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TEST REPORT

FCC Test for AT1K09d-A10
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2402-FC019-R1

DATE OF ISSUE
February 22, 2024

Tested by
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TEST REPORT

REPORT NO.
HCT-RF-2402-FC019-R1

DATE OF ISSUE
February 22, 2024

Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Eut Type Model Name	AU(AT1K09d) AT1K09d-A10
FCC ID	A3LAT1K09D-A10
Date of Test	November 29, 2023 ~ February 05, 2024
FCC Rule Part(s)	CFR 47 Part 2, Part 30
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

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REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	February 14, 2024	Initial Release
1	February 22, 2024	Revised the photo of the antenna board on page 7.

Notice

Content

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).

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) / A2LA(American Association for Laboratory Accreditation)(4114.01), which signed the ILAC-MRA.

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CONTENTS

1. GENERAL INFORMATION 5
1.1. APPLICANT INFORMATION 5
1.2. PRODUCT INFORMATION 5
1.3. TEST INFORMATION 8
2. FACILITIES AND ACCREDITATIONS 9
2.1. FACILITIES 9
2.2. EQUIPMENT 9
3. TEST SPECIFICATIONS 10
3.1. STANDARDS 10
3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST 11
3.3. MAXIMUM MEASUREMENTUNCERTAINTY 14
3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS 14
3.5. TEST DIAGRAMS 15
4. TEST EQUIPMENTS 17
5. TEST RESULT 18
5.1. OCCUPIED BANDWIDTH 18
5.2. EIRP DENSITY 42
5.3. EQUIVALENT ISOTROPIC RADIATED POWER 69
5.4. BAND EDGE 95
5.5. RADIATED SPURIOUS EMISSIONS 124
5.6. FREQUENCY STABILITY 169
6. Annex A_Test Equipment CERTIFIED DOCUMENTS 173
7. Annex B_EUT AND TEST SETUP PHOTO 174

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1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	Samsung Electronics Co., Ltd.
Company Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

1.2. PRODUCT INFORMATION

EUT Type	AU(AT1K09d)
EUT Serial Number	DKN2311070
Equipment Class	5GB-Part 30 Fixed Transmitter
Power Supply	-48 VDC
Output Power	See table below
Frequency Range	24 250 MHz ~ 24 450 MHz, 24 750 MHz ~ 25 250 MHz 38 300 MHz ~ 40 000 MHz

Mode		OBW [MHz]	EIRP [dBm/CC/path]	Total [dBm]
24 GHz	1CC	100	54.0	57.0
	2CC	200	57.0	60.0
	3CC	300	58.8	61.8
	4CC ~ 7CC	400 ~ 700	60.0	63.0
39 GHz	1CC	100	54.0	57.0
	2CC	200	57.0	60.0
	3CC	300	58.7	61.7
	4CC ~ 8CC	400 ~ 800	60.0	63.0
Inter-band 24 GHz + 39 GHz	2CC ~ 8CC	200 ~ 800	24 GHz: 63.0 39 GHz: 63.0	

*For detail carrier configuration, refer to the Technical Documents.

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Emission Designator	Mode		QPSK (G7D)	QPSK Max EIRP Density [W/100 MHz]	QAM (W7D)	QAM Max EIRP Density [W/100 MHz]
	24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz Contiguous		94M4G7D	516.42	94M4W7D	530.88
	24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz Contiguous		94M3G7D	729.46	94M4W7D	851.14
	24 GHz 7CC 700 MHz Contiguous	24.25 ~ 24.45 GHz Band 2CC	193MG7D	315.50	193MG7D	322.11
		24.75 ~ 25.25 GHz Band 5CC	490MG7D	436.52	490MW7D	463.47
	24 GHz 2CC (24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) Non-Contiguous		189MG7D	653.13	189MW7D	674.53
	24 GHz 2CC (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) Non-Contiguous		189MG7D	638.26	189MW7D	628.06
	39 GHz 1CC 100 MHz Contiguous		94M4G7D	512.86	94M4W7D	516.42
	39 GHz 8CC 800 MHz Contiguous		789MG7D	197.70	789MW7D	205.59
	39 GHz 2CC (1CC + 1CC) 100 MHz Non-Contiguous		189MG7D	363.08	189MW7D	363.92
	39 GHz 8CC (1CC + 7CC) 800 MHz Non-Contiguous		783MG7D	198.61	784MW7D	205.12
	39 GHz 8CC (7CC + 1CC) 800 MHz Non-Contiguous		784MG7D	205.12	785MW7D	207.49
Channel Bandwidths	24 GHz up to 7CC: 1CC(100 MHz) ~ 7CC(100 MHz * 7) 39 GHz up to 8CC: 1CC(100 MHz) ~ 8CC(100 MHz * 8) 24 GHz + 39 GHz up to 8CC					
Modulation Type	5G NR: QPSK, 16QAM, 64QAM, 256QAM					

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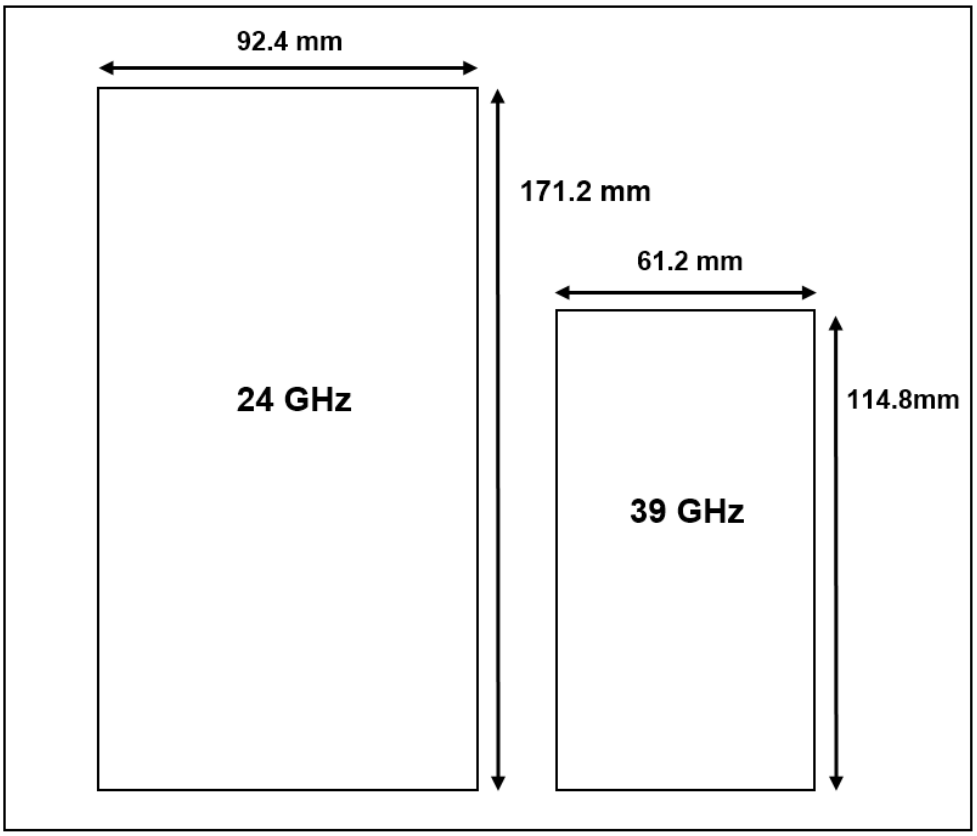
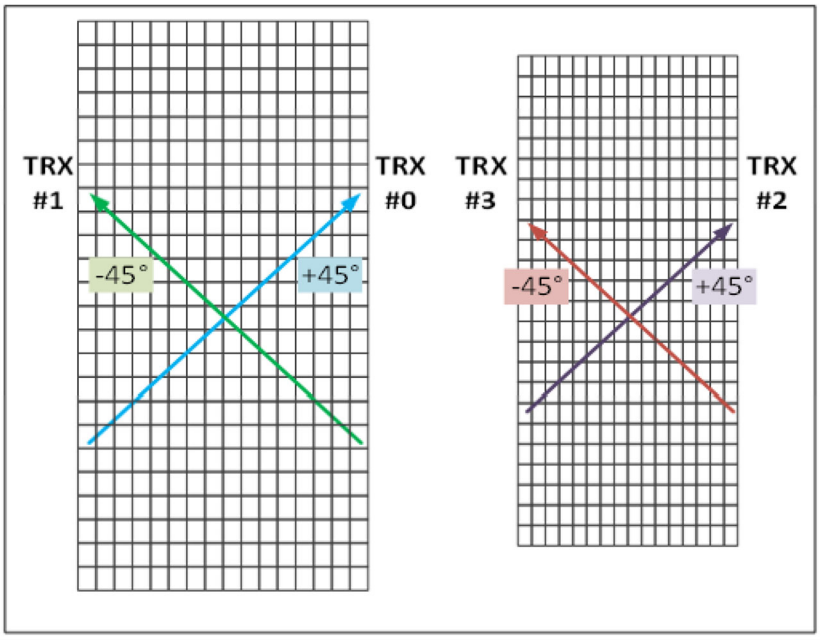
Antenna Specification	Maximum Gain: 30.4 dBi (24 GHz) / 29.9 dBi (39 GHz) Size:  Array: 

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1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 30
Measurement standards	ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 662911 D01 v02r01, KDB 842590 D01 v01r02
Place of Test	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

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2. FACILITIES AND ACCREDITATIONS

2.1. 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 31, 2022 (CAB identifier: KR0032).

2.2. 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.
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.”

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3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 30

Description	Reference	Results
Occupied Bandwidth	§ 2.1049	Compliant
EIRP Density	§ 30.202	Compliant
Equivalent Isotropic Radiated Power	§ 2.1046	Compliant
Band Edge	§ 2.1051, § 30.203	Compliant
Radiated Spurious Emissions	§ 2.1051, § 30.203	Compliant
Frequency Stability	§ 2.1055	Compliant

Note:

This device is reusing the test data from the test report (HCT-RF-2402-FC017) since this devices has same HW and SW capabilities with the device referenced except DC power supply.

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3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

- All tests is performed by radiated measurement and applied below conditions.

: Used measurement distance with far field of test such as EIRP, OBW and Band edge are as follow.

24 GHz	*Wavelength[m] = Speed of light[m/s] / Measurement frequency[Hz] = (3 x 10^8) / (24.25 x 10^9)= 0.01237* *(2 X (EUT Antenna dimension)^2) / Wavelength = (2 X (0.19457)^2)/ 0.01237 = 6.12* ***m***
39 GHz	*Wavelength[m] = Speed of light[m/s] / Measurement frequency[Hz] = (3 x 10^8) / (40.0 x 10^9)= 0.0075* *(2 X (EUT Antenna dimension)^2) / Wavelength = (2 X (0.13009)^2)/ 0.0075 = 4.51* ***m***

So, measurement distance is 6.5 m.

: Spurious emissions measurement distance is shown in table below(Reference : Measurement Antenna Dimension).

[24 GHz]

Frequency Rage (GHz)	Wavelength (cm)	Far Field Distance (m)	Measurement Distance(m)
18 ~ 24.25	1.24	1.491	3.50
24.45 ~ 24.75	1.21	1.522	3.50
25.25 ~ 40	0.75	2.460	3.50
40 ~ 60	0.50	1.354	1.50
60 ~90	0.33	0.856	1.50
90 ~ 140	0.21	0.572	1.50
140 ~ 200	0.15	0.332	1.50

[39 GHz]

Frequency Rage (GHz)	Wavelength (cm)	Far Field Distance (m)	Measurement Distance(m)
18 ~ 38.3	0.80	2.312	3.50
40 ~ 60	0.50	1.354	1.50
60 ~90	0.33	0.856	1.50
90 ~ 140	0.21	0.572	1.50
140 ~ 200	0.15	0.332	1.50

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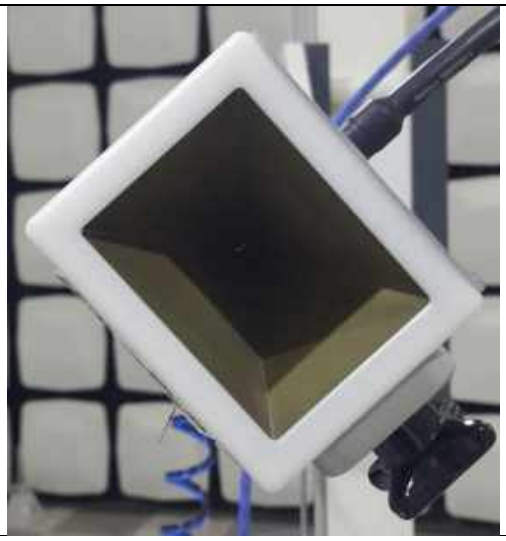
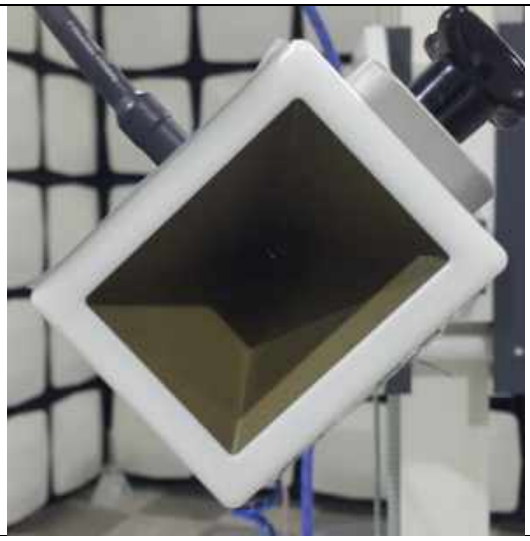
: Radiated test is performed on various angle of antenna and following location is worst test case.

45	135
	

- CC means component carriers and EUT support 1CC ~ 7CC (24 GHz), 1CC ~ 8CC (39GHz).
  : 24 GHz up to 7CC: 1CC(100 MHz) ~ 7CC(100 MHz * 7)
  39 GHz up to 8CC: 1CC(100 MHz) ~ 8CC(100 MHz * 8)
  24 GHz + 39 GHz up to 8CC

- In case of far-filed distance for fundamental emission, we applied the EUT antenna dimension because the EUT antenna dimension is bigger than the measurement antenna dimension.

- Inter-Band Carrier aggregation of 24GHz and 39 GHz was tested for RSE and band edge test as worst case mode.

- Test was performed the carrier case having maximum output power and maximum PSD(It means the worst case.).

- After pre-testing in all modes from 1CC to 7CC (24 GHz) / 1CC to 8CC (39 GHz),
  1CC and 7CC (24 GHz) / 1CC and 8CC (39 GHz)modes has founded out as worst mode.
  And in non-contiguous operation, 7CC(24 GHz) / 8CC(39 GHz) is the mode which has highest total power and 1CC + 1CC (24 GHz) / 1CC + 1CC, 1CC + 7CC, 7CC + 1CC (39 GHz) mode as non-contiguous mode is the worst case in both RSE and Bandedge test.

- Unwanted radiated emissions test was performed on state of all EUT antenna path is operated with a maximum output power level.

- Transmitter output signals are correlated.

- All modulations(QPSK, 16QAM, 64QAM, 256QAM) were investigated and the worst case configuration results are reported.

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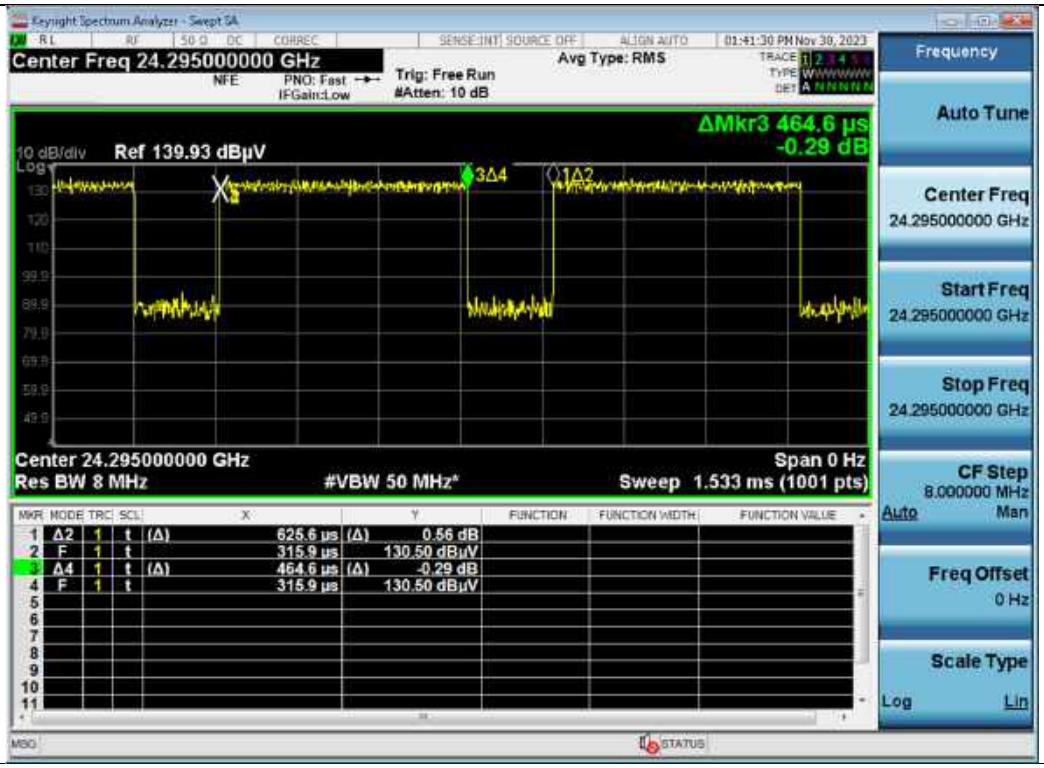
- Because of the EUT using TDD technology, it cannot be configured to transmit continuously and measurement instrument cannot be configured to measure only during active transmissions. So we perform the measurement using duty cycle method.

Measurement Result of AT1K09d-A10 Transmit On/Off Timing



: The EUT duty cycle is calculated according to ANSI C63.26 - 5.2.4.3.4.

Duty Cycle = On-time / Transmitter period = 0.4646 ms / 0.6256 ms = 0.7426

Duty Correction = 10 log (1/duty cycle) = 10 log (1/0.7426) = 1.2925 dB

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3.3. MAXIMUM MEASUREMENTUNCERTAINTY

Description	Condition	Uncertainty
Radiated Disturbance	9 kHz ~ 30 MHz	4.14 dB
	30 MHz ~ 1 GHz	5.82 dB
	1 GHz ~ 18 GHz	5.74 dB
	18 GHz ~ 40 GHz	5.76 dB
	Above 40 GHz	5.52 dB

Coverage factor $k = 2$, Confidence levels of 95 %

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+15 °C to +35 °C
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

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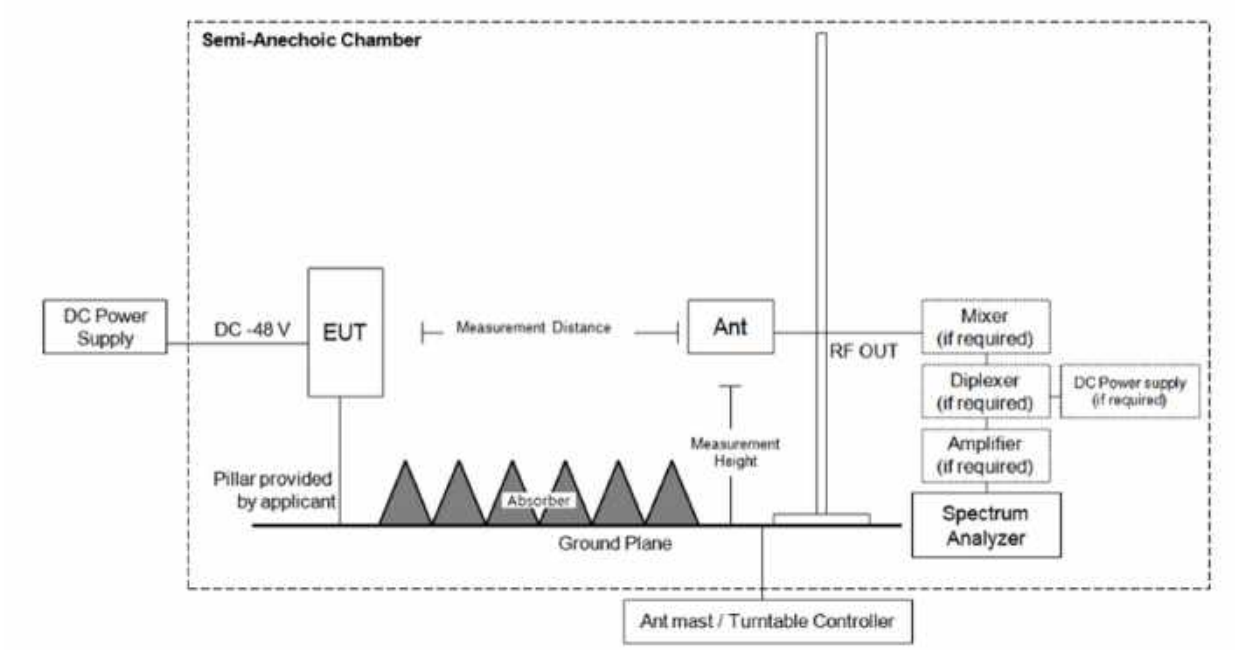
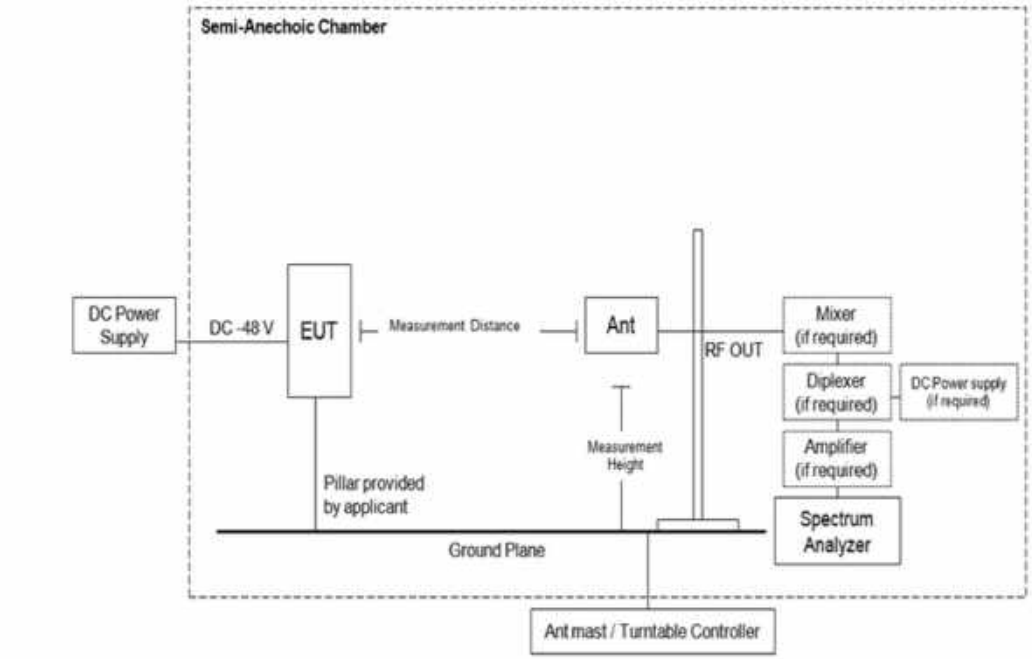
3.5. TEST DIAGRAMS

Occupied Bandwidth / EIRP / Band Edge / Radiated Spurious Emissions in 1 GHz to 40 GHz



Radiated Spurious Emissions in other bands



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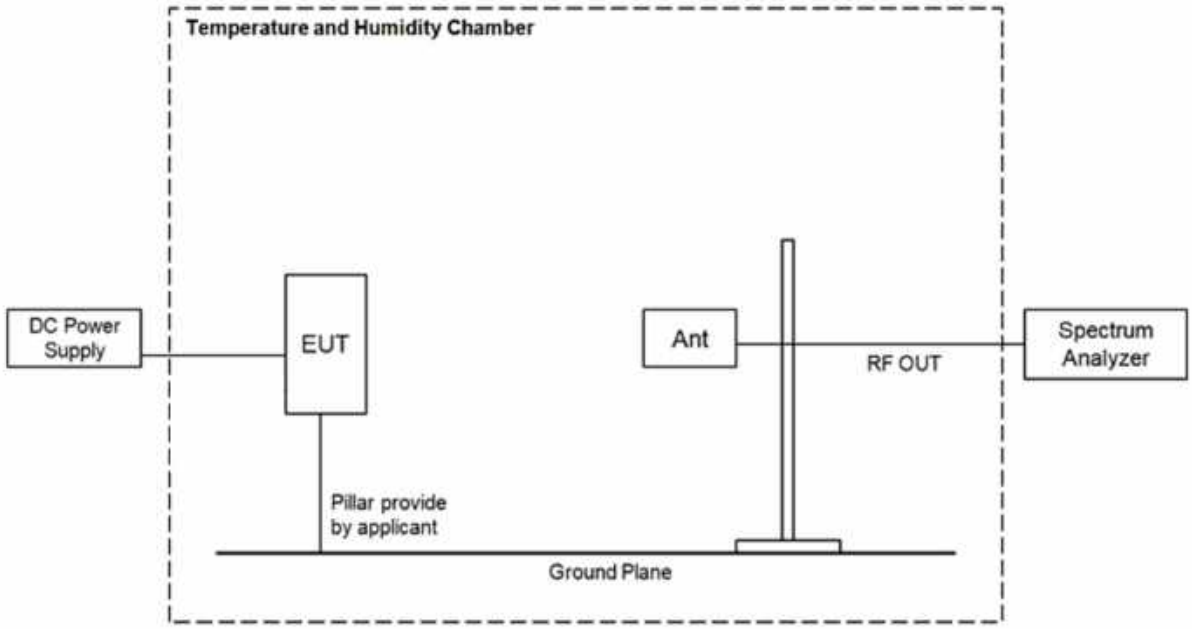
Frequency stability



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4. TEST EQUIPMENTS

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
PXA Signal Analyzer	FSV40	Rohde & Schwarz	100901	03/27/2024	Annual
PXA Signal Analyzer	N9030A	Keysight	MY55410714	02/15/2024	Annual
PXA Signal Analyzer	N9030B	Keysight	MY60070602	10/05/2024	Annual
AC Power Supply	PCR2000MA	KIKUSUI	ZL002530	12/29/2024	Annual
DC Power Supply	PWR800L	KIKUSUI	RK000880	07/17/2024	Annual
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	2090	Emco	060520	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Loop Antenna	Loop Antenna	Rohde & Schwarz	1513-175	01/16/2025	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	00895	09/16/2024	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1300	01/03/2026	Biennial
Horn Antenna	BBHA 9170	Schwarzbeck	BBHA9170541	11/01/2025	Biennial
Horn Antenna	WR-19 Horn Antenna	OML INC.	18042301	03/14/2024	Biennial
Horn Antenna	WR-12 Horn Antenna	OML INC.	18042301	03/14/2024	Biennial
Horn Antenna	WR-08 Horn Antenna	OML INC.	18050101	03/15/2024	Biennial
Horn Antenna	WR-05 Horn Antenna	OML INC.	18050101	03/15/2024	Biennial
Harmonic Mixer	WR-5	VDI	SAX774	03/14/2024	Annual
Harmonic Mixer	WR-8	VDI	SAX779	03/14/2024	Annual
Harmonic Mixer	WR-12	VDI	SAX773	03/22/2024	Annual
Harmonic Mixer	WR-19	VDI	SAX771	03/14/2024	Annual
Source Module	WR-19	OML INC.	S19MS-A-160516-1	07/19/2024	Annual
Source Module	WR-12	OML INC.	S12MS-A-160419-1	07/19/2024	Annual
Source Module	WR-08	OML INC.	S08MS-A-160419-1	07/19/2024	Annual
Source Module	WR-05	OML INC.	S05MS-A-160419-1	07/19/2024	Annual
Temperature and Humidity Chamber	NY-THR18750	NANGYEUL CO., LTD.	NY-200912201A	01/04/2025	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.

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5. TEST RESULT

5.1. OCCUPIED BANDWIDTH

FCC Rules

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

The measurement is performed in accordance with Section 5.4.3 and 5.4.4 of ANSI C63.26.

5.4.3 Occupied bandwidth—Relative measurement procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:

1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the

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relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

5.4.4 Occupied bandwidth—Power bandwidth (99%) measurement procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

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Test Results:
Tabular Data of Occupied Bandwidth

Contiguous

24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz

Ant.	Ant. Angle	CC	Channel	Mod.	Freq. (GHz)	Measured OBW (MHz)
A	45	1	Low	QPSK	24.30	94.280
				16QAM		94.145
				64QAM		94.322
				256QAM		94.432
B	135	1		QPSK	24.30	94.192
				16QAM		94.223
				64QAM		94.418
				256QAM		94.214
A	45	1	Middle	QPSK	24.35	94.213
				16QAM		94.021
				64QAM		94.000
				256QAM		93.991
B	135	1		QPSK	24.35	94.206
				16QAM		94.129
				64QAM		94.269
				256QAM		94.317
A	45	1	High	QPSK	24.40	94.150
				16QAM		94.371
				64QAM		94.174
				256QAM		94.230
B	135	1		QPSK	24.40	94.345
				16QAM		94.205
				64QAM		94.161
				256QAM		94.245

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24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz

Ant.	Ant. Angle	CC	Channel	Mod.	Freq. (GHz)	Measured OBW (MHz)
A	45	1	Low	QPSK	24.80	94.229
				16QAM		94.153
				64QAM		94.272
				256QAM		94.243
B	135	1		QPSK	24.80	94.222
				16QAM		94.219
				64QAM		94.319
				256QAM		94.251
A	45	1	Middle	QPSK	25.00	94.141
				16QAM		94.242
				64QAM		94.365
				256QAM		94.269
B	135	1		QPSK	25.00	94.285
				16QAM		94.322
				64QAM		94.262
				256QAM		94.153
A	45	1	High	QPSK	25.20	94.075
				16QAM		94.220
				64QAM		94.327
				256QAM		94.240
B	135	1		QPSK	25.20	94.293
				16QAM		94.159
				64QAM		94.149
				256QAM		94.174

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24 GHz 7CC 700 MHz (24.25 ~ 24.45 GHz Band 2CC + 24.75 ~ 25.25 GHz Band 5CC)

Ant.	Ant. Angle	CC	Freq. (GHz)	Mod.	24.25 ~ 24.25 GHz Band Measured OBW (MHz)	24.75 ~ 25.25 GHz Band Measured OBW (MHz)	SUM OBW (MHz)
A	45	2+5	24.35 + 25.00	QPSK	193.34	489.97	683.31
				16QAM	193.34	490.38	683.72
				64QAM	192.75	490.31	683.06
				256QAM	193.25	489.42	682.67
B	135	2+5		QPSK	193.17	489.28	682.45
				16QAM	193.29	489.16	682.45
				64QAM	193.33	489.22	682.55
				256QAM	193.40	489.85	683.25

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Non-Contiguous

24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz)

Ant.	Ant. Angle	CC	Mod.	24.25 ~ 24.45 GHz Band Low Ch.		24.75 ~ 25.25 GHz Band High Ch.		SUM OBW (MHz)
				Freq. (GHz)	Measured OBW (MHz)	Freq. (GHz)	Measured OBW (MHz)	
A	45	1+1	QPSK	24.30	94.308	25.20	94.209	188.517
			16QAM		94.254		94.278	188.532
			64QAM		94.402		94.082	188.484
			256QAM		94.160		94.307	188.467
B	135	1+1	QPSK	24.30	94.234	25.20	94.238	188.472
			16QAM		94.171		94.266	188.437
			64QAM		94.203		94.229	188.432
			256QAM		94.239		94.232	188.471

24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz)

Ant.	Ant. Angle	CC	Mod.	24.25 ~ 24.45 GHz Band High Ch.		24.75 ~ 25.25 GHz Band Low Ch.		SUM OBW (MHz)
				Freq. (GHz)	Measured OBW (MHz)	Freq. (GHz)	Measured OBW (MHz)	
A	45	1+1	QPSK	24.40	94.048	24.80	94.048	188.096
			16QAM		94.314		94.314	188.628
			64QAM		94.203		94.247	188.450
			256QAM		94.366		94.346	188.712
B	135	1+1	QPSK	24.40	94.225	24.80	94.225	188.450
			16QAM		94.267		94.267	188.534
			64QAM		94.164		94.188	188.352
			256QAM		94.340		94.228	188.568

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Contiguous

39 GHz 1CC 100 MHz

Ant.	Ant. Angle	CC	Channel	Mod.	Freq. (GHz)	Measured OBW (MHz)
A	45	1	Low	QPSK	38.35	94.103
				16QAM		94.228
				64QAM		94.200
				256QAM		94.184
B	135	1		QPSK	38.35	94.272
				16QAM		94.275
				64QAM		94.296
				256QAM		94.114
A	45	1	Middle	QPSK	39.15	94.179
				16QAM		94.136
				64QAM		94.155
				256QAM		94.027
B	135	1		QPSK	39.15	94.092
				16QAM		94.168
				64QAM		94.176
				256QAM		94.162
A	45	1	High	QPSK	39.95	94.378
				16QAM		94.414
				64QAM		94.331
				256QAM		94.262
B	135	1		QPSK	39.95	94.310
				16QAM		94.327
				64QAM		94.336
				256QAM		94.417

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39 GHz 8CC 800 MHz

Ant.	Ant. Angle	CC	Channel	Mod.	Freq. (GHz)	Measured OBW (MHz)
A	45	8	Low	QPSK	38.70	787.92
				16QAM		787.74
				64QAM		787.87
				256QAM		788.44
B	135	8		QPSK	38.70	788.65
				16QAM		788.45
				64QAM		788.63
				256QAM		788.87
A	45	8	Middle	QPSK	39.15	788.72
				16QAM		787.25
				64QAM		786.71
				256QAM		788.05
B	135	8		QPSK	39.15	786.97
				16QAM		787.68
				64QAM		787.39
				256QAM		788.22
A	45	8	High	QPSK	39.60	788.61
				16QAM		788.34
				64QAM		788.89
				256QAM		788.07
B	135	8		QPSK	39.60	787.48
				16QAM		787.85
				64QAM		787.86
				256QAM		787.63

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Non-Contiguous

39 GHz 2CC (1CC + 1CC) 200 MHz

Ant.	Ant. Angle	CC	Mod.	Channel: Low		Channel: High		SUM OBW (MHz)
				Freq. (GHz)	Measured OBW (MHz)	Freq. (GHz)	Measured OBW (MHz)	
A	45	1+1	QPSK	38.35	94.230	39.95	94.422	188.65
			16QAM		94.354		94.119	188.47
			64QAM		94.232		94.244	188.48
			256QAM		94.226		94.309	188.54
B	135	1+1	QPSK	38.35	94.338	39.95	94.349	188.69
			16QAM		94.308		94.379	188.69
			64QAM		94.259		94.170	188.43
			256QAM		94.349		94.227	188.58

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39 GHz 8CC (1CC + 7CC) 800 MHz

Ant.	Ant. Angle	CC	Mod.	Channel: Low		Channel: High		SUM OBW (MHz)
				Freq. (GHz)	Measured OBW (MHz)	Freq. (GHz)	Measured OBW (MHz)	
A	45	1+7	QPSK	38.35	94.268	39.65	688.34	782.60
			16QAM		94.334		689.12	783.45
			64QAM		94.247		688.79	783.04
			256QAM		94.397		688.89	783.28
B	135	1+7	QPSK	38.35	94.223	39.65	688.86	783.09
			16QAM		94.324		688.63	782.95
			64QAM		94.281		689.20	783.48
			256QAM		94.229		688.83	783.06

39 GHz 8CC (7CC + 1CC) 800 MHz

Ant.	Ant. Angle	CC	Mod.	Channel: Low		Channel: High		SUM OBW (MHz)
				Freq. (GHz)	Measured OBW (MHz)	Freq. (GHz)	Measured OBW (MHz)	
A	45	7+1	QPSK	38.65	689.46	39.95	94.235	783.69
			16QAM		688.88		94.467	783.35
			64QAM		690.53		94.514	785.05
			256QAM		689.80		94.558	784.36
B	135	7+1	QPSK	38.65	690.04	39.95	94.400	784.44
			16QAM		690.17		94.216	784.38
			64QAM		690.06		94.365	784.43
			256QAM		689.94		94.287	784.23

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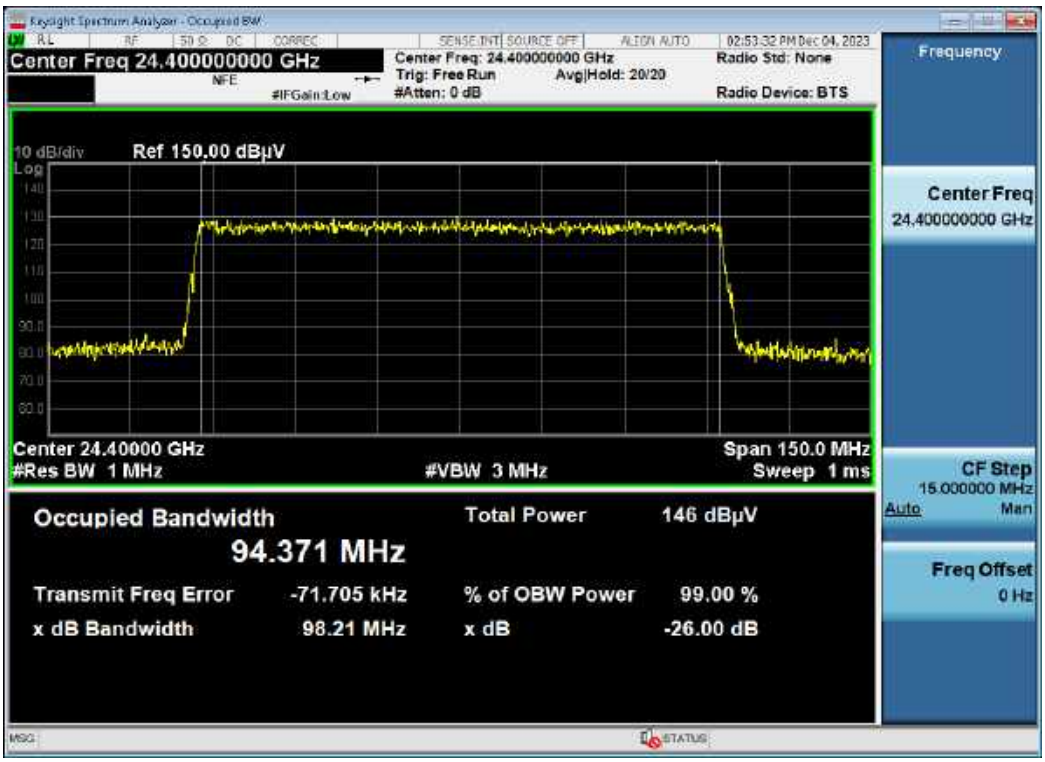
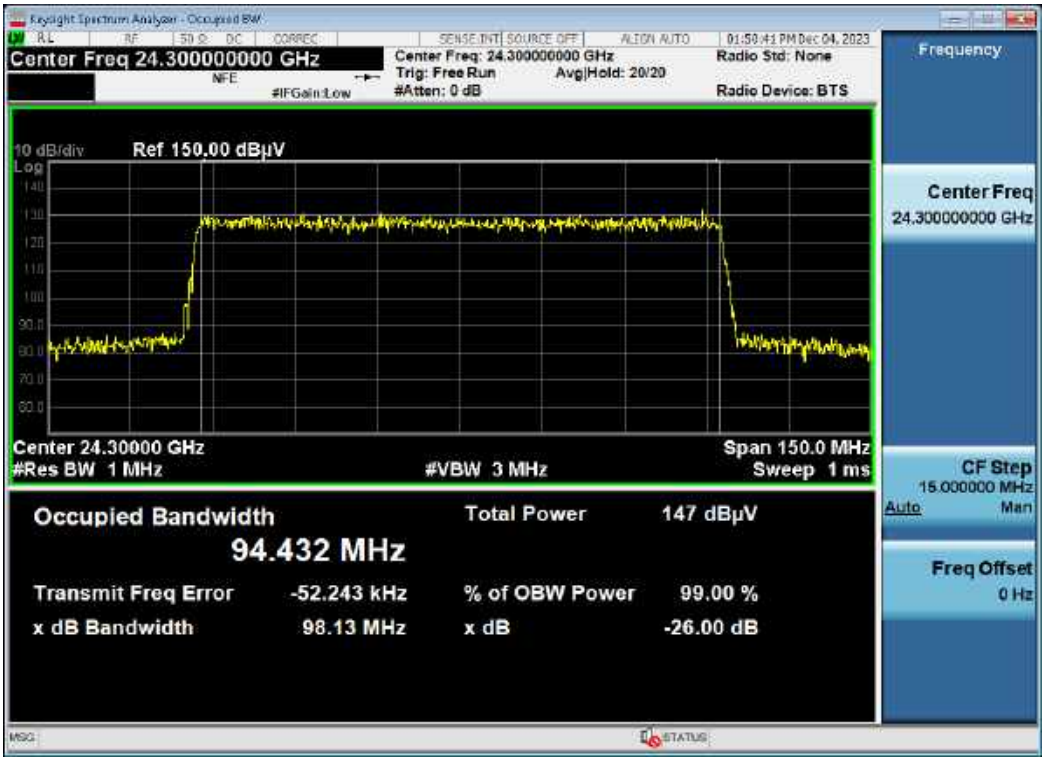
Plot Data of RF Occupied Bandwidth

