~2484.5	27.300	0.00	34.25	H	61.55	73.98	12.43	PK
# 2483.5~2484.5	14.550	0.00	34.25	H	48.80	53.98	5.18	AV
2484.5	29.761	0.00	34.25	H	64.01	73.98	9.97	PK
2484.5	13.202	0.00	34.25	H	47.45	53.98	6.53	AV
# 2483.5~2484.5	26.460	0.00	34.25	V	60.71	73.98	13.27	PK
# 2483.5~2484.5	14.310	0.00	34.25	V	48.56	53.98	5.42	AV
2484.5	29.120	0.00	34.25	V	63.37	73.98	10.61	PK
2484.5	12.894	0.00	34.25	V	47.14	53.98	6.84	AV

Note :

"#": integration method Used (ANSI C63.10 Section11.13.3)

3. 106 Tone

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	32.446	0.00	34.77	H	67.22	73.98	6.76	PK
2390.0	15.562	0.17	34.77	H	50.50	53.98	3.48	AV
2390.0	31.886	0.00	34.77	V	66.66	73.98	7.32	PK
2390.0	15.294	0.17	34.77	V	50.23	53.98	3.75	AV
# 2483.5~2484.5	31.850	0.00	34.25	H	66.10	73.98	7.88	PK
# 2483.5~2484.5	16.030	0.17	34.25	H	50.45	53.98	3.53	AV
# 2484.5~2485.5	30.070	0.00	34.25	H	64.32	73.98	9.66	PK
# 2484.5~2485.5	14.800	0.17	34.25	H	49.22	53.98	4.76	AV
2485.5	33.582	0.00	34.25	H	67.83	73.98	6.15	PK
2485.5	14.437	0.17	34.25	H	48.86	53.98	5.12	AV
# 2483.5~2484.5	30.446	0.00	34.25	V	64.70	73.98	9.28	PK
# 2483.5~2484.5	15.750	0.17	34.25	V	50.17	53.98	3.81	AV
# 2484.5~2485.5	29.314	0.00	34.25	V	63.56	73.98	10.42	PK
# 2484.5~2485.5	14.338	0.17	34.25	V	48.76	53.98	5.22	AV
2485.5	32.490	0.00	34.25	V	66.74	73.98	7.24	PK
2485.5	14.059	0.17	34.25	V	48.48	53.98	5.50	AV

Note :"#": integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode:	802.11ax(HE20)
Transfer Rate:	0
Operating Frequency	2417 MHz, 2457 MHz
Channel No.	02 Ch, 10 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	33.147	0.00	34.77	H	67.92	73.98	6.06	PK
2390.0	14.000	0.17	34.77	H	48.94	53.98	5.04	AV
2390.0	32.846	0.00	34.77	V	67.62	73.98	6.36	PK
2390.0	13.846	0.17	34.77	V	48.79	53.98	5.19	AV
2483.5	34.658	0.00	34.25	H	68.91	73.98	5.07	PK
2483.5	13.481	0.17	34.25	H	47.90	53.98	6.08	AV
2483.5	34.118	0.00	34.25	V	68.37	73.98	5.61	PK
2483.5	13.052	0.17	34.25	V	47.47	53.98	6.51	AV

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2467 MHz
Channel No.	12 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	34.485	0.00	34.25	H	68.74	73.98	5.25	PK
2483.5	12.557	0.17	34.25	H	46.98	53.98	7.00	AV
2483.5	33.189	0.00	34.25	V	67.44	73.98	6.54	PK
2483.5	12.340	0.17	34.25	V	46.76	53.98	7.22	AV

Operation Mode:	802.11ax(HE20)
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 -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
# 2483.5~2484.5	25.500	0.00	34.25	H	59.75	73.98	14.23	PK
# 2483.5~2484.5	13.000	0.17	34.25	H	47.42	53.98	6.56	AV
2484.5	28.956	0.00	34.25	H	63.21	73.98	10.77	PK
2484.5	12.120	0.17	34.25	H	46.54	53.98	7.44	AV
# 2483.5~2484.5	25.120	0.00	34.25	V	59.37	73.98	14.61	PK
# 2483.5~2484.5	12.840	0.17	34.25	V	47.26	53.98	6.72	AV
2484.5	28.654	0.00	34.25	V	62.90	73.98	11.08	PK
2484.5	11.894	0.17	34.25	V	46.31	53.98	7.67	AV

