TEST REPORT

FCC DTS ax Test for SM-X528U
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2502-FC031

DATE OF ISSUE
February 13, 2025

Tested by
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Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Product Name Model Name	Tablet SM-X528U
FCC ID	A3LSMX528U
Date of Test	December 23, 2024 ~ February 13, 2025
FCC Classification	Digital Transmission System(DTS)
Test Standard Used	FCC Rule Part(s): Part 15.247
Test Results	PASS
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	February 13, 2025	Initial Release

Notice

Content
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. The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. When confirmation of authenticity of this test report is required, please contact www.hct.co.kr The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

1. EUT DESCRIPTION

Model	SM-X528U		
Additional Model	-		
EUT Type	Tablet		
Power Supply	DC 3.86 V		
Frequency Range	2 412 MHz ~ 2 462 MHz		
Max. RF Output Power	Peak Power	SISO(Ant.1)	24.25 dBm
		MIMO_SDM(Ant.1+ Ant.2)	26.93 dBm
	Average Power	SISO(Ant.1)	15.61 dBm
		MIMO_SDM(Ant.1+ Ant.2)	18.27 dBm
Modulation Type	OFDM, OFDMA		
Number of Channels	11 Channels		
Antenna Specification	Type: Metal		
Serial number	Conducted : R32XC00A7HW Radiated : R32XC00A53E		

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	ANT.1	ANT.2	CDD	SDM
802.11ax	O	X	X	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 2.4 GHz and 5 GHz bands simultaneously on each antenna.

Simultaneous transmission Scenario	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	BT	Test Case
Bluetooth + 5 GHz WiFi MIMO	on	on	on	Scenario1

3. Directional Gain Calculation

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

$$\text{Directional Gain(CDD)} = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\{\sum_{k=1}^{N_{ANT}} g_{j,k}\}^2}{N_{ANT}}\right]$$

Directional gain(SDM) = Gmax + 10·LOG(N_{ANT}/ N_{ss})

Ant Gain (dBi)		N_{ANT}/ N_{ss}	Directional Gain (dBi)	
			CDD	SDM
ANT.1	-4.50	2/2	-1.64	-4.50
ANT.2	-4.80			

Note

According to ANSI C63.10-2013 section 14.4.3, the directional gain is calculated using the formula, where G_N is the gain of the nth antenna and N_{ANT} is the total number of antennas used.

Directional gain(CDD) = 10·log(((10$^{(ANT.0\ Gain/20)}$+10$^{(ANT.1\ Gain/20)}$)^2)/2) dBi

Directional gain(SDM) = Gmax + 10·log(N_{ANT}/ N_{ss})

Sample MIMO Calculation:

Ex) ANT.1 : 11.58 dBm ANT.2 : 12.08 dBm

MIMO = ANT.1 + ANT.2

(11.58 dBm + 12.08 dBm) = (14.387 mW + 16.143 mW) = 30.53 mW = 14.88 dBm

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 purpose 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 30 MHz 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 1 GHz. Above 1 GHz with 1.5 m 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 March 11, 2024 (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.

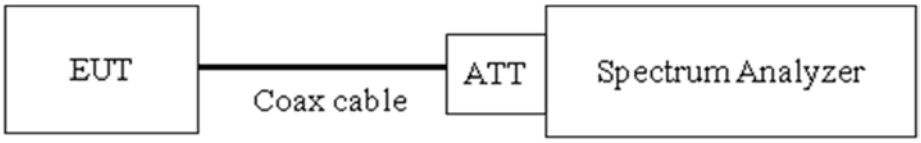
Parameter	Expanded Uncertainty (±kHz)
X dB, 99% Bandwidth	95 (Confidence level about 95 %, k=2)
Frequency stability	28 (Confidence level about 95 %, k=2)

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (Confidence level about 95 %, k=2)
Conducted Output Power(Power Meter)	0.54 (Confidence level about 95 %, k=2)
Conducted Output Power(Signal Analyzer)	0.68 (Confidence level about 95 %, k=2)
Power Spectral Density	1.03 (Confidence level about 95 %, k=2)
Band Edge (Out of Band Emissions)	0.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.58 (Confidence level about 95 %, k=2)

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 available 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*.

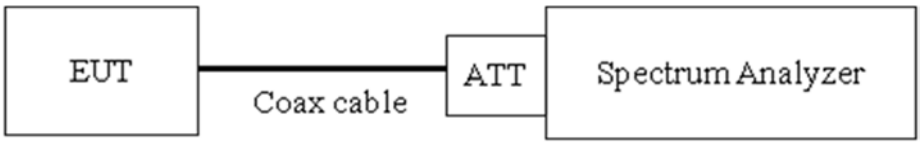
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6 dB 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.

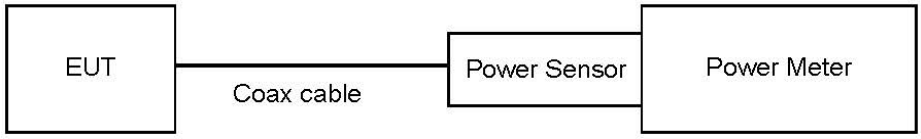
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

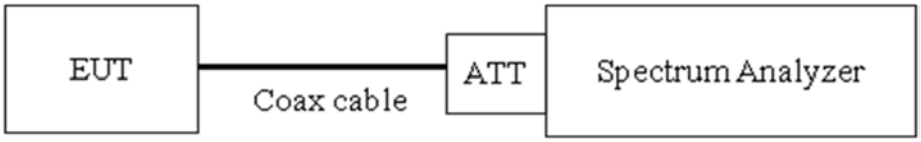
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm in any 3 kHz 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) mode over 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 = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

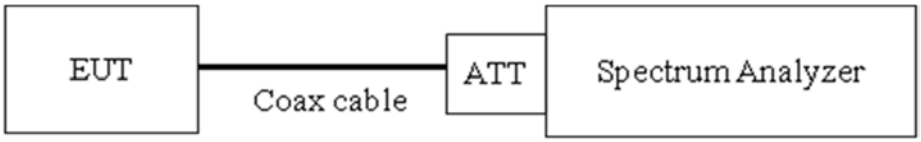
7.5. Conducted Band Edge (Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (Average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 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) Allow trace to fully stabilize.
8) 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	10.23
100	10.30
200	10.33
300	10.31
400	10.42
500	10.50
600	10.53
700	10.67
800	10.79
900	10.89
1000	10.91
2000	10.91
2400	10.98
2500	10.98
3000	11.37
4000	11.45
5000	12.01
6000	12.01
7000	12.32
8000	12.33
9000	12.37
10000	12.44
11000	12.43
12000	12.46
13000	12.48
14000	12.61
15000	12.56
16000	12.62
17000	12.66
18000	12.70
19000	12.76
20000	12.80
21000	12.82
22000	12.86
23000	12.93
24000	12.97
25000	12.98
26000	13.02

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss

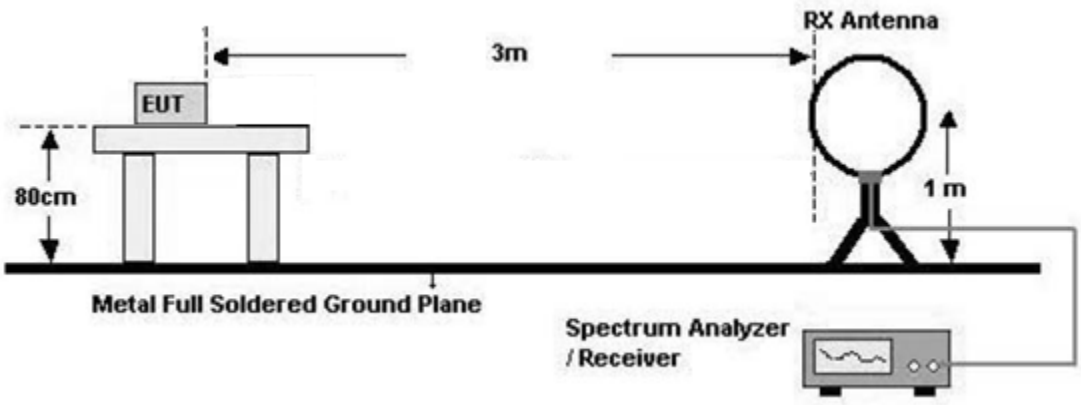
7.6. Radiated Test

Limit

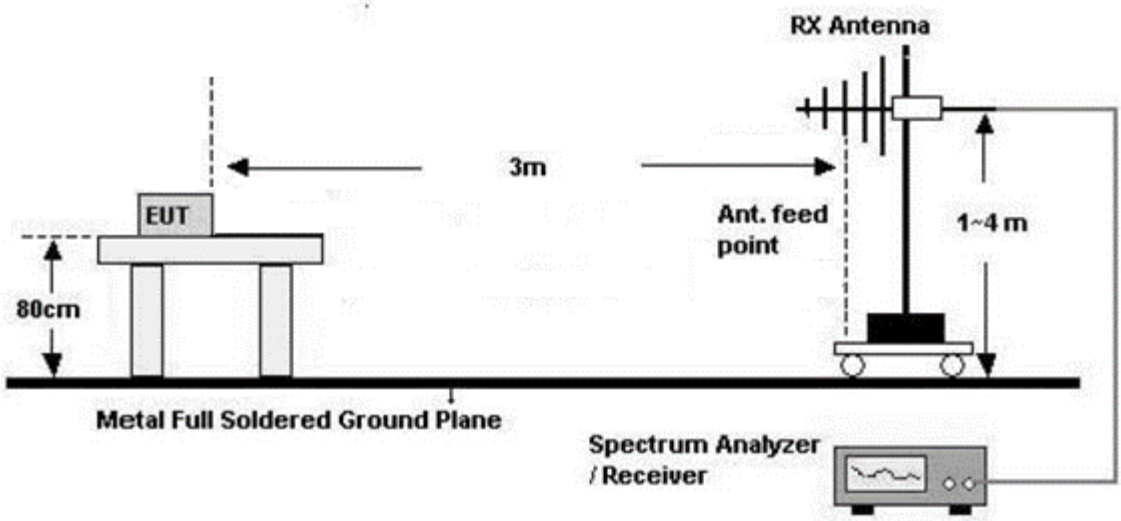
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