Antenna A / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 16QAM / High



Antenna B / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 256QAM / Low



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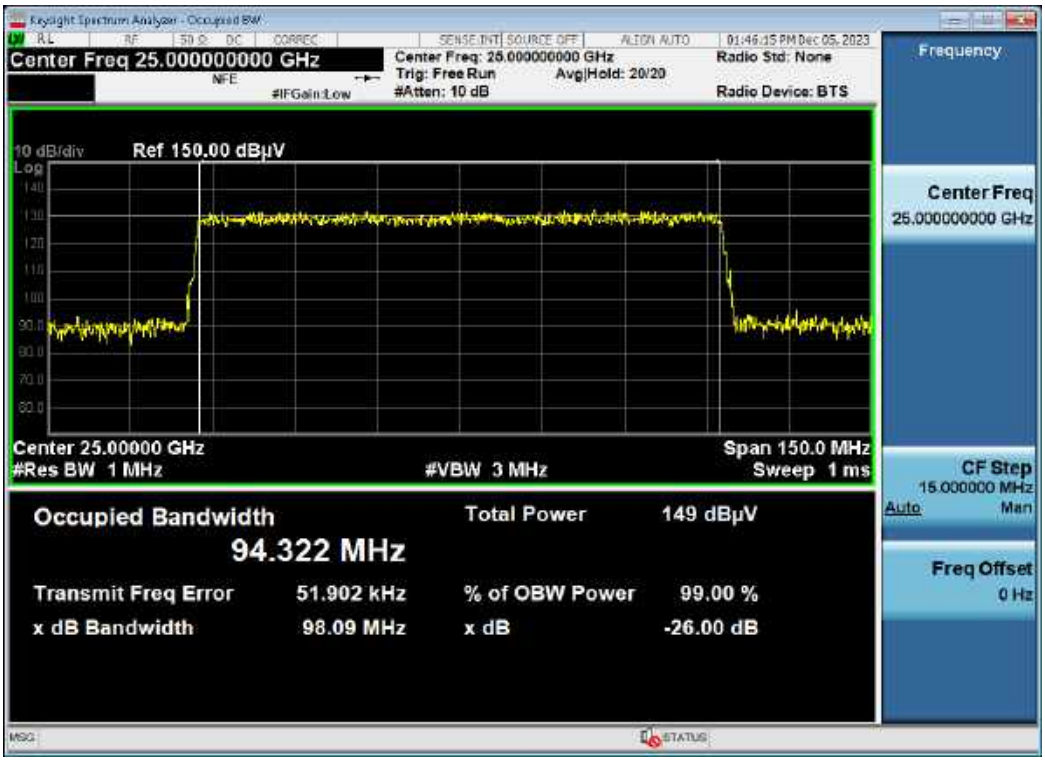
Antenna A / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 64QAM / Middle

Antenna B / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 16QAM / Middle



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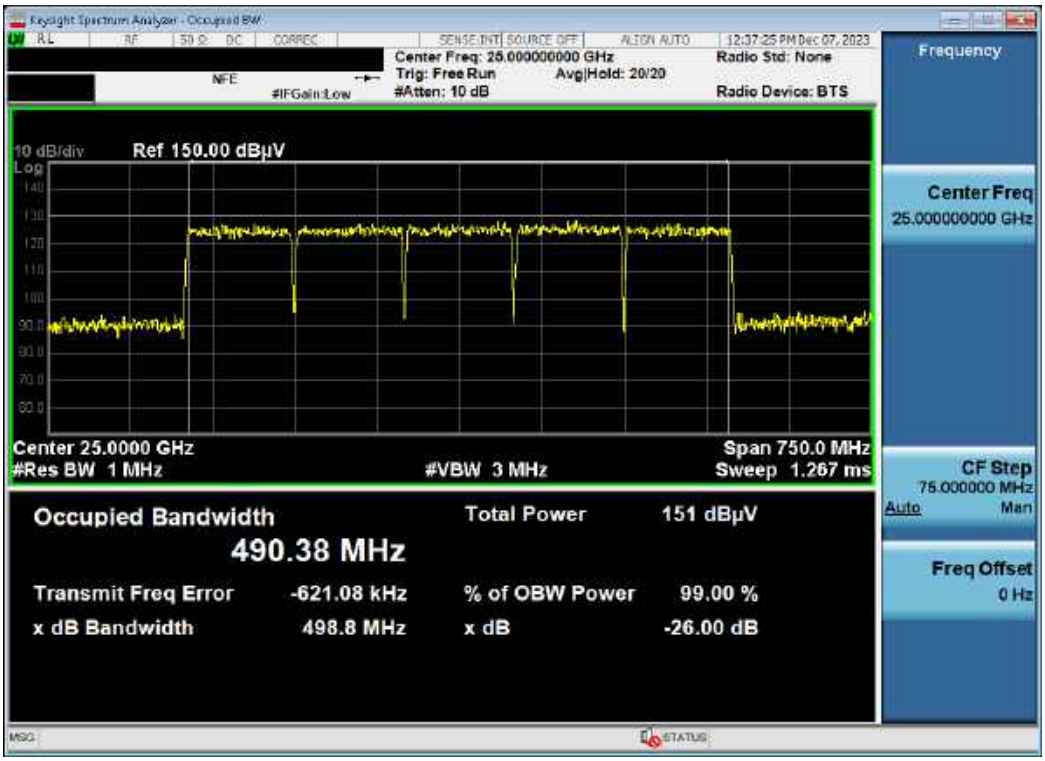
Antenna A / 24 GHz 7CC(2CC+5CC) 700 MHz / 16QAM / 24.25 ~ 24.45 GHz Band 2CC

Antenna A / 24 GHz 7CC(2CC+5CC) 700 MHz / 16QAM / (24.75 ~ 25.25 GHz Band)



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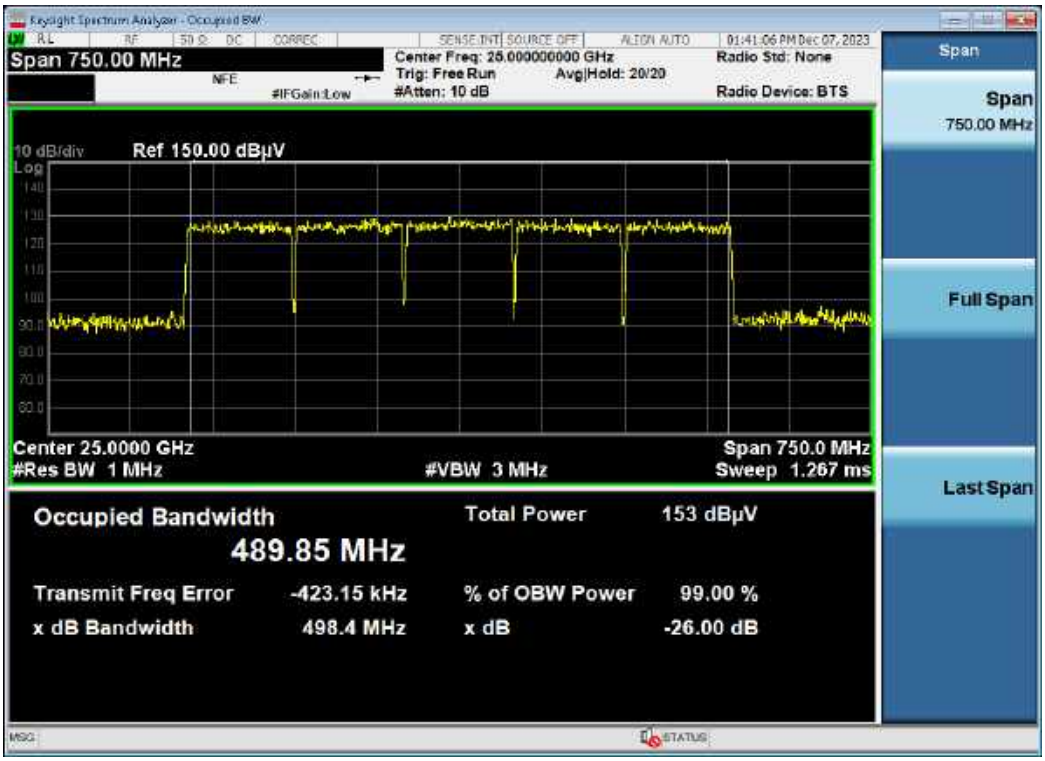
Antenna B / 24 GHz 7CC(2CC+5CC) 700 MHz / 256QAM / Low

Antenna B / 24 GHz 7CC(2CC+5CC) 700 MHz / 256QAM / High



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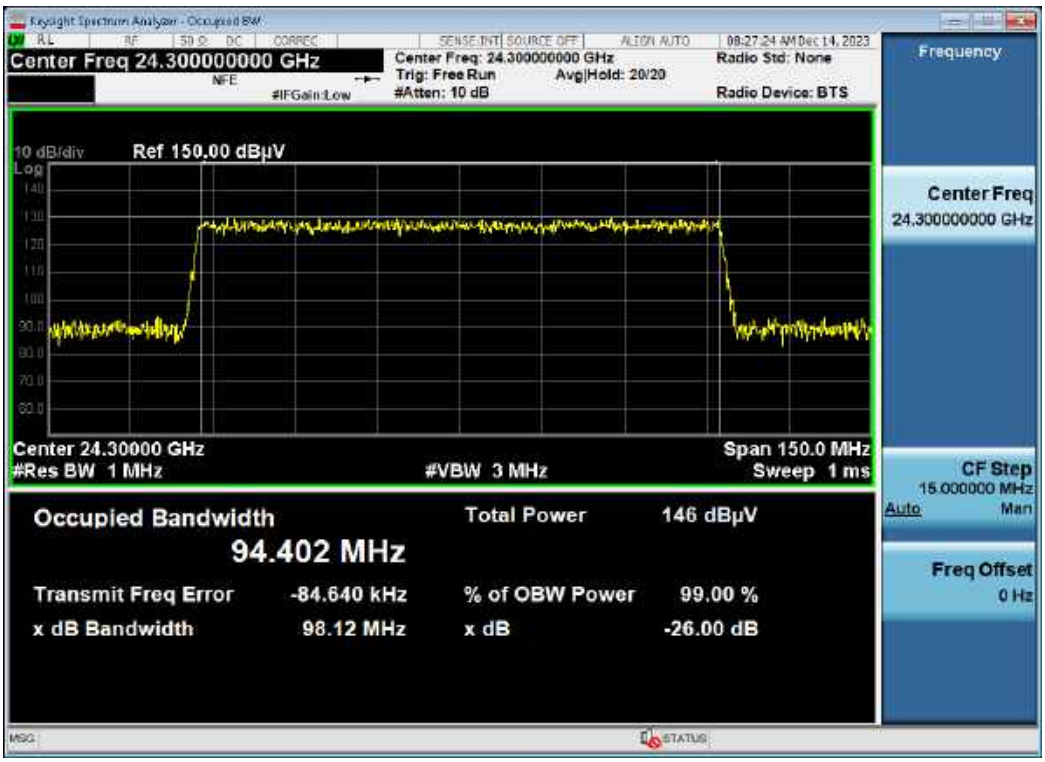
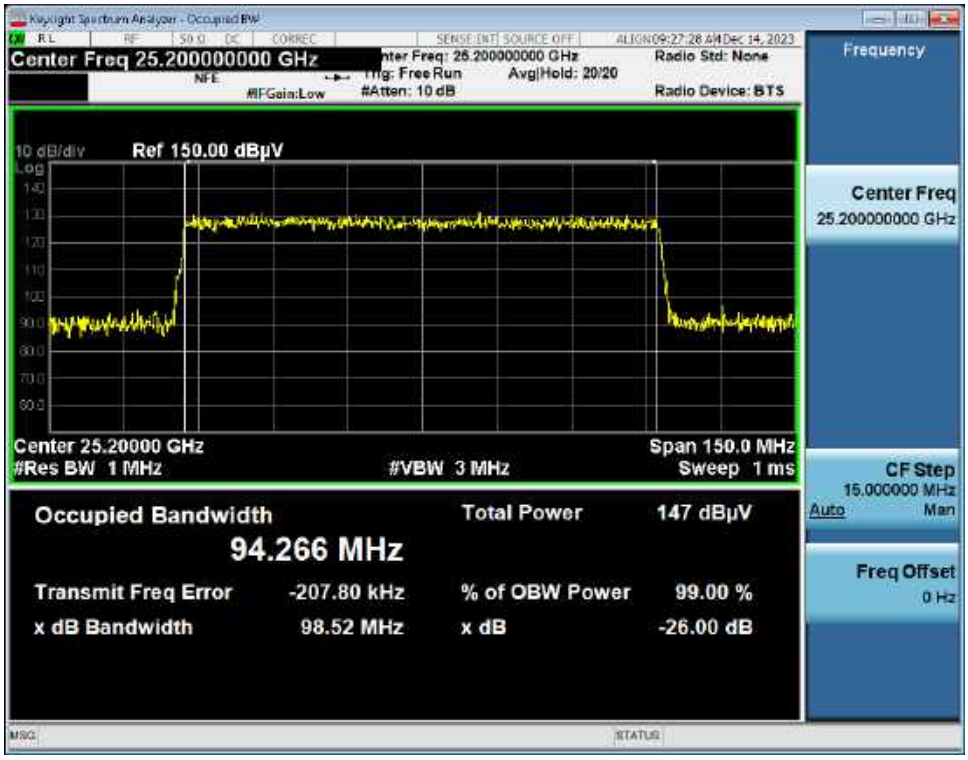
Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM / Low



Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 16QAM / High



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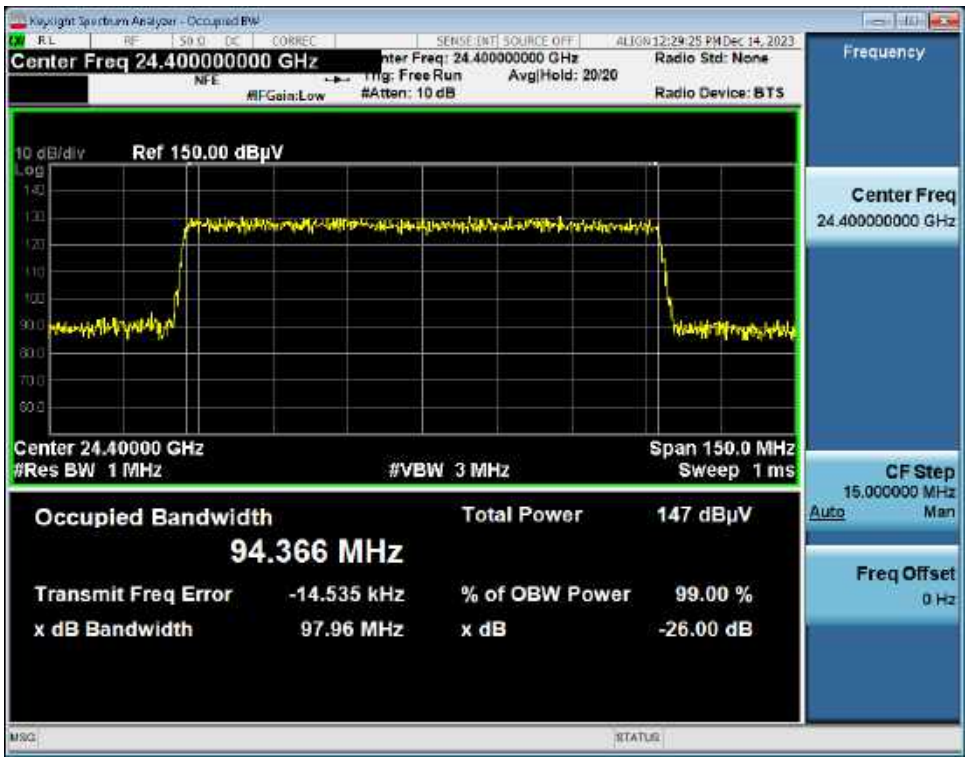
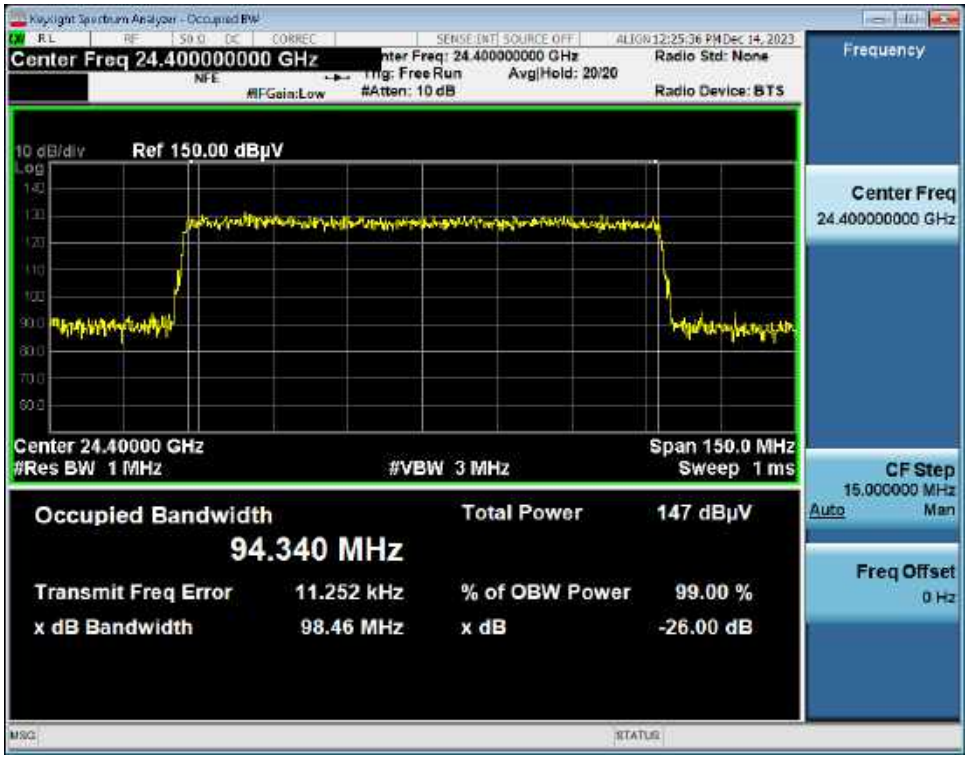
Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 256QAM / Low



Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 256QAM / Low



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Antenna A / 39 GHz 1CC 100 MHz / 16QAM / High

Antenna B / 39 GHz 1CC 100 MHz / 256QAM / High

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Antenna A / 39 GHz 8CC 800 MHz / 64QAM / High

Antenna B / 39 GHz 8CC 800 MHz / 256QAM / Low

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Antenna A / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / Low

Antenna A / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / High

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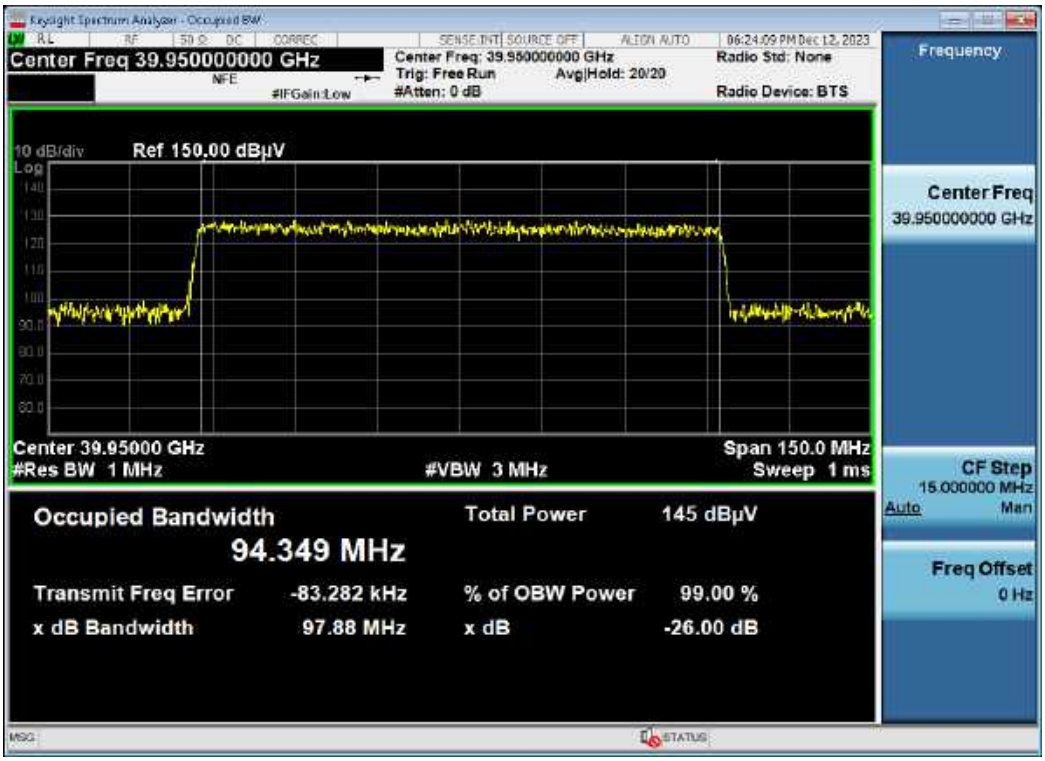
Antenna B / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / Low

Antenna B / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / High



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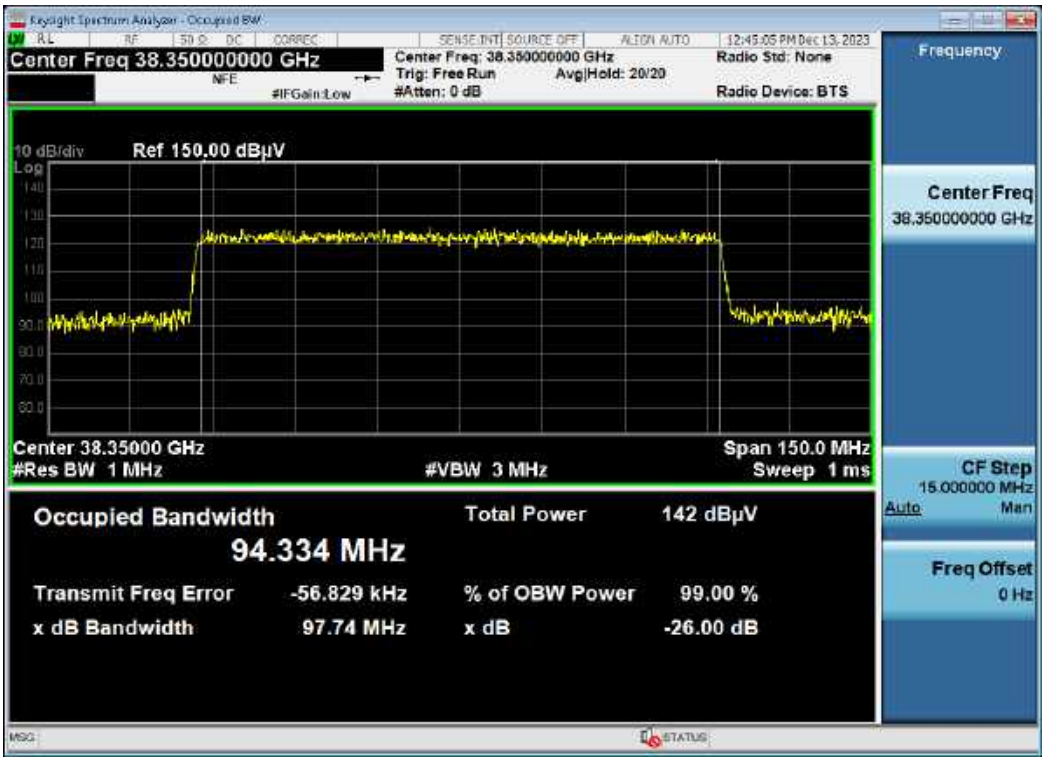
Antenna A / 39 GHz 8CC (1CC + 7CC) 800 MHz / 16QAM / Low



Antenna A / 39 GHz 8CC (1CC + 7CC) 800 MHz / 16QAM / High

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Antenna B / 39 GHz 8CC (1CC + 7CC) 800 MHz / 64QAM / Low

Antenna B / 39 GHz 8CC (1CC + 7CC) 800 MHz / 64QAM / High

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Antenna A / 39 GHz 8CC (7CC + 1CC) 800 MHz / 64QAM / Low

Antenna A / 39 GHz 8CC (7CC + 1CC) 800 MHz / 64QAM / High

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Antenna B / 39 GHz 8CC (7CC + 1CC) 800 MHz / QPSK / Low

Antenna B / 39 GHz 8CC (7CC + 1CC) 800 MHz / QPSK / High

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5.2. EIRP DENSITY

FCC Rules

Test Requirements:

§ 30.202 Power limits.

(a) For fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz. For channel bandwidths less than 100 megahertz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 megahertz.

Test Procedures:

The measurement is performed in accordance with Section 5.2.4.4.2 of ANSI C63.26.

a) Set span to 2 × to 3 × the OBW.

b) Set RBW = 1% to 5% of the OBW.

c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time:

1) Set = auto-couple, or

2) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.

f) Detector = power averaging (rms).

g) Set sweep trigger to “free run.”

h) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

j) Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

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Note:

1. In this test, EUT is operated only measurement path is turned on and path has straight beamforming.
2. For 7CC and 8CC measurement, test is performed for all carriers of 100 MHz bandwidth, but recorded only maximum output level.
3. The angle of antenna is set as maximum radiated power conditions.
4. The output tolerance of the EUT in the specification is ±3 dB and test result satisfies this condition.
5. Measurement distance is applied far field condition in section 3.2.
6. EIRP is calculated from measured value according to section 5.2.7 of ANSI C63.26-2015, and the formula is as follows.

$$EIRP\ (dBm) = E\ (dB\mu V/m) + 20\log(6.5\ m) - 104.77$$
$$= E\ (dB\mu V/m) - 88.51$$

7. E (dBμV/m) value is considered AFCL and Duty cycle factor and it as follow.
   Sample calculation:

$$E\ (dB\mu V/m) = measurement\ value\ (dB\mu V) + AFCL\ (24.350\ GHz) + Duty\ cycle\ correction\ (74\ \%)$$
$$= measurement\ value\ (dB\mu V) + 47.37 + 1.2921$$

8. Final EIRP value as follow.
   Sample calculation:

$$141.69\ dB\mu V\ (measured\ Value + AFCL) + 16.26(Distance\ Factor) - 104.77 + 1.2921\ (Duty)$$
$$= 54.48\ dBm\ (Final\ EIRP)$$

9. All modes of operation and modulations were investigated. The test results included in this sections are worst case emission in each emission designator W7D, G7D.

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Test Results:

Contiguous

24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1	Low	24.30	QPSK	141.05	75	53.83
					16QAM	141.07		53.85
					64QAM	141.21		53.99
					256QAM	141.62		54.41
			Middle	24.35	QPSK	140.62		53.40
					16QAM	141.25		54.03
					64QAM	141.37		54.15
					256QAM	141.26		54.04
			High	24.40	QPSK	140.81		53.59
					16QAM	140.66		53.44
					64QAM	140.75		53.53
					256QAM	141.14		53.92
B	45	1	Low	24.30	QPSK	141.62	75	54.40
					16QAM	141.26		54.04
					64QAM	141.69		54.48
					256QAM	141.62		54.40
			Middle	24.35	QPSK	141.46		54.24
					16QAM	141.12		53.90
					64QAM	141.27		54.05
					256QAM	141.06		53.84
			High	24.40	QPSK	140.70		53.48
					16QAM	140.69		53.47
					64QAM	141.28		54.06
					256QAM	141.56		54.34

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Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1	Low	QPSK	53.83	54.40	75	57.13
			16QAM	53.85	54.04		56.96
			64QAM	53.99	54.48		57.25
			256QAM	53.65	54.40		57.05
		Middle	QPSK	53.40	54.24		56.85
			16QAM	54.03	53.90		56.98
			64QAM	54.15	54.05		57.11
			256QAM	54.04	53.84		56.96
		High	QPSK	53.59	53.48		56.55
			16QAM	53.44	53.47		56.47
			64QAM	53.53	54.06		56.81
			256QAM	53.92	54.34		57.14

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24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1	Low	24.80	QPSK	141.55	75	54.33
					16QAM	141.43		54.21
					64QAM	141.37		54.15
					256QAM	141.39		54.17
			Middle	25.00	QPSK	141.91		54.69
					16QAM	141.98		54.76
					64QAM	143.34		56.12
					256QAM	142.13		54.91
			High	25.20	QPSK	141.25		54.03
					16QAM	141.78		54.56
					64QAM	141.49		54.27
					256QAM	141.90		54.68
B	45	1	Low	24.80	QPSK	142.89	75	55.67
					16QAM	142.88		55.66
					64QAM	143.12		55.90
					256QAM	143.05		55.83
			Middle	25.00	QPSK	143.60		56.38
					16QAM	143.49		56.27
					64QAM	143.66		56.44
					256QAM	143.54		56.32
			High	25.20	QPSK	142.70		55.48
					16QAM	142.51		55.29
					64QAM	143.03		55.81
					256QAM	142.93		55.71

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Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1	Low	QPSK	54.33	55.67	75	58.06
			16QAM	54.21	55.66		58.00
			64QAM	54.15	55.90		58.12
			256QAM	54.17	55.83		58.09
		Middle	QPSK	54.69	56.38		58.63
			16QAM	54.76	56.27		58.59
			64QAM	56.12	56.44		59.30
			256QAM	54.91	56.32		58.68
		High	QPSK	54.03	55.48		57.82
			16QAM	54.56	55.29		57.95
			64QAM	54.27	55.81		58.11
			256QAM	54.68	55.71		58.24

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24 GHz 7CC 700 MHz (24.25 ~ 24.45 GHz Band 2CC + 24.75 ~ 25.25 GHz Band 5CC)

24.25 ~ 24.45 GHz Band 2CC Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	2	24.40	QPSK	139.06	75	51.84
				16QAM	138.97		51.75
				64QAM	138.71		51.49
				256QAM	138.74		51.53
B	45	2	24.40	QPSK	139.33		52.11
				16QAM	139.59		52.37
				64QAM	139.28		52.06
				256QAM	139.16		51.94

*Measured value include AFCL factors.

Tabular Data of SUM EIRP Density

Ant.	CC	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	2	QPSK	51.84	52.11	75	54.99
		16QAM	51.75	52.37		55.08
		64QAM	51.49	52.06		54.79
		256QAM	51.53	51.94		54.75

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24.75 ~ 25.25 GHz Band 5CC Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	5	25.10	QPSK	139.90	75	52.68
				16QAM	139.74		52.52
				64QAM	139.71		52.49
				256QAM	140.13		52.91
B	45	5	25.00	QPSK	141.21		53.99
				16QAM	141.29		54.07
				64QAM	141.26		54.04
				256QAM	141.50		54.28

*Measured value include AFCL factors.

Tabular Data of SUM EIRP Density

Ant.	CC	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	5	QPSK	52.68	53.99	75	56.40
		16QAM	52.52	54.07		56.37
		64QAM	52.49	54.04		56.35
		256QAM	52.91	54.28		56.66

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Non-Contiguous

24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz)

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1+1	Low	24.30	QPSK	141.33	75	54.11
					16QAM	141.66		54.44
					64QAM	141.47		54.25
					256QAM	141.25		54.03
			High	25.20	QPSK	142.46		55.24
					16QAM	142.11		54.89
					64QAM	142.67		55.45
					256QAM	142.24		55.02
B	45	1+1	Low	24.30	QPSK	141.10	75	53.88
					16QAM	141.50		54.28
					64QAM	141.58		54.37
					256QAM	141.79		54.57
			High	25.20	QPSK	142.25		55.03
					16QAM	141.71		54.49
					64QAM	142.32		55.10
					256QAM	142.40		55.18

Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1+1	Low	QPSK	54.11	53.88	75	57.01
			16QAM	54.44	54.28		57.37
			64QAM	54.25	54.37		57.32
			256QAM	54.03	54.57		57.32
		High	QPSK	55.24	55.03		58.15
			16QAM	54.89	54.49		57.71
			64QAM	55.45	55.10		58.29
			256QAM	55.02	55.18		58.11

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24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz)

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1+1	Low	24.40	QPSK	141.83	75	54.61
					16QAM	141.96		54.74
					64QAM	141.73		54.51
					256QAM	141.69		54.47
			High	24.80	QPSK	141.98		54.76
					16QAM	141.76		54.54
					64QAM	141.62		54.40
					256QAM	141.81		54.59
B	45	1+1	Low	24.40	QPSK	141.96	75	54.74
					16QAM	142.06		54.84
					64QAM	141.89		54.67
					256QAM	141.96		54.74
			High	24.80	QPSK	142.52		55.30
					16QAM	142.44		55.22
					64QAM	142.45		55.23
					256QAM	142.53		55.31

Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1+1	Low	QPSK	54.61	54.74	75	57.69
			16QAM	54.74	54.84		57.80
			64QAM	54.51	54.67		57.60
			256QAM	54.47	54.74		57.62
		High	QPSK	54.76	55.30		58.05
			16QAM	54.54	55.22		57.90
			64QAM	54.40	55.23		57.85
			256QAM	54.59	55.31		57.98

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Contiguous

39 GHz 1CC 100 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1	Low	38.35	QPSK	140.59	75	53.37
					16QAM	139.87		52.65
					64QAM	139.38		52.16
					256QAM	139.89		52.67
			Middle	39.15	QPSK	141.36		54.14
					16QAM	141.19		53.97
					64QAM	141.49		54.28
					256QAM	141.26		54.04
			High	39.95	QPSK	140.19		52.98
					16QAM	140.11		52.89
					64QAM	139.86		52.64
					256QAM	140.13		52.91
B	45	1	Low	38.35	QPSK	140.23	75	53.01
					16QAM	140.16		52.94
					64QAM	139.28		52.06
					256QAM	139.85		52.63
			Middle	39.15	QPSK	141.25		54.03
					16QAM	141.14		53.92
					64QAM	141.00		53.78
					256QAM	141.43		54.21
			High	39.95	QPSK	141.26		54.04
					16QAM	139.99		52.77
					64QAM	140.06		52.84
					256QAM	140.34		53.12

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Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1	Low	QPSK	53.37	53.01	75	56.21
			16QAM	52.65	52.94		55.80
			64QAM	52.16	52.06		55.12
			256QAM	52.67	52.63		55.66
		Middle	QPSK	54.14	54.03		57.10
			16QAM	53.97	53.92		56.95
			64QAM	54.28	53.78		57.05
			256QAM	54.04	54.21		57.13
		High	QPSK	52.98	54.04		56.55
			16QAM	52.89	52.77		55.84
			64QAM	52.64	52.84		55.75
			256QAM	52.91	53.12		56.03

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39 GHz 8CC 800 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	8	Low	38.7	QPSK	136.51	75	49.29
					16QAM	136.55		49.33
					64QAM	136.78		49.56
					256QAM	136.87		49.65
			Middle	39.15	QPSK	136.83		49.61
					16QAM	137.22		50.00
					64QAM	137.29		50.07
					256QAM	137.49		50.27
			High	39.6	QPSK	136.76		49.54
					16QAM	136.88		49.66
					64QAM	136.93		49.71
					256QAM	136.72		49.50
B	45	8	Low	38.7	QPSK	136.46	75	49.24
					16QAM	136.72		49.50
					64QAM	136.08		48.86
					256QAM	135.95		48.73
			Middle	39.15	QPSK	137.26		50.04
					16QAM	137.02		49.80
					64QAM	137.27		50.05
					256QAM	137.20		49.98
			High	39.6	QPSK	137.55		50.33
					16QAM	137.36		50.15
					64QAM	137.59		50.37
					256QAM	137.60		50.38

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Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	8	Low	QPSK	49.29	49.24	75	52.28
			16QAM	49.33	49.50		52.43
			64QAM	49.56	48.86		52.23
			256QAM	49.65	48.73		52.22
		Middle	QPSK	49.61	50.04		52.84
			16QAM	50.00	49.80		52.91
			64QAM	50.07	50.05		53.07
			256QAM	50.27	49.98		53.13
		High	QPSK	49.54	50.33		52.96
			16QAM	49.66	50.15		52.92
			64QAM	49.71	50.37		53.06
			256QAM	49.50	50.38		52.97

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Non-Contiguous

39 GHz 2CC (1CC + 1CC) 200 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Frequency (GHz)	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1+1	Low	38.35	QPSK	139.65	75	52.43
					16QAM	139.68		52.46
					64QAM	139.92		52.70
					256QAM	139.78		52.56
			High	39.95	QPSK	139.41		52.19
					16QAM	139.74		52.52
					64QAM	139.76		52.54
					256QAM	139.84		52.62
B	45		Low	38.35	QPSK	139.96		52.74
					16QAM	139.68		52.46
					64QAM	139.72		52.50
					256QAM	139.71		52.49
			High	39.95	QPSK	140.19		52.97
					16QAM	139.89		52.67
					64QAM	139.84		52.62
					256QAM	139.73		52.51

*Measured value include AFCL factors.

Tabular Data of SUM EIRP Density

Ant.	CC	Channel	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1+1	Low	QPSK	52.43	52.74	75	55.60
			16QAM	52.46	52.46		55.47
			64QAM	52.70	52.50		55.61
			256QAM	52.56	52.49		55.54
		High	QPSK	52.19	52.97		55.60
			16QAM	52.52	52.67		55.60
			64QAM	52.54	52.62		55.59
			256QAM	52.62	52.51		55.58

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39 GHz 8CC (1CC + 7CC) 800 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	1+7	Low	QPSK	136.83	75	49.61
				16QAM	136.98		49.76
				64QAM	136.85		49.94
				256QAM	136.89		49.67
B	45		Low	QPSK	137.52		50.30
				16QAM	137.23		50.01
				64QAM	137.49		50.27
				256QAM	137.43		50.22

*Measured value include AFCL factors.

Tabular Data of SUM EIRP Density

Ant.	CC	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	1+7	QPSK	49.61	50.30	75	52.98
		16QAM	49.76	50.01		52.90
		64QAM	49.94	50.27		53.12
		256QAM	49.67	50.22		52.96

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39 GHz 8CC (7CC + 1CC) 800 MHz

Tabular Data of EIRP Density per path

Ant.	Ant. Angle	CC	Channel	Mod.	Measured Level (dBuV)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A	135	7+1	Low	QPSK	137.50	75	50.28
				16QAM	137.34		50.12
				64QAM	137.36		50.14
				256QAM	136.48		49.60
B	45		Low	QPSK	137.15		49.93
				16QAM	136.79		49.58
				64QAM	137.39		50.17
				256QAM	137.39		50.17

*Measured value include AFCL factors.