Note :

"#": integration method Used (ANSI C63.10 Section11.13.3)

4. 242 Tone

Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	32.997	0.00	34.77	H	67.77	73.98	6.21	PK
# 2389 ~ 2390	16.820	0.36	34.77	H	51.95	53.98	2.03	AV
2389.0	16.144	0.36	34.77	H	51.27	53.98	2.71	AV
2390.0	32.341	0.00	34.77	V	67.11	73.98	6.87	PK
# 2389 ~ 2390	16.514	0.36	34.77	V	51.64	53.98	2.34	AV
2389.0	15.500	0.36	34.77	V	50.63	53.98	3.35	AV
# 2483.5~2484.5	30.430	0.00	34.25	H	64.68	73.98	9.30	PK
# 2483.5~2484.5	16.610	0.36	34.25	H	51.22	53.98	2.76	AV
# 2484.5~2485.5	29.410	0.00	34.25	H	63.66	73.98	10.32	PK
# 2484.5~2485.5	15.300	0.36	34.25	H	49.91	53.98	4.07	AV
2485.5	35.293	0.00	34.25	H	69.54	73.98	4.44	PK
2485.5	14.939	0.36	34.25	H	49.55	53.98	4.43	AV
# 2483.5~2484.5	28.870	0.00	34.25	V	63.12	73.98	10.86	PK
# 2483.5~2484.5	16.310	0.36	34.25	V	50.92	53.98	3.06	AV
# 2484.5~2485.5	28.561	0.00	34.25	V	62.81	73.98	11.17	PK
# 2484.5~2485.5	14.892	0.36	34.25	V	49.50	53.98	4.48	AV
2485.5	34.590	0.00	34.25	V	68.84	73.98	5.14	PK
2485.5	14.551	0.36	34.25	V	49.16	53.98	4.82	AV

Note : “#” integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode:	802.11ax(HE20)
Transfer Rate:	0
Operating Frequency	2417 MHz, 2457 MHz
Channel No.	02 Ch, 10 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	35.439	0.00	34.77	H	70.21	73.98	3.77	PK
# 2389~2390	15.800	0.36	34.77	H	50.93	53.98	3.05	AV
2389.0	14.859	0.36	34.77	H	49.99	53.98	3.99	AV
2390.0	34.774	0.00	34.77	V	69.54	73.98	4.44	PK
# 2389~2390	15.511	0.36	34.77	V	50.64	53.98	3.34	AV
2389.0	14.352	0.36	34.77	V	49.48	53.98	4.50	AV
2483.5	37.070	0.00	34.25	H	71.32	73.98	2.66	PK
2483.5	16.721	0.36	34.25	H	51.33	53.98	2.65	AV
2483.5	36.491	0.00	34.25	V	70.74	73.98	3.24	PK
2483.5	16.551	0.36	34.25	V	51.16	53.98	2.82	AV

Note : “#” integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode:	802.11ax(HE20)
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 -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	33.756	0.00	34.25	H	68.01	73.98	5.97	PK
2483.5	14.746	0.36	34.25	H	49.36	53.98	4.62	AV
2483.5	33.354	0.00	34.25	V	67.60	73.98	6.38	PK
2483.5	14.514	0.36	34.25	V	49.12	53.98	4.86	AV