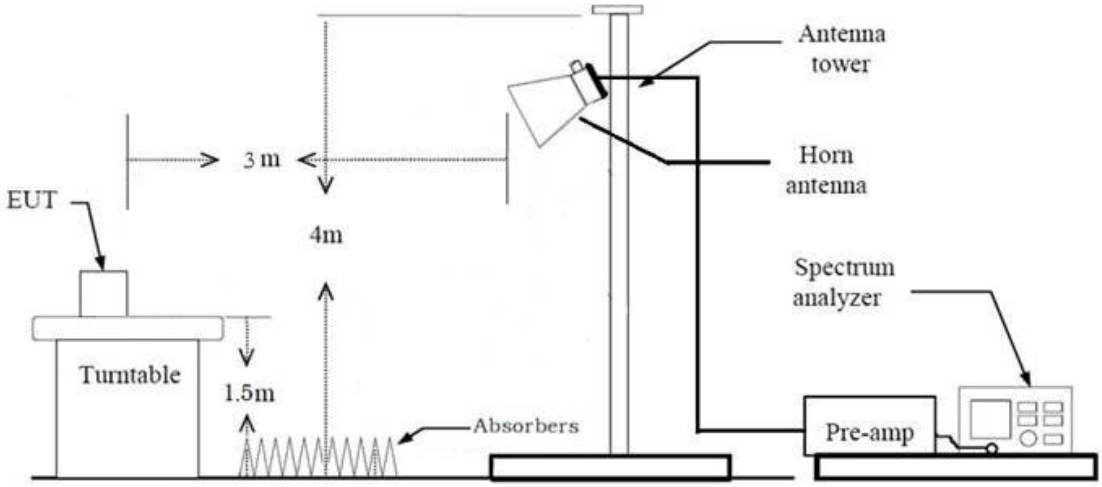
Below 30 MHz



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 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m 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 = Max hold
   - RBW = 9 kHz
   - VBW ≥ 3 x RBW
9. Total = Measured 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 1 GHz)

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 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m 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 = Max hold
      - 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 = Measured 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 1 m to 4 m 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 % 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)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

    Total(Measurement Type : Average, Duty cycle ≥ 98 %)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

    Total(Measurement Type : Average, Duty cycle < 98 %)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.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 1 m to 4 m 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 = Max hold
   - 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 % 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)

= Peak Measured Value

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

= Average Measured Value

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

= Average Measured Value + Duty Cycle Factor

- We apply to the offset in the range 1 GHz - 18 GHz.
- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

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) = Measured 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. Band Edge (Conducted)
   : All Mode (Channel, Tones, RU Offset) of operation were investigated and the worst case configuration results are reported.

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

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)
   - Worst case : Stand alone
2. All data rate of operation were investigated and the worst case results are reported.
   (Worst case : MCS 0)
3. All Antenna of operation were investigated and the worst case results are reported
   - Antenna Operation Type : SISO_Ant.1, SISO_Ant.2, MIMO_SDM(Ant.1+Ant.2)
   - Worstcase: MIMO_SDM(Ant.1+Ant.2)
4. EUT Axis
   - Radiated Spurious Emissions : X
   - Radiated Restricted Band Edge : X
5. 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
6. All mode(Tone, RU Offset) of operation were investigated and the worst case configuration results are reported
7. SM-X528U, SM-A566E were tested and the worst case results are reported.
   (Worst case: SM-X528U)

[RSE Worst case]

BW (MHz)	Test	Tones (T)	Offset
20	RSE	26	4
		SU	-

[Bandedge Worst case]

BW (MHz)	Test	Tones (T)	Offset	
			Lower	Upper
20	Band Edge	26	0	8
		52	37	40
		106	53	54
		242	61	61
		SU	-	-

Radiated test(Simultaneous transmission Scenario)

1. Please refer to the [BT], [UNII ax] Test Report.

AC Power line Conducted Emissions

1. Please refer to the [DTS] Test Report.

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

Note1:

1. Please refer to the [DTS] Test Report.

9. TEST RESULT

9.1 DUTY CYCLE

[SISO]

Mode	Tone (T)	Worst Data rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ax (HE20)	26	MCS0	5.545	5.646	0.982	0.000
	52	MCS0	5.140	5.241	0.981	0.000
	106	MCS0	2.450	2.552	0.960	0.177
	242	MCS0	1.105	1.205	0.917	0.376
802.11ax(SU)	BW 20	MCS0	1.101	1.199	0.918	0.370

[MIMO_SDM(Ant.1+Ant.2)]

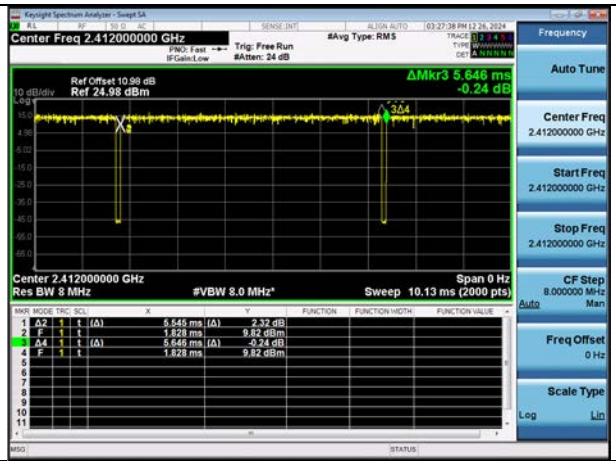
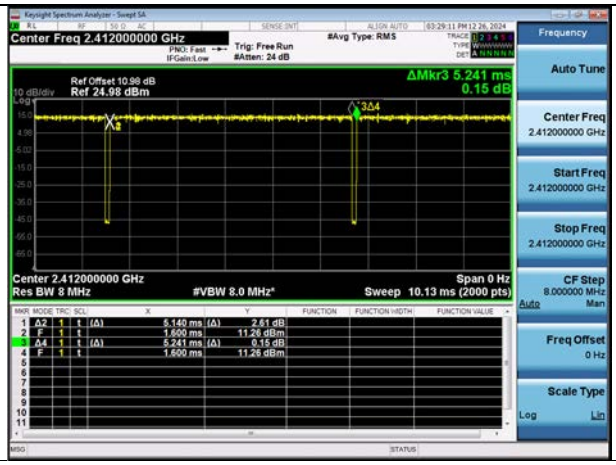
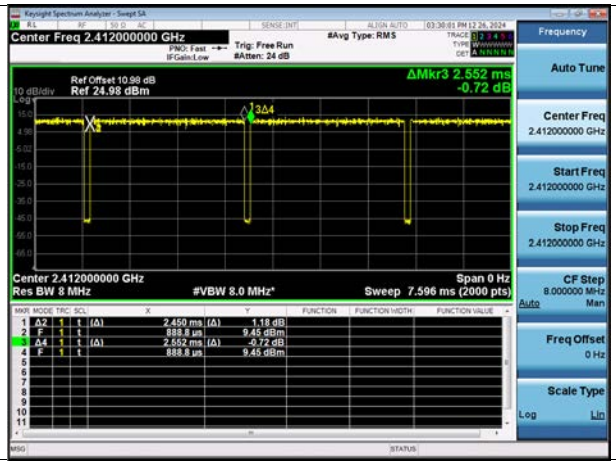
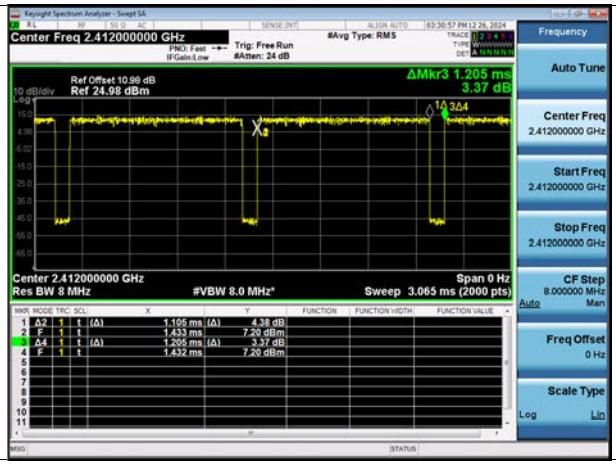
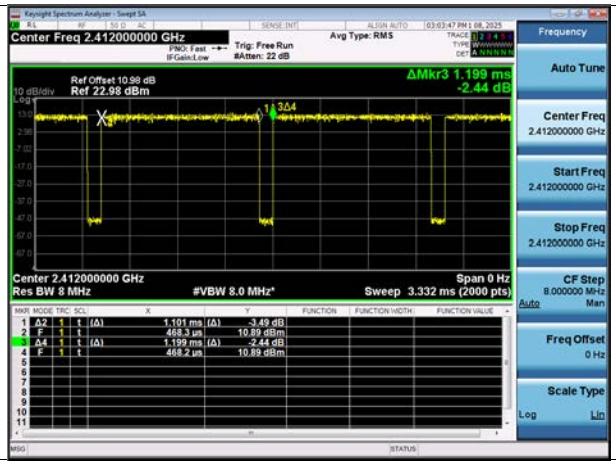
Mode	Tone (T)	Worst Data rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ax (HE20)	26	MCS0	5.142	5.248	0.980	0.000
	52	MCS0	2.609	2.712	0.962	0.168
	106	MCS0	1.267	1.366	0.928	0.327
	242	MCS0	0.592	0.688	0.860	0.653
802.11ax(SU)	BW 20	MCS0	0.587	0.686	0.857	0.671