Tabular Data of SUM EIRP Density

Ant.	CC	Modulation	Ant A EIRP (dBm/100 MHz)	Ant B EIRP (dBm/100 MHz)	Limit (dBm/100 MHz)	Calculated EIRP (dBm/100 MHz)
A+B	7+1	QPSK	50.28	49.93	75	53.12
		16QAM	50.12	49.58		52.87
		64QAM	50.14	50.17		53.17
		256QAM	49.60	50.17		52.90

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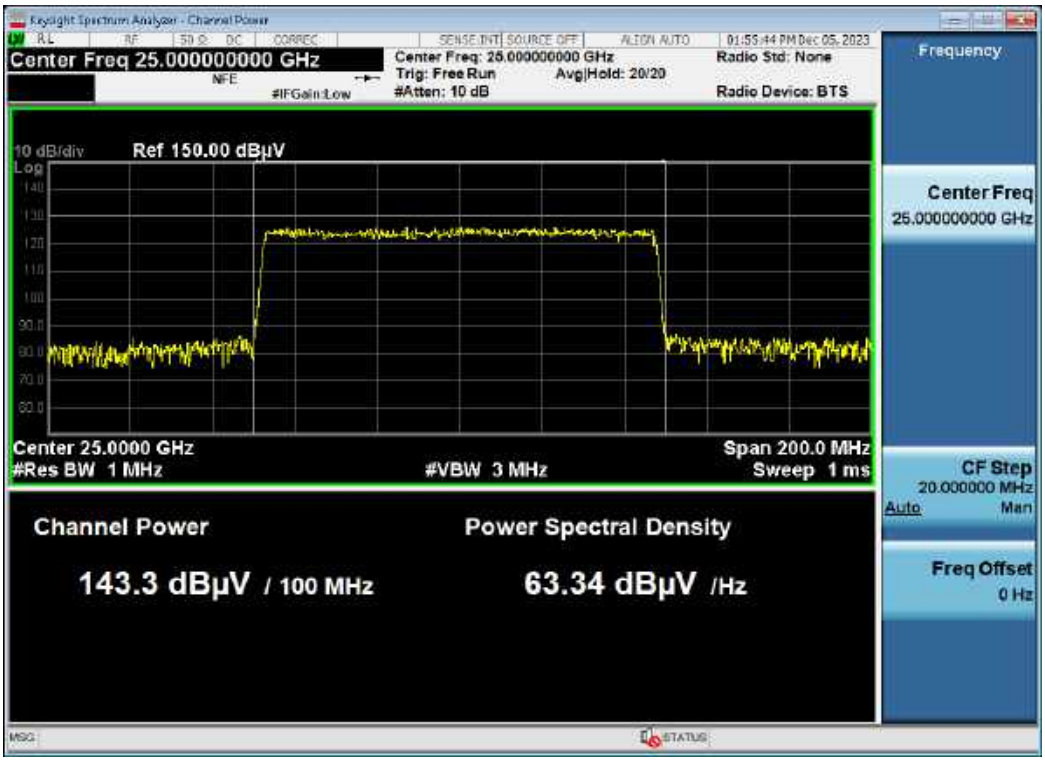
Plot Data of EIRP Density Tabular per path

Antenna A / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 64QAM / Middle

Antenna B / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 64QAM / Low

The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna A / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 64QAM / Middle



Antenna B / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 64QAM / Middle

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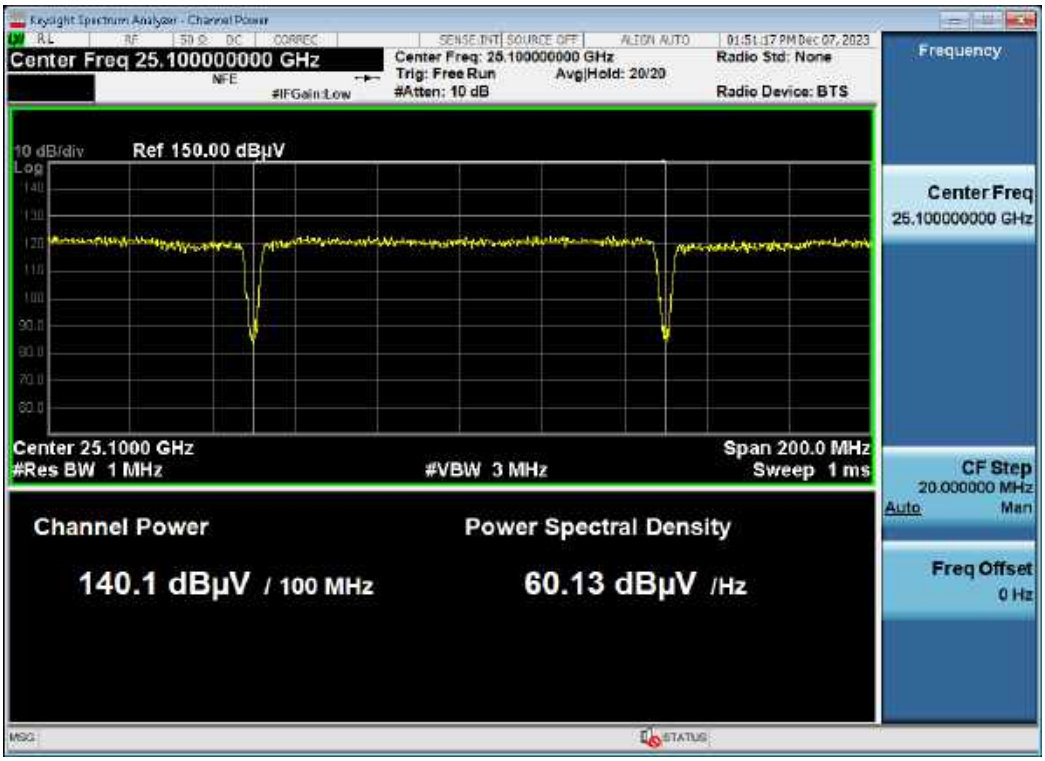
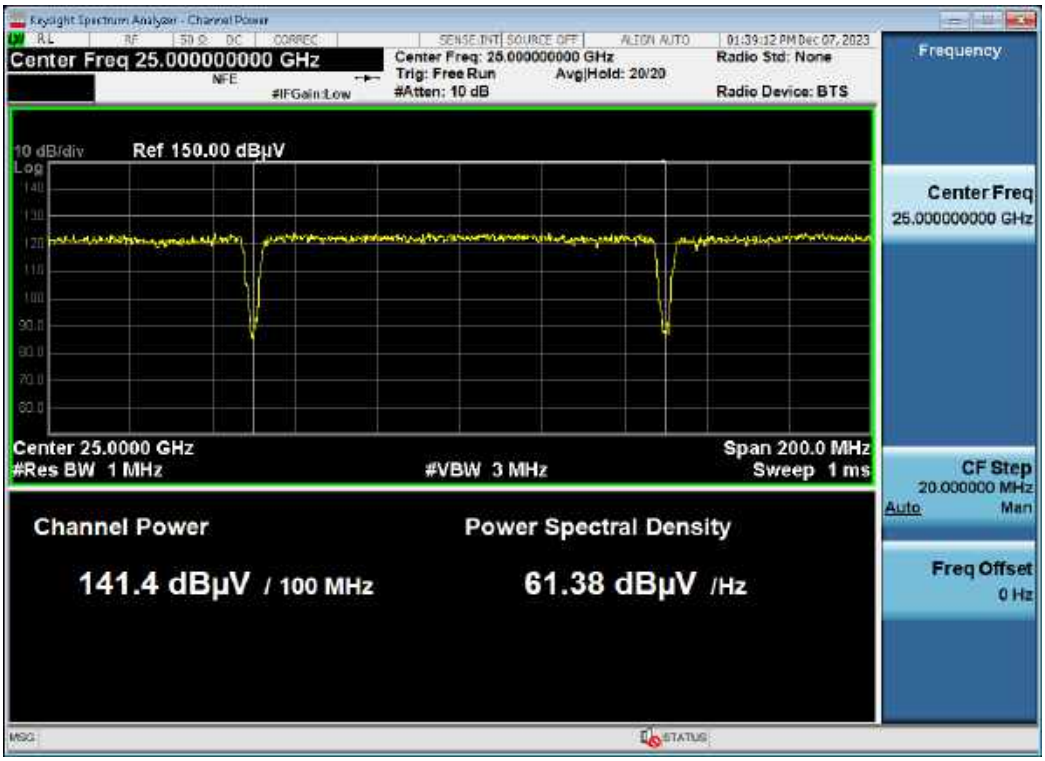
Antenna A / 24 GHz 7CC 700 MHz / 256QAM / Low



Antenna B / 24 GHz 7CC 700 MHz / 256QAM / High



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Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM / High

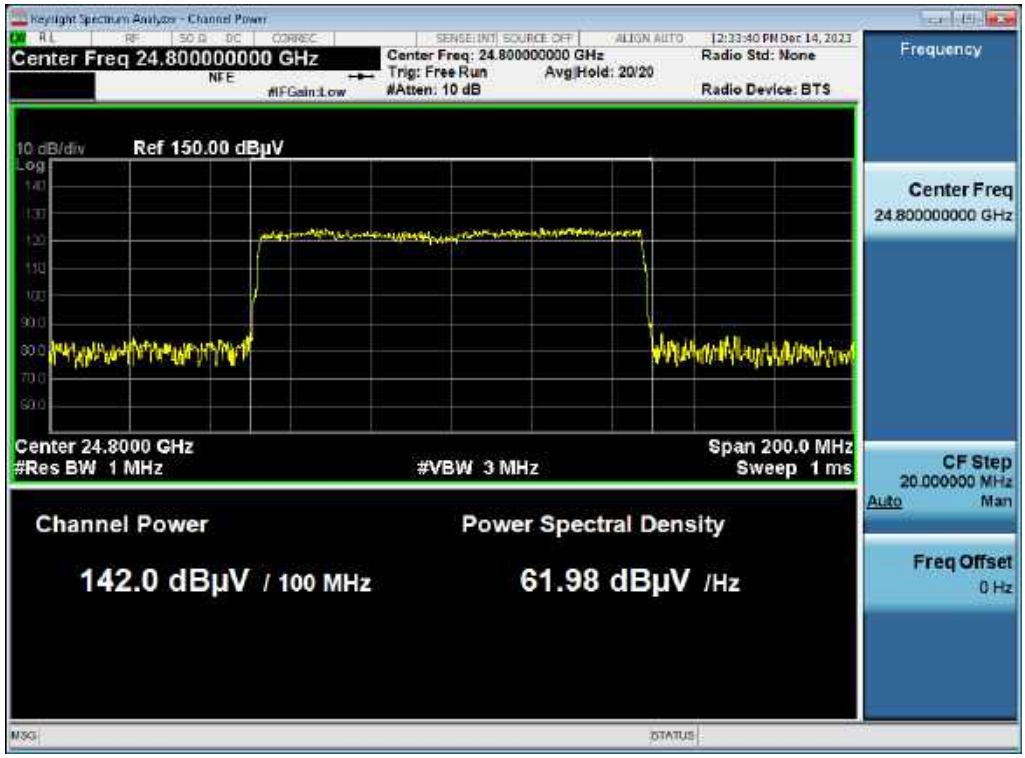
Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 256QAM / High

The report shall not be (partly) reproduced except in full without approval of the laboratory.

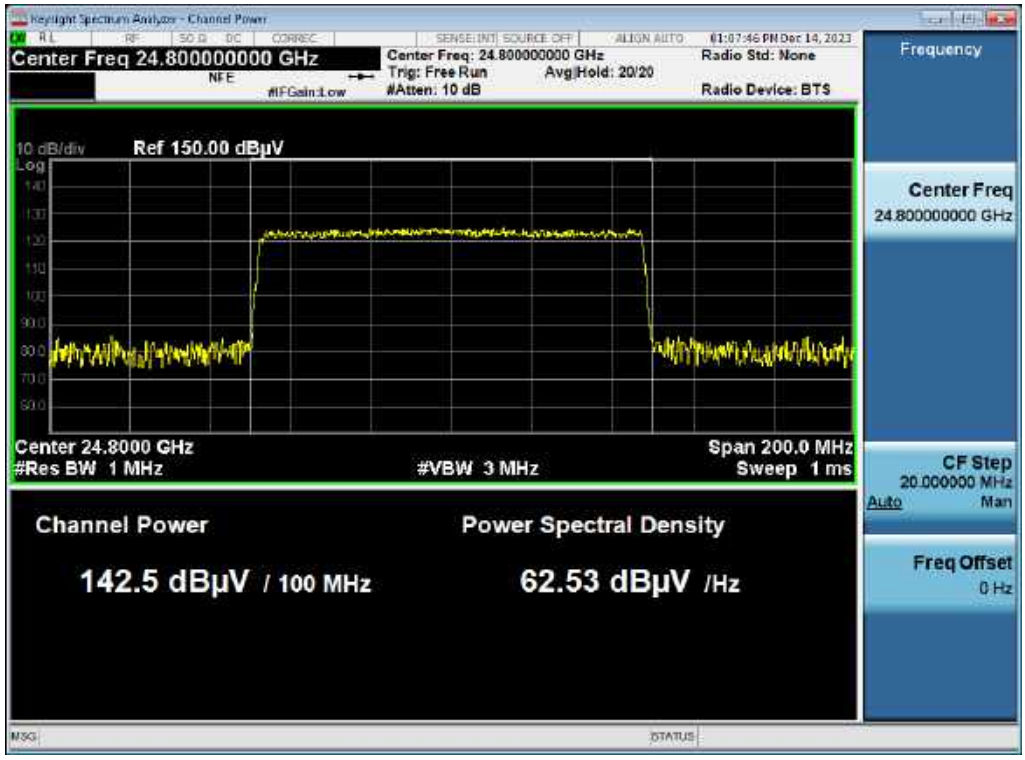
Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / QPSK / High



Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 256QAM / High



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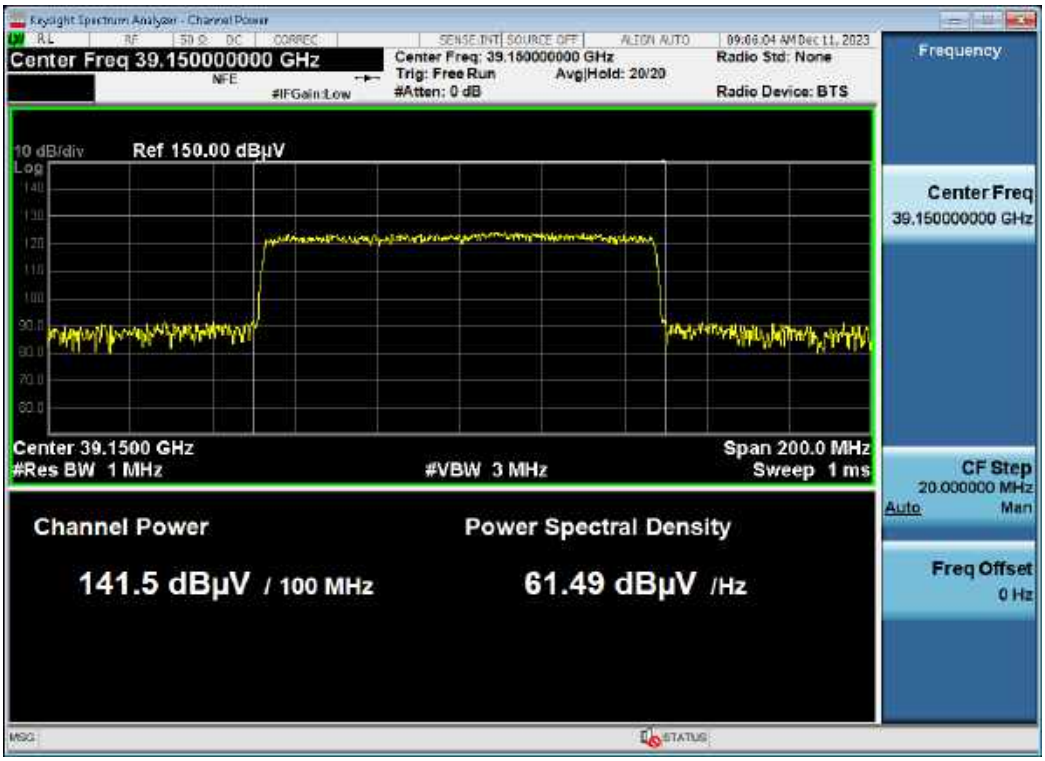
Antenna A / 39 GHz 1CC 100 MHz / 64QAM / Middle



Antenna B / 39 GHz 1CC 100 MHz / 256QAM / Middle

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Antenna A / 39 GHz 8CC 800 MHz / 256QAM / Middle

Antenna B / 39 GHz 8CC 800 MHz / 256QAM / High

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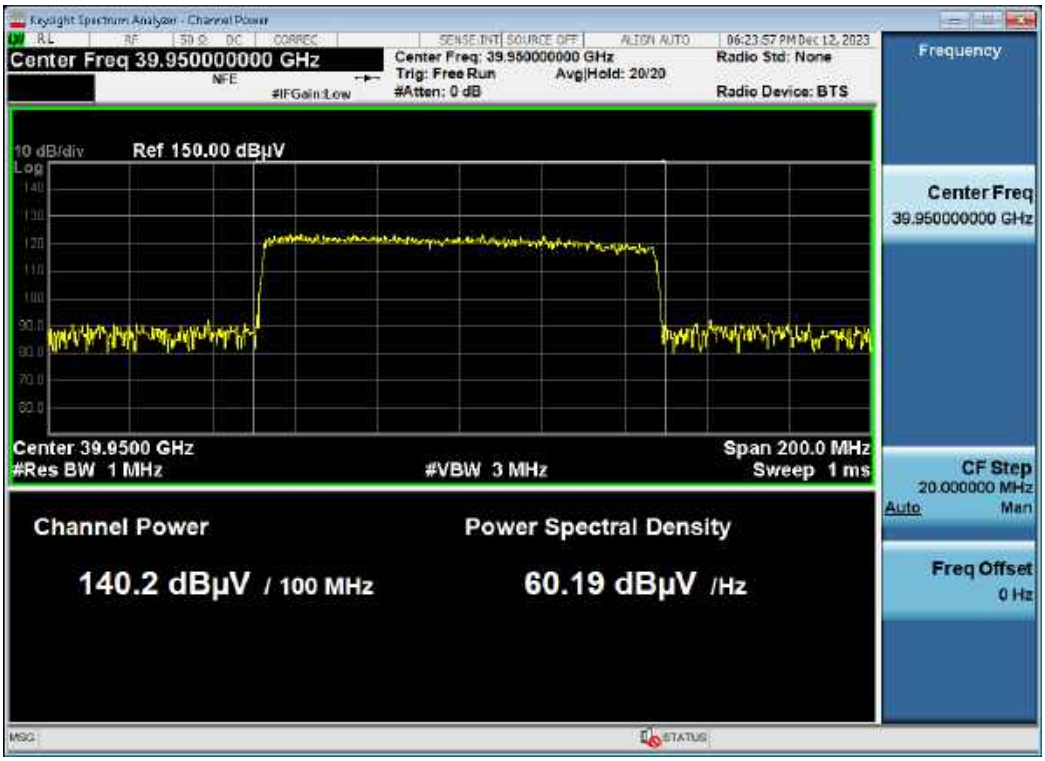
Antenna A / 39 GHz 2CC (1CC + 1CC) 200 MHz / 64QAM / Low

Antenna B / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / High



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Antenna A / 39 GHz 8CC (1CC + 7CC) 800 MHz / 16QAM / Low

Antenna B / 39 GHz 8CC (1CC + 7CC) 800 MHz / QPSK / High

The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna A / 39 GHz 8CC (7CC + 1CC) 800 MHz / QPSK / Low

Antenna B / 39 GHz 8CC (7CC + 1CC) 800 MHz / 64QAM / High

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5.3. EQUIVALENT ISOTROPIC RADIATED POWER

FCC Rules

Test Requirements:

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

Test Procedures:

The measurement is performed in accordance with Section 5.2.4.4.2 of ANSI C63.26.

a) Set span to 2 × to 3 × the OBW.

b) Set RBW = 1% to 5% of the OBW.

c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time:

   1) Set = auto-couple, or

   2) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.

f) Detector = power averaging (rms).

g) Set sweep trigger to “free run.”

h) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

j) Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

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Note:

1. Basic test conditions are same as EIRP density test on section 5.2.
2. Final conducted power is calculated as follows

Conducted Power (dBm) = EIRP (dBm) – Antenna Gain (dBi)*

*Antenna Gain of the above formula was applied from actual measurement data of the radiation pattern document.

3. Sample calculations:

Antenna A, 100M, 1CC, Low, QPSK:

Contiguous

140.88 dBμV (measured+AFCL) + 16.25 (distance) + 1.2921 (duty) - 104.77(Conversion) - 30.24 (Ant Gain)

= 23.42 dBm (Final conducted output power)

Antenna B, 1CC, Low, QPSK:

Contiguous

141.58 dBμV (measured) + 16.25 (distance) + 1.2921(Duty) – 104.77(Conversion) – 30.24 (Ant Gain)

= 24.12 dBm (Final conducted output power)

Total Output Power (100M, 1CC, Low, QPSK):

Conversion dBm to mW (Antenna A)

10^(23.42 dBm /10) = 219.650 mW

Conversion dBm to mW (Antenna B)

10^(24.12 dBm /10) = 258.033 mW

Sum each antenna power

219.650 (Ant.A) + 258.033 (Ant.B) = 477.682 mW

Conversion mW to dBm

*10 * log (477.682 mW) = 26.79 dBm*

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Test Results:

Contiguous

24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1	Low	24.30	QPSK	140.88	53.66	30.242	23.42
					16QAM	141.82	54.60		24.35
					64QAM	141.24	54.02		23.77
					256QAM	141.53	54.31		24.06
			Middle	24.35	QPSK	141.12	53.90	30.252	23.65
					16QAM	141.28	54.06		23.80
					64QAM	141.22	54.00		23.74
					256QAM	140.78	53.56		23.31
			High	24.40	QPSK	140.87	53.65	30.263	23.39
					16QAM	140.79	53.57		23.31
					64QAM	140.85	53.63		23.37
					256QAM	141.32	54.10		23.84
B	45	1	Low	24.30	QPSK	141.58	54.36	30.242	24.12
					16QAM	141.66	54.44		24.20
					64QAM	141.20	53.98		23.74
					256QAM	141.52	54.30		24.06
			Middle	24.35	QPSK	140.93	53.71	30.252	23.46
					16QAM	141.16	53.94		23.68
					64QAM	141.40	54.18		23.92
					256QAM	141.19	53.97		23.72
			High	24.40	QPSK	140.84	53.62	30.263	23.36
					16QAM	140.53	53.31		23.05
					64QAM	141.22	54.00		23.73
					256QAM	141.61	54.39		24.13

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Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1	Low	QPSK	23.42	24.12	26.79
			16QAM	24.35	24.20	27.29
			64QAM	23.77	23.74	26.77
			256QAM	24.06	24.06	27.07
		Middle	QPSK	23.65	23.46	26.57
			16QAM	23.80	23.68	26.75
			64QAM	23.74	23.92	26.84
			256QAM	23.31	23.72	26.53
		High	QPSK	23.39	23.36	26.39
			16QAM	23.31	23.05	26.19
			64QAM	23.37	23.73	26.57
			256QAM	23.84	24.13	27.00

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24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1	Low	24.80	QPSK	141.43	54.21	30.374	23.83
					16QAM	141.33	54.11		23.74
					64QAM	141.43	54.21		23.84
					256QAM	141.17	53.96		23.58
			Middle	25.00	QPSK	142.04	54.82	30.432	24.39
					16QAM	141.99	54.77		24.33
					64QAM	143.54	56.32		25.89
					256QAM	142.04	54.82		24.38
			High	25.20	QPSK	142.00	54.78	30.486	24.29
					16QAM	141.53	54.31		23.83
					64QAM	141.84	54.62		24.13
					256QAM	141.86	54.64		24.15
B	45	1	Low	24.80	QPSK	142.82	55.60	30.374	25.22
					16QAM	142.81	55.59		25.22
					64QAM	143.05	55.83		25.45
					256QAM	142.91	55.69		25.32
			Middle	25.00	QPSK	143.31	56.09	30.432	25.66
					16QAM	143.68	56.46		26.03
					64QAM	143.62	56.40		25.96
					256QAM	143.60	56.38		25.95
			High	25.20	QPSK	142.53	55.31	30.486	24.83
					16QAM	143.17	55.95		25.46
					64QAM	143.00	55.78		25.30
					256QAM	142.18	54.96		24.48

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Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1	Low	QPSK	23.83	25.22	27.59
			16QAM	23.74	25.22	27.55
			64QAM	23.84	25.45	27.73
			256QAM	23.58	25.32	27.55
		Middle	QPSK	24.39	25.66	28.08
			16QAM	24.33	26.03	28.27
			64QAM	25.89	25.96	28.94
			256QAM	24.38	25.95	28.25
		High	QPSK	24.29	24.83	27.58
			16QAM	23.83	25.46	27.73
			64QAM	24.13	25.30	27.76
			256QAM	24.15	24.48	27.33

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24 GHz 7CC 700 MHz (24.25 ~ 24.45 GHz Band 2CC + 24.75 ~ 25.25 GHz Band 5CC)

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	7	Low	24.75	QPSK	147.61	60.39	30.369	30.02
					16QAM	147.52	60.30		29.93
					64QAM	147.64	60.42		30.05
					256QAM	147.50	60.28		29.91
B	45		Low	24.75	QPSK	148.90	61.68	30.360	31.31
					16QAM	148.86	61.64		31.27
					64QAM	148.64	61.42		31.05
					256QAM	148.90	61.68		31.31

Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	7	Low	QPSK	30.02	31.31	33.72
			16QAM	29.93	31.27	33.66
			64QAM	30.05	31.05	33.59
			256QAM	29.91	31.31	33.68

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Non-Contiguous

24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz)

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1+1	Low	24.30	QPSK	141.42	54.20	30.242	23.96
					16QAM	141.94	54.72		24.48
					64QAM	141.33	54.11		23.87
					256QAM	141.18	53.96		23.72
			High	25.20	QPSK	142.21	54.99	30.486	24.50
					16QAM	142.19	54.97		24.48
					64QAM	142.29	55.07		24.58
					256QAM	142.42	55.20		24.72
B	45	1+1	Low	24.30	QPSK	141.76	54.54	30.242	24.30
					16QAM	141.66	54.44		24.20
					64QAM	141.71	54.49		24.25
					256QAM	141.53	54.31		24.06
			High	25.20	QPSK	141.96	54.74	30.486	24.26
					16QAM	141.93	54.71		24.23
					64QAM	142.59	55.37		24.88
					256QAM	142.32	55.10		24.61

Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1+1	Low	QPSK	23.96	24.30	27.14
			16QAM	24.48	24.20	27.35
			64QAM	23.87	24.25	27.07
			256QAM	23.72	24.06	26.91
		High	QPSK	24.50	24.26	27.39
			16QAM	24.48	24.23	27.37
			64QAM	24.58	24.88	27.74
			256QAM	24.72	24.61	27.68

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24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz)

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1+1	Low	24.40	QPSK	141.87	54.65	30.263	24.38
					16QAM	141.82	54.60		24.34
					64QAM	141.64	54.42		24.16
					256QAM	141.88	54.66		24.40
			High	24.80	QPSK	141.62	54.40	30.374	24.03
					16QAM	141.77	54.55		24.18
					64QAM	141.75	54.53		24.16
					256QAM	141.90	54.68		24.31
B	45	1+1	Low	24.40	QPSK	142.07	54.85	30.263	24.58
					16QAM	141.90	54.68		24.42
					64QAM	141.84	54.62		24.36
					256QAM	141.97	54.75		24.49
			High	24.80	QPSK	142.36	55.15	30.374	24.77
					16QAM	142.45	55.23		24.85
					64QAM	142.49	55.27		24.90
					256QAM	142.50	55.28		24.91

Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1+1	Low	QPSK	24.38	24.58	27.49
			16QAM	24.34	24.42	27.39
			64QAM	24.16	24.36	27.27
			256QAM	24.40	24.49	27.45
		High	QPSK	24.03	24.77	27.43
			16QAM	24.18	24.85	27.54
			64QAM	24.16	24.90	27.55
			256QAM	24.31	24.91	27.63

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Contiguous

39 GHz 1CC 100 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1	Low	38.35	QPSK	140.39	53.17	29.913	23.26
					16QAM	139.74	52.52		22.60
					64QAM	139.59	52.37		22.46
					256QAM	139.41	52.19		22.28
			Middle	39.15	QPSK	141.52	54.31	30.087	24.22
					16QAM	141.16	53.94		23.86
					64QAM	141.48	54.26		24.18
					256QAM	141.34	54.12		24.03
			High	39.95	QPSK	140.05	52.83	30.277	22.56
					16QAM	140.28	53.06		22.79
					64QAM	139.99	52.77		22.50
					256QAM	140.00	52.78		22.50
B	45	1	Low	38.35	QPSK	140.48	53.26	29.913	23.35
					16QAM	140.25	53.03		23.12
					64QAM	139.54	52.32		22.40
					256QAM	139.81	52.59		22.68
			Middle	39.15	QPSK	141.35	54.13	30.087	24.04
					16QAM	141.02	53.80		23.71
					64QAM	141.14	53.92		23.83
					256QAM	141.14	53.92		23.84
			High	39.95	QPSK	139.89	52.67	30.277	22.39
					16QAM	140.21	52.99		22.72
					64QAM	140.17	52.95		22.67
					256QAM	140.32	53.10		22.82

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Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1	Low	QPSK	23.26	23.35	26.31
			16QAM	22.60	23.12	25.88
			64QAM	22.46	22.40	25.44
			256QAM	22.28	22.68	25.49
		Middle	QPSK	24.22	24.04	27.14
			16QAM	23.86	23.71	26.79
			64QAM	24.18	23.83	27.02
			256QAM	24.03	23.84	26.95
		High	QPSK	22.56	22.39	25.49
			16QAM	22.79	22.72	25.76
			64QAM	22.50	22.67	25.60
			256QAM	22.50	22.82	25.67

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39 GHz 8CC 800 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	8	Low	38.70	QPSK	144.70	57.48	29.980	27.50
					16QAM	145.20	57.98		28.00
					64QAM	145.35	58.13		28.15
					256QAM	145.36	58.14		28.16
			Middle	39.15	QPSK	145.42	58.20	30.087	28.11
					16QAM	145.32	58.10		28.02
					64QAM	145.33	58.12		28.03
					256QAM	145.24	58.02		27.93
			High	39.60	QPSK	145.34	58.12	30.182	27.94
					16QAM	145.20	57.98		27.80
					64QAM	145.29	58.07		27.89
					256QAM	145.05	57.83		27.65
B	45	8	Low	38.70	QPSK	144.88	57.66	29.980	27.68
					16QAM	144.92	57.70		27.72
					64QAM	144.91	57.69		27.71
					256QAM	144.88	57.67		27.69
			Middle	39.15	QPSK	145.32	58.10	30.087	28.01
					16QAM	145.25	58.03		27.94
					64QAM	145.32	58.10		28.01
					256QAM	145.20	57.98		27.89
			High	39.60	QPSK	145.61	58.39	30.182	28.21
					16QAM	145.74	58.52		28.34
					64QAM	145.53	58.31		28.13
					256QAM	145.60	58.38		28.20

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Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	8	Low	QPSK	27.50	27.68	30.60
			16QAM	28.00	27.72	30.87
			64QAM	28.15	27.71	30.95
			256QAM	28.16	27.69	30.94
		Middle	QPSK	28.11	28.01	31.07
			16QAM	28.02	27.94	30.99
			64QAM	28.03	28.01	31.03
			256QAM	27.93	27.89	30.92
		High	QPSK	27.94	28.21	31.09
			16QAM	27.80	28.34	31.09
			64QAM	27.89	28.13	31.02
			256QAM	27.65	28.20	30.94

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Non-Contiguous

39 GHz 2CC (1CC + 1CC) 200 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1+1	Low	38.35	QPSK	139.86	52.64	29.913	22.72
					16QAM	139.47	52.25		22.33
					64QAM	139.58	52.36		22.45
					256QAM	139.31	52.09		22.18
			High	39.95	QPSK	139.70	52.48	30.277	22.21
					16QAM	139.87	52.65		22.38
					64QAM	139.70	52.48		22.20
					256QAM	139.74	52.52		22.25
B	45		Low	38.35	QPSK	139.99	52.77	29.913	22.86
					16QAM	139.78	52.56		22.65
					64QAM	139.67	52.45		22.53
					256QAM	139.88	52.66		22.75
			High	39.95	QPSK	139.86	52.64	30.277	22.36
					16QAM	140.03	52.81		22.53
					64QAM	139.84	52.62		22.34
					256QAM	139.80	52.58		22.30

Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1+1	Low	QPSK	22.72	22.86	25.80
			16QAM	22.33	22.65	25.50
			64QAM	22.45	22.53	25.50
			256QAM	22.18	22.75	25.48
		High	QPSK	22.21	22.36	25.30
			16QAM	22.38	22.53	25.47
			64QAM	22.20	22.34	25.28
			256QAM	22.25	22.30	25.28

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39 GHz 8CC (1CC + 7CC) 800 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	1+7	Low	38.35	QPSK	136.53	49.31	29.913	19.40
					16QAM	136.59	49.37		19.46
					64QAM	136.50	49.28		19.37
					256QAM	136.48	49.26		19.35
			High	39.65	QPSK	144.52	57.30	30.215	27.08
					16QAM	144.70	57.48		27.27
					64QAM	145.01	57.79		27.58
					256QAM	145.06	57.84		27.63
B	45		Low	38.35	QPSK	136.70	49.48	29.913	19.57
					16QAM	136.62	49.40		19.48
					64QAM	136.90	49.68		19.77
					256QAM	136.96	49.74		19.83
			High	39.65	QPSK	144.92	57.70	30.215	27.49
					16QAM	144.91	57.69		27.47
					64QAM	145.35	58.13		27.92
					256QAM	145.42	58.20		27.99

Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	1+7	Low	QPSK	19.40	19.57	22.49
			16QAM	19.46	19.48	22.48
			64QAM	19.37	19.77	22.58
			256QAM	19.35	19.83	22.61
		High	QPSK	27.08	27.49	30.30
			16QAM	27.27	27.47	30.38
			64QAM	27.58	27.92	30.76
			256QAM	27.63	27.99	30.82

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39 GHz 8CC (7CC + 1CC) 800 MHz

Tabular Data of RF Output Power

Ant.	Ant. Angle	CC	Channel	Freq. (GHz)	Mod.	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Conducted (dBm)
A	135	7+1	Low	38.65	QPSK	144.99	57.77	29.980	27.79
					16QAM	144.79	57.57		27.59
					64QAM	144.83	57.61		27.63
					256QAM	144.47	57.25		27.27
			High	39.95	QPSK	137.39	50.17	30.277	19.89
					16QAM	136.89	49.67		19.39
					64QAM	137.10	49.88		19.61
					256QAM	136.92	49.70		19.42
B	45		Low	38.65	QPSK	144.01	56.79	29.980	26.81
					16QAM	144.19	56.97		26.99
					64QAM	144.52	57.30		27.32
					256QAM	144.44	57.22		27.24
			High	39.95	QPSK	136.79	49.57	30.277	19.29
					16QAM	136.84	49.62		19.34
					64QAM	137.05	49.83		19.56
					256QAM	137.14	49.92		19.65

Tabular Data of SUM Output Power

Antenna	CC	Channel	Mod.	Ant. A (dBm)	Ant. B (dBm)	Result (dBm)
A+B	7+1	Low	QPSK	27.79	26.81	30.34
			16QAM	27.59	26.99	30.31
			64QAM	27.63	27.32	30.49
			256QAM	27.27	27.24	30.27
		High	QPSK	19.89	19.29	22.61
			16QAM	19.39	19.34	22.38
			64QAM	19.61	19.56	22.59
			256QAM	19.42	19.65	22.54

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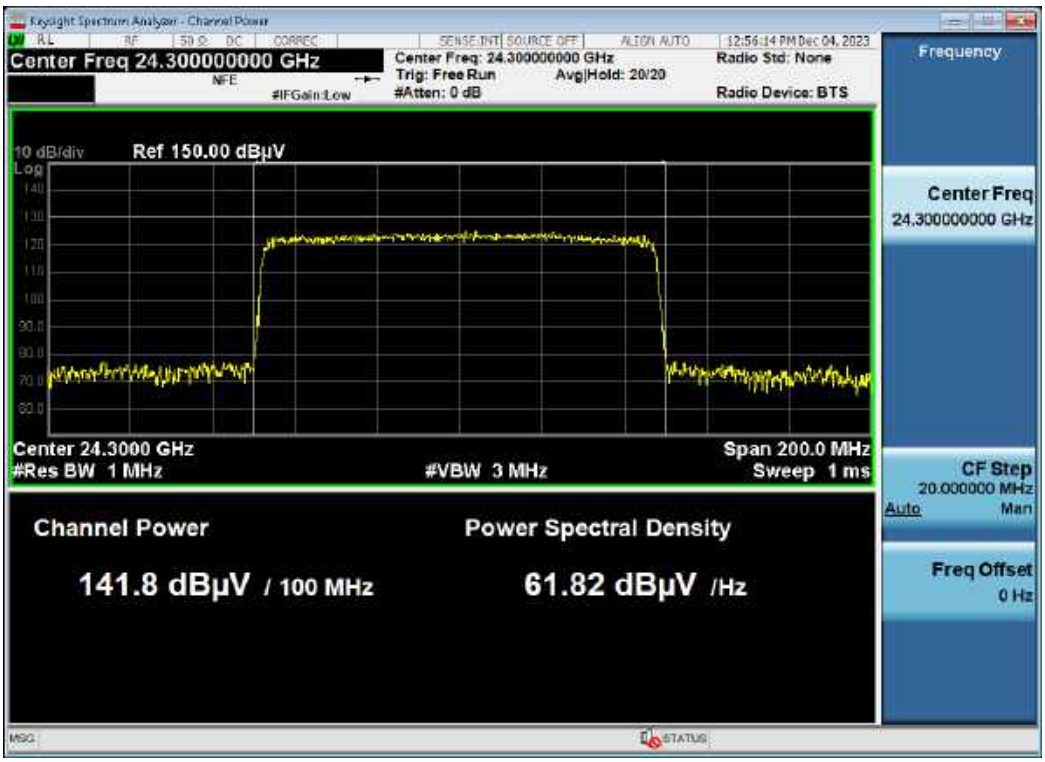
Plot Data of Equivalent Isotropic Radiated Power

Antenna A / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 16QAM / Low



Antenna B / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 16QAM / Low

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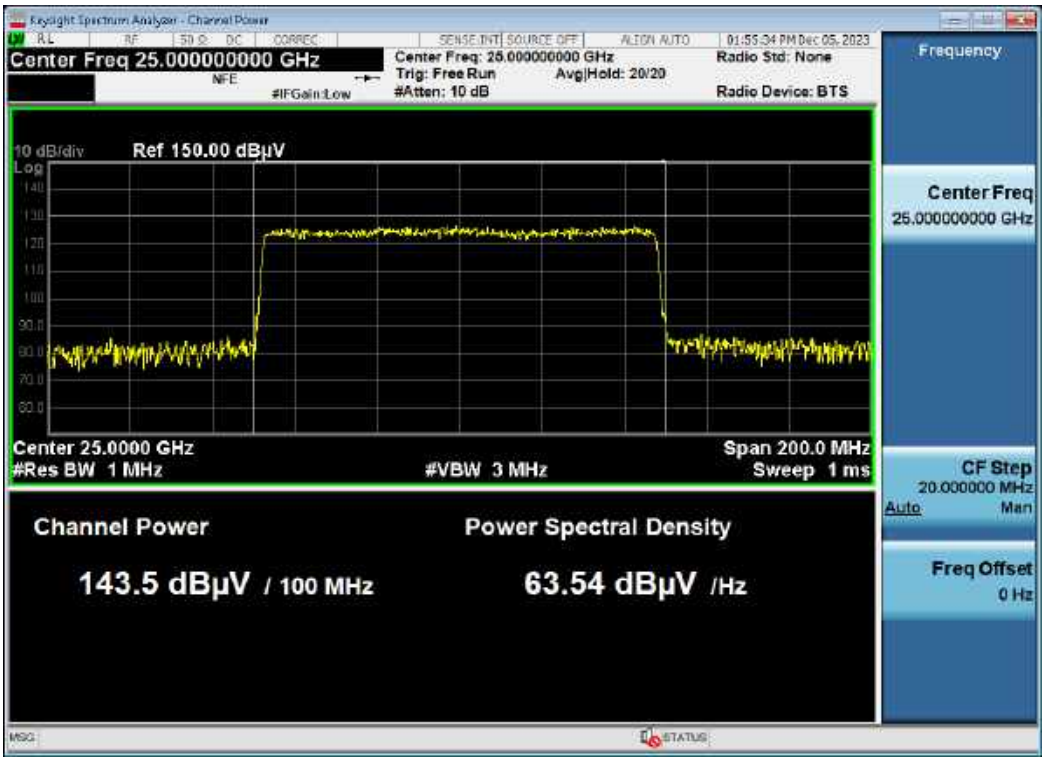
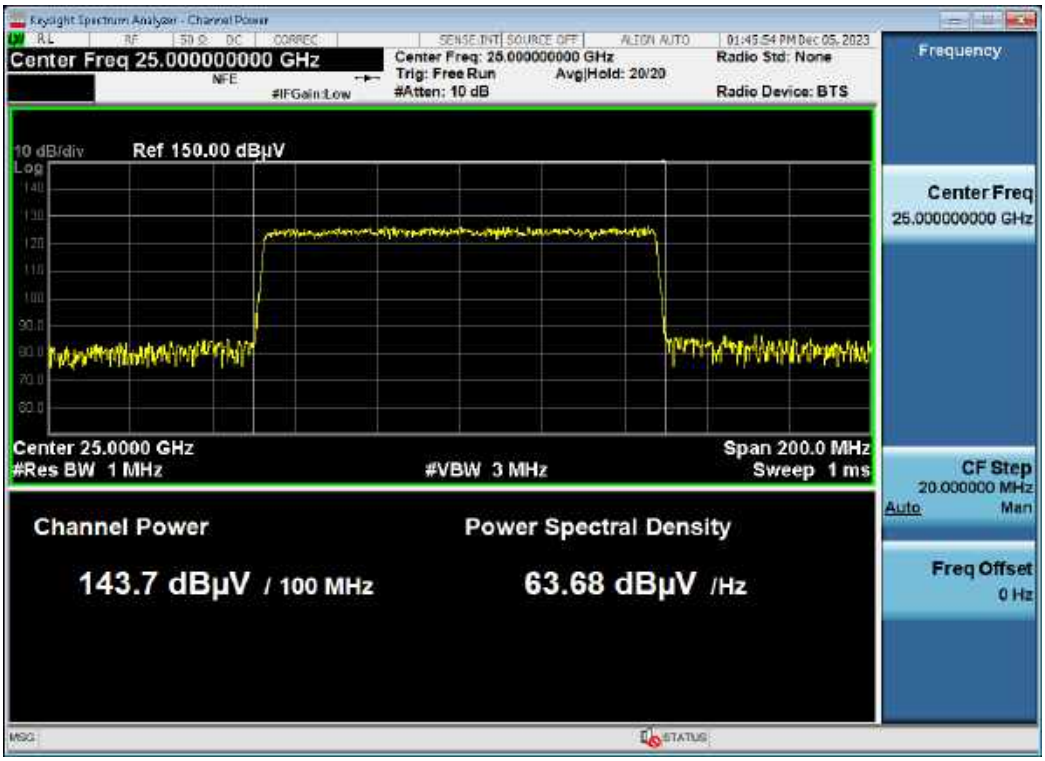
Antenna A / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 64QAM / Middle