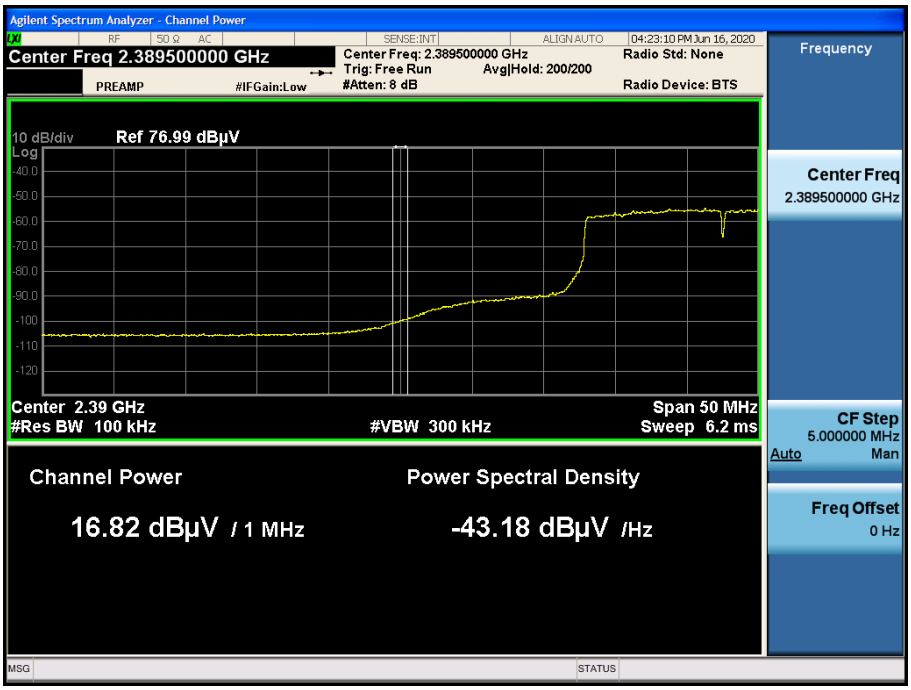
Operation Mode:	802.11ax(HE20)
Transfer MCS Index:	0
Operating Frequency	2472 MHz
Channel No.	13 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
# 2483.5~2484.5	24.550	0.00	34.25	H	58.80	73.98	15.18	PK
2483.5	25.226	0.00	34.25	H	59.48	73.98	14.50	PK
2483.5	16.065	0.36	34.25	H	50.68	53.98	3.31	AV
# 2483.5~2484.5	24.340	0.00	34.25	V	58.59	73.98	15.39	PK
2483.5	25.084	0.00	34.25	V	59.33	73.98	14.65	PK
2483.5	15.667	0.36	34.25	V	50.28	53.98	3.70	AV

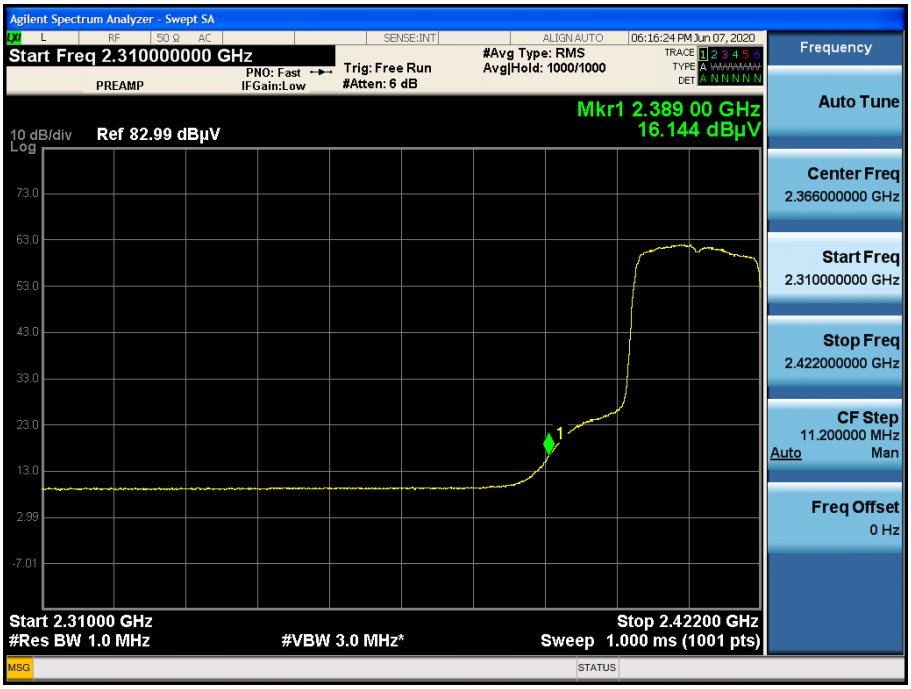
Note : “#” integration method Used (ANSI C63.10 Section11.13.3)

▣ Test Plots (242 Tone)