▣ Test Plots

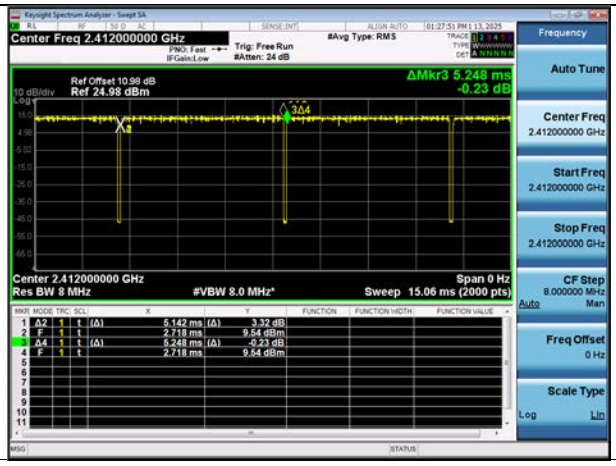
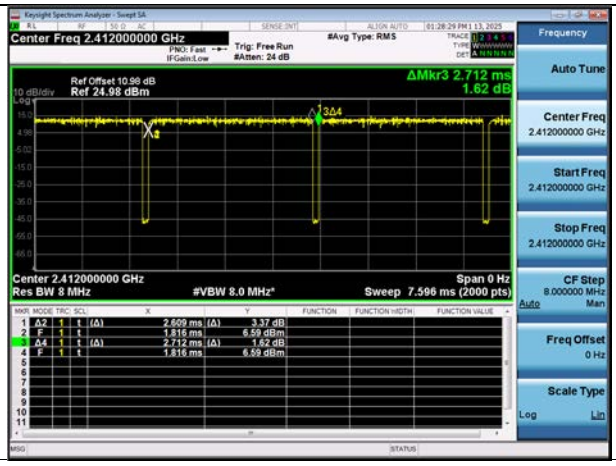
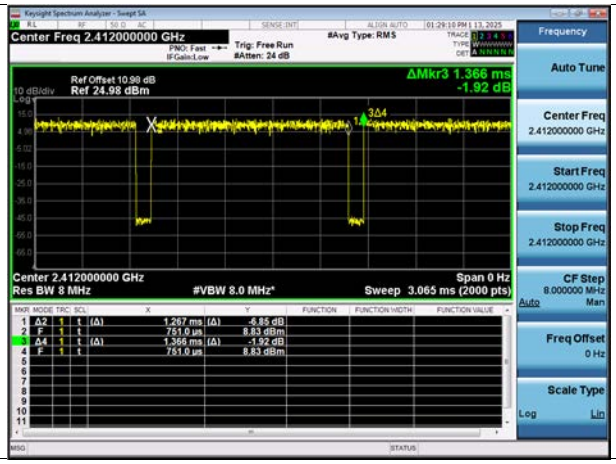
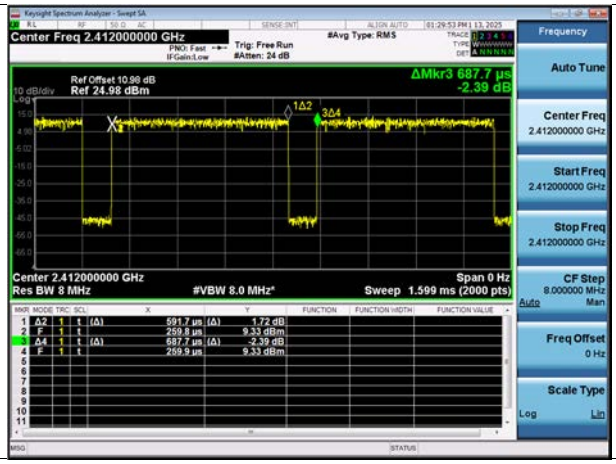
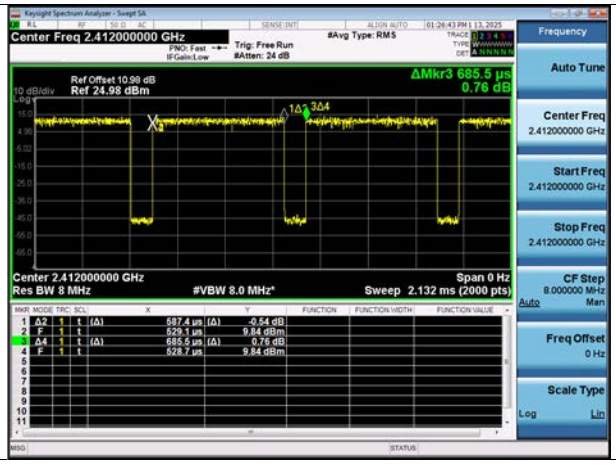
Note:

In order to simplify the report, attached plots were only the lowest data rate.

[SISO]

26 Tones (MCS 0)	52 Tones (MCS 0)
	
106 Tones (MCS 0)	**242 Tones (MCS 0)**
	
SU (MCS 0)	
	

[MIMO_SDM(Ant.1+Ant.2)]

26 Tones (MCS 0)	52 Tones (MCS 0)
	
106 Tones (MCS 0)	**242 Tones (MCS 0)**
	
SU (MCS 0)	
	

9.2 6 dB BANDWIDTH

Limit : > 500 kHz

[Ant. 1]

Mode	Freq. [MHz]	CH.	6dB Bandwidth [MHz]			99% Occupied Bandwidth [MHz]		
			RU Index : Low	RU Index : Mid	RU Index : High	RU Index : Low	RU Index : Mid	RU Index : High
			ANT1	ANT1	ANT1	ANT1	ANT1	ANT1
HE20 26T	2412	1	14.48	2.686	15.73	17.637	14.935	17.594
	2437	6	15.74	2.685	14.48	17.596	14.968	17.647
	2462	11	14.47	2.657	15.74	17.480	14.969	17.652
HE20 52T	2412	1	13.92	4.073	13.75	17.339	15.040	17.296
	2437	6	15.22	6.646	13.98	17.382	15.073	17.274
	2462	11	14.11	7.864	14.93	17.277	15.067	17.438
HE20 106T	2412	1	12.19	-	12.21	16.987	-	17.089
	2437	6	12.46	-	12.46	17.009	-	17.062
	2462	11	12.51	-	13.62	16.968	-	17.172
HE20 242T	2412	1	-	12.83	-	-	17.959	-
	2437	6	-	12.66	-	-	17.951	-
	2462	11	-	12.82	-	-	17.934	-
HE20 SU	2412	1	-	12.98	-	-	17.966	-
	2437	6	-	12.65	-	-	17.951	-
	2462	11	-	13.80	-	-	17.956	-

[Ant. 2]

Mode	Freq. [MHz]	CH.	6dB Bandwidth [MHz]			99% Occupied Bandwidth [MHz]		
			RU Index : Low	RU Index : Mid	RU Index : High	RU Index : Low	RU Index : Mid	RU Index : High
			ANT2	ANT2	ANT2	ANT2	ANT2	ANT2
HE20 26T	2412	1	14.51	2.670	15.72	17.547	14.768	17.549
	2437	6	15.70	2.691	14.52	17.570	14.945	17.619
	2462	11	14.51	2.636	15.72	17.549	14.819	17.631
HE20 52T	2412	1	15.00	6.653	13.88	17.375	15.030	17.311
	2437	6	13.79	6.637	15.35	17.365	15.052	17.395
	2462	11	14.15	7.878	14.17	17.340	15.050	17.376
HE20 106T	2412	1	11.84	-	12.31	17.032	-	17.044
	2437	6	11.96	-	11.99	17.039	-	17.147
	2462	11	12.19	-	12.29	17.014	-	17.082
HE20 242T	2412	1	-	12.90	-	-	17.897	-
	2437	6	-	13.21	-	-	17.969	-
	2462	11	-	12.66	-	-	17.899	-
HE20 SU	2412	1	-	12.64	-	-	17.869	-
	2437	6	-	12.68	-	-	17.948	-
	2462	11	-	12.64	-	-	17.904	-

▣ Test Plots

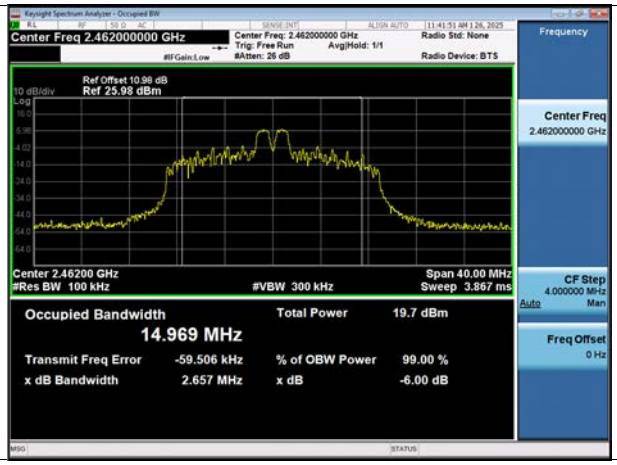
Note: In order to simplify the report, attached plots were only the most narrow 6 dB BW channel.

[Ant. 1]

BW20M Ch.1(2412 MHz) RU 4

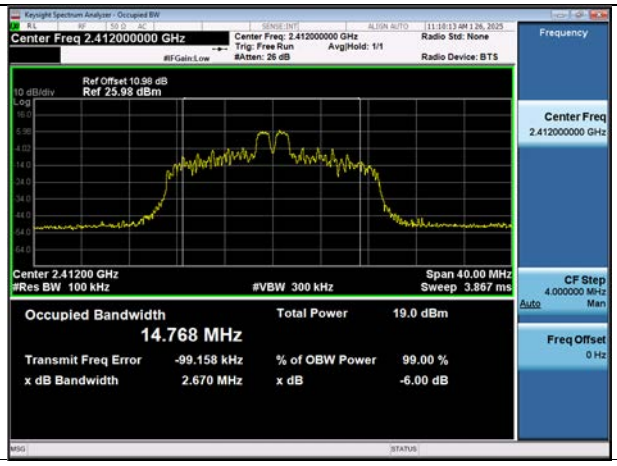
BW20M Ch.6(2437 MHz) RU 4

BW20M Ch.11(2462 MHz) RU 4

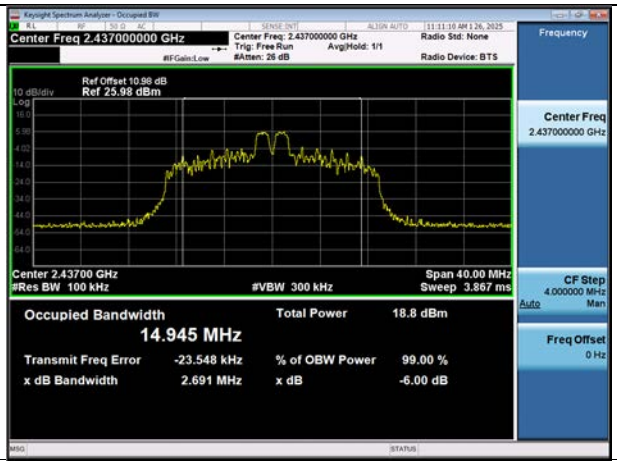


[Ant. 2]