Antenna B / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 16QAM / Middle



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Antenna A / 24 GHz 7CC 700 MHz / 64QAM / Low

Antenna B / 24 GHz 7CC 700 MHz / 256QAM / High

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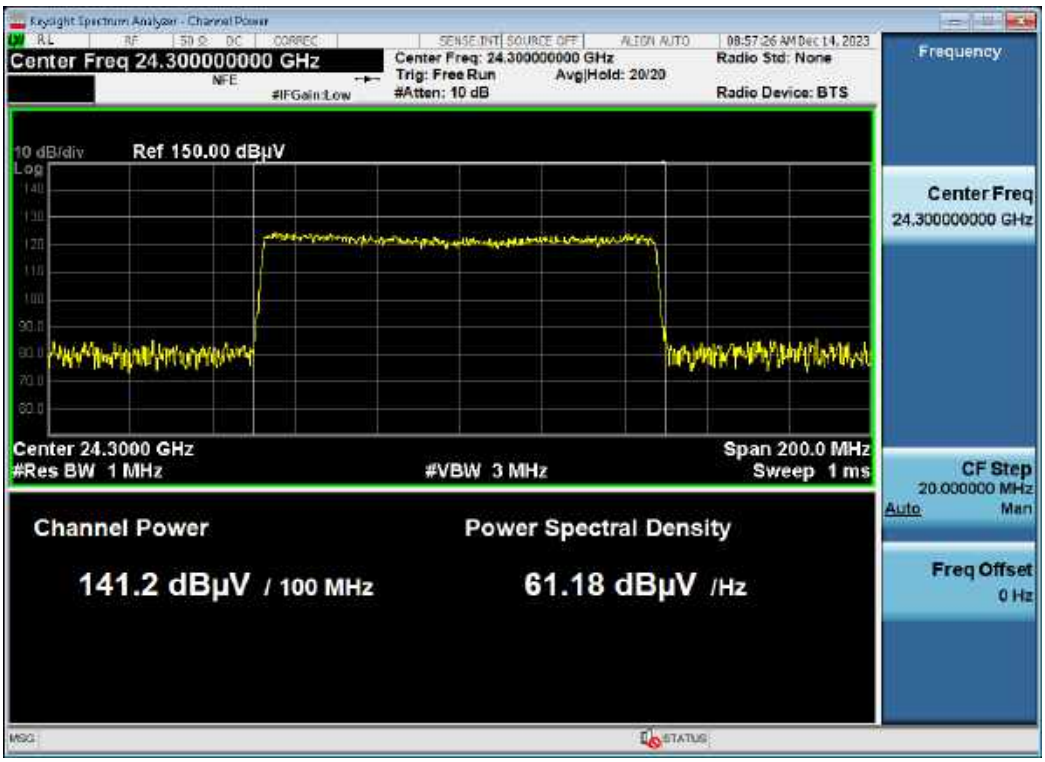
Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 256QAM / Low



Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM / High

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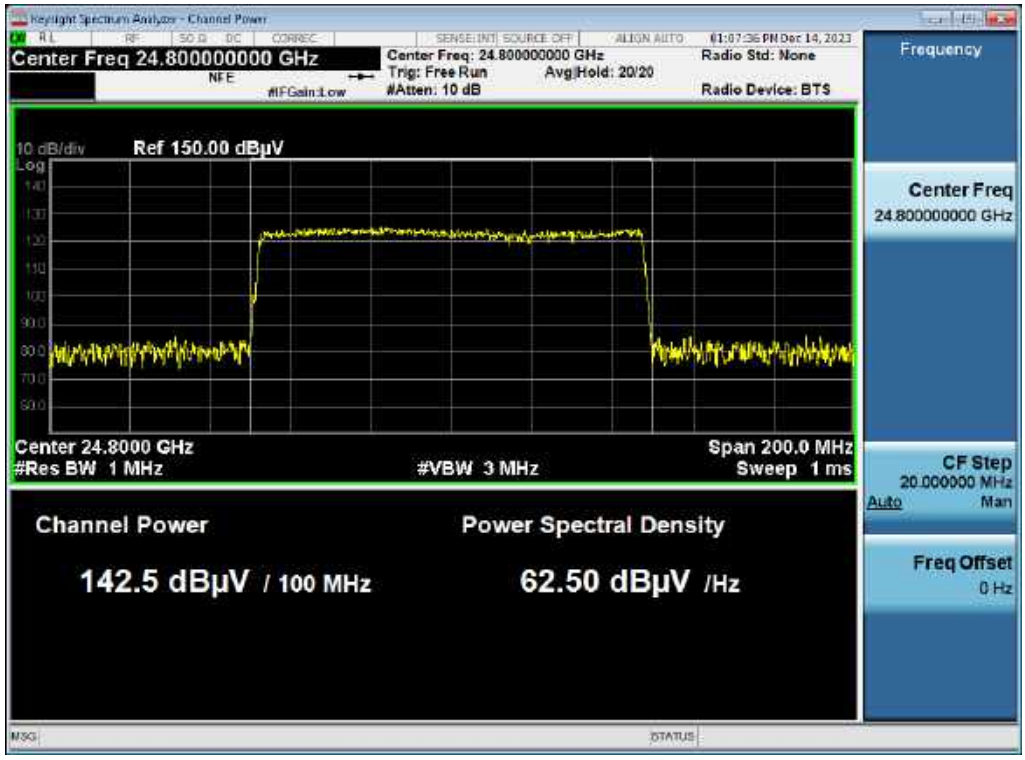
Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 256QAM / Low

Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 256QAM / High



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Antenna A / 39 GHz 1CC 100 MHz / QPSK / Middle

Antenna B / 39 GHz 1CC 100 MHz / QPSK / Middle

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Antenna A / 39 GHz 8CC 800 MHz / 256QAM / Low

Antenna B / 39 GHz 8CC 800 MHz / 16QAM / High

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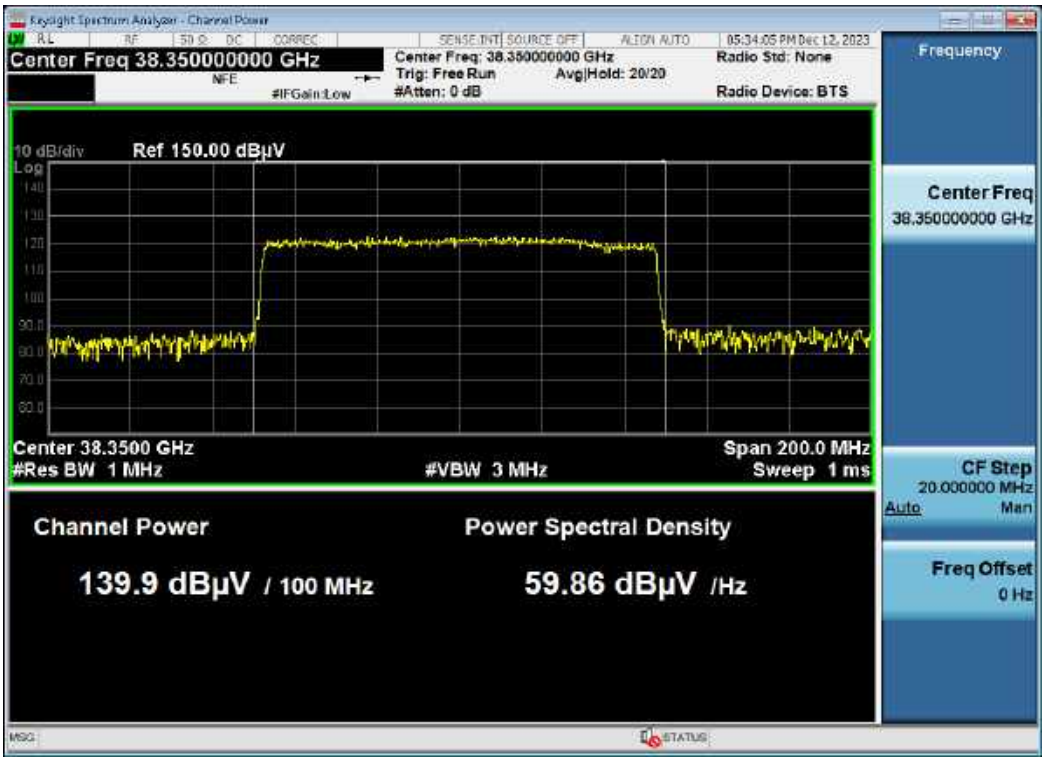
Antenna A / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / Low



Antenna B / 39 GHz 2CC (1CC + 1CC) 200 MHz / QPSK / High

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Antenna A / 39 GHz 8CC (1CC + 7CC) 800 MHz / 256QAM / High

Antenna B / 39 GHz 8CC (1CC + 7CC) 800 MHz / 256QAM / High

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Antenna A / 39 GHz 8CC (7CC + 1CC) 800 MHz / QPSK / Low

Antenna B / 39 GHz 8CC (7CC + 1CC) 800 MHz / 64QAM / Low

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5.4. BAND EDGE

FCC Rules

Test Requirements:

§ 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 30.203 Emission limits.

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

(b)

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values.

Test Procedures:

The measurement is performed in accordance with Section 5.7.3 of ANSI C63.26.

5.7.3 Out-of-band unwanted emissions measurements

a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.

b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.

c) Set the number of points in sweep ≥ 2 × span / RBW.

d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:

1), 2) Omitted

3) If the device cannot be configured to transmit continuously (duty cycle < 98%) and a free running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

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4) Omitted

e) The test report shall include the plots of the measuring instrument display and the measured data.

f) See Annex I for example emission mask plots.

Note:

1. Basic test conditions are same as EIRP test on section 5.2.
2. In the band edge test of path A and B are individually operated and measured at the maximum emission position of path A. For measurement of path B repeat at the maximum emission position of path B.
3. Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.
   - *OBW 10% from the edge: 2Tx MIMO correction: 10 log(N_{ANT}) = 10 log(2) = 3.01 dB*
     *-5 dBm – 10*log (2) = -8.01 dBm*
4. Band edge value is calculated as follows.
   *Band Edge Result = Measured Value + 20 * log(D) – 104.77 + AFCL + Duty – EUT Antenna Gain**
   * Antenna Gain of the above formula was applied from actual measurement data of the radiation pattern document.
5. Sample calculation:
   83.73 dBμV (measured+AFCL) + 16.25 (distance) + 1.2921 (Duty) – 104.77 (Conversion) - 30.24 (Ant Gain)
   = -33.73 dBm (Band Edge Result)

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Test Results:

Contiguous

24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1	Low	QPSK	Lower A	83.729	-3.491	30.229	-33.720	-8
						Lower B	81.249	-5.971	30.229	-36.200	-8
					16QAM	Lower A	86.733	-0.487	30.229	-30.716	-8
						Lower B	86.153	-1.067	30.229	-31.296	-8
					64QAM	Lower A	85.668	-1.552	30.229	-31.781	-8
						Lower B	84.985	-2.235	30.229	-32.464	-8
					256QAM	Lower A	87.447	0.227	30.229	-30.002	-8
						Lower B	84.158	-3.062	30.229	-33.291	-8
				High	QPSK	Upper A	86.269	-0.951	30.288	-31.239	-8
						Upper B	86.212	-1.008	30.288	-31.296	-8
					16QAM	Upper A	85.191	-2.029	30.288	-32.317	-8
						Upper B	84.929	-2.291	30.288	-32.579	-8
					64QAM	Upper A	85.812	-1.408	30.288	-31.696	-8
						Upper B	85.805	-1.415	30.288	-31.703	-8
					256QAM	Upper A	87.365	0.145	30.288	-30.143	-8
						Upper B	74.821	-12.399	30.288	-42.687	-8
MAX Ant. B	135		1	Low	QPSK	Lower A	74.291	-12.929	30.229	-43.158	-8
						Lower B	82.749	-4.471	30.229	-34.700	-8
					16QAM	Lower A	83.961	-3.259	30.229	-33.488	-8
						Lower B	85.898	-1.322	30.229	-31.551	-8
					64QAM	Lower A	85.523	-1.697	30.229	-31.926	-8
						Lower B	86.843	-0.377	30.229	-30.606	-8
					256QAM	Lower A	85.037	-2.183	30.229	-32.412	-8
						Lower B	86.657	-0.563	30.229	-30.792	-8
				High	QPSK	Upper A	85.440	-1.780	30.288	-32.068	-8
						Upper B	85.473	-1.747	30.288	-32.035	-8
					16QAM	Upper A	85.618	-1.602	30.288	-31.890	-8
						Upper B	85.929	-1.291	30.288	-31.579	-8
					64QAM	Upper A	85.198	-2.022	30.288	-32.310	-8
						Upper B	86.156	-1.064	30.288	-31.352	-8
					256QAM	Upper A	85.034	-2.186	30.288	-32.474	-8
						Upper B	87.604	0.384	30.288	-29.904	-8

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24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1	Low	QPSK	Lower A	86.632	-0.588	30.369	-30.957	-8
						Lower B	84.734	-2.486	30.369	-32.855	-8
					16QAM	Lower A	86.165	-1.055	30.369	-31.424	-8
						Lower B	85.788	-1.432	30.369	-31.801	-8
					64QAM	Lower A	85.881	-1.339	30.369	-31.708	-8
						Lower B	86.007	-1.213	30.369	-31.582	-8
					256QAM	Lower A	86.296	-0.924	30.369	-31.293	-8
						Lower B	87.132	-0.088	30.369	-30.457	-8
				High	QPSK	Lower A	87.925	0.705	30.493	-29.788	-8
						Lower B	86.591	-0.629	30.493	-31.122	-8
					16QAM	Lower A	87.758	0.538	30.493	-29.955	-8
						Lower B	87.385	0.165	30.493	-30.328	-8
					64QAM	Lower A	87.629	0.409	30.493	-30.084	-8
						Lower B	87.029	-0.191	30.493	-30.684	-8
					256QAM	Lower A	87.219	0.000	30.493	-30.493	-8
						Lower B	86.850	-0.370	30.493	-30.863	-8
MAX Ant. B	135		1	Low	QPSK	Lower A	86.275	-0.945	30.369	-31.314	-8
						Lower B	87.748	0.528	30.369	-29.841	-8
					16QAM	Lower A	87.207	-0.013	30.369	-30.382	-8
						Lower B	87.786	0.566	30.369	-29.803	-8
					64QAM	Lower A	85.912	-1.308	30.369	-31.677	-8
						Lower B	88.486	1.266	30.369	-29.103	-8
					256QAM	Lower A	85.650	-1.570	30.369	-31.939	-8
						Lower B	87.355	0.135	30.369	-30.234	-8
				High	QPSK	Lower A	86.854	-0.366	30.493	-30.859	-8
						Lower B	88.019	0.799	30.493	-29.694	-8
					16QAM	Lower A	86.546	-0.674	30.493	-31.167	-8
						Lower B	87.990	0.770	30.493	-29.723	-8
					64QAM	Lower A	86.522	-0.698	30.493	-31.191	-8
						Lower B	88.068	0.848	30.493	-29.645	-8
					256QAM	Lower A	86.406	-0.814	30.493	-31.307	-8
						Lower B	89.144	1.924	30.493	-28.569	-8

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24 GHz 7CC 700 MHz (24.25 ~ 24.45 GHz Band 2CC 200 MHz + 24.75 ~ 25.25 GHz Band 5CC 500 MHz)

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Band	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	2+5	24.25 ~ 24.45 GHz Band	QPSK	Lower A	87.047	-0.173	30.229	-30.402	-8
						Lower B	75.647	-11.573	30.229	-41.802	-8
						Upper A	86.523	-0.697	30.288	-30.985	-8
						Upper B	75.948	-11.272	30.288	-41.560	-8
					16QAM	Lower A	88.217	0.997	30.229	-29.232	-8
						Lower B	75.277	-11.943	30.229	-42.172	-8
						Upper A	86.363	-0.857	30.288	-31.145	-8
						Upper B	78.167	-9.053	30.288	-39.341	-8
					64QAM	Lower A	87.772	0.552	30.229	-29.677	-8
						Lower B	75.693	-11.527	30.229	-41.756	-8
						Upper A	86.356	-0.864	30.288	-31.152	-8
						Upper B	76.577	-10.643	30.288	-40.931	-8
					256QAM	Lower A	87.734	0.514	30.229	-29.715	-8
						Lower B	75.387	-11.833	30.229	-42.062	-8
						Upper A	86.537	-0.683	30.288	-30.971	-8
						Upper B	75.456	-11.764	30.288	-42.052	-8
MAX Ant. B	135		2+5	24.25 ~ 24.45 GHz Band	QPSK	Lower A	76.372	-10.848	30.229	-41.077	-8
						Lower B	89.062	1.842	30.229	-28.387	-8
						Upper A	76.078	-11.142	30.288	-41.430	-8
						Upper B	86.872	-0.348	30.288	-30.636	-8
					16QAM	Lower A	75.870	-11.350	30.229	-41.579	-8
						Lower B	87.406	0.186	30.229	-30.043	-8
						Upper A	75.937	-11.283	30.288	-41.571	-8
						Upper B	88.025	0.805	30.288	-29.483	-8
					64QAM	Lower A	75.692	-11.528	30.229	-41.757	-8
						Lower B	88.945	1.725	30.229	-28.504	-8
						Upper A	76.754	-10.466	30.288	-40.754	-8
						Upper B	87.474	0.254	30.288	-30.034	-8
					256QAM	Lower A	75.940	-11.280	30.229	-41.509	-8
						Lower B	87.709	0.489	30.229	-29.740	-8
						Upper A	75.912	-11.308	30.288	-41.596	-8
						Upper B	88.158	0.938	30.288	-29.350	-8

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24 GHz 7CC 700 MHz (24.25 ~ 24.45 GHz Band 2CC 200 MHz + 24.75 ~ 25.25 GHz Band 5CC 500 MHz)

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Band	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	2+5	24.75 ~ 25.25 GHz Band	QPSK	Lower A	86.250	-0.970	30.369	-31.339	-8
						Lower B	76.593	-10.627	30.369	-40.996	-8
						Upper A	86.442	-0.778	30.493	-31.271	-8
						Upper B	77.788	-9.432	30.493	-39.925	-8
					16QAM	Lower A	86.613	-0.607	30.369	-30.976	-8
						Lower B	75.941	-11.279	30.369	-41.648	-8
						Upper A	86.050	-1.170	30.493	-31.663	-8
						Upper B	78.085	-9.135	30.493	-39.628	-8
					64QAM	Lower A	85.774	-1.446	30.369	-31.815	-8
						Lower B	76.703	-10.517	30.369	-40.886	-8
						Upper A	85.344	-1.876	30.493	-32.369	-8
						Upper B	78.171	-9.049	30.493	-39.542	-8
					256QAM	Lower A	75.882	-11.338	30.369	-41.707	-8
						Lower B	86.038	-1.182	30.369	-31.551	-8
						Upper A	86.308	-0.912	30.493	-31.405	-8
						Upper B	78.579	-8.641	30.493	-39.134	-8
MAX Ant. B	135		2+5	24.75 ~ 25.25 GHz Band	QPSK	Lower A	76.709	-28.061	30.369	-58.430	-8
						Lower B	87.754	-17.016	30.369	-47.385	-8
						Upper A	77.672	-27.098	30.493	-57.591	-8
						Upper B	86.967	-17.803	30.493	-48.296	-8
					16QAM	Lower A	75.083	-29.687	30.369	-60.056	-8
						Lower B	87.576	-17.194	30.369	-47.563	-8
						Upper A	78.662	-26.108	30.493	-56.601	-8
						Upper B	86.655	-18.115	30.493	-48.608	-8
					64QAM	Lower A	75.720	-29.050	30.369	-59.419	-8
						Lower B	87.633	-17.137	30.369	-47.506	-8
						Upper A	77.069	-27.701	30.493	-58.194	-8
						Upper B	87.299	-17.471	30.493	-47.964	-8
					256QAM	Lower A	75.217	-29.553	30.369	-59.922	-8
						Lower B	86.149	-18.621	30.369	-48.990	-8
						Upper A	77.904	-26.866	30.493	-57.359	-8
						Upper B	87.027	-17.743	30.493	-48.236	-8

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Non-Contiguous

24 GHz 2CC (24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz)
Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1+1	24.25 ~ 24.45 GHz Band Low	QPSK	Lower A	86.589	-0.631	30.229	-30.860	-8
						Lower B	83.831	-3.389	30.229	-33.618	-8
					16QAM	Lower A	85.238	-1.982	30.229	-32.211	-8
						Lower B	84.018	-3.202	30.229	-33.431	-8
					64QAM	Lower A	85.779	-1.441	30.229	-31.670	-8
						Lower B	82.965	-4.255	30.229	-34.484	-8
					256QAM	Lower A	85.142	-2.078	30.229	-32.307	-8
						Lower B	83.637	-3.583	30.229	-33.812	-8
				24.75 ~ 25.25 GHz Band High	QPSK	Upper A	86.312	-0.908	30.493	-31.401	-8
						Upper B	85.105	-2.115	30.493	-32.608	-8
					16QAM	Upper A	86.220	-1.000	30.493	-31.493	-8
						Upper B	85.459	-1.761	30.493	-32.254	-8
					64QAM	Upper A	87.093	-0.127	30.493	-30.620	-8
						Upper B	85.643	-1.577	30.493	-32.070	-8
					256QAM	Upper A	86.171	-1.049	30.493	-31.542	-8
						Upper B	85.746	-1.474	30.493	-31.967	-8
MAX Ant. B	135		1+1	24.25 ~ 24.45 GHz Band Low	QPSK	Lower A	83.483	-3.737	30.229	-33.966	-8
						Lower B	85.603	-1.617	30.229	-31.846	-8
					16QAM	Lower A	83.703	-3.517	30.229	-33.746	-8
						Lower B	85.208	-2.012	30.229	-32.241	-8
					64QAM	Lower A	83.336	-3.884	30.229	-34.113	-8
						Lower B	85.120	-2.100	30.229	-32.329	-8
					256QAM	Lower A	83.741	-3.479	30.229	-33.708	-8
						Lower B	86.054	-1.166	30.229	-31.395	-8
				24.75 ~ 25.25 GHz Band High	QPSK	Upper A	85.350	-1.870	30.493	-32.363	-8
						Upper B	86.286	-0.934	30.493	-31.427	-8
					16QAM	Upper A	85.358	-1.862	30.493	-32.355	-8
						Upper B	86.471	-0.749	30.493	-31.242	-8
					64QAM	Upper A	85.594	-1.626	30.493	-32.119	-8
						Upper B	86.565	-0.655	30.493	-31.148	-8
					256QAM	Upper A	85.200	-2.020	30.493	-32.513	-8
						Upper B	85.980	-1.240	30.493	-31.733	-8

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24 GHz 2CC (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) (24.25 ~ 24.25 GHz Band)
Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1+1	24.25 ~ 24.45 GHz Band High	QPSK	Upper A	85.573	-1.647	30.288	-31.935	-8
						Upper B	84.424	-2.796	30.288	-33.084	-8
					16QAM	Upper A	86.811	-0.409	30.288	-30.697	-8
						Upper B	84.116	-3.104	30.288	-33.392	-8
					64QAM	Upper A	86.005	-1.215	30.288	-31.503	-8
						Upper B	84.306	-2.914	30.288	-33.202	-8
					256QAM	Upper A	84.952	-2.268	30.288	-32.556	-8
						Upper B	84.684	-2.536	30.288	-32.824	-8
MAX Ant. B	135		1+1	24.25 ~ 24.45 GHz Band High	QPSK	Upper A	84.135	-3.085	30.288	-33.373	-8
						Upper B	87.218	-0.002	30.288	-30.290	-8
					16QAM	Upper A	84.441	-2.779	30.288	-33.067	-8
						Upper B	85.954	-1.266	30.288	-31.554	-8
					64QAM	Upper A	84.377	-2.843	30.288	-33.131	-8
						Upper B	85.777	-1.443	30.288	-31.731	-8
					256QAM	Upper A	84.175	-3.045	30.288	-33.333	-8
						Upper B	86.445	-0.775	30.288	-31.063	-8

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24 GHz 7CC (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) (24.75 ~ 25.25 GHz Band)
Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1+1	24.75 ~ 25.25 GHz Band Low	QPSK	Lower A	85.270	-1.950	30.369	-32.319	-8
						Lower B	84.620	-2.600	30.369	-32.969	-8
					16QAM	Lower A	85.569	-1.651	30.369	-32.020	-8
						Lower B	85.601	-1.619	30.369	-31.988	-8
					64QAM	Lower A	85.131	-2.089	30.369	-32.458	-8
						Lower B	84.582	-2.638	30.369	-33.007	-8
					256QAM	Lower A	87.476	0.256	30.369	-30.113	-8
						Lower B	84.117	-3.103	30.369	-33.472	-8
MAX Ant. B	135		1+1	24.75 ~ 25.25 GHz Band Low	QPSK	Lower A	84.888	-2.332	30.369	-32.701	-8
						Lower B	85.707	-1.513	30.369	-31.882	-8
					16QAM	Lower A	84.556	-2.664	30.369	-33.033	-8
						Lower B	86.195	-1.025	30.369	-31.394	-8
					64QAM	Lower A	84.587	-2.633	30.369	-33.002	-8
						Lower B	86.114	-1.106	30.369	-31.475	-8
					256QAM	Lower A	84.370	-2.850	30.369	-33.219	-8
						Lower B	85.620	-1.600	30.369	-31.969	-8

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Contiguous

39 GHz 1CC 100 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1	Low	QPSK	Lower A	88.376	1.156	29.891	-28.735	-8
						Lower B	88.022	0.802	29.891	-29.089	-8
					16QAM	Lower A	88.006	0.786	29.891	-29.105	-8
						Lower B	88.017	0.797	29.891	-29.094	-8
					64QAM	Lower A	87.895	0.675	29.891	-29.216	-8
						Lower B	87.684	0.464	29.891	-29.427	-8
					256QAM	Lower A	87.613	0.393	29.891	-29.498	-8
						Lower B	88.229	1.009	29.891	-28.882	-8
				High	QPSK	Upper A	84.578	-2.642	30.277	-32.919	-8
						Upper B	73.302	-13.918	30.277	-44.195	-8
					16QAM	Upper A	84.662	-2.558	30.277	-32.835	-8
						Upper B	73.131	-14.089	30.277	-44.366	-8
					64QAM	Upper A	84.348	-2.872	30.277	-33.149	-8
						Upper B	73.256	-13.964	30.277	-44.241	-8
					256QAM	Upper A	83.949	-3.271	30.277	-33.548	-8
						Upper B	73.152	-14.068	30.277	-44.345	-8
MAX Ant. B	135		1	Low	QPSK	Lower A	88.085	0.865	29.891	-29.026	-8
						Lower B	87.816	0.596	29.891	-29.295	-8
					16QAM	Lower A	87.551	0.331	29.891	-29.560	-8
						Lower B	87.638	0.418	29.891	-29.473	-8
					64QAM	Lower A	87.573	0.353	29.891	-29.538	-8
						Lower B	87.960	0.740	29.891	-29.151	-8
					256QAM	Lower A	88.172	0.952	29.891	-28.939	-8
						Lower B	87.353	0.133	29.891	-29.758	-8
				High	QPSK	Upper A	73.795	-13.425	30.277	-43.702	-8
						Upper B	84.138	-3.082	30.277	-33.359	-8
					16QAM	Upper A	73.836	-13.384	30.277	-43.661	-8
						Upper B	84.437	-2.783	30.277	-33.060	-8
					64QAM	Upper A	73.891	-13.329	30.277	-43.606	-8
						Upper B	84.347	-2.873	30.277	-33.150	-8
					256QAM	Upper A	73.169	-14.051	30.277	-44.328	-8
						Upper B	85.256	-1.964	30.277	-32.241	-8

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39 GHz 8CC 800 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	8	Low	QPSK	Lower A	88.640	1.420	29.891	-28.471	-8
						Lower B	88.583	1.363	29.891	-28.528	-8
					16QAM	Lower A	89.460	2.240	29.891	-27.651	-8
						Lower B	87.659	0.439	29.891	-29.452	-8
					64QAM	Lower A	88.219	0.999	29.891	-28.892	-8
						Lower B	88.167	0.947	29.891	-28.944	-8
					256QAM	Lower A	88.626	1.406	29.891	-28.485	-8
						Lower B	89.683	2.463	29.891	-27.428	-8
				High	QPSK	Upper A	79.567	-7.653	30.277	-37.930	-8
						Upper B	71.399	-15.821	30.277	-46.098	-8
					16QAM	Upper A	79.369	-7.851	30.277	-38.128	-8
						Upper B	71.835	-15.385	30.277	-45.662	-8
					64QAM	Upper A	79.445	-7.775	30.277	-38.052	-8
						Upper B	71.655	-15.565	30.277	-45.842	-8
					256QAM	Upper A	79.211	-8.009	30.277	-38.286	-8
						Upper B	71.584	-15.636	30.277	-45.913	-8
MAX Ant. B	135		8	Low	QPSK	Lower A	90.060	2.840	29.891	-27.051	-8
						Lower B	87.755	0.535	29.891	-29.356	-8
					16QAM	Lower A	88.911	1.691	29.891	-28.200	-8
						Lower B	88.427	1.207	29.891	-28.684	-8
					64QAM	Lower A	89.244	2.024	29.891	-27.867	-8
						Lower B	89.527	2.307	29.891	-27.584	-8
					256QAM	Lower A	89.262	2.042	29.891	-27.849	-8
						Lower B	90.031	2.811	29.891	-27.080	-8
				High	QPSK	Upper A	85.578	-1.642	30.277	-31.919	-8
						Upper B	70.383	-16.837	30.277	-47.114	-8
					16QAM	Upper A	85.719	-1.501	30.277	-31.778	-8
						Upper B	69.858	-17.362	30.277	-47.639	-8
					64QAM	Upper A	85.848	-1.372	30.277	-31.649	-8
						Upper B	70.267	-16.953	30.277	-47.230	-8
					256QAM	Upper A	86.647	-0.573	30.277	-30.850	-8
						Upper B	70.206	-17.014	30.277	-47.291	-8

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Non-Contiguous

39 GHz 2CC (1CC + 1CC) 100 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1+1	Low	QPSK	Lower A	88.468	1.248	29.891	-28.643	-8
						Lower B	87.982	0.762	29.891	-29.129	-8
					16QAM	Lower A	88.012	0.792	29.891	-29.099	-8
						Lower B	88.361	1.141	29.891	-28.750	-8
					64QAM	Lower A	87.958	0.738	29.891	-29.153	-8
						Lower B	88.454	1.234	29.891	-28.657	-8
					256QAM	Lower A	88.451	1.231	29.891	-28.660	-8
						Lower B	87.750	0.530	29.891	-29.361	-8
				High	QPSK	Upper A	80.902	-6.318	30.277	-36.595	-8
						Upper B	67.560	-19.660	30.277	-49.937	-8
					16QAM	Upper A	81.175	-6.045	30.277	-36.322	-8
						Upper B	67.796	-19.424	30.277	-49.701	-8
					64QAM	Upper A	81.017	-6.203	30.277	-36.480	-8
						Upper B	67.893	-19.327	30.277	-49.604	-8
					256QAM	Upper A	80.765	-6.455	30.277	-36.732	-8
						Upper B	67.745	-19.475	30.277	-49.752	-8
MAX Ant. B	135		1+1	Low	QPSK	Lower A	87.494	0.274	29.891	-29.617	-8
						Lower B	88.256	1.036	29.891	-28.855	-8
					16QAM	Lower A	87.439	0.219	29.891	-29.672	-8
						Lower B	88.474	1.254	29.891	-28.637	-8
					64QAM	Lower A	87.462	0.242	29.891	-29.649	-8
						Lower B	89.156	1.936	29.891	-27.955	-8
					256QAM	Lower A	87.920	0.700	29.891	-29.191	-8
						Lower B	87.764	0.544	29.891	-29.347	-8
				High	QPSK	Upper A	66.854	-20.366	30.277	-50.643	-8
						Upper B	84.792	-2.428	30.277	-32.705	-8
					16QAM	Upper A	66.602	-20.618	30.277	-50.895	-8
						Upper B	85.250	-1.970	30.277	-32.247	-8
					64QAM	Upper A	66.628	-20.592	30.277	-50.869	-8
						Upper B	85.018	-2.202	30.277	-32.479	-8
					256QAM	Upper A	66.648	-20.572	30.277	-50.849	-8
						Upper B	84.796	-2.424	30.277	-32.701	-8

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39 GHz 8CC (1CC + 7CC) 800 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1+7	Low	QPSK	Lower A	87.939	0.719	29.891	-29.172	-8
						Lower B	87.824	0.604	29.891	-29.287	-8
					16QAM	Lower A	88.275	1.055	29.891	-28.836	-8
						Lower B	87.904	0.684	29.891	-29.207	-8
					64QAM	Lower A	87.945	0.725	29.891	-29.166	-8
						Lower B	87.652	0.432	29.891	-29.459	-8
					256QAM	Lower A	87.863	0.643	29.891	-29.248	-8
						Lower B	87.943	0.723	29.891	-29.168	-8
				High	QPSK	Upper A	78.856	-8.364	30.277	-38.641	-8
						Upper B	70.923	-16.297	30.277	-46.574	-8
					16QAM	Upper A	79.374	-7.846	30.277	-38.123	-8
						Upper B	72.119	-15.101	30.277	-45.378	-8
					64QAM	Upper A	79.082	-8.138	30.277	-38.415	-8
						Upper B	70.624	-16.596	30.277	-46.873	-8
					256QAM	Upper A	78.787	-8.433	30.277	-38.710	-8
						Upper B	71.604	-15.616	30.277	-45.893	-8
MAX Ant. B	135		1+7	Low	QPSK	Lower A	88.060	0.840	29.891	-29.051	-8
						Lower B	88.442	1.222	29.891	-28.669	-8
					16QAM	Lower A	87.785	0.565	29.891	-29.326	-8
						Lower B	88.635	1.415	29.891	-28.476	-8
					64QAM	Lower A	88.034	0.814	29.891	-29.077	-8
						Lower B	87.622	0.402	29.891	-29.489	-8
					256QAM	Lower A	87.841	0.621	29.891	-29.270	-8
						Lower B	88.029	0.809	29.891	-29.082	-8
				High	QPSK	Upper A	71.478	-15.742	30.277	-46.019	-8
						Upper B	82.386	-4.834	30.277	-35.111	-8
					16QAM	Upper A	70.417	-16.803	30.277	-47.080	-8
						Upper B	82.713	-4.507	30.277	-34.784	-8
					64QAM	Upper A	69.983	-17.237	30.277	-47.514	-8
						Upper B	82.428	-4.792	30.277	-35.069	-8
					256QAM	Upper A	70.503	-16.717	30.277	-46.994	-8
						Upper B	82.364	-4.856	30.277	-35.133	-8

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39 GHz 8CC (7CC + 1CC) 800 MHz

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	7+1	Low	QPSK	Lower A	89.445	2.225	29.891	-27.666	-8
						Lower B	89.657	2.437	29.891	-27.454	-8
					16QAM	Lower A	87.846	0.626	29.891	-29.265	-8
						Lower B	88.438	1.218	29.891	-28.673	-8
					64QAM	Lower A	89.316	2.096	29.891	-27.795	-8
						Lower B	88.447	1.227	29.891	-28.664	-8
					256QAM	Lower A	89.858	2.638	29.891	-27.253	-8
						Lower B	88.001	0.781	29.891	-29.110	-8
				High	QPSK	Upper A	85.928	-1.292	30.277	-31.569	-8
						Upper B	66.211	-21.009	30.277	-51.286	-8
					16QAM	Upper A	85.786	-1.434	30.277	-31.711	-8
						Upper B	66.336	-20.884	30.277	-51.161	-8
					64QAM	Upper A	85.590	-1.630	30.277	-31.907	-8
						Upper B	66.444	-20.776	30.277	-51.053	-8
					256QAM	Upper A	85.484	-1.736	30.277	-32.013	-8
						Upper B	66.306	-20.914	30.277	-51.191	-8
MAX Ant. B	135		7+1	Low	QPSK	Lower A	88.774	1.554	29.891	-28.337	-8
						Lower B	88.068	0.848	29.891	-29.043	-8
					16QAM	Lower A	88.577	1.357	29.891	-28.534	-8
						Lower B	88.569	1.349	29.891	-28.542	-8
					64QAM	Lower A	88.504	1.284	29.891	-28.607	-8
						Lower B	88.771	1.551	29.891	-28.340	-8
					256QAM	Lower A	89.688	2.468	29.891	-27.423	-8
						Lower B	88.242	1.022	29.891	-28.869	-8
				High	QPSK	Upper A	65.938	-21.282	30.277	-51.559	-8
						Upper B	87.206	-0.014	30.277	-30.291	-8
					16QAM	Upper A	65.743	-21.477	30.277	-51.754	-8
						Upper B	87.766	0.546	30.277	-29.731	-8
					64QAM	Upper A	65.642	-21.578	30.277	-51.855	-8
						Upper B	87.122	-0.098	30.277	-30.375	-8
					256QAM	Upper A	65.814	-21.406	30.277	-51.683	-8
						Upper B	87.065	-0.155	30.277	-30.432	-8

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InterBand

24.25 ~ 24.45 GHz band 1CC Low Ch. + 24.75 ~ 25.25 GHz band 1CC High Ch. + 39 GHz band 5CC Low Ch. + 39GHz band 1CC High Ch.