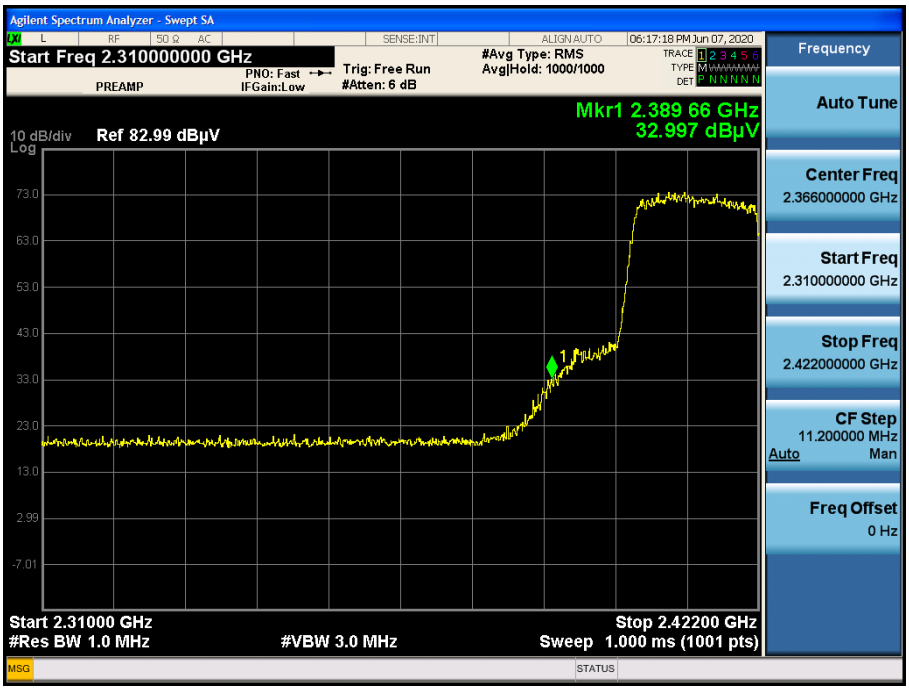
Radiated Restricted Band Edges plot – Average Reading (802.11ax(HE20) Ch.1)_X-H, RU 61
Integration method _ 2 389 MHz ~ 2 390 MHz



Radiated Restricted Band Edges plot – Average Reading (802.11ax(HE20) Ch.1) _X-H, RU 61
2 310 MHz ~ 2 389 MHz



Radiated Restricted Band Edges plot – Peak Reading (802.11ax(HE20) Ch.1) _X-H, RU 61
2 310 MHz ~ 2 390 MHz



Radiated Restricted Band Edges plot – Average Reading (802.11ax(HE20) Ch.11) _ X-H, RU 61

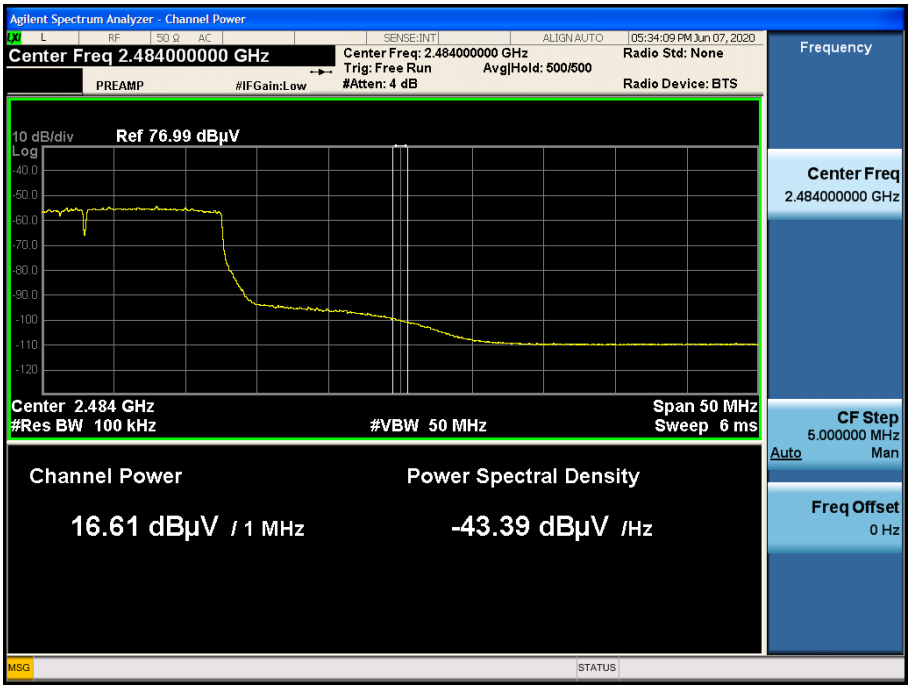
2485.5 MHz ~ 2 500.0 MHz

Radiated Restricted Band Edges plot – Peak Reading (802.11ax(HE20) Ch.11) _ X-H, RU 61