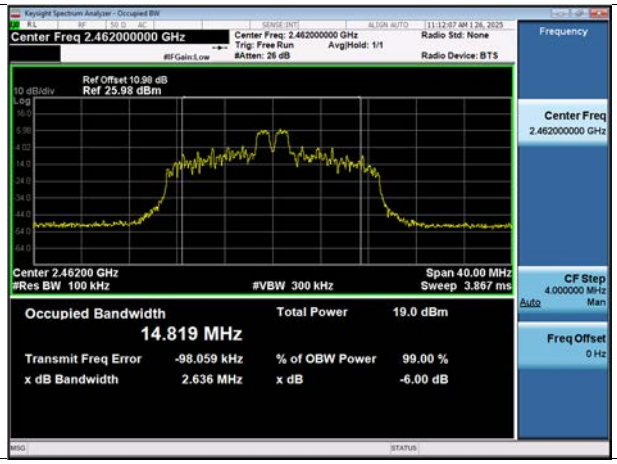
BW20M Ch.1(2412 MHz) RU 4



BW20M Ch.6(2437 MHz) RU 4



BW20M Ch.11(2462 MHz) RU 4



9.3 OUTPUT POWER

Note:

1. MIMO Peak Power = 10·log((10^(Ant.1 Peak power /10))+(10^(Ant.2 Peak power /10)))

Peak Power

[SISO Ant.1]

Mode	Freq. [MHz]	CH.	Total Peak Power [dBm]		
			RU Index : Low	RU Index : Mid	RU Index : High
			ANT1	ANT1	ANT1
HE20 26T	2412	1	15.62	20.44	15.61
	2437	6	15.79	20.77	15.67
	2462	11	16.27	21.08	16.15
HE20 52T	2412	1	16.97	20.06	16.98
	2437	6	17.17	20.28	17.31
	2462	11	17.79	20.81	17.10
HE20 106T	2412	1	20.22	-	20.21
	2437	6	20.59	-	20.43
	2462	11	20.72	-	20.19
HE20 242T	2412	1	-	19.80	-
	2437	6	-	20.39	-
	2462	11	-	20.32	-
HE20 SU	2412	1	-	23.85	-
	2437	6	-	23.99	-
	2462	11	-	24.25	-

[MIMO_SDM(Ant.1+Ant.2)]

Mode	Freq. [MHz]	CH.	Total Peak Power [dBm]									Limit [dBm]
			RU Index : Low			RU Index : Mid			RU Index : High			
			ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	
HE20 26T	2412	1	16.33	15.45	18.92	21.03	21.23	24.14	15.53	14.97	18.27	30
	2437	6	16.51	15.15	18.89	21.32	20.52	23.95	15.77	14.44	18.17	30
	2462	11	16.69	15.76	19.26	21.22	21.42	24.33	15.36	15.22	18.30	30
HE20 52T	2412	1	17.08	16.54	19.83	20.19	19.72	22.97	17.08	16.66	19.88	30
	2437	6	17.41	16.88	20.16	20.78	19.52	23.21	17.65	16.34	20.05	30
	2462	11	17.87	17.03	20.48	20.55	20.03	23.31	17.52	16.84	20.20	30
HE20 106T	2412	1	20.17	19.78	22.99	-	-	-	19.79	19.55	22.68	30
	2437	6	20.58	19.43	23.05	-	-	-	20.35	19.49	22.95	30
	2462	11	20.52	20.06	23.31	-	-	-	20.32	19.88	23.11	30
HE20 242T	2412	1	-	-	-	19.89	19.72	22.81	-	-	-	30
	2437	6	-	-	-	20.30	19.55	22.95	-	-	-	30
	2462	11	-	-	-	20.22	19.68	22.97	-	-	-	30
HE20 SU	2412	1	-	-	-	24.00	23.83	26.93	-	-	-	30
	2437	6	-	-	-	24.06	23.61	26.85	-	-	-	30
	2462	11	-	-	-	24.03	23.77	26.91	-	-	-	30

Average Power

Note:

1. Total Power [dBm] = Measured Power [dBm] + Duty Cycle Factor [dB]

[SISO Ant.1]

Mode	Freq. [MHz]	CH.	Total Average Power [dBm]		
			RU Index : Low	RU Index : Mid	RU Index : High
			ANT1	ANT1	ANT1
HE20 26T	2412	1	2.46	10.45	2.45
	2437	6	2.72	10.83	2.74
	2462	11	3.23	10.72	2.63
HE20 52T	2412	1	4.90	9.75	4.94
	2437	6	5.28	10.13	5.33
	2462	11	5.86	10.56	5.13
HE20 106T	2412	1	9.86	-	9.91
	2437	6	10.20	-	10.08
	2462	11	10.31	-	9.90
HE20 242T	2412	1	-	10.17	-
	2437	6	-	10.65	-
	2462	11	-	10.58	-
HE20 SU	2412	1	-	15.54	-
	2437	6	-	15.56	-
	2462	11	-	15.61	-

[MIMO_SDM(Ant.1+Ant.2)]

Mode	Freq. [MHz]	CH.	Total Average Power [dBm]									Limit [dBm]
			RU Index : Low			RU Index : Mid			RU Index : High			
			ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	
HE20 26T	2412	1	2.14	1.81	4.99	10.27	10.16	13.23	2.21	1.96	5.10	30
	2437	6	2.83	1.66	5.29	10.58	9.64	13.15	2.46	1.66	5.09	30
	2462	11	2.98	2.24	5.64	10.47	10.53	13.51	2.12	2.11	5.13	30
HE20 52T	2412	1	5.29	4.63	7.98	10.14	9.50	12.84	5.30	4.69	8.01	30
	2437	6	5.45	4.75	8.12	10.57	9.32	13.00	5.82	4.54	8.24	30
	2462	11	6.15	5.02	8.63	10.44	9.87	13.17	5.58	4.97	8.29	30
HE20 106T	2412	1	10.08	9.37	12.75	-	-	-	9.64	9.36	12.51	30
	2437	6	10.35	9.11	12.78	-	-	-	10.31	8.83	12.64	30
	2462	11	10.31	9.64	12.99	-	-	-	10.11	9.51	12.83	30
HE20 242T	2412	1	-	-	-	10.20	9.93	13.08	-	-	-	30
	2437	6	-	-	-	10.87	9.60	13.29	-	-	-	30
	2462	11	-	-	-	10.76	9.87	13.35	-	-	-	30
HE20 SU	2412	1	-	-	-	15.47	15.03	18.27	-	-	-	30
	2437	6	-	-	-	15.58	14.49	18.08	-	-	-	30
	2462	11	-	-	-	15.51	14.96	18.25	-	-	-	30

9.4 POWER SPECTRAL DENSITY

Limit : 8 [dBm/3 kHz]

Note :

1. MIMO Total PSD = 10·log(((10^(Ant.1 PSD /10))+(10^(Ant.2 PSD/10)))
2. Total PSD = Measured Value + Duty Cycle Factor

[SISO Ant.1]

Mode	Freq. [MHz]	CH.	Total Power Spectral Density [dBm/MHz]		
			RU Index : Low	RU Index : Mid	RU Index : High
			ANT1	ANT1	ANT1
HE20 26T	2412	1	-12.947	-6.158	-13.072
	2437	6	-13.040	-6.071	-12.928
	2462	11	-11.823	-5.656	-13.026
HE20 52T	2412	1	-12.393	-8.881	-12.787
	2437	6	-12.272	-9.059	-12.400
	2462	11	-11.483	-8.560	-11.954
HE20 106T	2412	1	-10.262	-	-10.604
	2437	6	-10.229	-	-10.482
	2462	11	-9.995	-	-10.231
HE20 242T	2412	1	-	-13.362	-
	2437	6	-	-13.230	-
	2462	11	-	-12.218	-
HE20 SU	2412	1	-	-8.134	-
	2437	6	-	-8.314	-
	2462	11	-	-7.694	-