Tabular Data of Band Edge

Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. A	45	6.5	1+1+5+1	24.25 ~ 24.45 GHz band Low	QPSK	Lower A	82.947	-4.273	30.229	-34.502	-8
						Lower B	77.629	-9.591	30.229	-39.820	-8
					16QAM	Lower A	82.873	-4.347	30.229	-34.576	-8
						Lower B	76.974	-10.246	30.229	-40.475	-8
					64QAM	Lower A	83.816	-3.404	30.229	-33.633	-8
						Lower B	76.974	-10.246	30.229	-40.475	-8
					256QAM	Lower A	82.674	-4.546	30.229	-34.775	-8
						Lower B	78.700	-8.520	30.229	-38.749	-8
				24.75 ~ 25.25 GHz band High	QPSK	Upper A	82.334	-4.886	30.493	-35.379	-8
						Upper B	78.874	-8.346	30.493	-38.839	-8
					16QAM	Upper A	86.220	-1.000	30.493	-31.493	-8
						Upper B	79.558	-7.662	30.493	-38.155	-8
					64QAM	Upper A	83.664	-3.556	30.493	-34.049	-8
						Upper B	80.471	-6.749	30.493	-37.242	-8
					256QAM	Upper A	83.461	-3.759	30.493	-34.252	-8
						Upper B	78.582	-8.638	30.493	-39.131	-8
				39 GHz band Low	QPSK	Lower A	91.012	3.792	29.891	-26.099	-8
						Lower B	91.278	4.058	29.891	-25.833	-8
					16QAM	Lower A	91.689	4.469	29.891	-25.422	-8
						Lower B	90.838	3.618	29.891	-26.273	-8
					64QAM	Lower A	92.215	4.995	29.891	-24.896	-8
						Lower B	90.651	3.431	29.891	-26.460	-8
					256QAM	Lower A	91.452	4.232	29.891	-25.659	-8
						Lower B	90.624	3.404	29.891	-26.487	-8
				39 GHz band High	QPSK	Upper A	94.152	6.932	30.277	-23.345	-8
						Upper B	94.285	7.065	30.277	-23.212	-8
					16QAM	Upper A	93.872	6.652	30.277	-23.625	-8
						Upper B	93.990	6.770	30.277	-23.507	-8
					64QAM	Upper A	95.013	7.793	30.277	-22.484	-8
						Upper B	95.290	8.070	30.277	-22.207	-8
					256QAM	Upper A	94.174	6.954	30.277	-23.323	-8
						Upper B	93.710	6.490	30.277	-23.787	-8

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Pos.	Ant. Angle	Distance (m)	CC	Ch.	Mod.	Edge	Measured Level (dBuV)	EIRP (dBm)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
MAX Ant. B	135	6.5	1+1+5+1	24.25 ~ 24.45 GHz band Low	QPSK	Lower A	78.049	-9.171	30.229	-39.400	-8
						Lower B	82.997	-4.223	30.229	-34.452	-8
					16QAM	Lower A	77.445	-9.775	30.229	-40.004	-8
						Lower B	84.683	-2.537	30.229	-32.766	-8
					64QAM	Lower A	77.252	-9.968	30.229	-40.197	-8
						Lower B	85.741	-1.479	30.229	-31.708	-8
					256QAM	Lower A	76.790	-10.430	30.229	-40.659	-8
						Lower B	83.667	-3.553	30.229	-33.782	-8
				24.75 ~ 25.25 GHz band High	QPSK	Upper A	78.911	-8.309	30.493	-38.802	-8
						Upper B	83.432	-3.788	30.493	-34.281	-8
					16QAM	Upper A	78.670	-8.550	30.493	-39.043	-8
						Upper B	83.979	-3.241	30.493	-33.734	-8
					64QAM	Upper A	78.928	-8.292	30.493	-38.785	-8
						Upper B	84.458	-2.762	30.493	-33.255	-8
					256QAM	Upper A	79.650	-7.570	30.493	-38.063	-8
						Upper B	85.205	-2.015	30.493	-32.508	-8
				39 GHz band Low	QPSK	Lower A	91.062	3.842	29.891	-26.049	-8
						Lower B	91.553	4.333	29.891	-25.558	-8
					16QAM	Lower A	92.741	5.521	29.891	-24.370	-8
						Lower B	91.553	4.333	29.891	-25.558	-8
					64QAM	Lower A	92.264	5.044	29.891	-24.847	-8
						Lower B	91.245	4.025	29.891	-25.866	-8
					256QAM	Lower A	90.120	2.900	29.891	-26.991	-8
						Lower B	91.775	4.555	29.891	-25.336	-8
				39 GHz band High	QPSK	Upper A	95.406	8.186	30.277	-22.091	-8
						Upper B	94.793	7.573	30.277	-22.704	-8
					16QAM	Upper A	94.033	6.813	30.277	-23.464	-8
						Upper B	94.378	7.158	30.277	-23.119	-8
					64QAM	Upper A	94.241	7.021	30.277	-23.256	-8
						Upper B	93.561	6.341	30.277	-23.936	-8
					256QAM	Upper A	93.820	6.600	30.277	-23.677	-8
						Upper B	94.039	6.819	30.277	-23.458	-8

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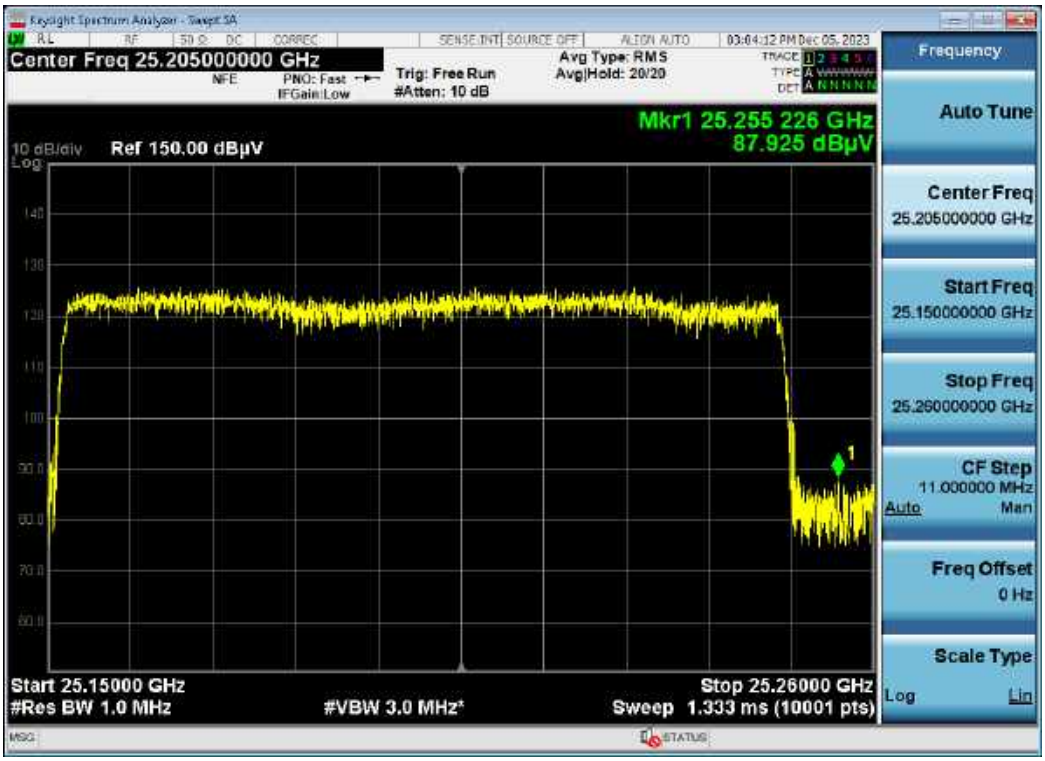
Plot data of Band Edge

Antenna A / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 256QAM / Low / Lower A

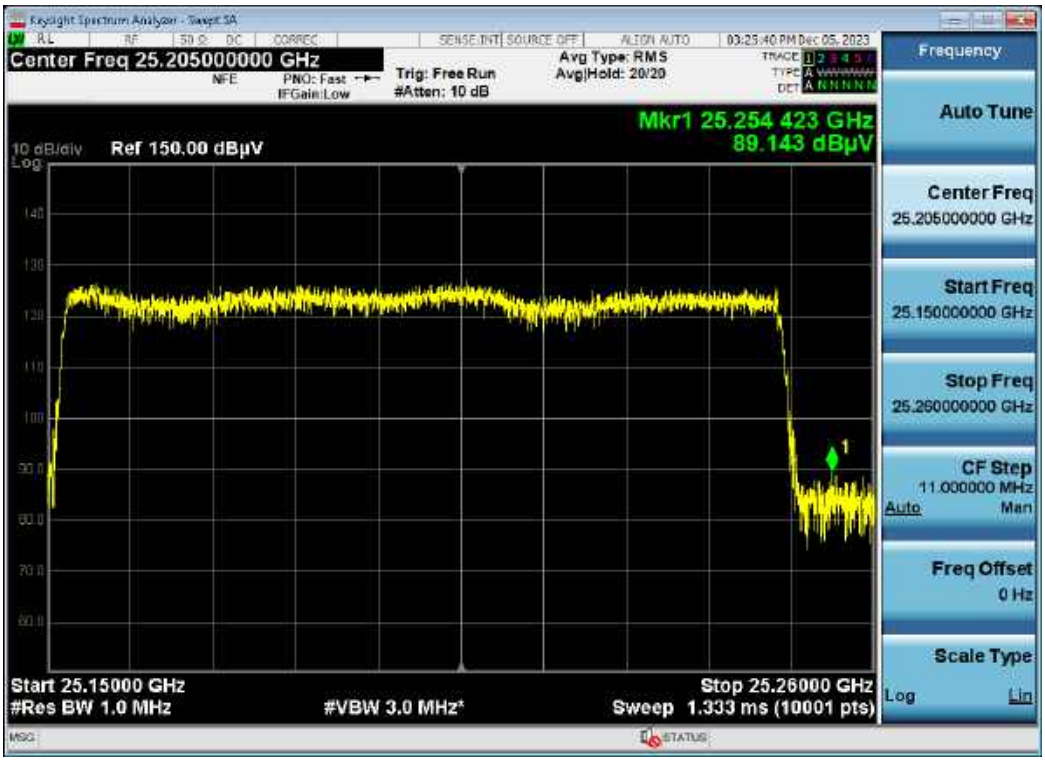
Antenna B / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / 256QAM / High / Lower B

The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna A / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / QPSK / High / Lower A



Antenna B / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / 256QAM / High / Lower B



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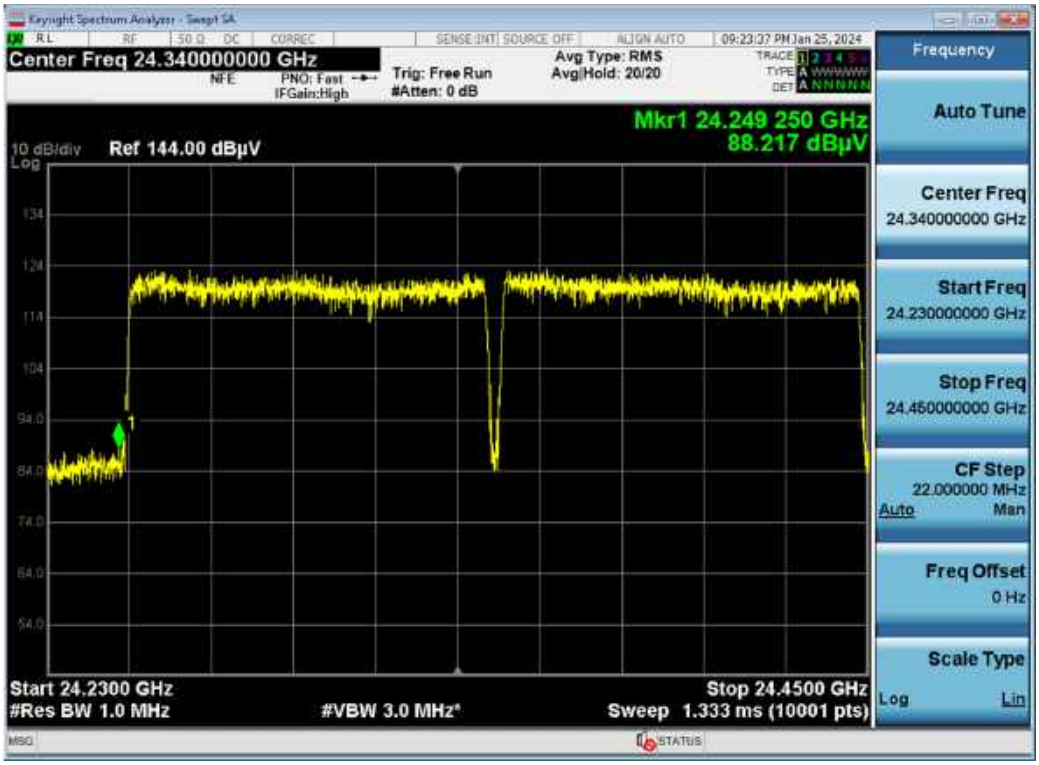
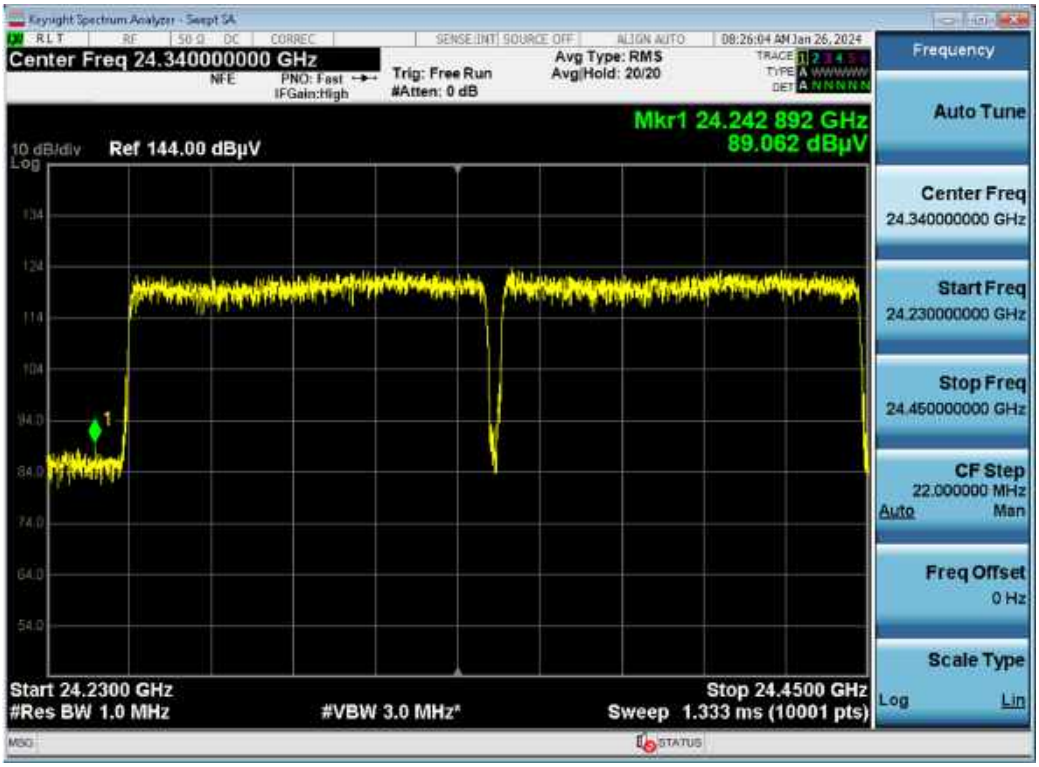
Antenna A / 24 GHz 7CC 700 MHz / 24.25 ~ 24.25 GHz Band / 16QAM / Low / Lower A



Antenna B / 24 GHz 7CC 700 MHz / 24.25 ~ 24.25 GHz Band / QPSK / Low / Lower B



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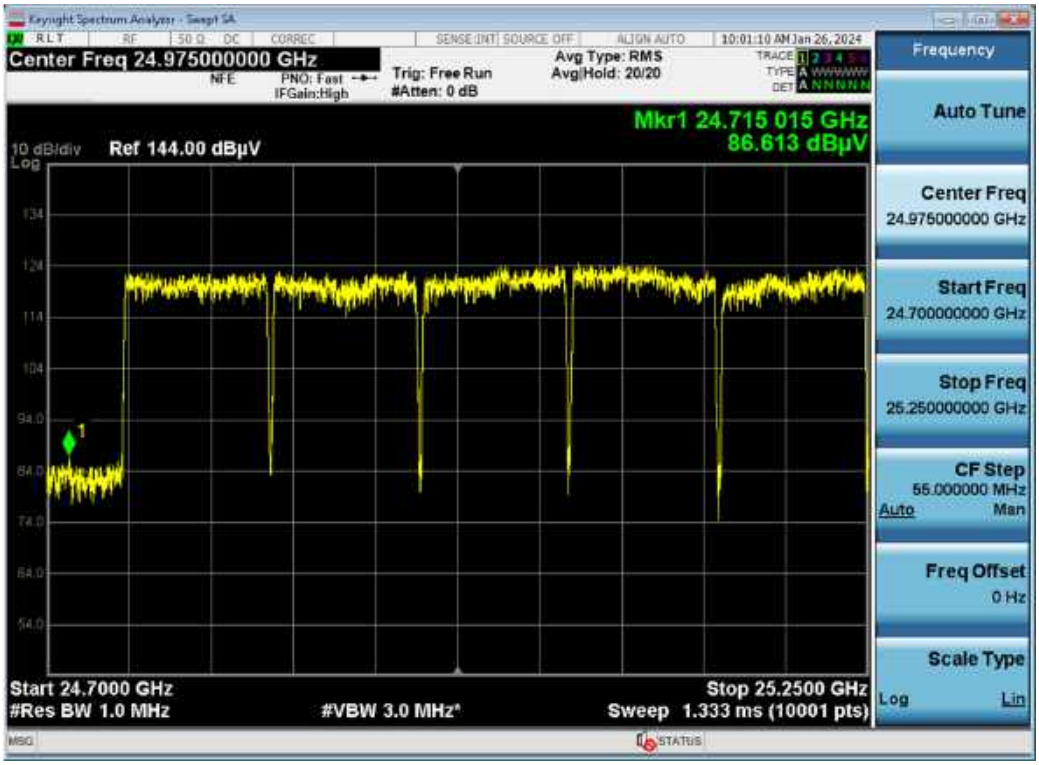
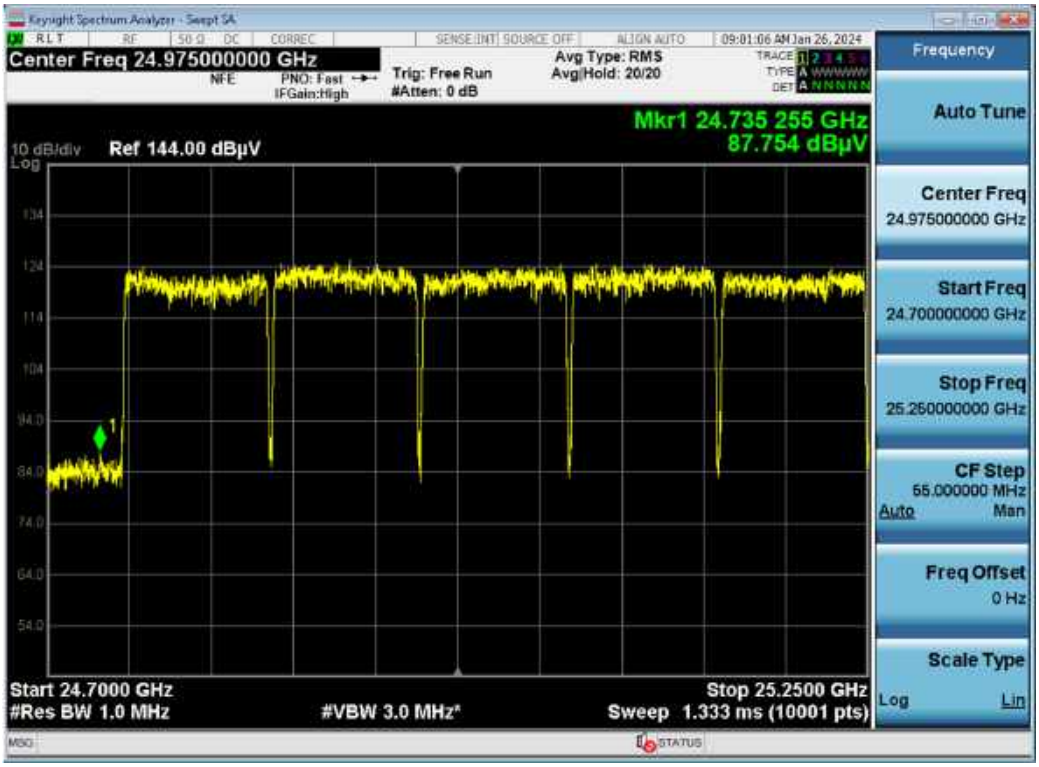
Antenna A / 24 GHz 7CC 700 MHz / 24.75 ~ 25.25 GHz Band / 16QAM / Low / Lower A



Antenna B / 24 GHz 7CC 700 MHz / 24.75 ~ 25.25 GHz Band / QPSK / Low / Lower B



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Antenna A / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM / High / Lower A

Antenna B / 24 GHz 2CC Non-Contiguous

(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM / High / Lower B

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Antenna A / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) /
24.25 ~ 24.25 GHz Band / 16QAM / High / Lower A

Antenna B / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) /
24.25 ~ 24.25 GHz Band / QPSK / High / Lower B

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Antenna A / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) /
24.75 ~ 25.25 GHz Band / 256QAM / Low / Lower A

Antenna B / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 24.75 ~ 25.25 GHz Band /
16QAM / Low / Lower B

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Antenna A / 39 GHz 1CC 100 MHz / QPSK / Low / Lower A

Antenna B / 39 GHz 1CC 100 MHz / 256QAM / Low / Lower A

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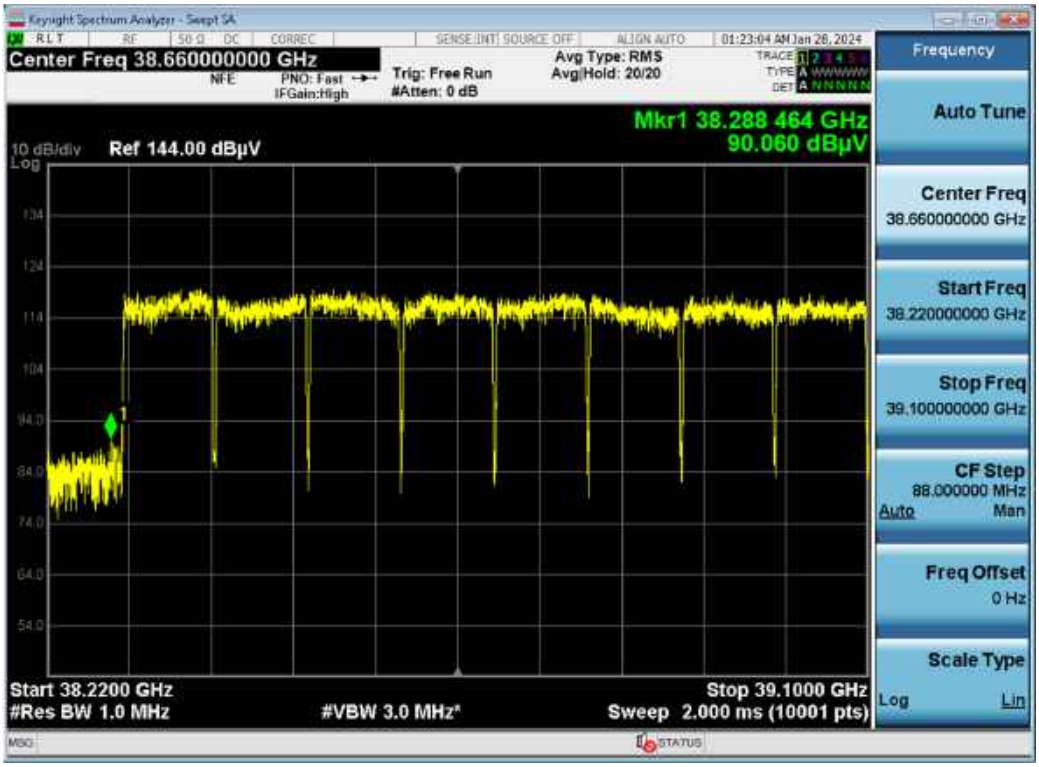
Antenna A / 39 GHz 8CC 800 MHz / 256QAM / Low / Lower B

Antenna B / 39 GHz 8CC 800 MHz / QPSK / Low / Lower A



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Antenna A / 39 GHz 2CC (1CC + 1CC) 100 MHz / QPSK / Low / Lower A

Antenna B / 39 GHz 2CC (1CC + 1CC) 100 MHz / 64QAM / Low / Lower B

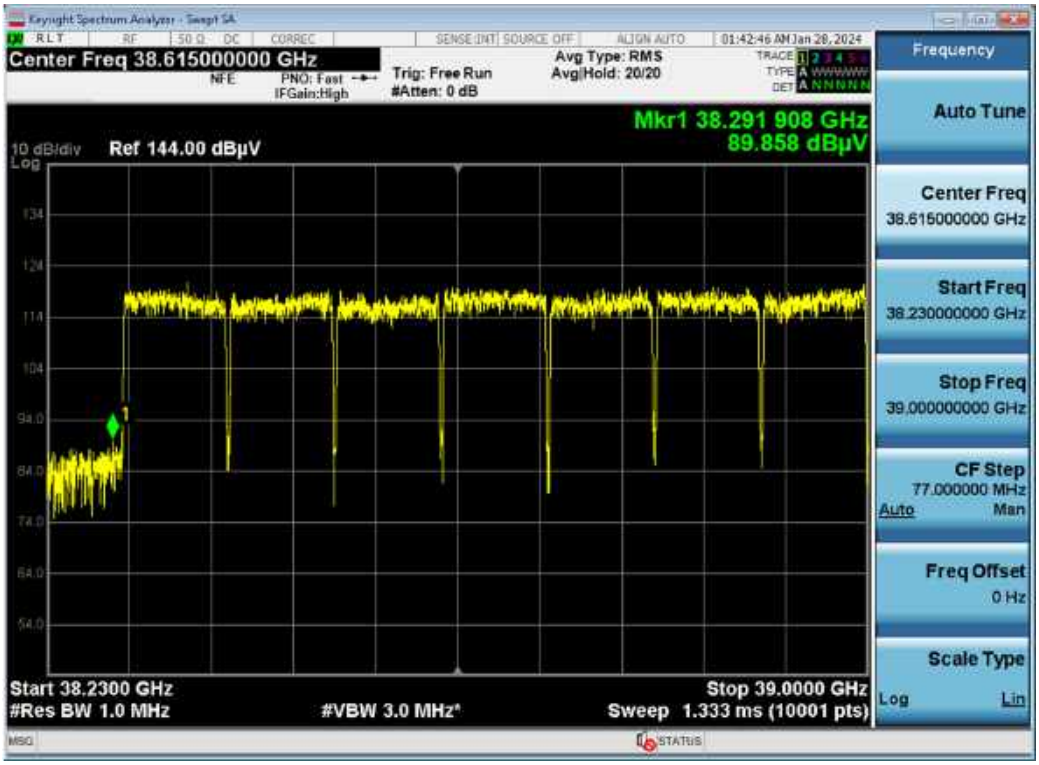
The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna A / 39 GHz 8CC (1CC + 7CC) 800 MHz / 16QAM / Low / Lower A

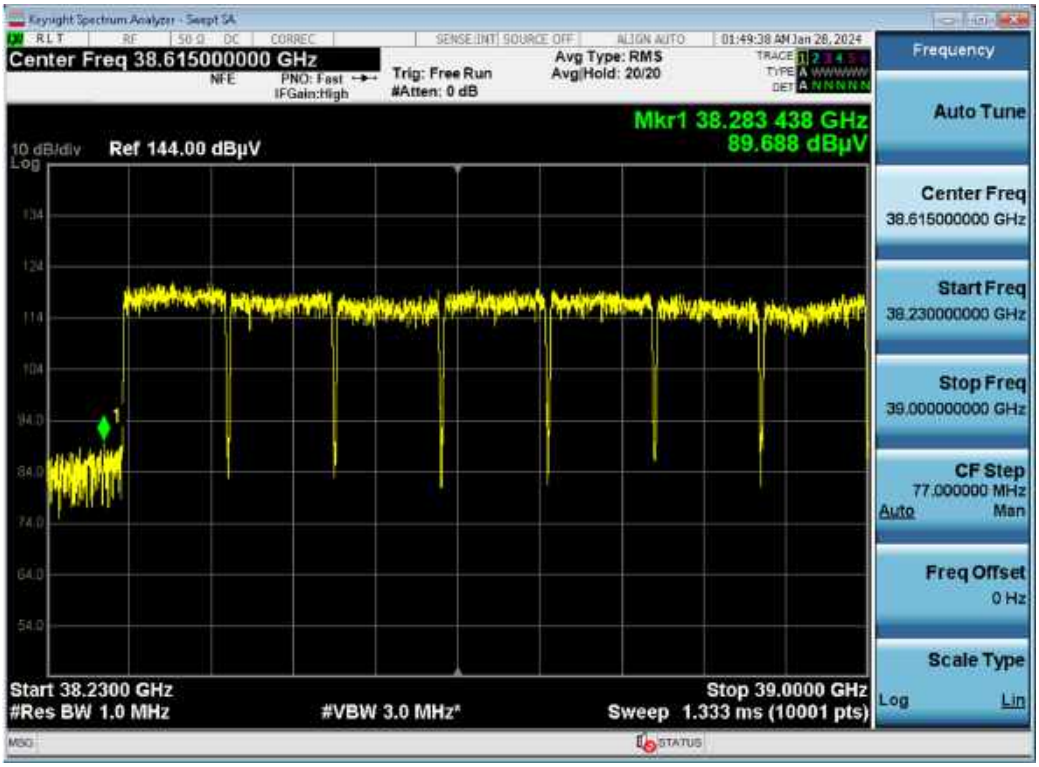
Antenna B / 39 GHz 8CC (1CC + 7CC) 800 MHz / 16QAM / Low / Lower B

The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna A / 39 GHz 8CC (7CC + 1CC) 800 MHz / 256QAM / Low / Lower A



Antenna B / 39 GHz 8CC (7CC + 1CC) 800 MHz / 256QAM / Low / Lower A



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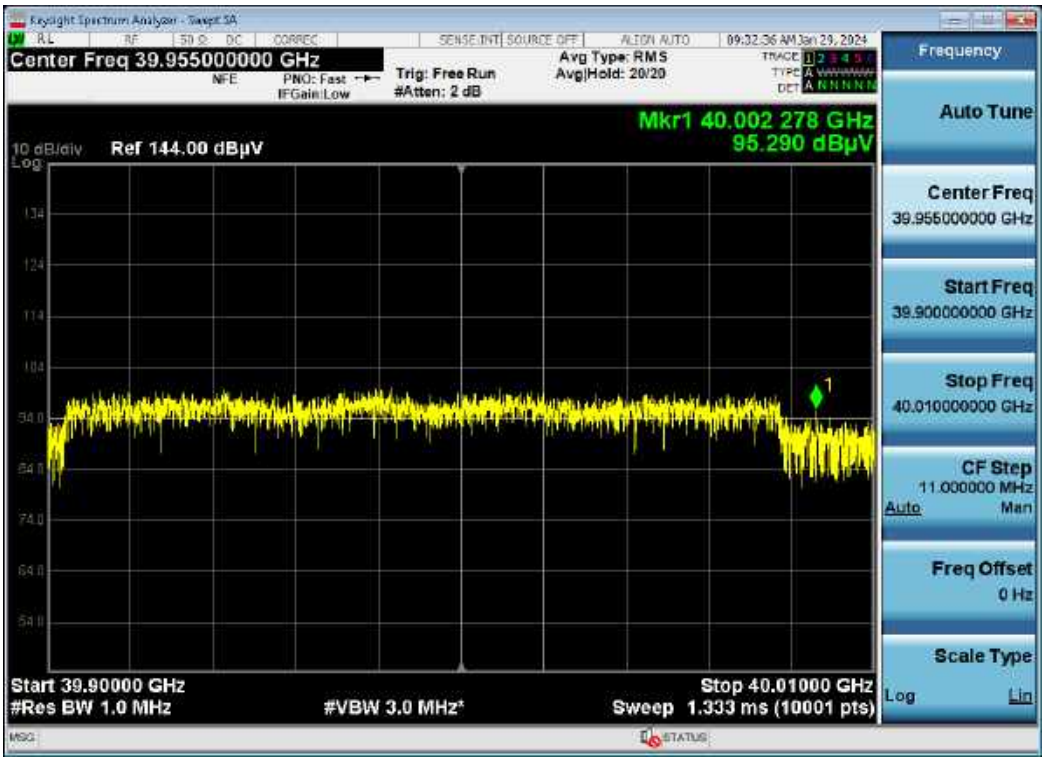
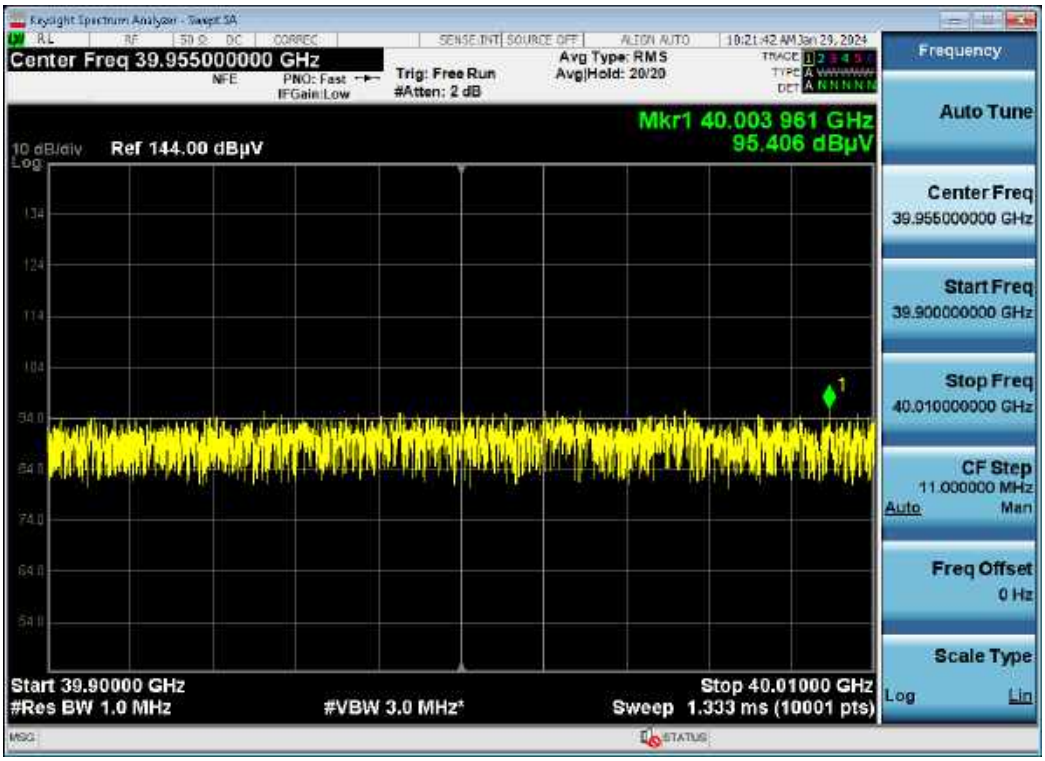
Antenna A / InterBand / 64QAM / High / Upper B



Antenna B / InterBand / QPSK / High / Upper A



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5.5. RADIATED SPURIOUS EMISSIONS

FCC Rules

Test Requirements:

§ 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 30.203 Emission limits.

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

(b)

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values.

EIRP Test Procedures:

The measurement is performed in accordance with Section 5.7.4 of ANSI C63.26.

5.7.4 Spurious unwanted emission measurements

a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.

b) When using an average power (rms) detector, ensure that the number of points in the sweep ≥ 2 × (span / RBW). This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

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d) Identify and measure the highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

f) Compare the results with the corresponding limit in the applicable regulation.

g) The test report shall include the data plots of the measuring instrument display and the measured data.

TRP Test Procedures:

The measurement is performed in accordance with Section 4.4.3.3.2 of KDB 842590 D01 v01r02 (2021-04).

a) Align the EUT with a chosen xy-plane and the xz-plane of the antenna measurement coordinate system.
NOTE 1: For harmonics and spurious emission frequencies which are beamforming as identified in exploratory scan, it may be required to align the orthogonal cuts to include the peak based on exploratory scans.

b) Measure the EUT dimensions, i.e., depth (d), width (w), and height (h); see Figure A.1 in Appendix A.

c) Calculate the spherical and cylindrical diameters (D and Dcyl) using Equations (A.1) and (A.2) (see Appendix A).

d) For the highest frequency (smallest wavelength) of the frequency band measured, calculate the reference angular steps $\Delta\theta$ref and $\Delta\phi$ref using Equations (A.3) and (A.4).

e) Set the grid spatial sampling step $\Delta\theta \leq \Delta\theta$ref for the vertical angle and $\Delta\phi \leq \Delta\phi$ref for the horizontal cut.

f) For each emission frequency, measure the EIRP (as a sum of two orthogonal polarizations) at each spatial sampling step on the selected grid.

g) For each emission frequency, calculate the average EIRP for both the cuts separately, and then take the average of these two average values.

h) Add 2 dB as a correction factor to the averaged value computed in step g).

i) If the TRP limit is exceeded, a third orthogonal cut in the yz-plane and using the $\Delta\theta$ angular step, can be added. Now, calculate the average values in all three cuts separately, and then take the average value of these three average values.

j) Add 1.5 dB as a correction factor to the averaged value computed in step i).

k) Evaluate the pass/fail decision by comparing TRP from step h) or step j) against the applicable TRP limit.
NOTE 2: The 2 dB correction factor for two cut and 1.5 dB correction factor for three cuts is derived from [4].

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Note:

1. Spurious emission test is performed up to 200 GHz frequency according to section 5.1.1 of ANSI C63.26 -2015.
2. Several results in the tabular are measured by TRP, because result value is fail or insufficient margin.
3. Measurement distance is applied far field condition in section 3.2.
4. We were performed the test in MIMO mode.
5. Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.
   - *Beyond OBW 10%: 2Tx MIMO correction: 10 log(N_{ANT}) = 10 log(2) = 3.01 dB*

     *-13 dBm – 10*log (2) = -16.01 dBm*
6. In case of under 18 GHz and above 40 GHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured so we are attached only the worst case plots.
7. Because of no critical emissions are detected in the test, only peak value is recorded in this report.
8. Test plot(18 GHz ~ 40 GHz) include AFCL factors and results are calculated in tabular data.
9. In this test, AFCL factor consists of antenna factor, cable loss, mixer loss, amplifier gain..
10. Emissions value is first converted by distance factor as follow. *(*Measured Value include AFCL factors.)*

    Converted value (dBm) = Measured Value (dBuV) + 20 * log(D) - 104.77*
11. Final spurious emissions result is calculated as follows.