2 485.5 MHz ~ 2 500.0 MHz

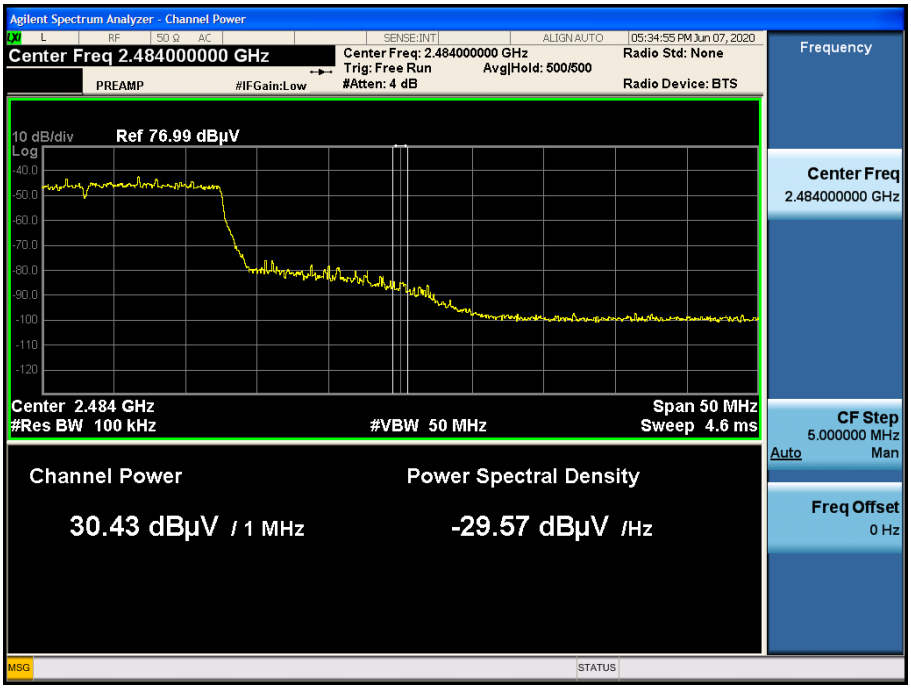
Radiated Restricted Band Edges plot – Average Reading (802.11ax(HE20) Ch.11)_ X-H, RU 61

Integration method _ 2 483.5 ~ 2 484.5 MHz



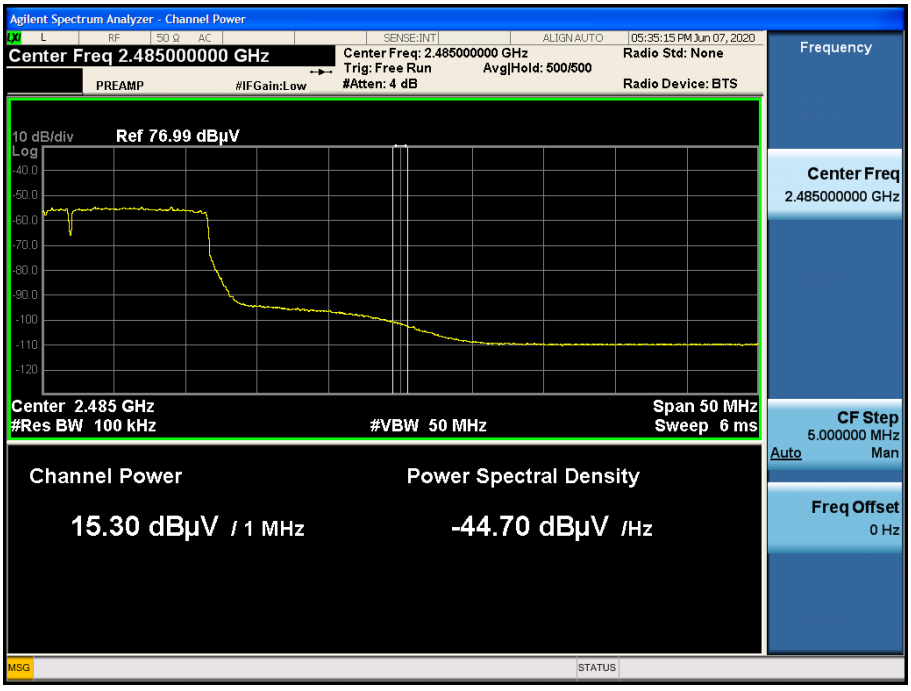
Radiated Restricted Band Edges plot – Peak Reading (802.11ax(HE20) Ch.11) _ X-H, RU 61