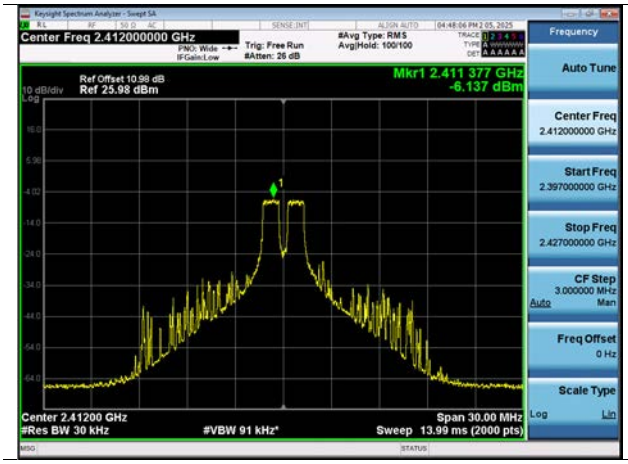
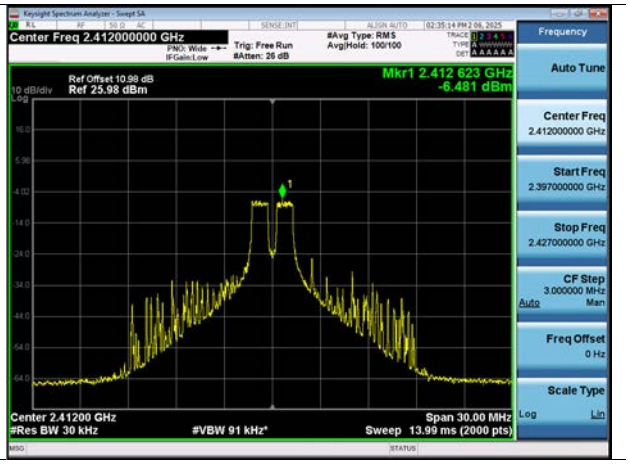
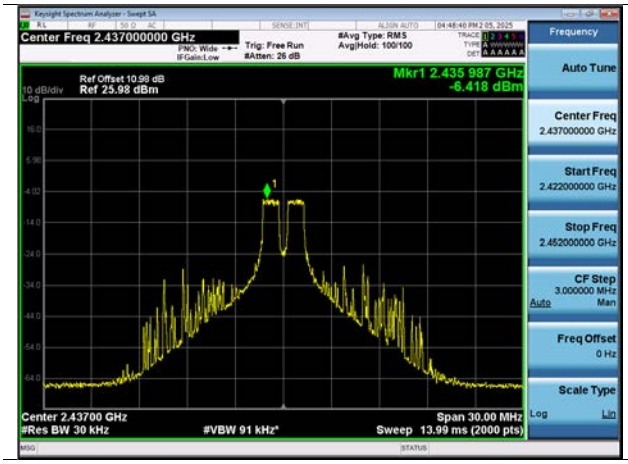
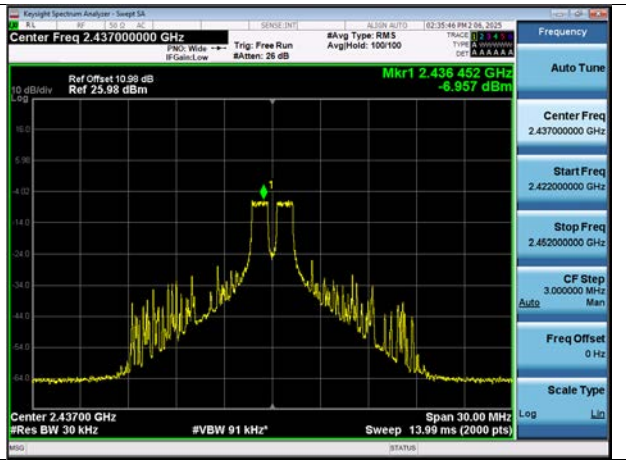
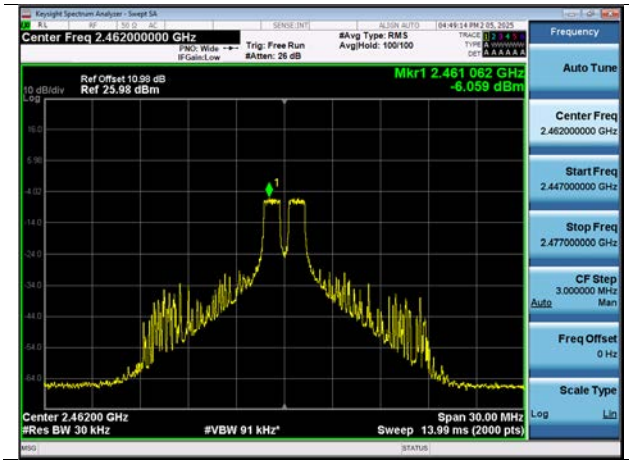
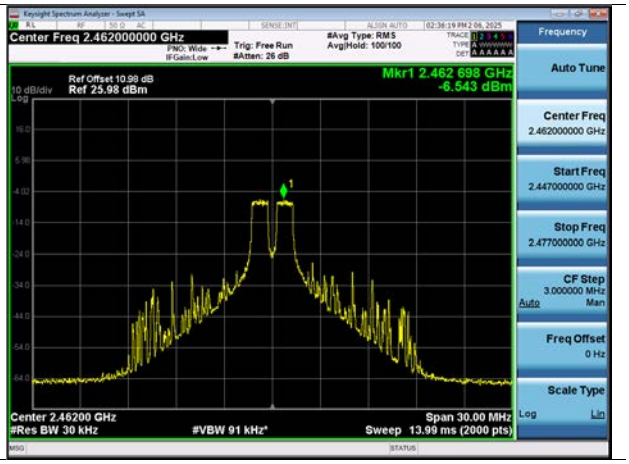
[MIMO_SDM(Ant.1+Ant.2)]

Mode	Freq. [MHz]	CH.	Total Power Spectral Density [dBm/MHz]									Limit [dBm/3 kHz]
			RU Index : Low			RU Index : Mid			RU Index : High			
			ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	
HE20 26T	2412	1	-12.818	-13.820	-10.280	-6.137	-6.481	-3.295	-13.461	-13.203	-10.320	8
	2437	6	-13.233	-13.714	-10.457	-6.418	-6.957	-3.669	-13.425	-13.839	-10.617	8
	2462	11	-12.676	-13.511	-10.063	-6.059	-6.543	-3.284	-13.317	-13.515	-10.405	8
HE20 52T	2412	1	-12.731	-13.286	-9.989	-9.092	-9.791	-6.417	-12.355	-13.399	-9.835	8
	2437	6	-12.702	-12.942	-9.810	-8.685	-9.803	-6.198	-12.356	-13.029	-9.669	8
	2462	11	-11.774	-12.697	-9.201	-9.153	-9.558	-6.340	-12.164	-13.164	-9.625	8
HE20 106T	2412	1	-10.847	-11.230	-8.024	-	-	-	-10.867	-11.180	-8.011	8
	2437	6	-10.911	-11.162	-8.025	-	-	-	-10.795	-11.421	-8.087	8
	2462	11	-10.449	-10.967	-7.690	-	-	-	-10.492	-10.910	-7.686	8
HE20 242T	2412	1	-	-	-	-13.714	-13.401	-10.544	-	-	-	8
	2437	6	-	-	-	-13.169	-13.657	-10.396	-	-	-	8
	2462	11	-	-	-	-13.146	-13.825	-10.462	-	-	-	8
HE20 SU	2412	1	-	-	-	-7.662	-8.680	-5.131	-	-	-	8
	2437	6	-	-	-	-7.619	-9.155	-5.309	-	-	-	8
	2462	11	-	-	-	-7.732	-8.988	-5.305	-	-	-	8

▣ Test Plots

Note: In order to simplify the report, attached plots were only the worst case PSD channel.

[MIMO_SDM(Ant.1+Ant.2)]

ANT.1	ANT.2
BW20M Ch.1(2412 MHz) 26T RU 4	
	
BW20M Ch.6(2437 MHz) 26T RU 4	
	
BW20M Ch.11(2462 MHz) 26T RU 4	
	

9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

Band Edge

Limit : 30 dBc

[SISO Ant.1]

Mode	Freq. [MHz]	CH.	RU Index	Measured Position	Band edge [dB]
HE20	2412	1	Low	Lowest Bandedge	35.732
26T	2462	11	High	Highest Bandedge	45.744
HE20	2412	1	Low	Lowest Bandedge	43.197
52T	2462	11	High	Highest Bandedge	51.379
HE20	2412	1	Low	Lowest Bandedge	46.166
106T	2462	11	High	Highest Bandedge	49.019
HE20	2412	1	Low	Lowest Bandedge	43.995
242T	2462	11	High	Highest Bandedge	47.582
HE20	2412	1	Low	Lowest Bandedge	46.308
SU	2462	11	High	Highest Bandedge	46.831

[MIMO_SDM(Ant. 1)]

Mode	Freq. [MHz]	CH.	RU Index	Measured Position	Band edge [dB]
HE20	2412	1	Low	Lowest Bandedge	42.415
26T	2462	11	High	Highest Bandedge	51.036
HE20	2412	1	Low	Lowest Bandedge	42.126
52T	2462	11	High	Highest Bandedge	50.177
HE20	2412	1	Low	Lowest Bandedge	43.905
106T	2462	11	High	Highest Bandedge	49.159
HE20	2412	1	Low	Lowest Bandedge	42.616
242T	2462	11	High	Highest Bandedge	47.543
HE20	2412	1	Low	Lowest Bandedge	43.697
SU	2462	11	High	Highest Bandedge	47.141

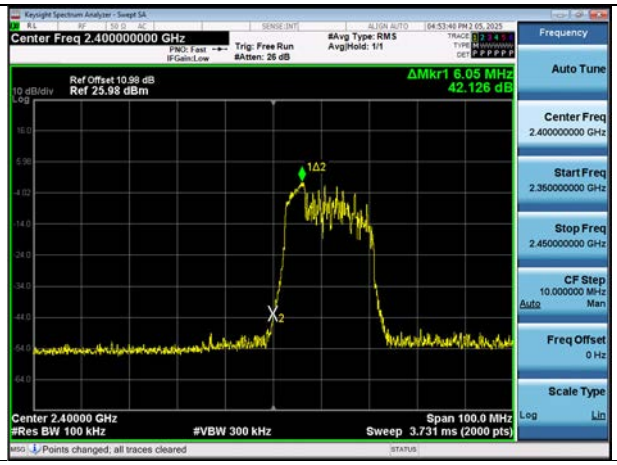
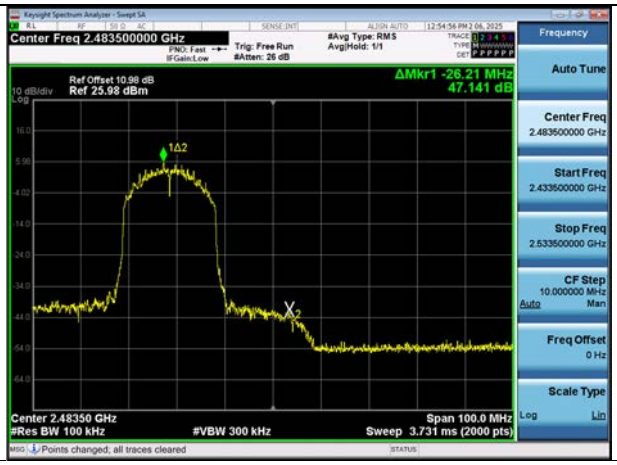
[MIMO_SDM(Ant. 2)]