    Spurious Emissions = Converted Value (dBm) + Duty Cycle correction
12. Spurious emissions test is performed about the worst case of modulation type.
13. Sample calculations:

    18 GHz ~ Low Edge

    82.820 dBμV (measured + AFCL) + 10.88 (distance) – 104.77 (Conversion) + 1.2921 (Duty) = -9.77 dBm/MHz

    30 ~ 40 GHz

    69.430 dBμV (measured + AFCL) + 10.88 (distance) – 104.77 (Conversion) + 1.2921 (Duty) = -23.16 dBm/MHz

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Tabular Data of Radiated Spurious Emissions Test Results:

Contiguous

24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ Low Edge	256QAM	Low	23.378	86.89	1.292	3.0	-5.706	-20.278
	16QAM	Middle	23.268	85.54	1.292	3.0	-7.056	-21.762
	64QAM	High	23.188	82.78	1.292	3.0	-9.816	-23.824
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	256QAM	Low	24.579	75.42	1.292	3.0	-17.176	-
	64QAM	Middle	24.451	75.21	1.292	3.0	-17.386	-
	16QAM	High	24.460	78.66	1.292	3.0	-13.936	-24.443
24.75 ~ 25.25 GHz Band High Edge ~ 30 GHz	64QAM	Low	28.125	81.97	1.292	3.0	-10.626	-22.025
	16QAM	Middle	28.125	83.51	1.292	3.0	-9.086	-21.303
	256QAM	High	28.125	82.99	1.292	3.0	-9.606	-22.106
30 GHz ~ 40 GHz	64QAM	Low	39.953	69.25	1.292	3.0	-23.346	-
	16QAM	Middle	39.526	69.23	1.292	3.0	-23.366	-
	256QAM	High	39.918	69.42	1.292	3.0	-23.176	-

24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ Low Edge	64QAM	Low	23.665	75.480	1.292	3.0	-17.116	-
	256QAM	Middle	23.665	74.080	1.292	3.0	-18.516	-
	256QAM	High	23.665	72.640	1.292	3.0	-19.956	-
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	64QAM	Low	24.740	80.46	1.292	3.0	-12.136	-24.530
	16QAM	Middle	24.743	71.92	1.292	3.0	-20.676	-
	64QAM	High	24.457	73.28	1.292	3.0	-19.316	-
24.75 ~ 25.25 GHz Band High Edge ~ 30 GHz	16QAM	Low	28.125	83.710	1.292	3.0	-8.886	-23.053
	64QAM	Middle	28.125	83.780	1.292	3.0	-8.816	-23.007
	16QAM	High	28.125	84.990	1.292	3.0	-7.606	-23.357
30 GHz ~ 40 GHz	64QAM	Low	39.527	68.550	1.292	3.0	-24.046	-
	64QAM	Middle	39.496	69.040	1.292	3.0	-23.556	-
	64QAM	High	39.521	68.600	1.292	3.0	-23.996	-

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24 GHz 7CC Contiguous 700 MHz (24.25 ~ 24.45 GHz Band 2CC + 24.75 ~ 25.25 GHz Band 5CC)

	Modulation	Frequency (GHz)	Measured Value (dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ Low Edge	16QAM	24.233	84.670	1.292	3.0	-7.926	-20.073
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	16QAM	24.684	86.070	1.292	3.0	-6.526	-19.937
24.75 ~ 25.25 GHz Band High Edge ~ 30 GHz	16QAM	25.632	87.030	1.292	3.0	-5.566	-17.977
30 GHz ~ 40 GHz	QPSK	39.900	68.600	1.292	3.0	-23.996	-

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Non-Contiguous

24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz)

	Modulation	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ Low Edge	QPSK	23.375	85.400	1.292	3.0	-7.196	-22.049
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	16QAM	24.507	76.570	1.292	3.0	-16.026	-
24.75 ~ 25.25 GHz Band High Edge ~ 30 GHz	16QAM	28.125	84.280	1.292	3.0	-8.316	-22.015
30 GHz ~ 40 GHz	64QAM	39.525	68.510	1.292	3.0	-24.086	-

24 GHz 2CC Non-Contiguous (24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz)

	Modulation	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ Low Edge	64QAM	23.198	81.340	1.292	3.0	-11.256	-22.029
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	256QAM	24.739	79.320	1.292	3.0	-13.276	-24.455
24.75 ~ 25.25 GHz Band High Edge ~ 30 GHz	16QAM	28.125	84.850	1.292	3.0	-7.746	-21.445
30 GHz ~ 40 GHz	16QAM	39.535	68.310	1.292	3.0	-24.286	-

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Contiguous

39 GHz 1CC 100 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 26.50 GHz	256QAM	Low	26.498	58.780	1.292	3.0	-33.816	-
		Middle	26.469	58.610	1.292	3.0	-33.986	-
		High	26.476	58.600	1.292	3.0	-33.996	-
26.50 GHz ~ Low Edge	16QAM	Low	37.907	72.550	1.292	3.0	-20.046	-
	64QAM	Middle	37.907	74.010	1.292	3.0	-18.586	-
	256QAM	High	37.907	78.250	1.292	3.0	-14.346	-22.461

39 GHz 8CC Contiguous 800 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 26.50 GHz	QPSK	Low	26.064	50.390	1.292	3.0	-42.206	-
	16QAM	Middle	26.058	50.340	1.292	3.0	-42.256	-
	256QAM	High	26.058	50.330	1.292	3.0	-42.266	-
26.50 GHz ~ Low Edge	16QAM	Low	38.216	63.640	1.292	3.0	-28.956	-
	64QAM	Middle	37.906	60.130	1.292	3.0	-32.466	-
	16QAM	High	37.907	62.57	1.292	3.0	-30.026	-

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Non-Contiguous

39 GHz 2CC Non-Contiguous (1CC + 1CC) 100 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 26.50 GHz	256QAM	1C+1C	26.471	58.880	1.292	3.5	-33.716	-
26.5G – Low Edge	64QAM	1C+1C	37.907	74.550	1.292	3.5	-18.046	-

39 GHz 8CC Non-Contiguous (1CC + 7CC) 800 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 26.50 GHz	QPSK	1C+7C	26.478	58.240	1.292	3.5	-34.356	-
26.5G – Low Edge	QPSK	1C+7C	37.907	75.900	1.292	3.5	-16.696	-

39 GHz 8CC Non-Contiguous (7CC + 1CC) 800 MHz

	Modulation	Channel	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 26.50 GHz	16QAM	7C+1C	26.057	50.460	1.292	3.5	-42.136	-
26.5G – Low Edge	256QAM	7C+1C	38.213	62.560	1.292	3.5	-30.036	-

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InterBand

24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 1CC

	Modulation	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 24.25 ~ 24.45 GHz Band Low Edge	QPSK	18.118	74.210	1.292	3.5	-18.386	-
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	QPSK	24.512	73.940	1.292	3.5	-18.656	-
24.75 ~ 25.25 GHz Band High Edge ~ 39 GHz Low Edge	QPSK	34.855	86.410	1.292	3.5	-6.186	-16.275

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24.25 ~ 24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 1CC

	Modulation	Frequency (GHz)	Measured Value (dBµV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 24.25 ~ 24.45 GHz Band Low Edge	256QAM	23.224	79.360	1.292	3.5	-13.236	-24.530
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	16QAM	24.737	78.470	1.292	3.5	-14.126	-23.508
24.75 ~ 25.25 GHz Band High Edge ~ 39 GHz Low Edge	256QAM	34.860	86.740	1.292	3.5	-5.856	-16.256

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24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 5CC + 39 GHz High 1CC

	Modulation	Frequency (GHz)	Measured Value (dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 24.25 ~ 24.45 GHz Band Low Edge	64QAM	23.379	84.850	1.292	3.5	-7.746	-21.762
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	16QAM	24.648	76.370	1.292	3.5	-16.226	-
24.75 ~ 25.25 GHz Band High Edge ~ 39 GHz Low Edge	64QAM	34.853	86.490	1.292	3.5	-6.106	-16.211

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24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 5CC

	Modulation	Frequency (GHz)	Measured Value (dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 24.25 ~ 24.45 GHz Band Low Edge	QPSK	18.114	74.240	1.292	3.5	-18.356	-
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	QPSK	24.516	74.050	1.292	3.5	-18.546	-
24.75 ~ 25.25 GHz Band High Edge ~ 39 GHz Low Edge	256QAM	34.852	86.780	1.292	3.5	-5.816	-16.651

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24.25 ~ 24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 5CC + 39 GHz High 1CC

	Modulation	Frequency (GHz)	Measured Value (dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 24.25 ~ 24.45 GHz Band Low Edge	16QAM	23.191	81.010	1.292	3.5	-11.586	-22.918
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	16QAM	24.461	78.550	1.292	3.5	-14.046	-24.119
24.75 ~ 25.25 GHz Band High Edge ~ 39 GHz Low Edge	256QAM	34.848	86.630	1.292	3.5	-5.966	-16.248

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24.25 ~ 24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 5CC

	Modulation	Frequency (GHz)	Measured Value(dBμV)	Duty	Distance (m)	Result (dBm)	TRP (dBm)
18 GHz ~ 24.25 ~ 24.45 GHz Band Low Edge	16QAM	23.194	80.640	1.292	3.5	-11.956	-22.781
24.25 ~ 24.45 GHz Band High Edge ~ 24.75 ~ 25.25 GHz Band Low Edge	16QAM	24.463	77.890	1.292	3.5	-14.706	-25.120
24.75 ~ 25.25 GHz Band High Edge ~ 39 GHz Low Edge	QPSK	34.854	86.460	1.292	3.5	-6.136	-16.268

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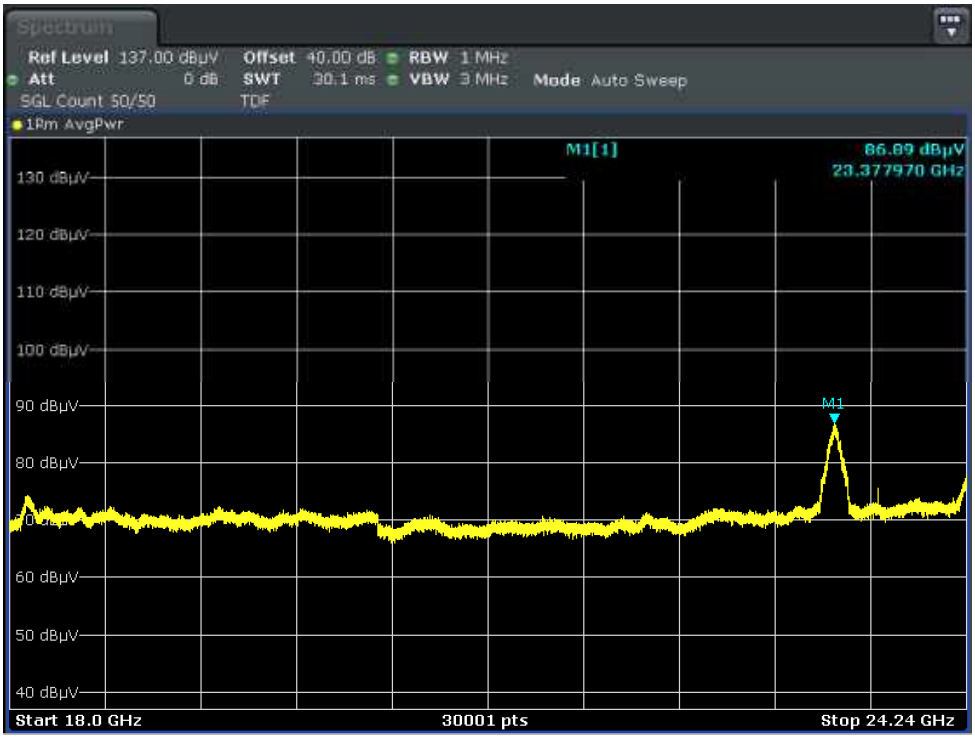
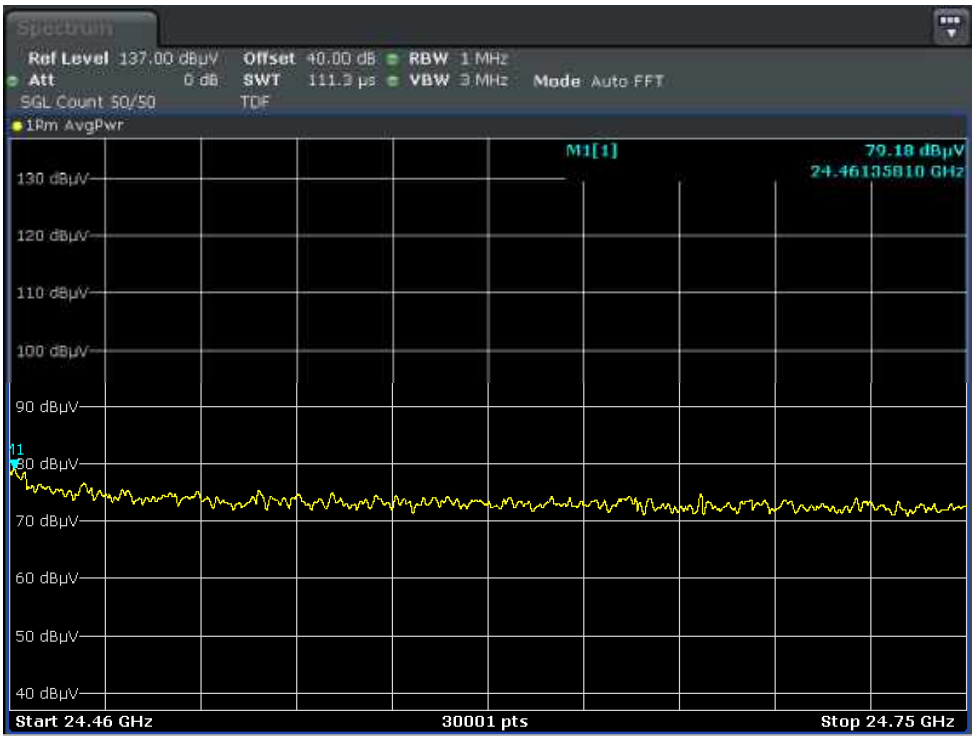
Plot data of Radiated Spurious Emissions

Antenna B / 18G - 24.25G / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / Low / 256QAM

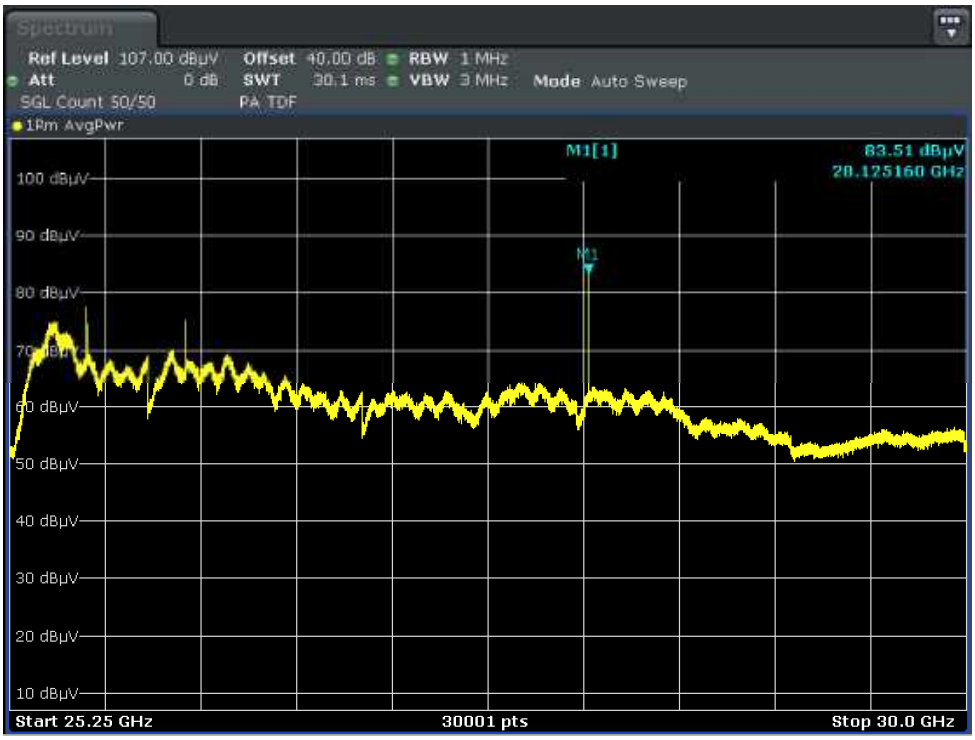


Antenna B / 24.45G - 24.75G / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / High / 64QAM

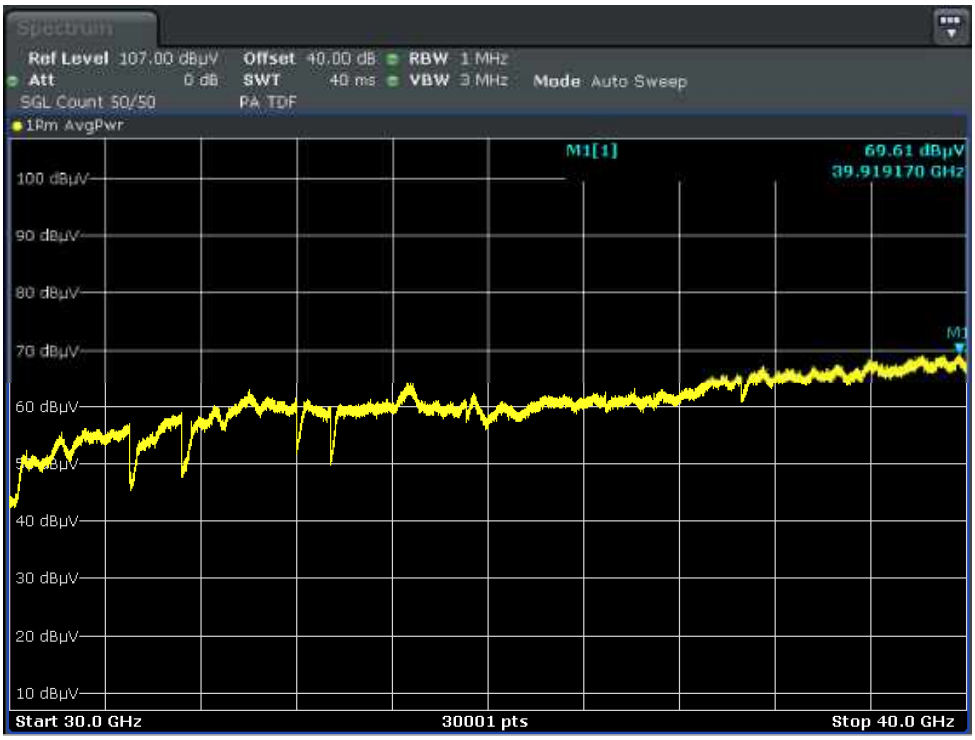


The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna B / 25.25G - 30G / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / Middle / 16QAM

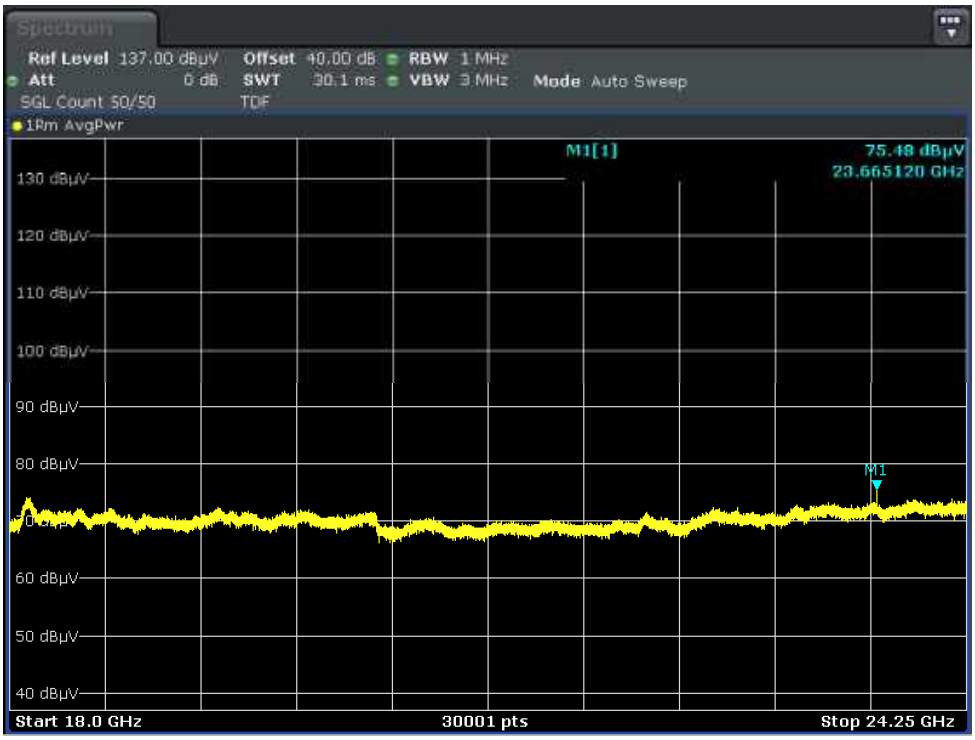


Antenna A / 30G - 40G / 24 GHz 1CC (24.25 ~ 24.45 GHz Band) 100 MHz / Low / 64QAM

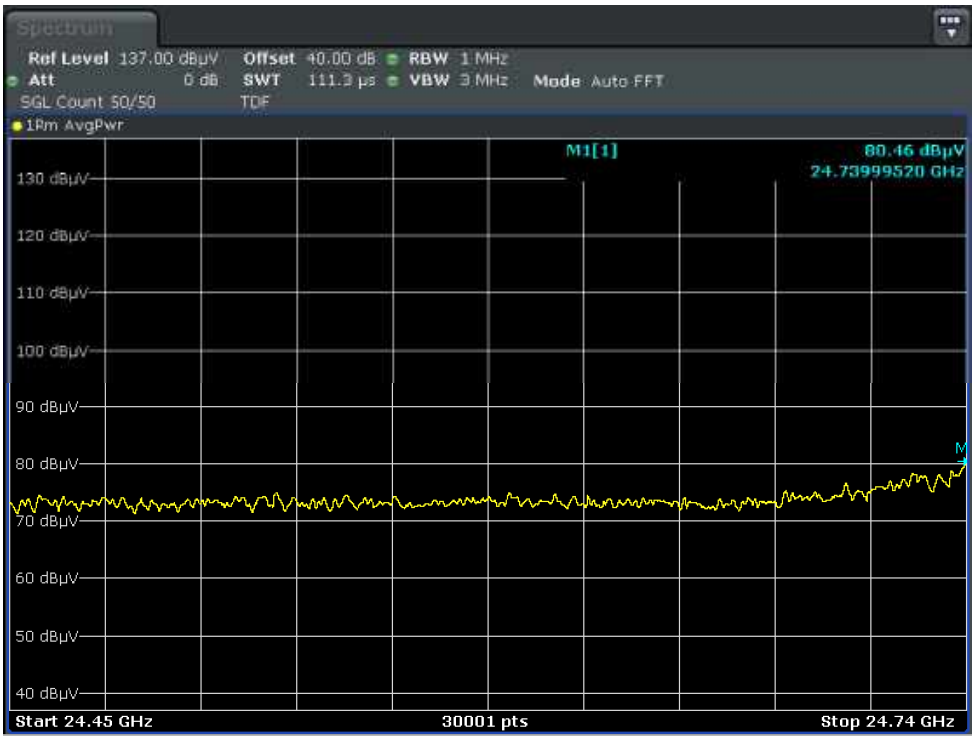


The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna B / 18G - 24.25G / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / Low / 64QAM

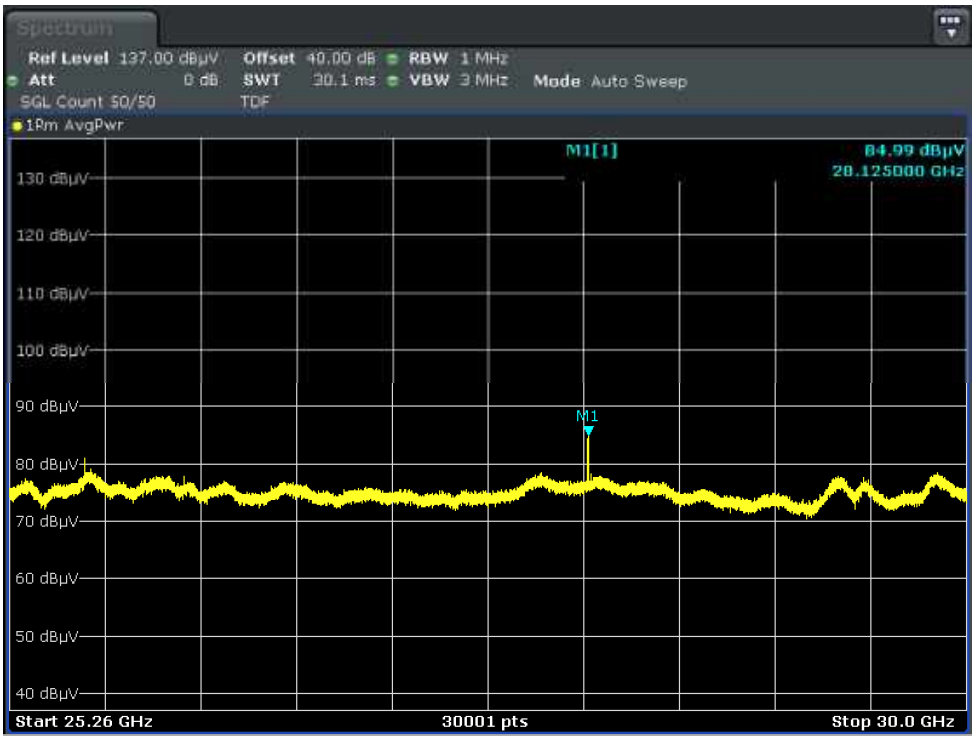


Antenna B / 24.45G - 24.75G / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / Low / 64QAM

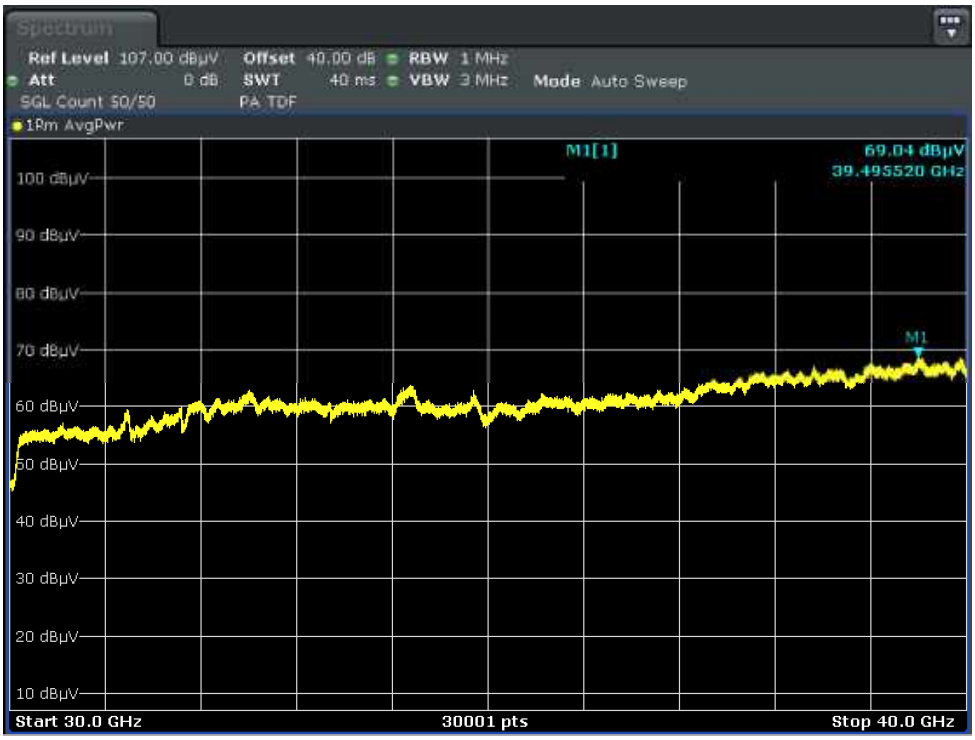


The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna B / 25.25G - 30G / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / High / 64QAM

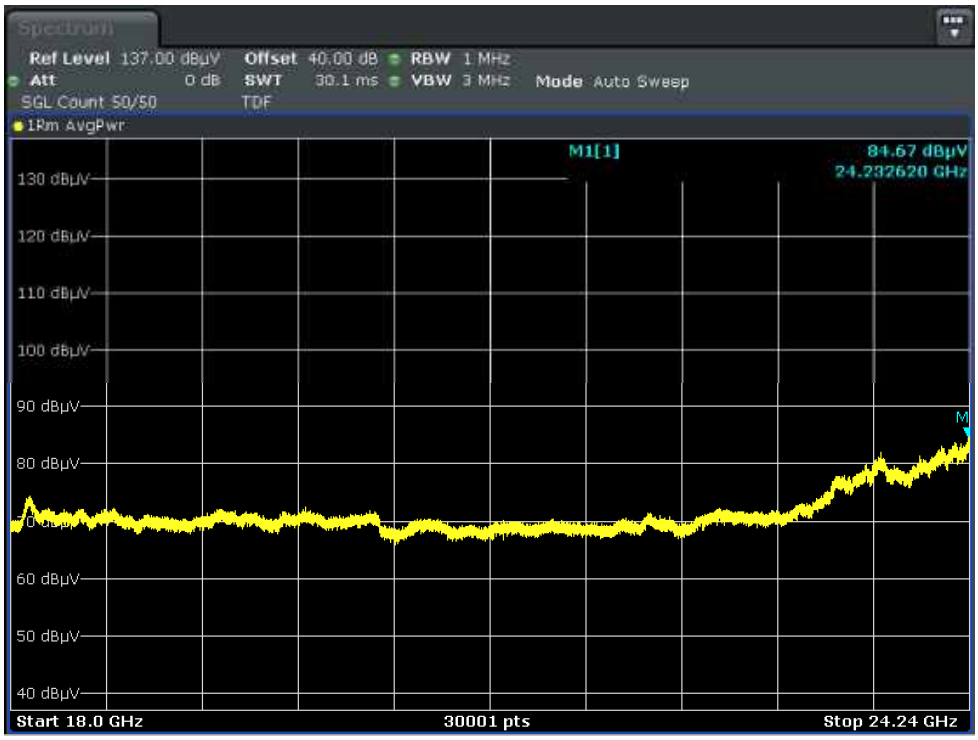


Antenna A / 30G - 40G / 24 GHz 1CC (24.75 ~ 25.25 GHz Band) 100 MHz / Middle / 64QAM

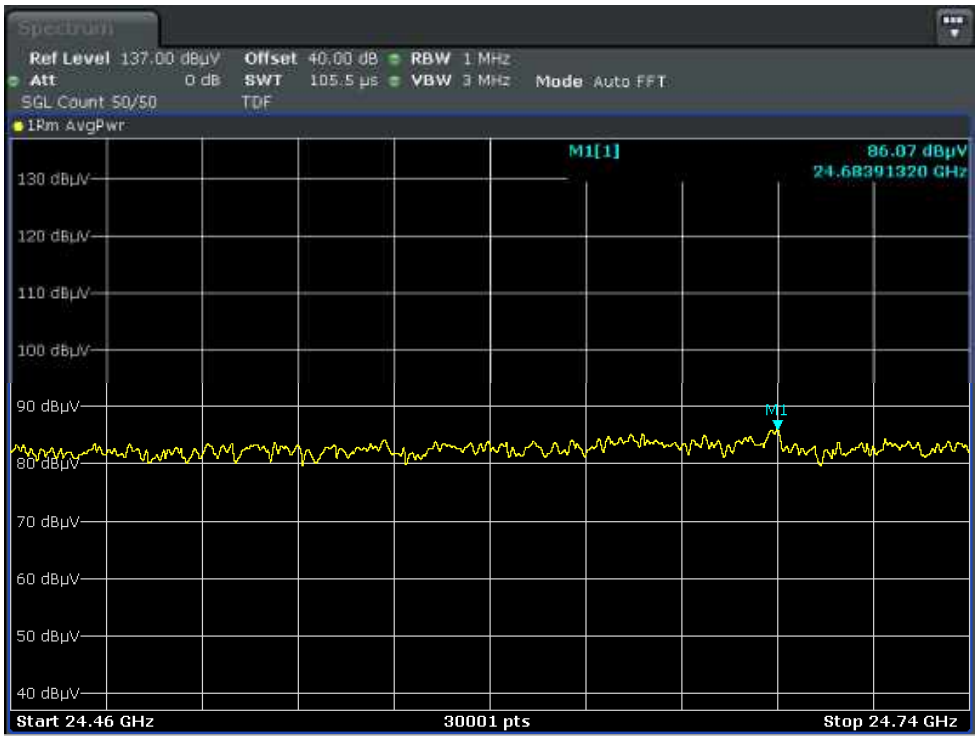


The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna B / 18G - 24.25G / 24 GHz 7CC 700 MHz / Low / 16QAM



Antenna B / 24.45G - 24.75G / 24 GHz 7CC 700 MHz / Low / 16QAM



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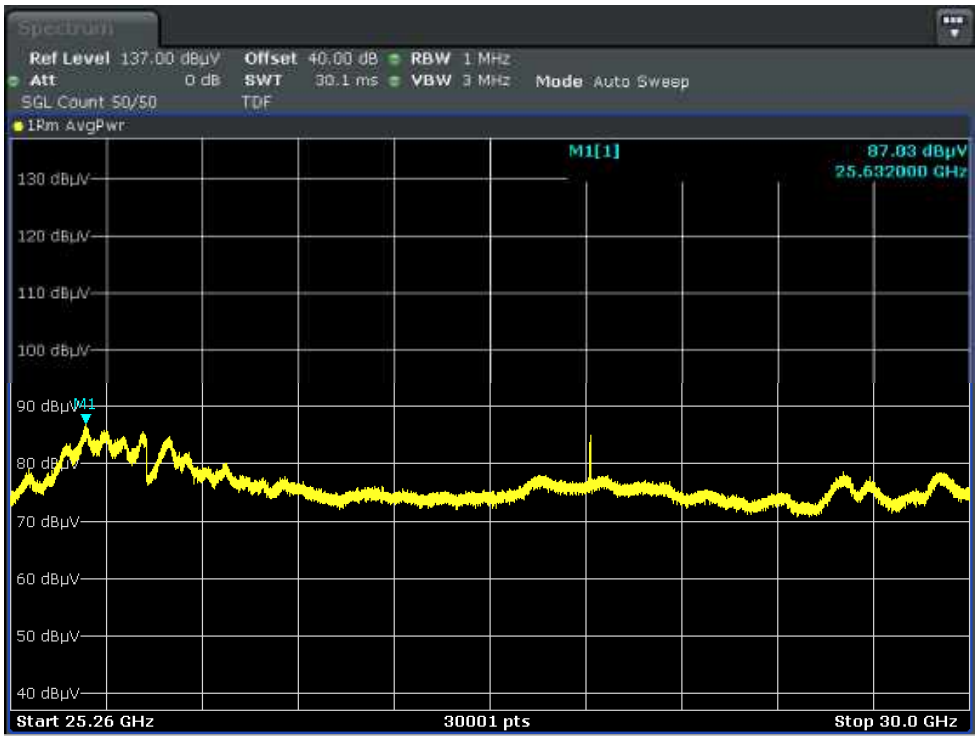
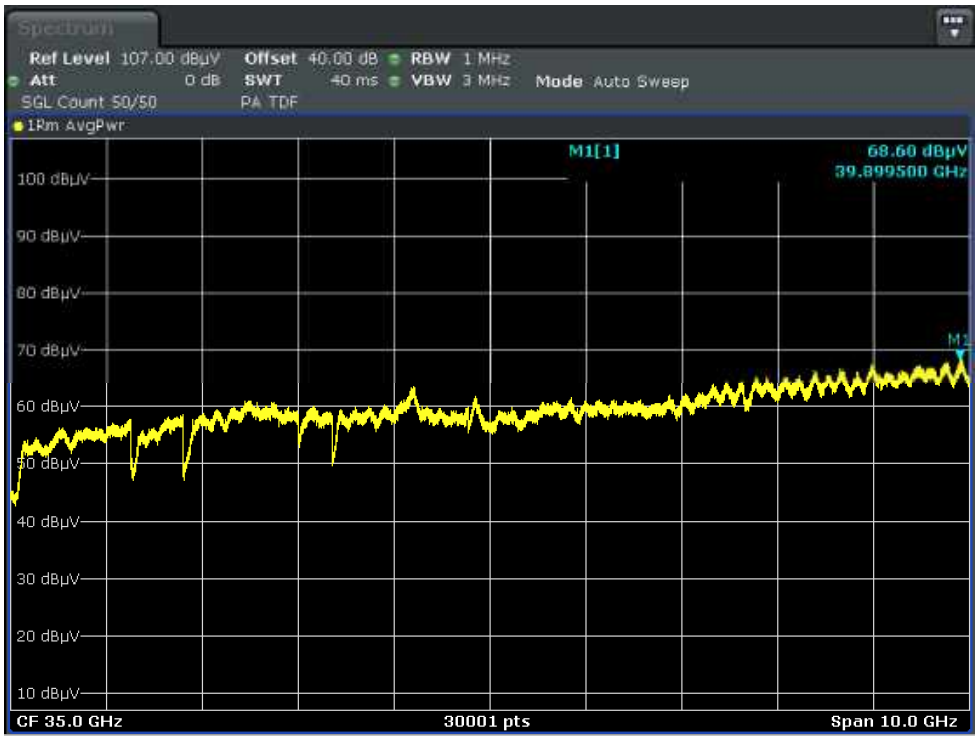
Antenna B / 25.25G - 30G / 24 GHz 7CC 700 MHz / Low / 16QAM



Antenna B / 30G - 40G / 24 GHz 7CC 700 MHz / Low / QPSK



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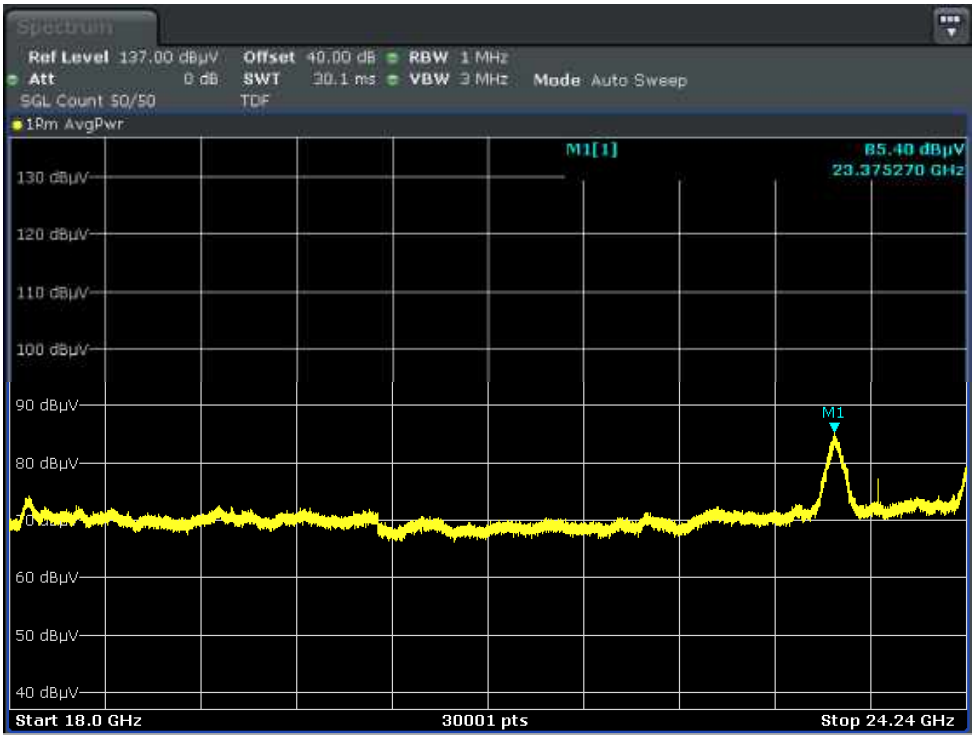
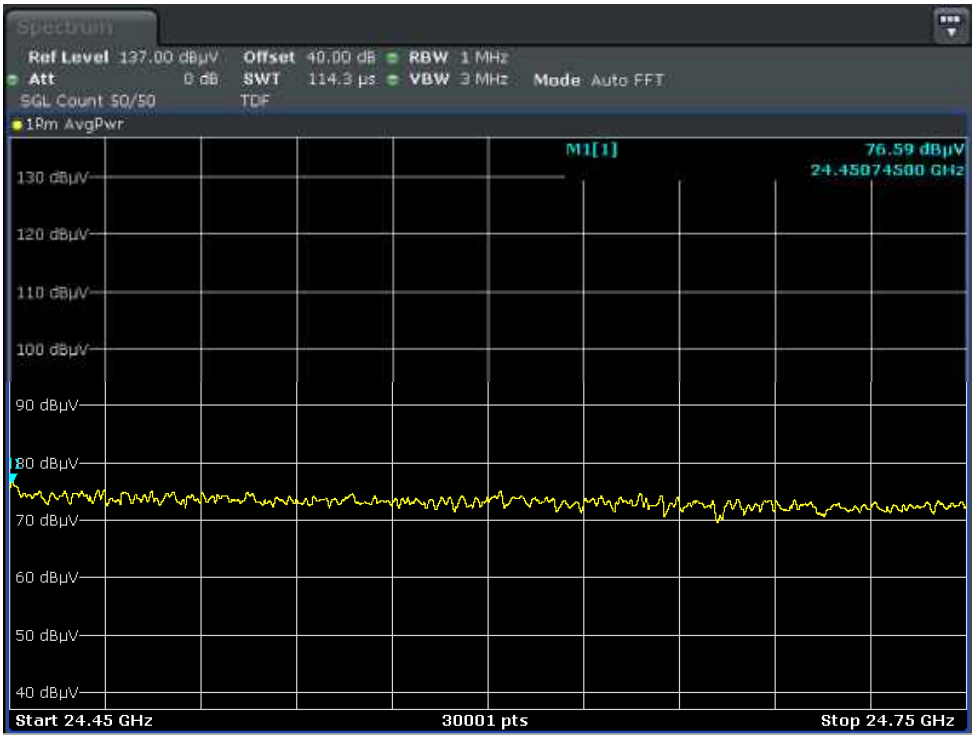
Antenna B / 18G - 24.25G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / QPSK



Antenna A / 24.45G - 24.75G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM



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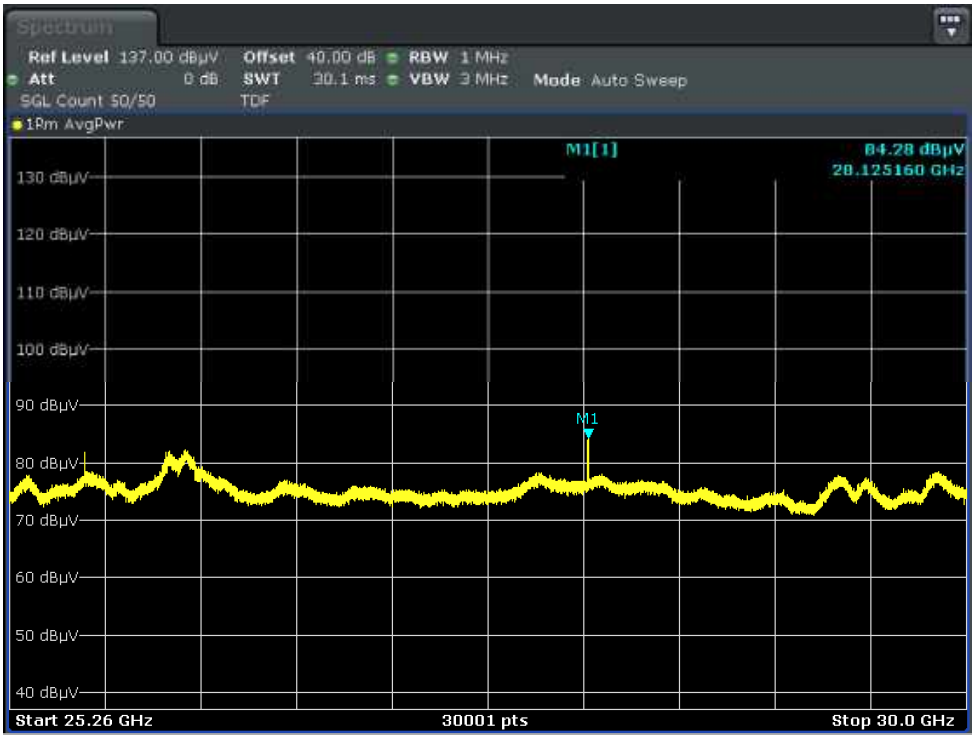
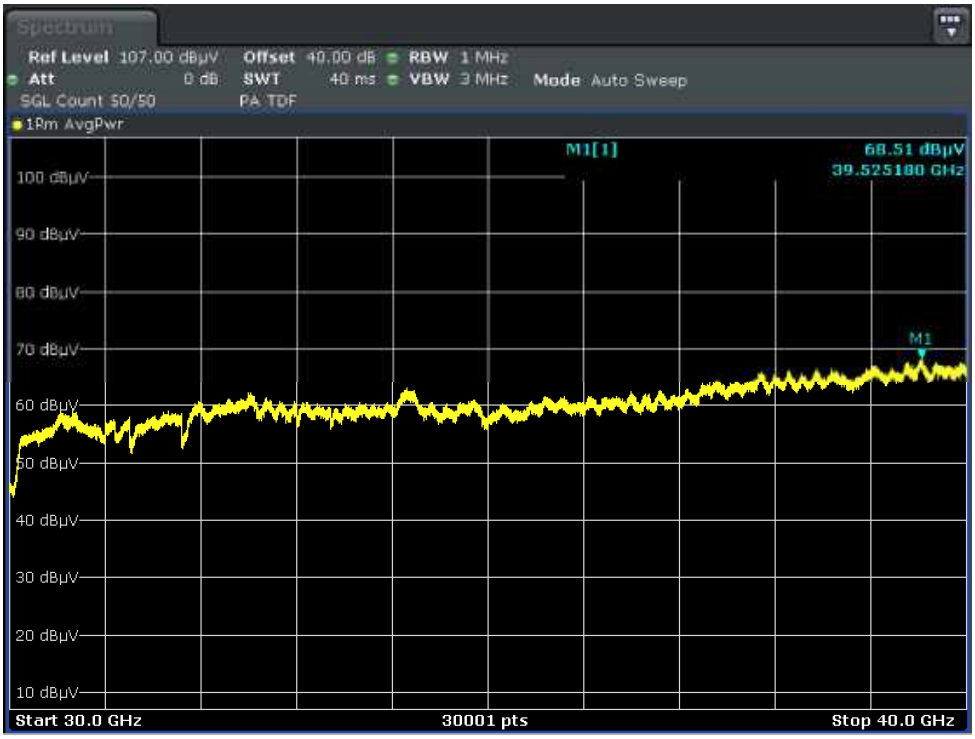
Antenna B / 25.25G - 30G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 16QAM



Antenna A / 30G - 40G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: Low 100 MHz + 24.75 ~ 25.25 GHz Band: High 100 MHz) / 64QAM



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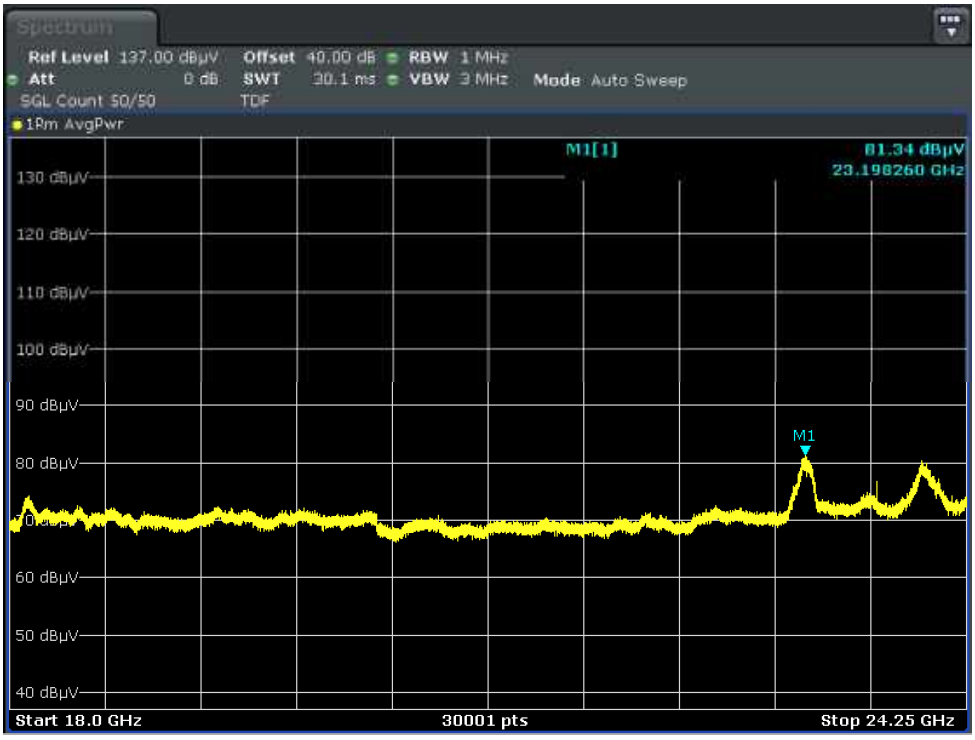
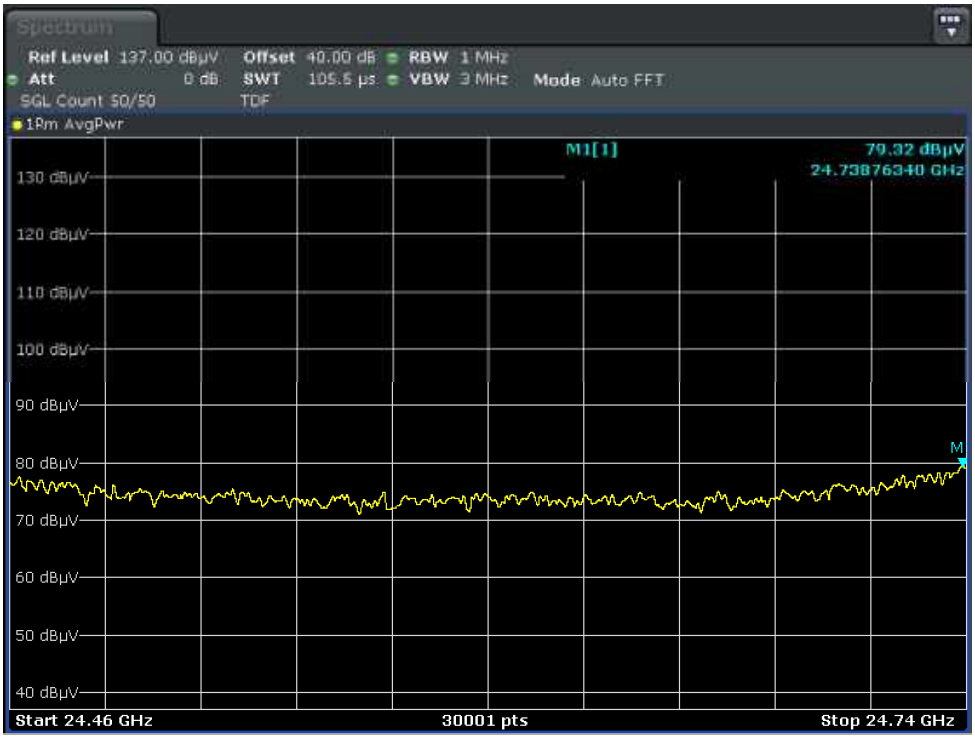
Antenna B / 18G - 24.25G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 64QAM



Antenna B / 24.45G - 24.75G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 256QAM



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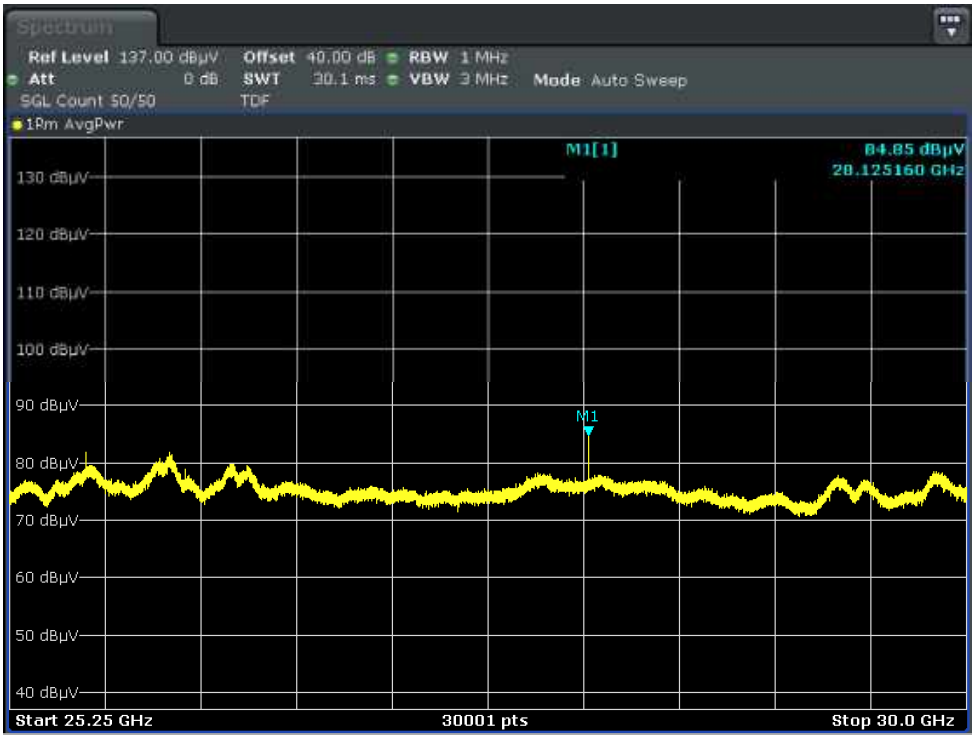
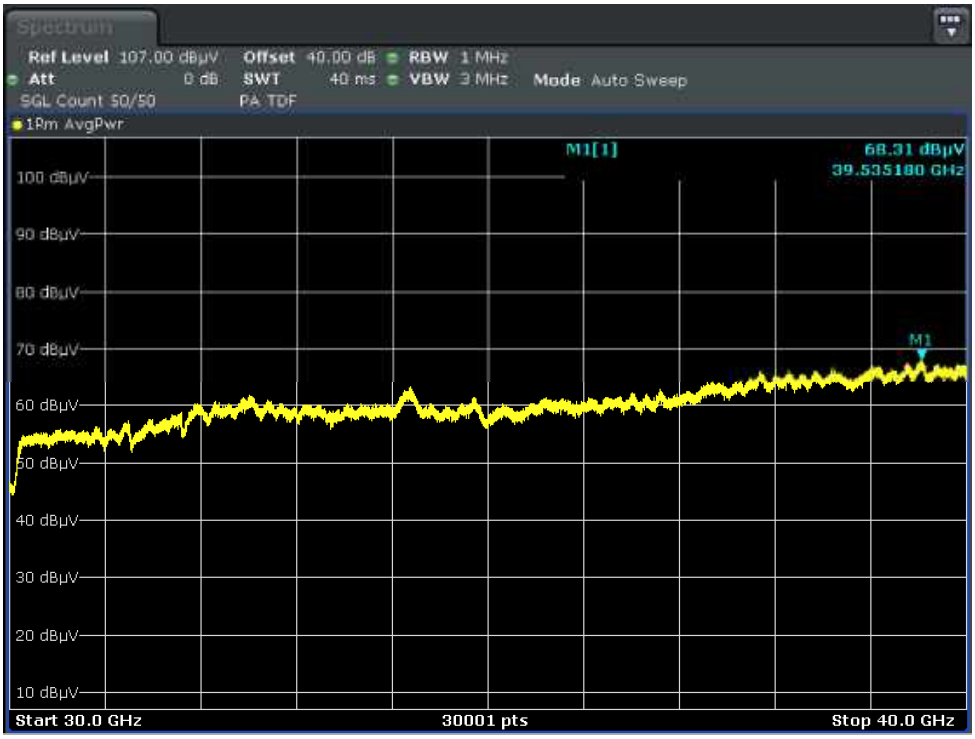
Antenna B / 25.25G - 30G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 16QAM



Antenna A / 30G - 40G / 24 GHz 2CC Non-Contiguous
(24.25 ~ 24.45 GHz Band: High 100 MHz + 24.75 ~ 25.25 GHz Band: Low 100 MHz) / 16QAM



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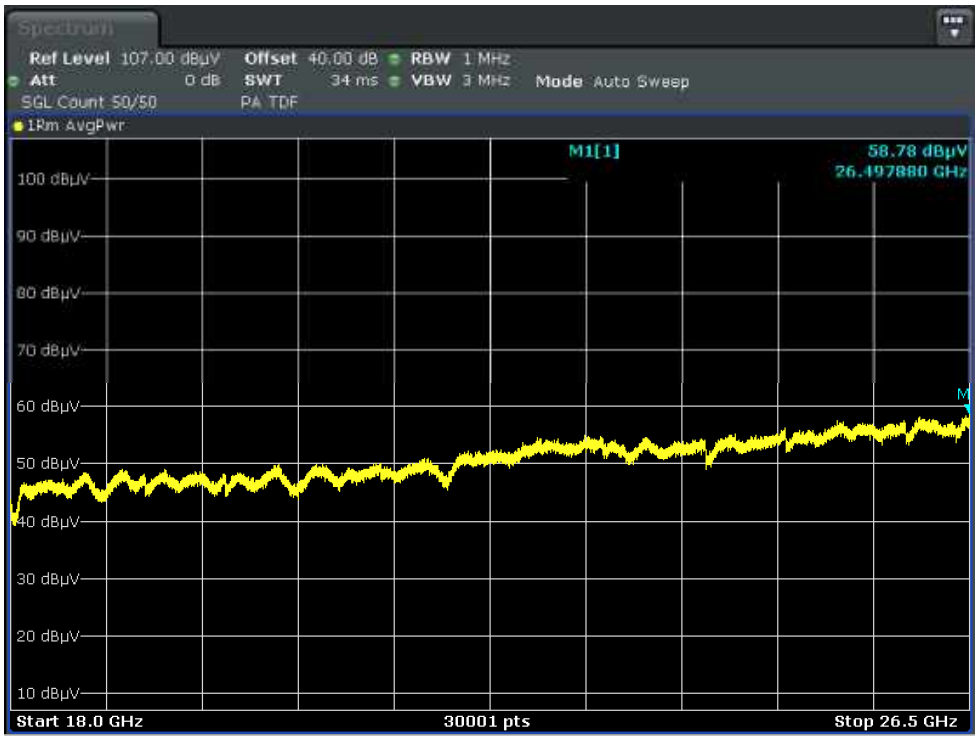
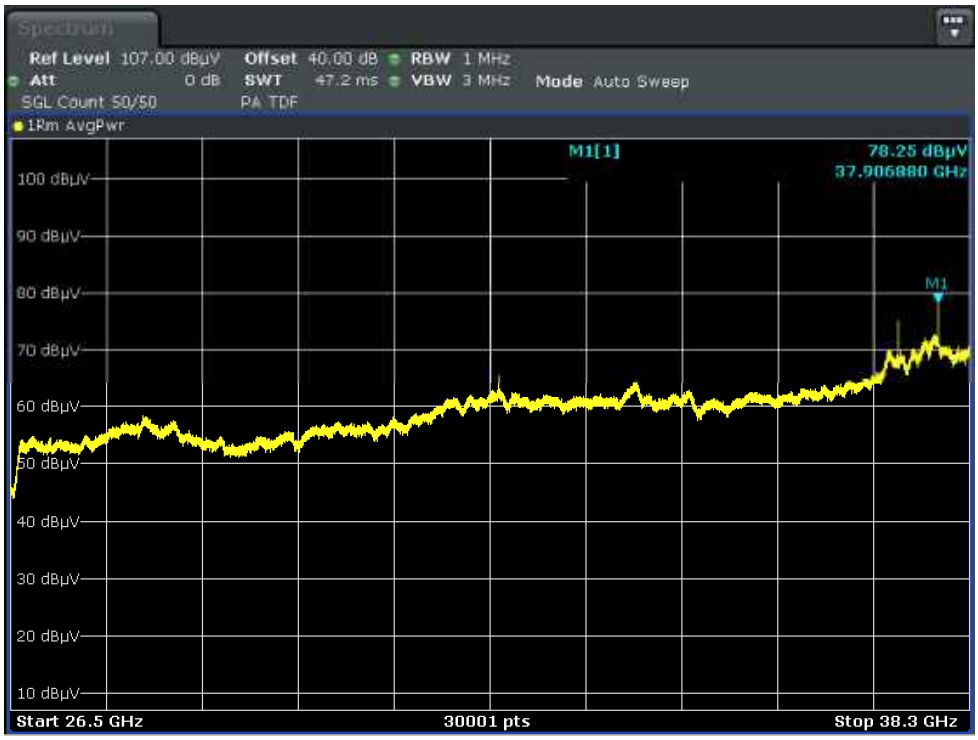
Antenna A / 18G - 26.5G / 39 GHz 1CC 100 MHz / Low / 256QAM

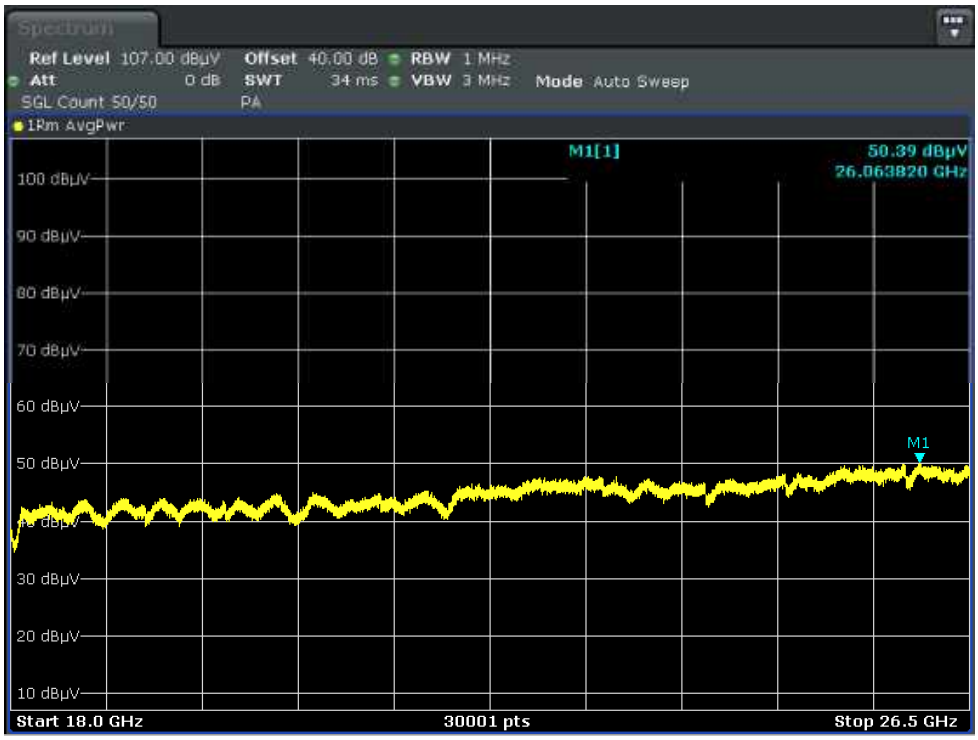


Antenna B / 26.5G - 38.29G / 39 GHz 1CC 100 MHz / High / 64QAM

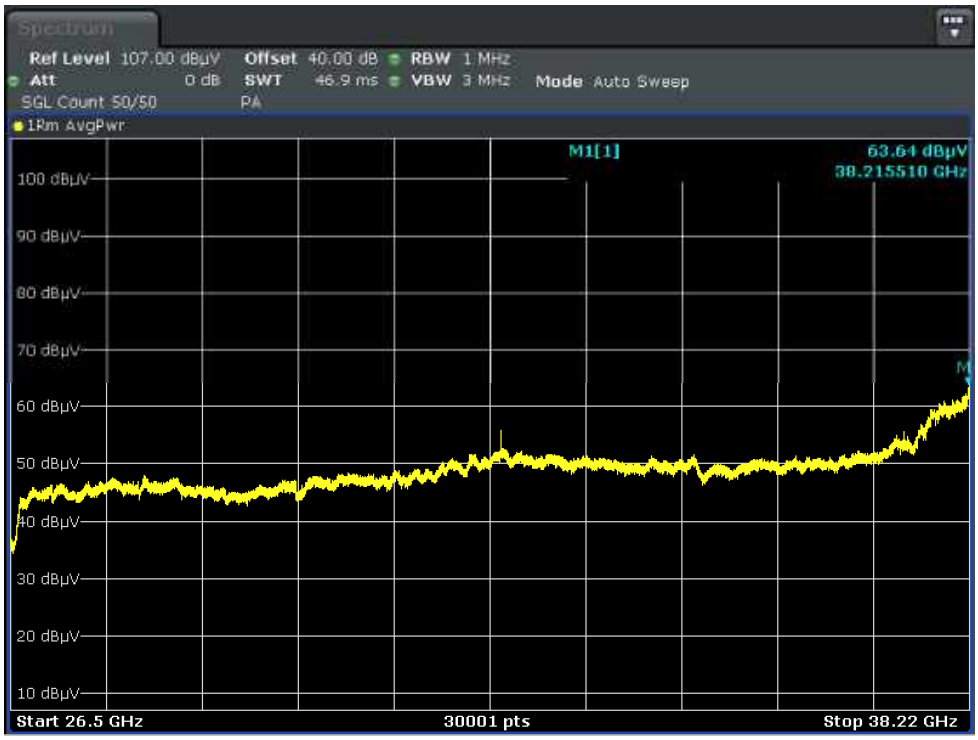


The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna A / 18G - 26.5G / 39 GHz 8CC 800 MHz / Low / QPSK

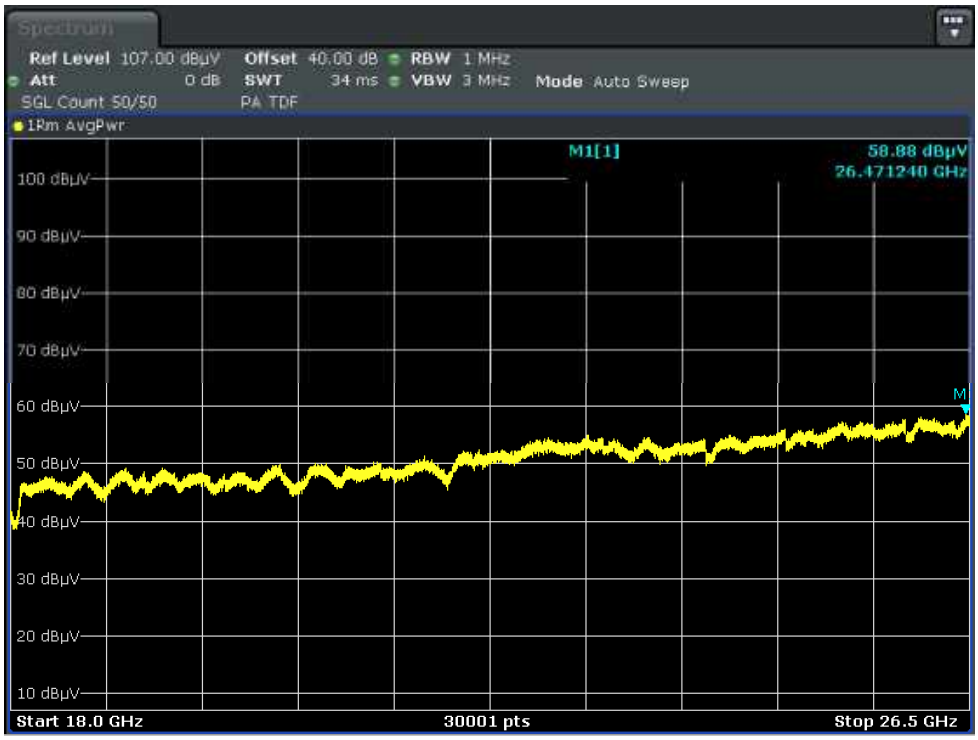


Antenna B / 26.5G- 38.30G / 39 GHz 8CC 800 MHz / Low / 16QAM

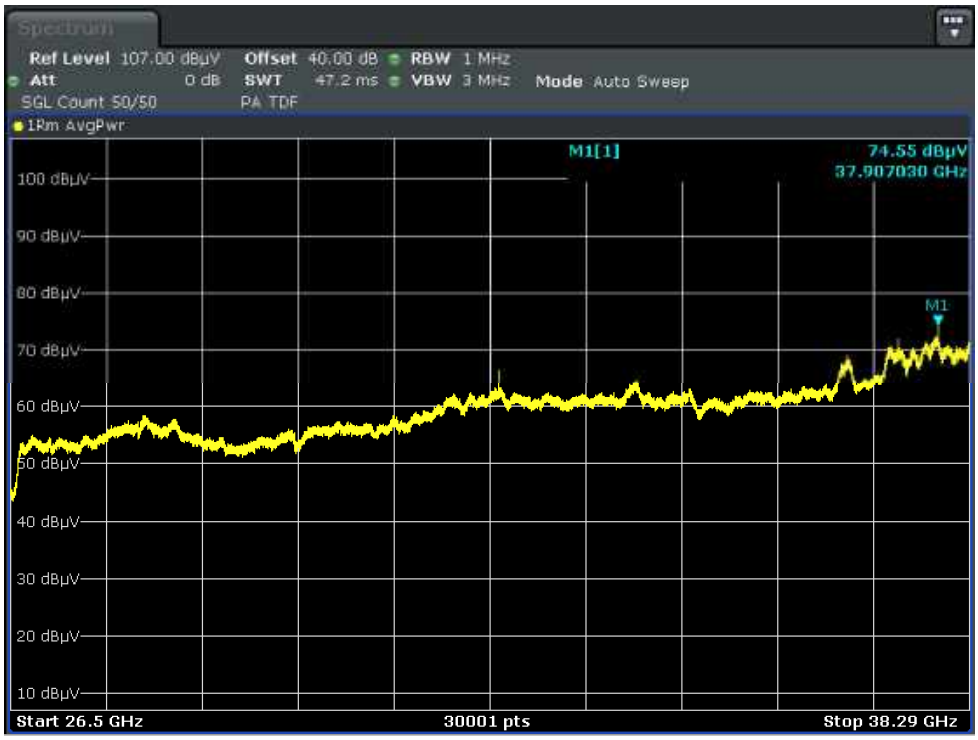


The report shall not be (partly) reproduced except in full without approval of the laboratory.

Antenna B / 18G - 26.50G / 39 GHz 2CC (1CC + 1CC) 100 MHz / 256QAM



Antenna A / 26.50G - 38.30G / 39 GHz 2CC (1CC + 1CC) 100 MHz / 64QAM



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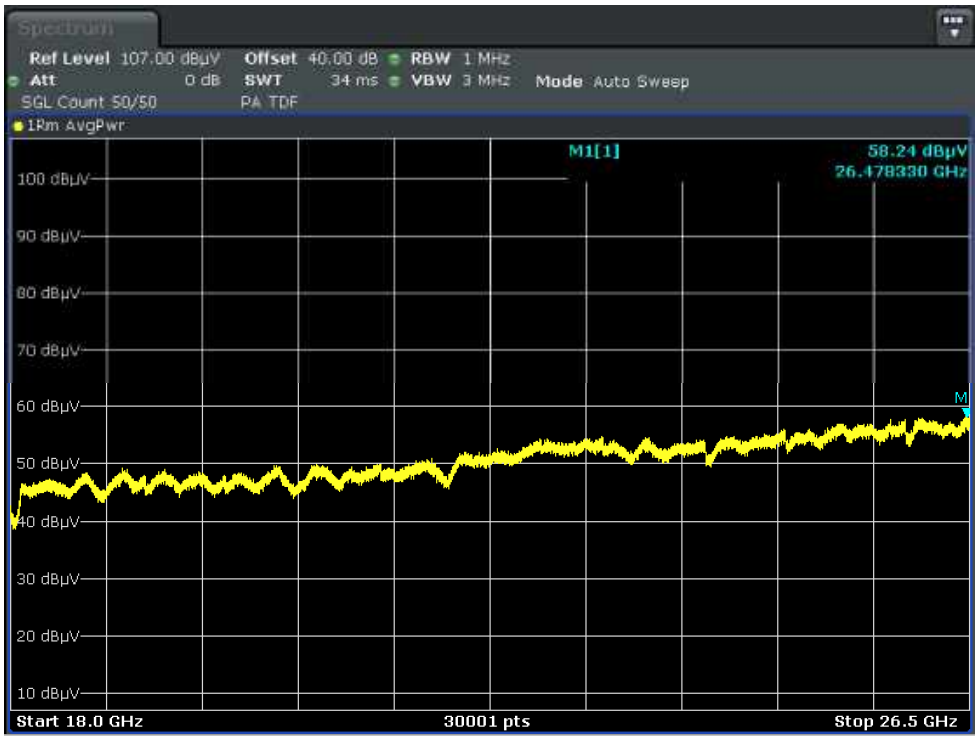
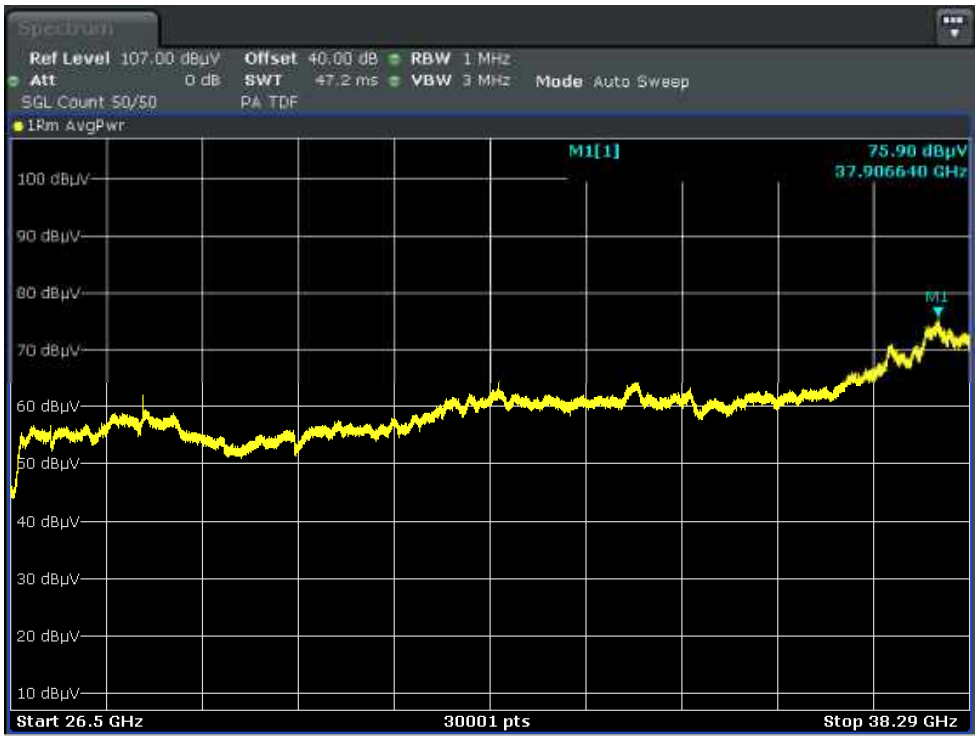
Antenna A / 18G - 26.50G / 39 GHz 8CC (1CC + 7CC) 800 MHz / QPSK



Antenna A / 26.50G - 38.30G / 39 GHz 8CC (1CC + 7CC) 800 MHz / QPSK



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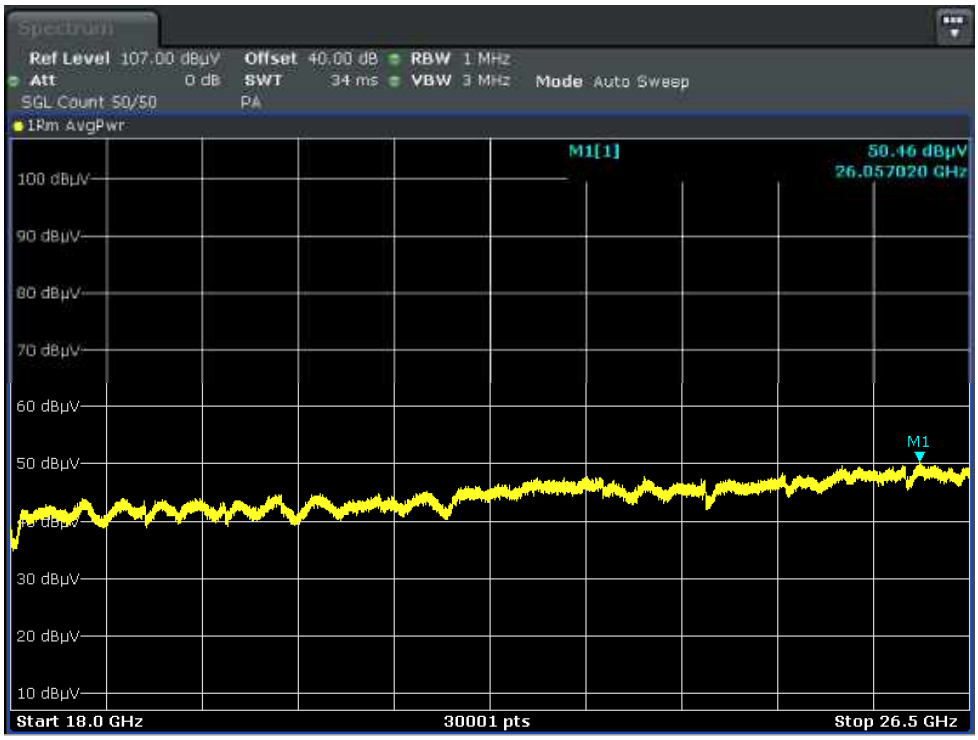
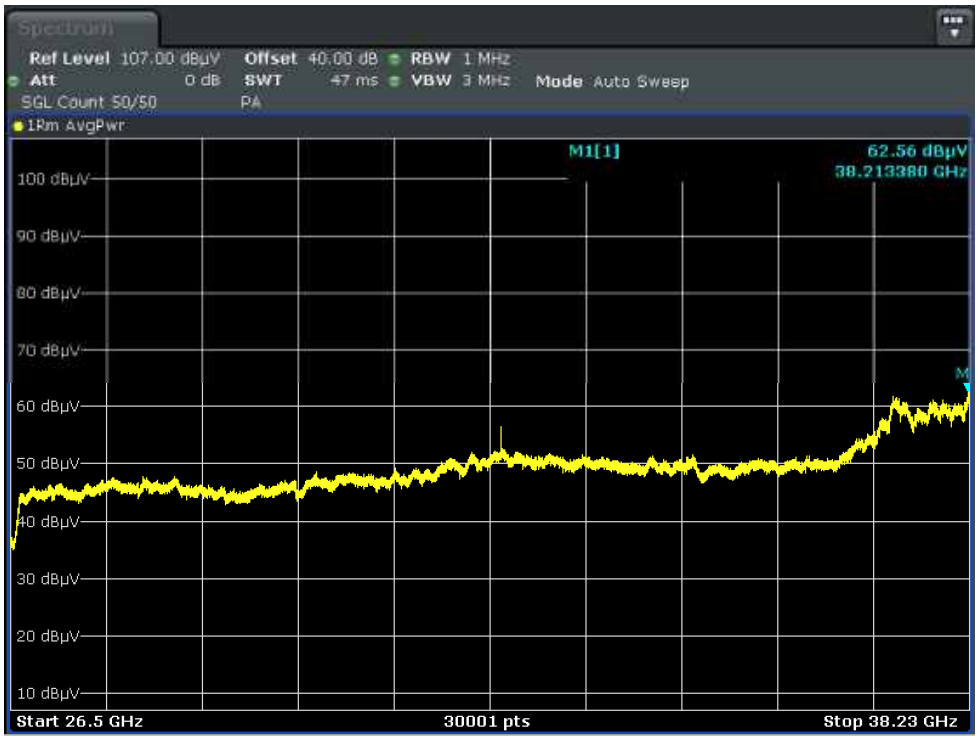
Antenna A / 18G - 26.50G / 39 GHz 8CC (7CC + 1CC) 800 MHz / 16QAM



Antenna B / 26.50G - 38.30G / 39 GHz 8CC (7CC + 1CC) 800 MHz / 256QAM



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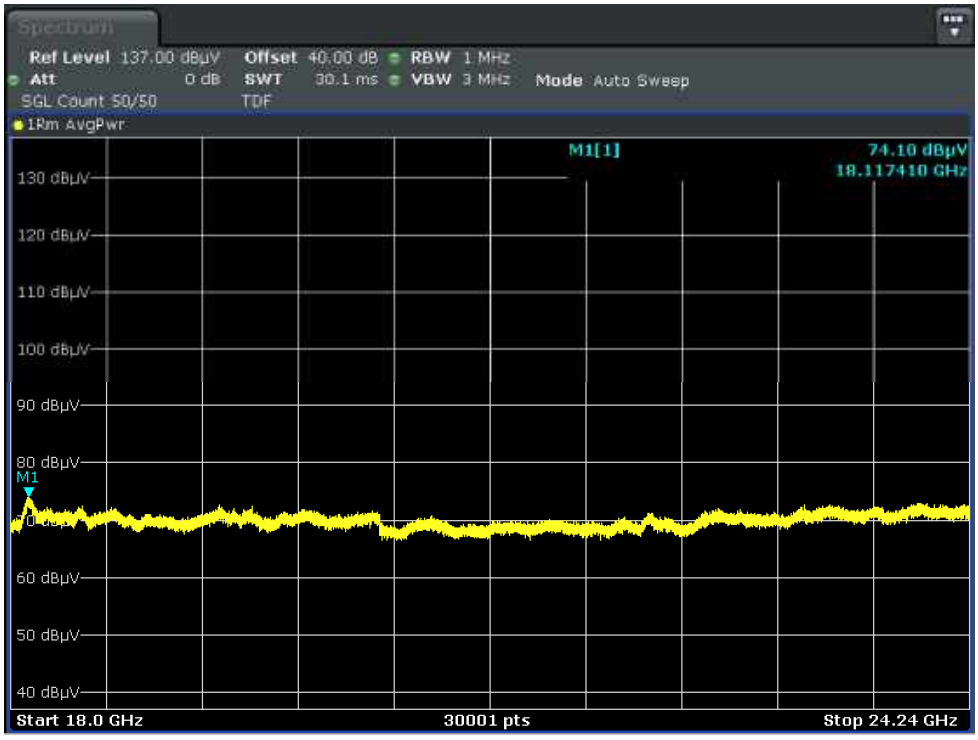
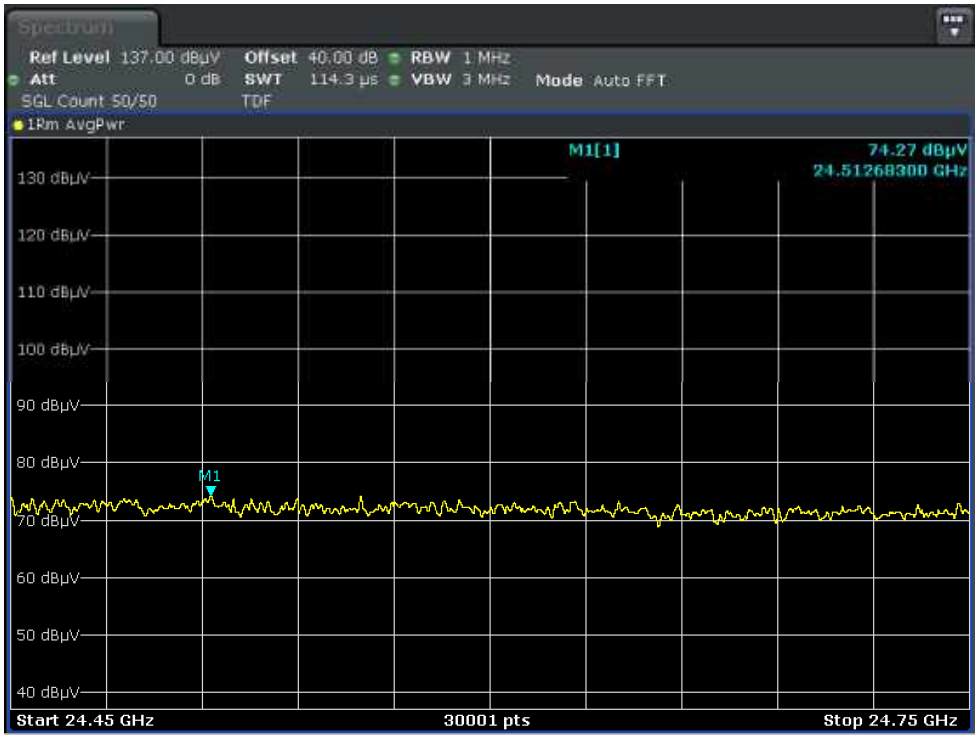
Antenna B / 18G - 24.25G / InterBand_4C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 1CC / 16QAM