Integration method _ 2 483.5 ~ 2 484.5 MHz



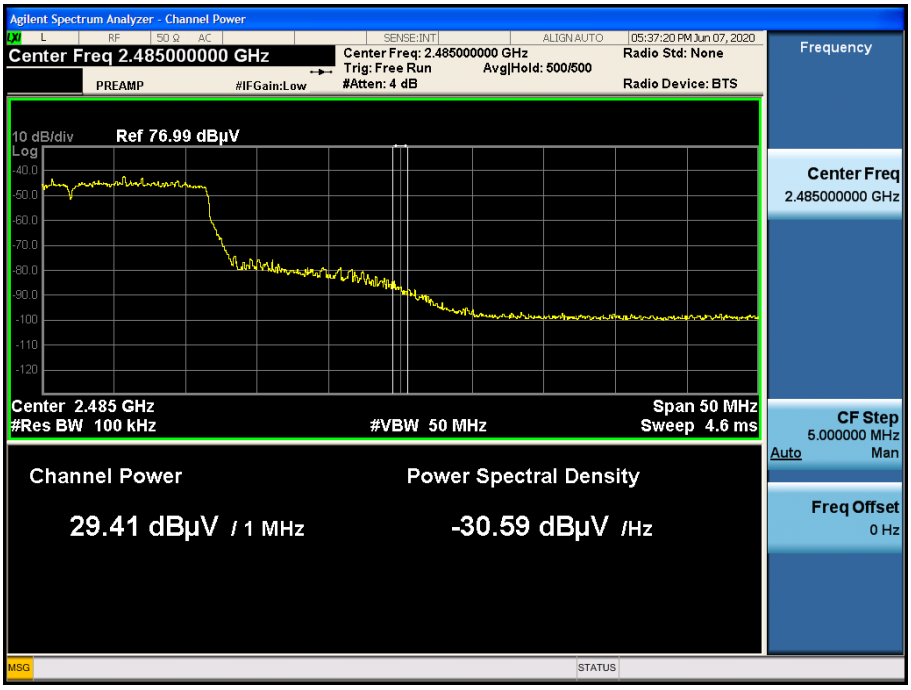
Radiated Restricted Band Edges plot – Average Reading (802.11ax(HE20) Ch.11) _ X-H, RU 61

Integration method _ 2 484.5 ~ 2 485.5 MHz



Radiated Restricted Band Edges plot – Peak Reading (802.11ax(HE20) Ch.11) _ X-H, RU 61

Integration method _ 2 484.5 ~ 2 485.5 MHz



Note:

Plot of worst case are only reported.

10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/11/2019	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/05/2020	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/18/2020	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/11/2020	Annual	MY51110085
Agilent	N9020A / Signal Analyzer	05/25/2020	Annual	MY52090906
Agilent	N9030A / Signal Analyzer	01/13/2020	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/24/2019	Annual	101231
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Keysight	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/11/2019	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/25/2020	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/12/2020	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/02/2019	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	04/26/2019	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	VULB 9160 / TRILOG Antenna	08/09/2018	Biennial	9160-3368
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	04/27/2020	Annual	100854
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/26/2019	Annual	101068-SZ
Agilent	N9020A / Signal Analyzer	05/11/2020	Annual	MY51110085
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	03/02/2020	Annual	8
Wainwright Instruments	WHKX8-6090-7000-18000-40SS/ High Pass Filter	03/02/2020	Annual	25
Api tech.	18B-03 / Attenuator (3 dB)	03/02/2020	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	03/02/2020	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	03/02/2020	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	03/02/2020	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/26/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	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.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

11. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2006-FC082-P