Mode	Freq. [MHz]	CH.	RU Index	Measured Position	Band edge [dB]
HE20	2412	1	Low	Lowest Bandedge	41.114
26T	2462	11	High	Highest Bandedge	48.971
HE20	2412	1	Low	Lowest Bandedge	43.206
52T	2462	11	High	Highest Bandedge	48.818
HE20	2412	1	Low	Lowest Bandedge	43.804
106T	2462	11	High	Highest Bandedge	49.024
HE20	2412	1	Low	Lowest Bandedge	45.601
242T	2462	11	High	Highest Bandedge	45.620
HE20	2412	1	Low	Lowest Bandedge	43.172
SU	2462	11	High	Highest Bandedge	47.620

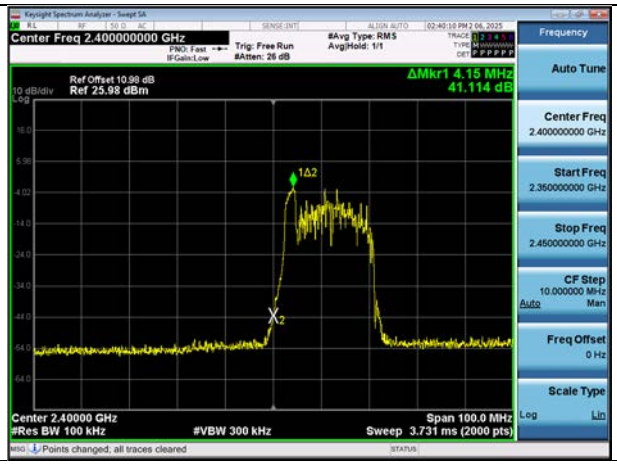
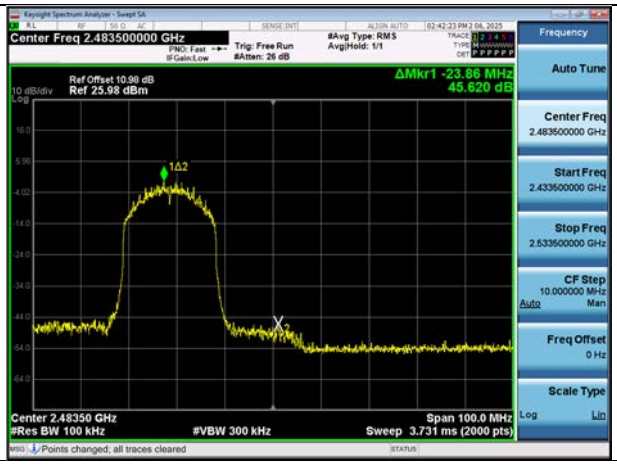
▣ Test Plots

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

[MIMO_SDM(Ant. 1)]

BW 20M Ch.1(2412 MHz) 52T RU 37	BW 20M Ch.11(2462 MHz) SU
	

[MIMO_SDM(Ant. 2)]

BW 20M Ch.1(2412 MHz) 26T RU 0	BW 20M Ch.11(2462 MHz) 242T RU 61
	

Conducted Spurious Emissions

Limit : 30 dBc

[SISO ANT.1]

Mode	Freq. [MHz]	CH.	Conducted Spurious Emissions [dB]		
			RU Index : Low	RU Index : Mid	RU Index : High
			ANT1	ANT1	ANT1
HE20 26T	2412	1	50.005	57.998	52.386
	2437	6	51.209	58.008	49.429
	2462	11	52.962	57.181	51.144
HE20 52T	2412	1	51.952	54.707	52.165
	2437	6	52.470	55.708	51.698
	2462	11	50.950	57.554	53.431
HE20 106T	2412	1	55.816	-	54.467
	2437	6	54.408	-	56.193
	2462	11	55.354	-	54.993
HE20 242T	2412	1	-	52.624	-
	2437	6	-	51.462	-
	2462	11	-	52.073	-
HE20 SU	2412	1	-	58.208	-
	2437	6	-	56.032	-
	2462	11	-	56.999	-

[MIMO_SDM(Ant. 1)]

Mode	Freq. [MHz]	CH.	Conducted Spurious Emissions [dB]		
			RU Index : Low	RU Index : Mid	RU Index : High
			ANT1	ANT1	ANT1
HE20 26T	2412	1	51.462	57.976	49.306
	2437	6	49.591	58.219	50.367
	2462	11	50.216	58.463	51.749
HE20 52T	2412	1	51.595	55.315	50.090
	2437	6	51.970	54.435	51.360
	2462	11	52.595	55.252	51.132
HE20 106T	2412	1	53.853	-	54.223
	2437	6	53.635	-	54.654
	2462	11	54.385	-	53.356
HE20 242T	2412	1	-	52.947	-
	2437	6	-	51.720	-
	2462	11	-	51.753	-
HE20 SU	2412	1	-	56.136	-
	2437	6	-	57.499	-
	2462	11	-	56.731	-

[MIMO_SDM(Ant. 2)]

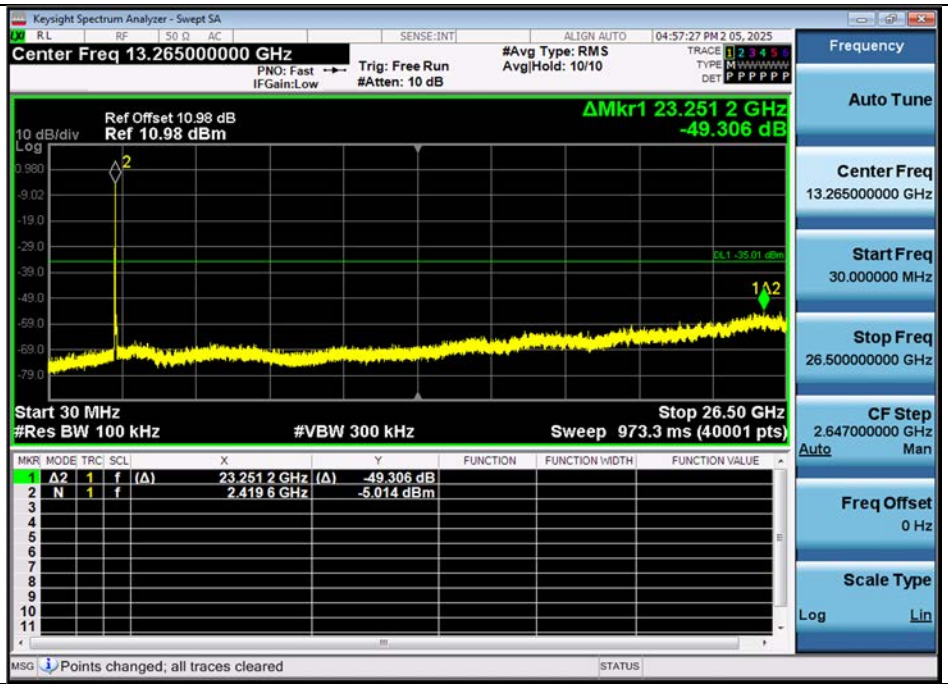
Mode	Freq. [MHz]	CH.	Conducted Spurious Emissions [dB]		
			RU Index : Low	RU Index : Mid	RU Index : High
			ANT2	ANT2	ANT2
HE20 26T	2412	1	50.112	57.378	48.781
	2437	6	49.787	56.453	51.409
	2462	11	50.158	57.850	50.405
HE20 52T	2412	1	50.341	54.215	51.767
	2437	6	51.042	55.793	49.074
	2462	11	50.201	55.059	51.164
HE20 106T	2412	1	52.409	-	52.539
	2437	6	51.171	-	51.923
	2462	11	53.365	-	53.510
HE20 242T	2412	1	-	51.527	-
	2437	6	-	52.171	-
	2462	11	-	50.367	-
HE20 SU	2412	1	-	56.493	-
	2437	6	-	57.549	-
	2462	11	-	56.142	-

▣ Test Plots

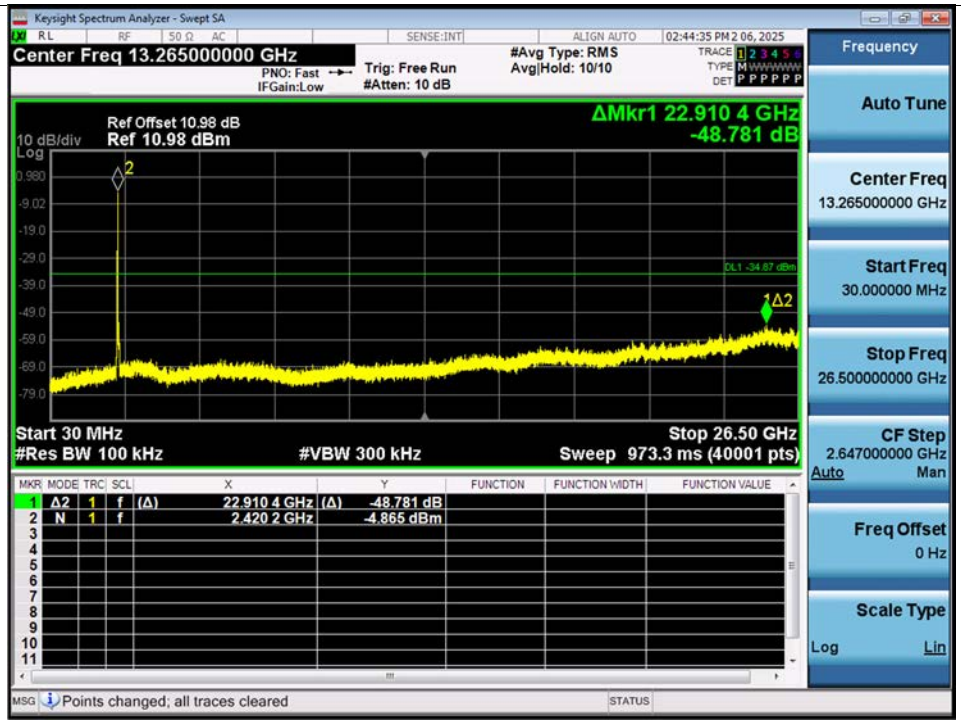
Note:

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

MIMO_SDM(Ant. 1) BW20M Ch.1(2 412 MHz) 26T RU 8



MIMO_SDM(Ant. 2) BW20M Ch.1(2 412 MHz) 26T RU 8



9.6 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

Frequency	Measured Value	A.F+C.L+D.F	POL	Total	Limit	Margin
[MHz]	[dBμV/m]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]
No Critical peaks found						

Note:

1. The Measured 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 (dBμV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dBμV/m]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/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

[MIMO_SDM(Ant.1+Ant.2)]

Band :	DTS		Operation Mode :		802.11ax_HT20 MCS0 26T RU4			
CH.1	2412 MHz		Transfer Rate :		MCS0			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4824	50.39	0.00	-5.39	V	45.00	73.98	28.98	PK
4824	40.02	0.00	-5.39	V	34.63	53.98	19.35	AV
7236	47.48	0.00	1.88	V	49.36	73.98	24.62	PK
7236	35.77	0.00	1.88	V	37.65	53.98	16.33	AV
4824	51.21	0.00	-5.39	H	45.82	73.98	28.16	PK
4824	40.05	0.00	-5.39	H	34.66	53.98	19.32	AV
7236	47.86	0.00	1.88	H	49.74	73.98	24.24	PK
7236	35.67	0.00	1.88	H	37.55	53.98	16.43	AV

Band :	DTS		Operation Mode :		802.11ax_HT20 MCS0 26T RU4			
CH.6	2437 MHz		Transfer Rate :		MCS0			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4874	50.62	0.00	-5.17	V	45.45	73.98	28.53	PK
4874	40.08	0.00	-5.17	V	34.91	53.98	19.07	AV
7311	47.61	0.00	1.88	V	49.49	73.98	24.49	PK
7311	36.11	0.00	1.88	V	37.99	53.98	15.99	AV
4874	51.02	0.00	-5.17	H	45.85	73.98	28.13	PK
4874	40.00	0.00	-5.17	H	34.83	53.98	19.15	AV
7311	46.84	0.00	1.88	H	48.72	73.98	25.26	PK
7311	35.55	0.00	1.88	H	37.43	53.98	16.55	AV

Band :	DTS		Operation Mode :		802.11ax_HT20 MCS0 26T RU4			
CH.11	2462 MHz		Transfer Rate :		MCS0			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4924	51.35	0.00	-4.97	V	46.38	73.98	27.60	PK
4924	40.48	0.00	-4.97	V	35.51	53.98	18.47	AV
7386	46.75	0.00	1.98	V	48.73	73.98	25.25	PK
7386	35.32	0.00	1.98	V	37.30	53.98	16.68	AV
4924	51.25	0.00	-4.97	H	46.28	73.98	27.70	PK
4924	40.47	0.00	-4.97	H	35.50	53.98	18.48	AV
7386	46.78	0.00	1.98	H	48.76	73.98	25.22	PK
7386	35.18	0.00	1.98	H	37.16	53.98	16.82	AV

Band :	DTS		Operation Mode :		802.11ax_HT20 MCS0 SU			
CH.1	2412 MHz		Transfer Rate :		MCS0			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4824	51.16	0.00	-5.39	V	45.77	73.98	28.21	PK
4824	40.25	0.67	-5.39	V	35.53	53.98	18.45	AV
7236	47.71	0.00	1.88	V	49.59	73.98	24.39	PK
7236	36.21	0.67	1.88	V	38.76	53.98	15.22	AV
4824	50.88	0.00	-5.39	H	45.49	73.98	28.49	PK
4824	39.89	0.67	-5.39	H	35.17	53.98	18.81	AV
7236	46.84	0.00	1.88	H	48.72	73.98	25.26	PK
7236	35.73	0.67	1.88	H	38.28	53.98	15.70	AV

Band :	DTS		Operation Mode :		802.11ax_HT20 MCS0 SU			
CH.6	2437 MHz		Transfer Rate :		MCS0			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4874	51.83	0.00	-5.17	V	46.66	73.98	27.32	PK
4874	40.45	0.67	-5.17	V	35.95	53.98	18.03	AV
7311	47.67	0.00	1.88	V	49.55	73.98	24.43	PK
7311	36.22	0.67	1.88	V	38.77	53.98	15.21	AV
4874	50.97	0.00	-5.17	H	45.80	73.98	28.18	PK
4874	40.02	0.67	-5.17	H	35.52	53.98	18.46	AV
7311	47.34	0.00	1.88	H	49.22	73.98	24.76	PK
7311	35.83	0.67	1.88	H	38.38	53.98	15.60	AV

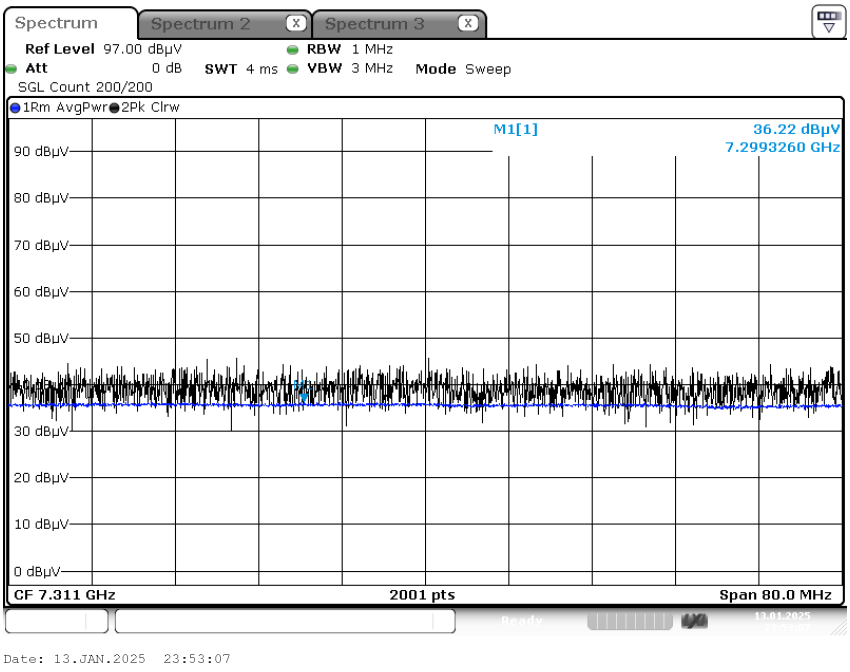
Band :	DTS		Operation Mode :		802.11ax_HT20 MCS0 SU			
CH.11	2462 MHz		Transfer Rate :		MCS0			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4924	52.19	0.00	-4.97	V	47.22	73.98	26.76	PK
4924	41.00	0.67	-4.97	V	36.70	53.98	17.28	AV
7386	47.23	0.00	1.98	V	49.21	73.98	24.77	PK
7386	35.81	0.67	1.98	V	38.46	53.98	15.52	AV
4924	50.84	0.00	-4.97	H	45.87	73.98	28.11	PK
4924	40.54	0.67	-4.97	H	36.24	53.98	17.74	AV
7386	46.39	0.00	1.98	H	48.37	73.98	25.61	PK
7386	35.39	0.67	1.98	H	38.04	53.98	15.94	AV

▣ Test Plots

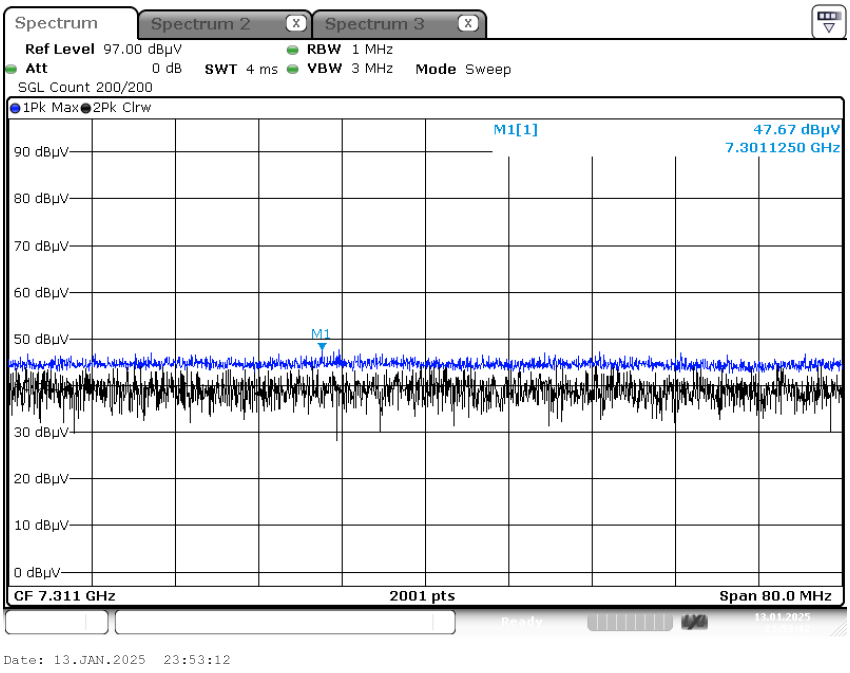
[MIMO_SDM(Ant.1+Ant.2)]

Note: In order to simplify, Plots of worst case are only reported.

Radiated Spurious Emissions plot – Average result (802.11ax(HE20), Ch.6 3rd Harmonic, X-V, SU)



Radiated Spurious Emissions plot – Peak result (802.11ax(HE20), Ch.6 3rd Harmonic, X-V, SU)



9.7 RADIATED RESTRICTED BAND EDGES

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

[MIMO_SDM(Ant.1+Ant.2)]

802.11ax(MCS0)			HE20			SU		
Channel	CH 1		Freq	2412 MHz				
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2390	67.030	0.00	0.00	H	67.03	73.98	6.95	PK
2390.0	51.010	0.67	0.00	H	51.68	53.98	2.30	AV

802.11ax(MCS0)			HE20			SU		
Channel	CH 11		Freq	2462 MHz				
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2483.5	65.920	0.00	0.00	H	65.92	73.98	8.06	PK
#2483.5	51.100	0.67	0.00	H	51.77	53.98	2.21	AV

802.11ax(MCS0)			HE20	242T				
Channel	CH 1		Freq	2412 MHz		RU offset	61	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2390	63.000	0.00	0.00	H	63.00	73.98	10.98	PK
2390.0	48.380	0.65	0.00	H	49.03	53.98	4.95	AV

802.11ax(MCS0)			HE20	242T				
Channel	CH 11		Freq	2462 MHz		RU offset	61	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2483.5	63.620	0.00	0.00	H	63.62	73.98	10.36	PK
2483.5	50.050	0.65	0.00	H	50.70	53.98	3.28	AV

802.11ax(MCS0)			HE20	106T				
Channel	CH 1		Freq	2412 MHz		RU offset	53	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
#2390	62.390	0.00	0.00	H	62.39	73.98	11.59	PK
2390.0	48.540	0.33	0.00	H	48.87	53.98	5.11	AV

802.11ax(MCS0)			HE20	106T				
Channel	CH 11		Freq	2462 MHz		RU offset	54	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
#2483.5	63.530	0.00	0.00	H	63.53	73.98	10.45	PK
2483.5	49.740	0.33	0.00	H	50.07	53.98	3.91	AV

802.11ax(MCS0)			HE20	52T				
Channel	CH 1		Freq	2412 MHz		RU offset	37	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2390.0	68.260	0.00	0.00	H	68.26	73.98	5.72	PK
2390.0	45.850	0.17	0.00	H	46.02	53.98	7.96	AV

802.11ax(MCS0)			HE20	52T				
Channel	CH 11		Freq	2462 MHz		RU offset	40	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	71.180	0.00	0.00	H	71.18	73.98	2.80	PK
2483.5	48.450	0.17	0.00	H	48.62	53.98	5.36	AV

802.11ax(MCS0)			HE20	26T				
Channel	CH 1		Freq	2412 MHz		RU offset	0	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2390.0	68.230	0.00	0.00	H	68.23	73.98	5.75	PK
2390.0	45.590	0.00	0.00	H	45.59	53.98	8.39	AV

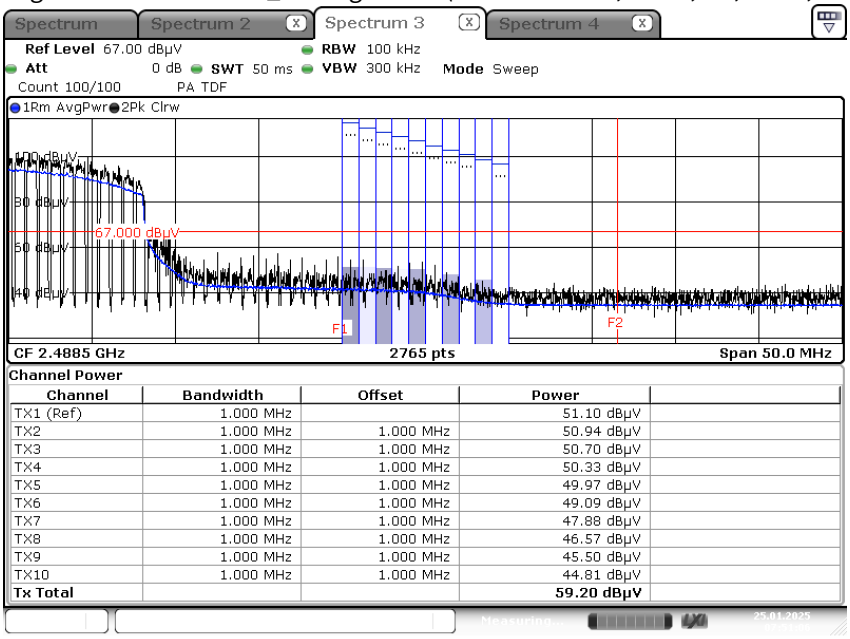
802.11ax(MCS0)			HE20	26T				
Channel	CH 11		Freq	2462 MHz		RU offset	8	
Frequency	Measured Value	Duty Cycle Factor	A.F+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	71.160	0.00	0.00	H	71.16	73.98	2.82	PK
2483.5	48.140	0.00	0.00	H	48.14	53.98	5.84	AV

▣ Test Plots

[MIMO_SDM(Ant.1+Ant.2)]

Note: In order to simplify the report, Plots of worst case are only reported.

Integration method Used_ Average result(802.11ax HE20, MCS0, SU, ch.11, X-H)



Channel	Bandwidth	Offset	Power
TX1 (Ref)	1.000 MHz		51.10 dBµV
TX2	1.000 MHz	1.000 MHz	50.94 dBµV
TX3	1.000 MHz	1.000 MHz	50.70 dBµV
TX4	1.000 MHz	1.000 MHz	50.33 dBµV
TX5	1.000 MHz	1.000 MHz	49.97 dBµV
TX6	1.000 MHz	1.000 MHz	49.09 dBµV
TX7	1.000 MHz	1.000 MHz	47.88 dBµV
TX8	1.000 MHz	1.000 MHz	46.57 dBµV
TX9	1.000 MHz	1.000 MHz	45.50 dBµV
TX10	1.000 MHz	1.000 MHz	44.81 dBµV
Tx Total			**59.20 dBµV**

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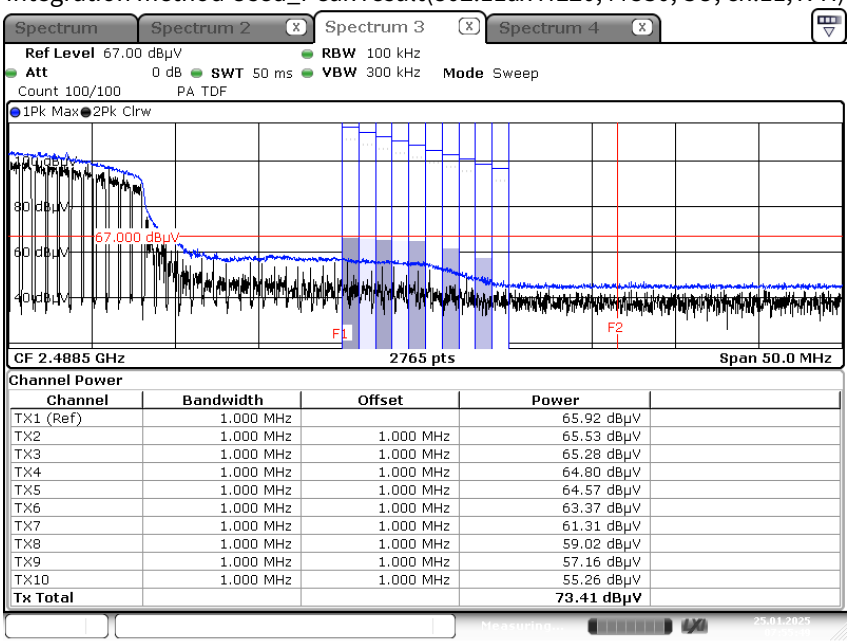
Integration method Used_Peak result(802.11ax HE20, MCS0, SU, ch.11, X-H)



Channel	Bandwidth	Offset	Power
TX1 (Ref)	1.000 MHz		65.92 dBµV
TX2	1.000 MHz	1.000 MHz	65.53 dBµV
TX3	1.000 MHz	1.000 MHz	65.28 dBµV
TX4	1.000 MHz	1.000 MHz	64.80 dBµV
TX5	1.000 MHz	1.000 MHz	64.57 dBµV
TX6	1.000 MHz	1.000 MHz	63.37 dBµV
TX7	1.000 MHz	1.000 MHz	61.31 dBµV
TX8	1.000 MHz	1.000 MHz	59.02 dBµV
TX9	1.000 MHz	1.000 MHz	57.16 dBµV
TX10	1.000 MHz	1.000 MHz	55.26 dBµV
Tx Total			**73.41 dBµV**

Date: 25.JAN.2025 07:55:48

10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	07/17/2025	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	07/02/2025	Annual
Temperature Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Signal Analyzer	N9030A	Keysight	MY55410508	08/23/2025	Annual
Power Meter	N1911A	Agilent	MY45100523	02/28/2025	Annual
Power Sensor	N1921A	Agilent	MY57820067	02/22/2025	Annual
Directional Coupler	87300B	Agilent	3116A03621	10/21/2025	Annual
Power Splitter	11667B	Hewlett Packard	10545	01/23/2026	Annual
DC Power Supply	E3632A	Agilent	KR01009150	04/18/2025	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	08285	05/28/2025	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	02/20/2025	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	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

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller (Antenna mast & Turn Table)	CO3000	Innco system	CO3000/ 15421/57580623/G	N/A	N/A
Antenna Position Tower	MA4640	Innco system	9320422	04/05/2025	Biennial
Turn Table	N/A	Innco system	5930623	N/A	N/A
Loop Antenna	FMZB 1513	Schwarzbeck	1513-175	01/06/2027	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-1135	08/19/2026	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1151	07/14/2025	Biennial
Horn Antenna (15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Amp & Filter Bank Switch Controller	FBSM-01B	T&M system	TM2009001	N/A	N/A
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	12/26/2025	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/04/2025	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/04/2025	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	01/09/2026	Annual
RF Switching System	FMSR-05B (HPF(3~18GHz) + LNA1(1~18GHz))	T&M system	S5L1	03/12/2025	Annual
RF Switching System	FMSR -05B (ATT(10dB) + LNA1(1~18GHz))	T&M system	S5L2	03/12/2025	Annual
RF Switching System	FMSR -05B (ATT(3dB) + LNA1(1~18GHz))	T&M system	S5L3	03/12/2025	Annual
RF Switching System	FMSR -05B (LNA1(1~18GHz))	T&M system	S5L4	03/12/2025	Annual
RF Switching System	FMSR -05B (HPF(7~18GHz) + LNA2(6~18GHz))	T&M system	S5L5	03/12/2025	Annual
RF Switching System	FMSR -05B (Thru(30MHz ~ 18GHz))	T&M system	S5L6	03/12/2025	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/07/2025	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000175	03/19/2025	Annual
Spectrum Analyzer	FSV40 (9 kHz ~ 40 GHz)	Rohde & Schwarz	101510	09/24/2025	Annual

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-2502-FC031-P