Antenna A / 24.45G - 24.75G / InterBand_4C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 1CC /
256QAM



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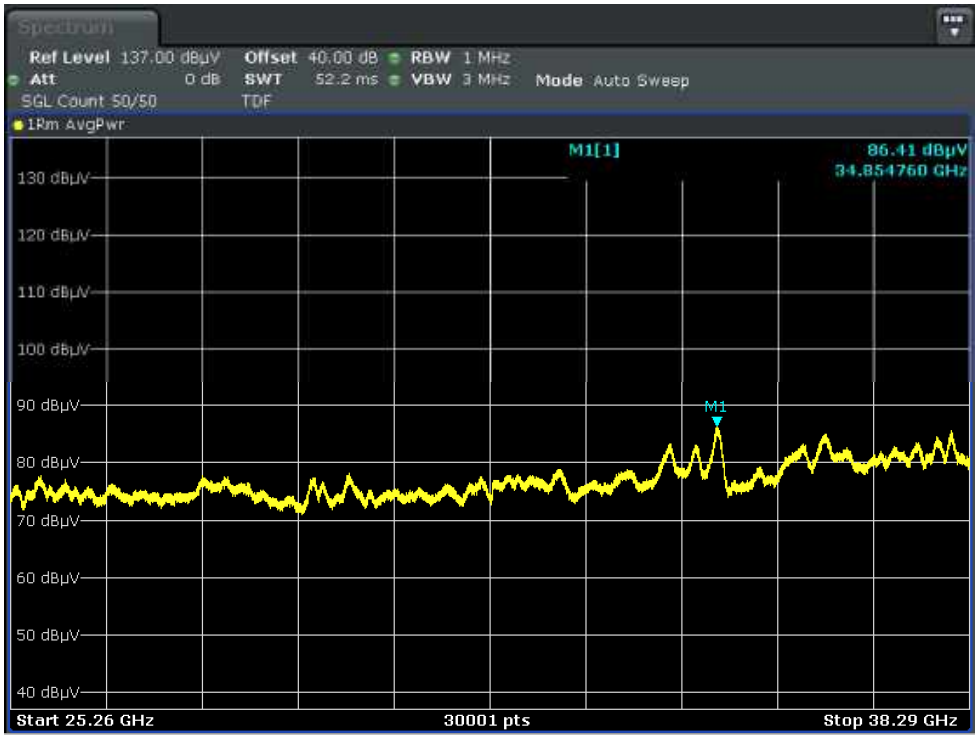
Antenna B / 25.25G - 38.30G / InterBand_4C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 1CC / QPSK



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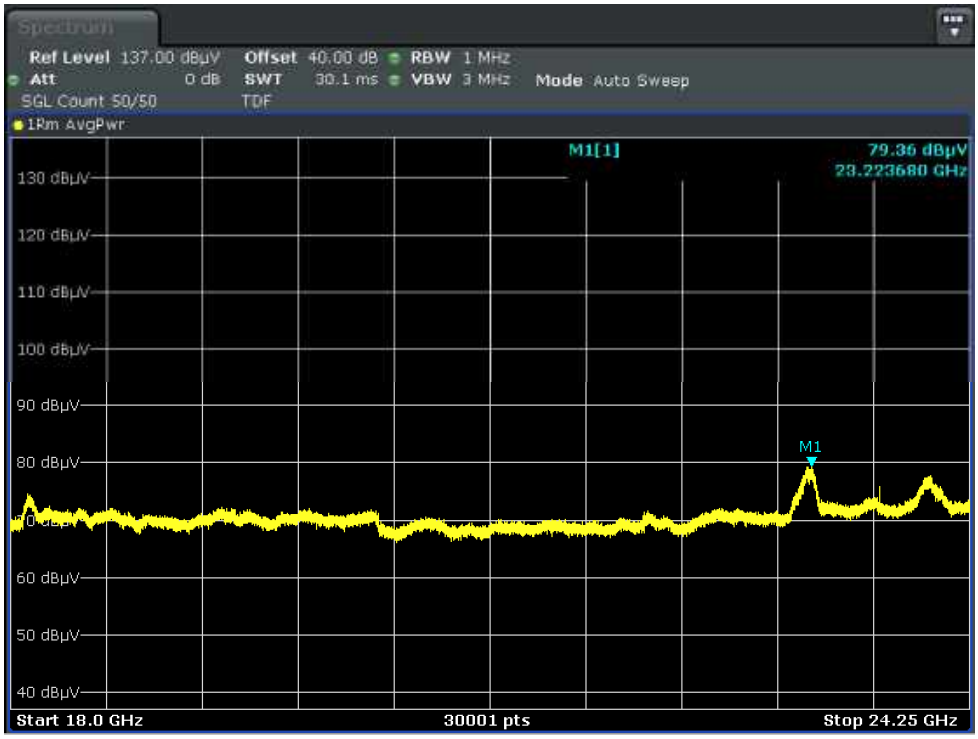
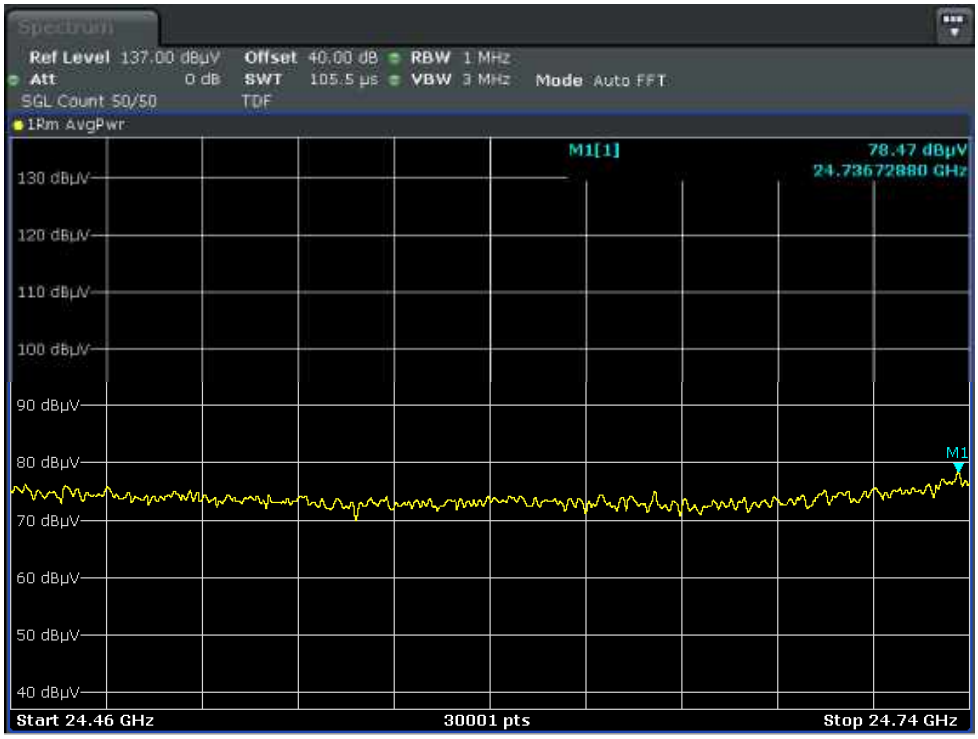
Antenna B / 18G - 24.25G / InterBand_4C /
24.25 ~ 24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 1CC /
256QAM



Antenna A / 24.45G - 24.75G / InterBand_4C /
24.25 ~ 24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 1CC / 16QAM



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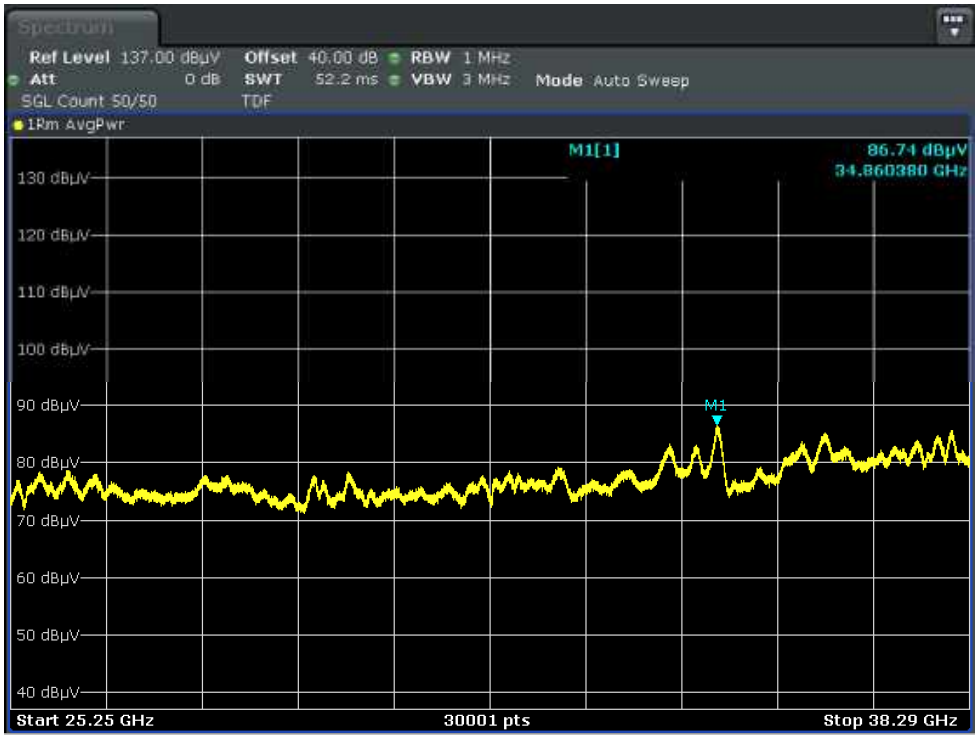
Antenna A / 25.25G - 38.30G / InterBand_4C /
24.25 ~ 24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 1CC /
256QAM



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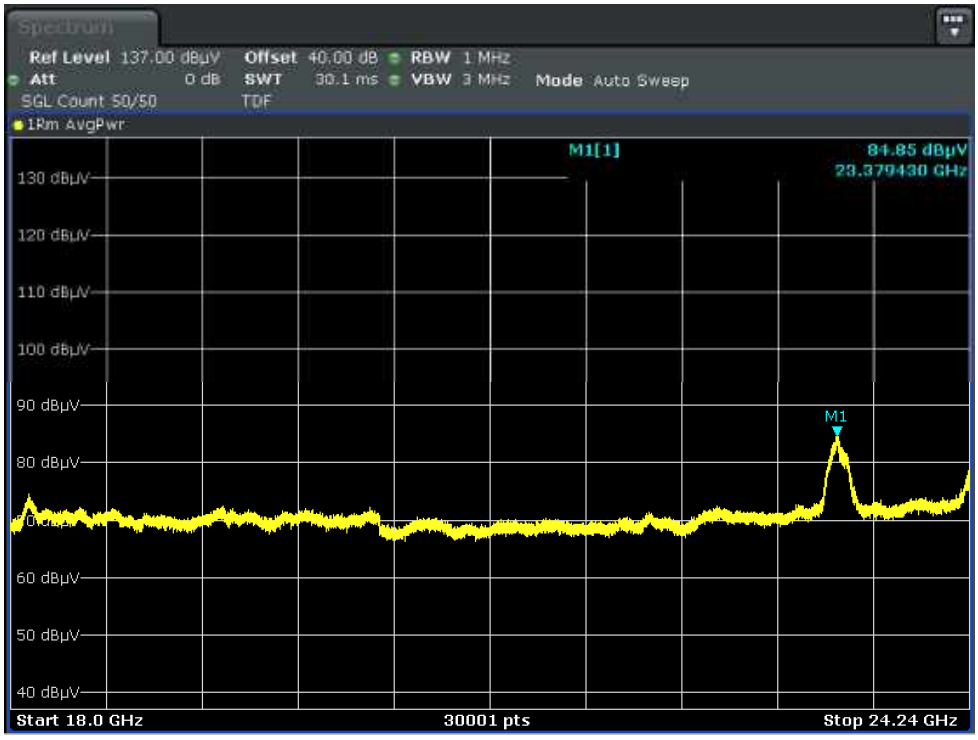
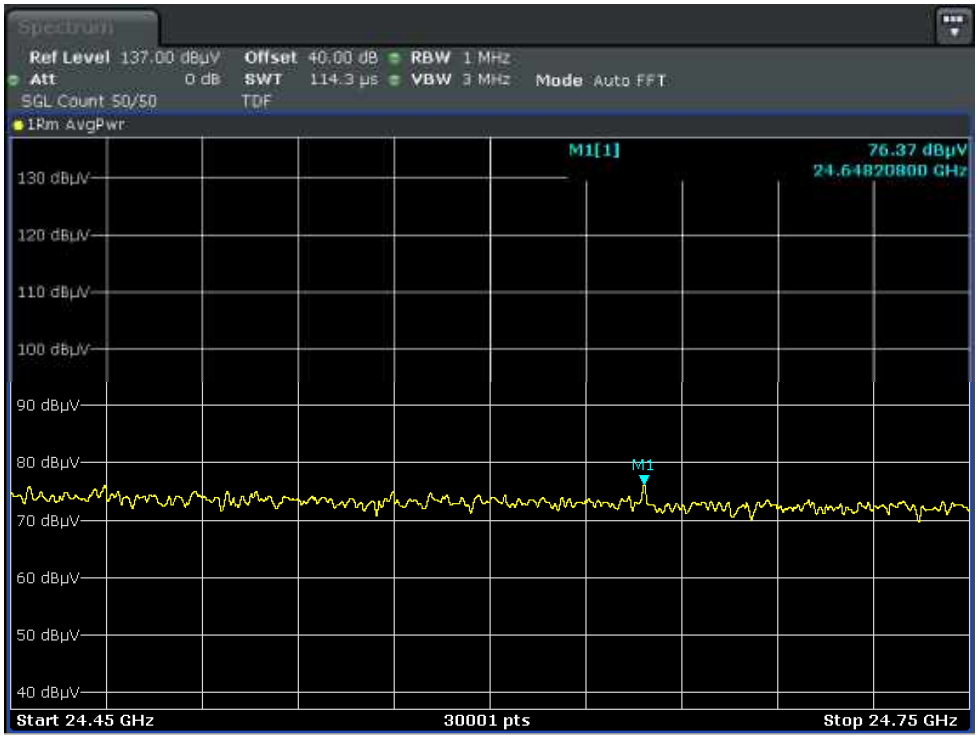
Antenna A / 18G - 24.25G / InterBand_8C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 5CC + 39 GHz High 1CC / 64QAM



Antenna B / 24.45G - 24.75G / InterBand_8C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 5CC + 39 GHz High 1CC / 16QAM



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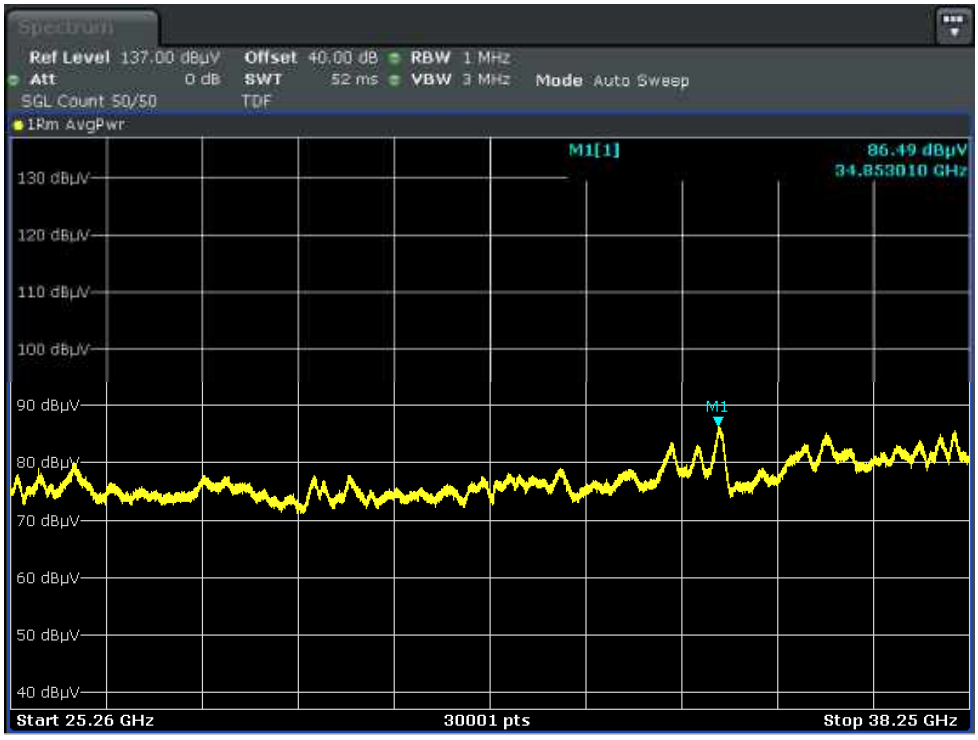
Antenna A / 25.25G - 38.30G / InterBand_8C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 5CC + 39 GHz High 1CC / 64QAM



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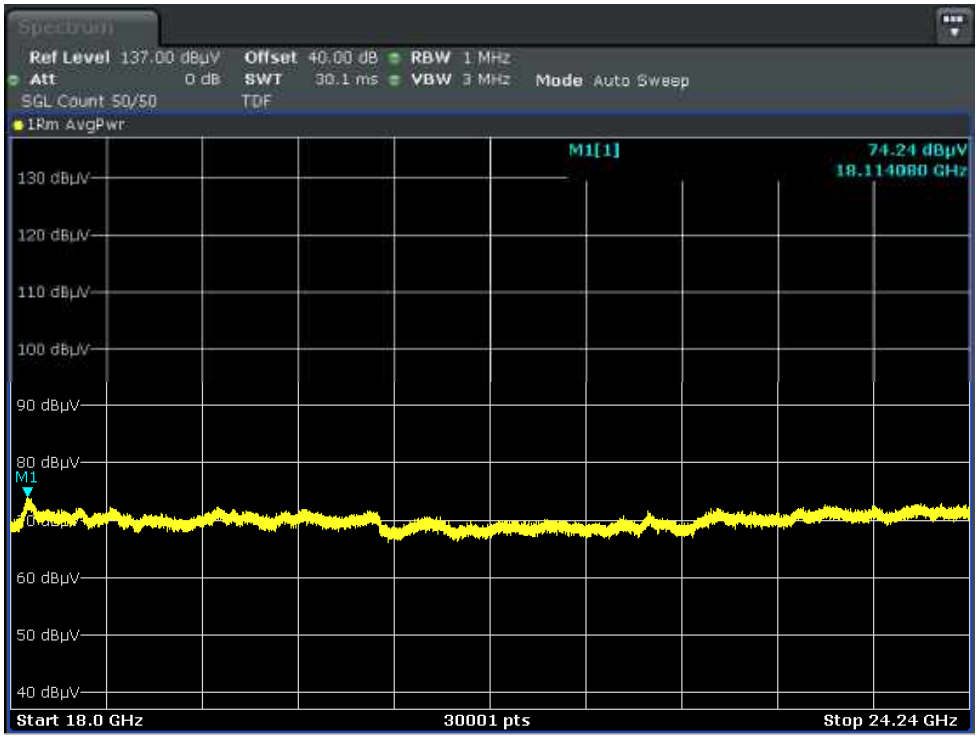
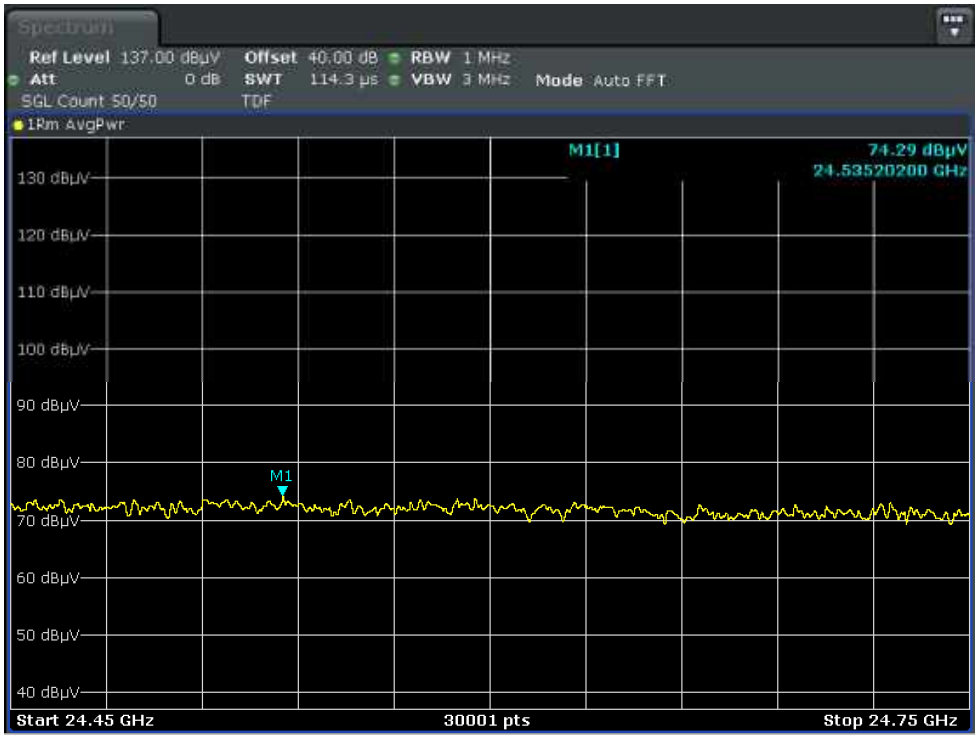
Antenna A / 18G - 24.25G / InterBand_8C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 5CC / QPSK



Antenna B / 24.45G - 24.75G / InterBand_8C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 5CC /
256QAM



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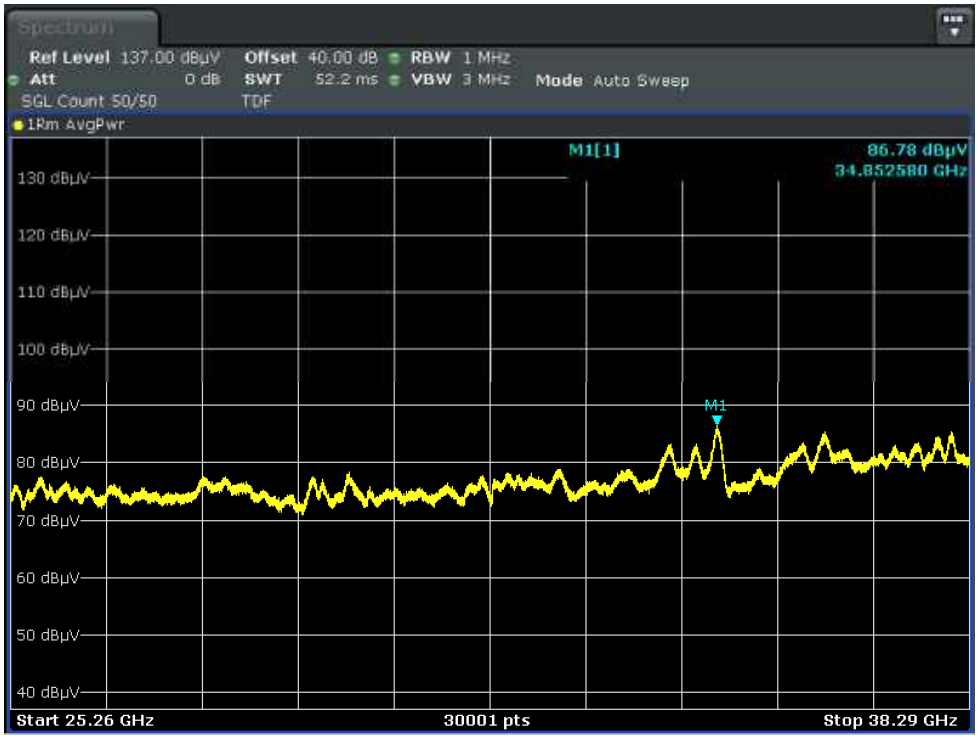
Antenna A / 25.25G - 38.30G / InterBand_8C /
24.25 ~ 24.45 GHz Band Low 1CC + 24.75 GHz ~ 25.25 GHz Band High 1CC + 39 GHz Low 1CC + 39 GHz High 5CC / 256QAM



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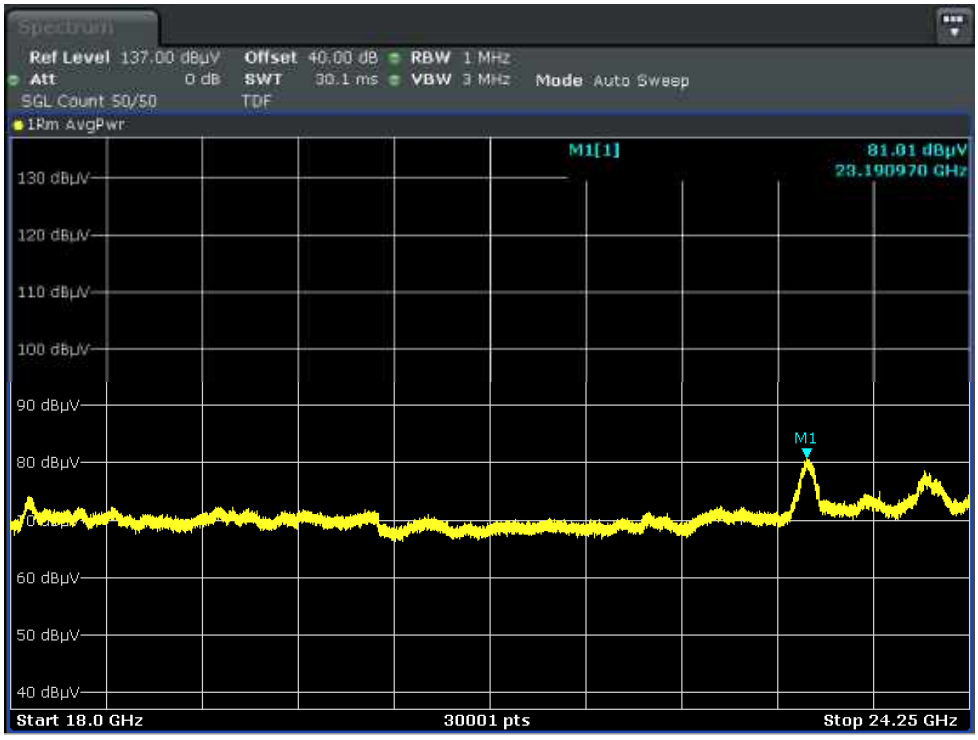
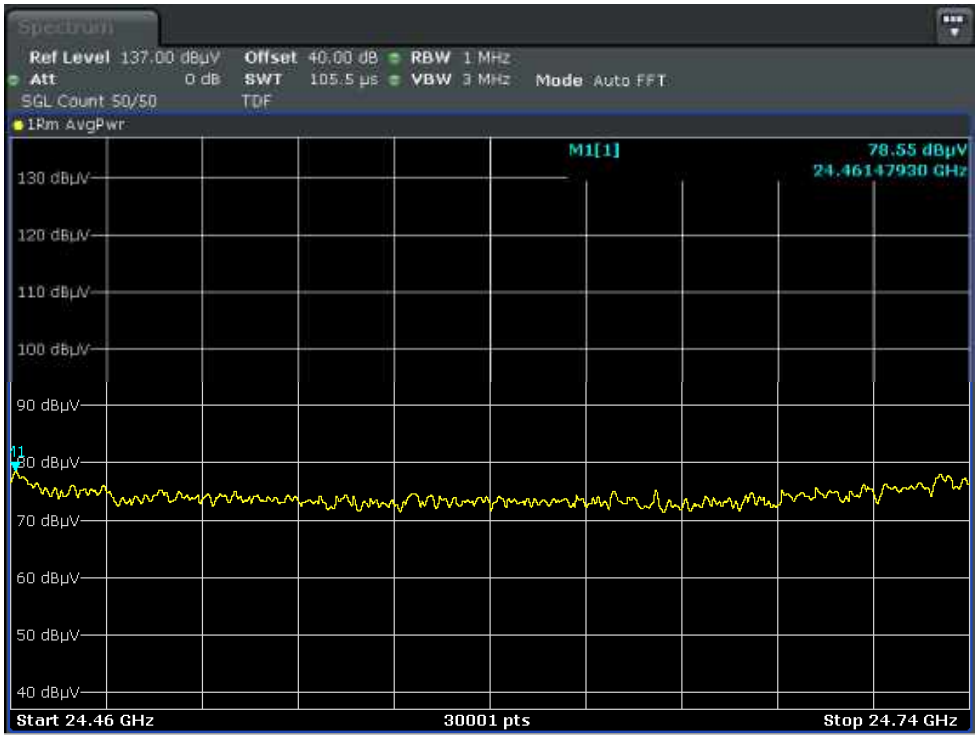
Antenna B / 18G - 24.25G / InterBand_8C /
24.45 GHz Band High 1CC+ 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 5CC + 39 GHz High 1CC / 16QAM



Antenna B / 24.45G - 24.75G / InterBand_8C /
24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 5CC + 39 GHz High 1CC / 16QAM



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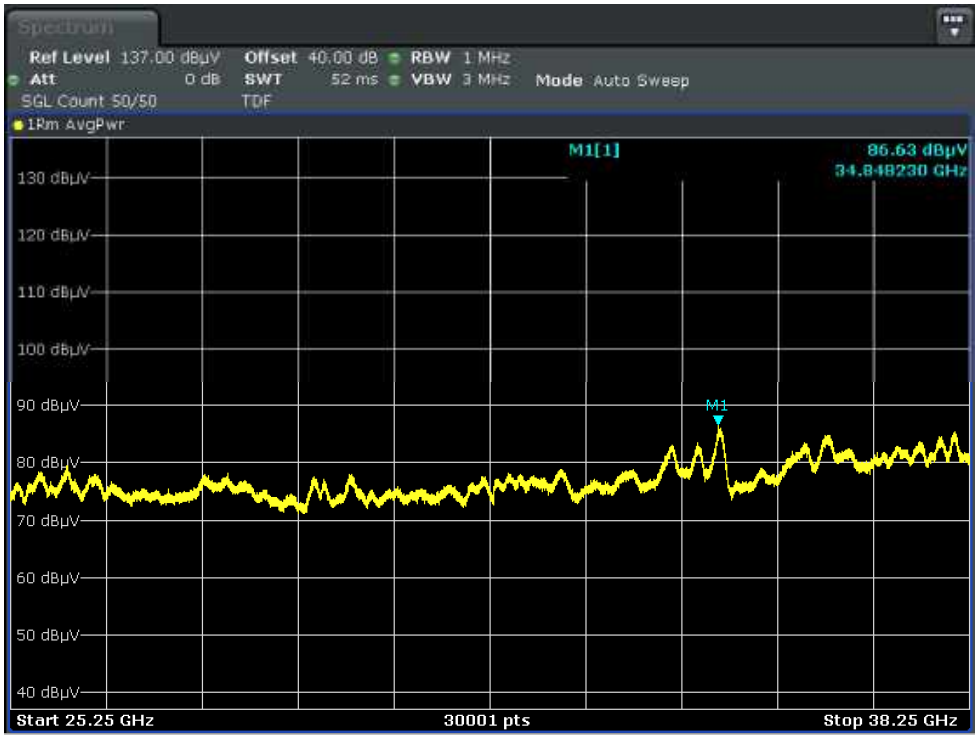
Antenna A / 25.25G - 38.30G / InterBand_8C /
24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 5CC + 39 GHz High 1CC / 256QAM



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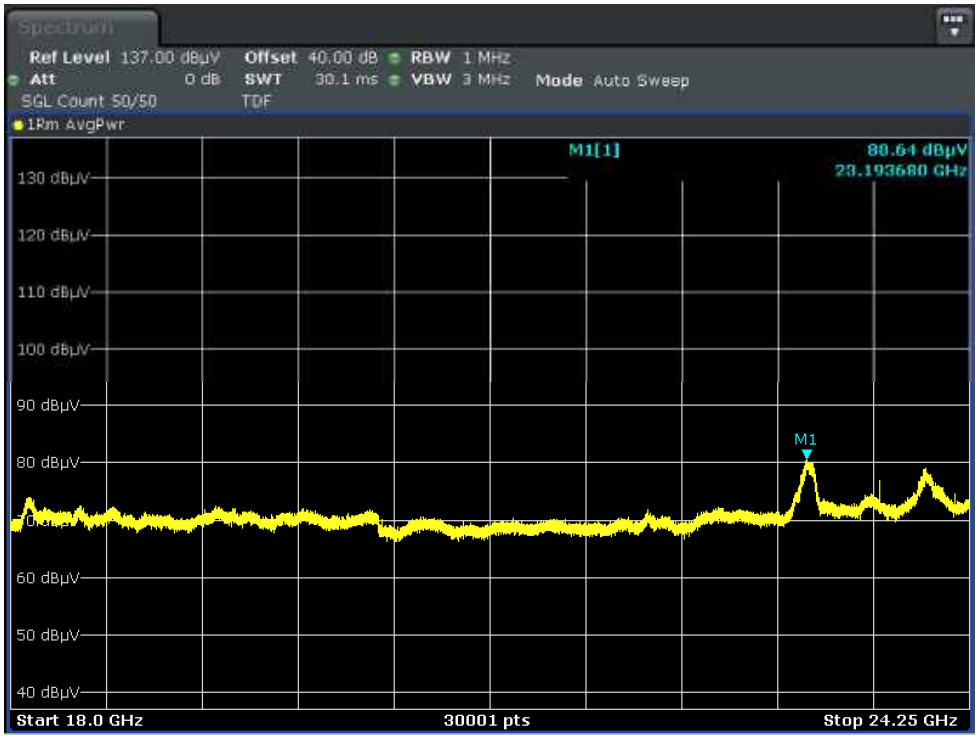
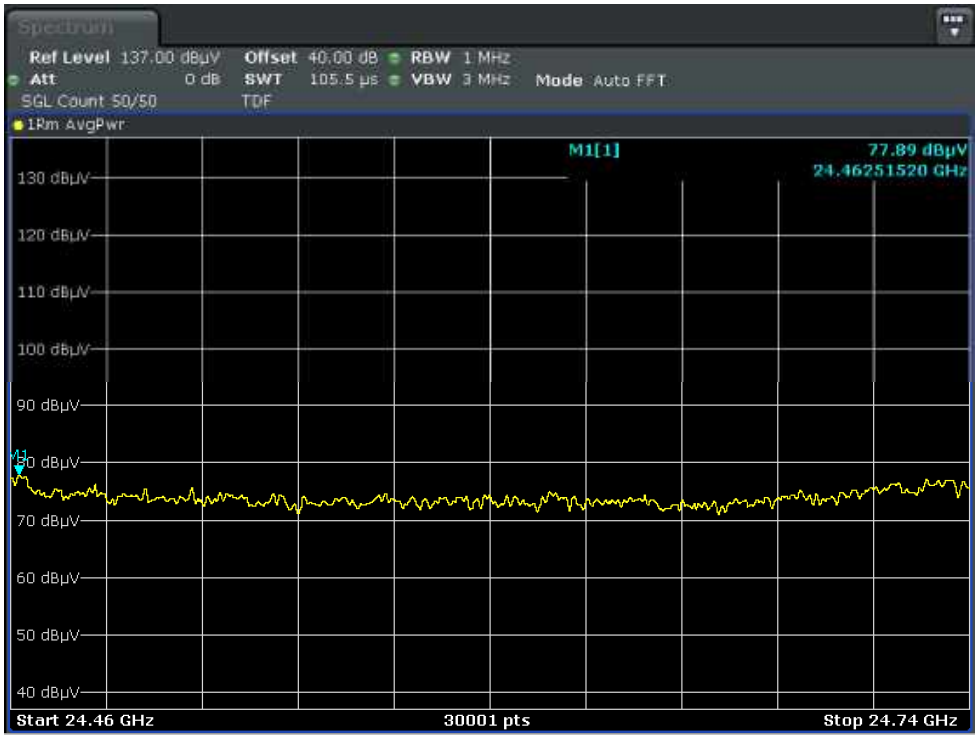
Antenna B / 18G - 24.25G / InterBand_8C /
24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 5CC / 16QAM



Antenna B / 24.45G - 24.75G / InterBand_8C /
24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 5CC / QPSK



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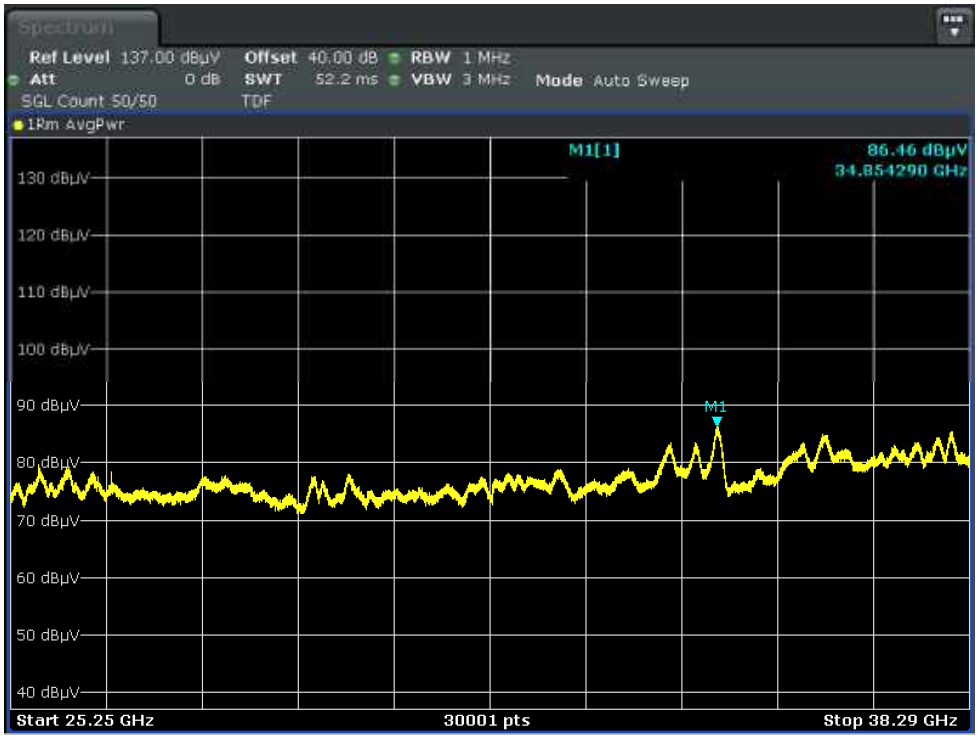
Antenna A / 25.25G - 38.30G / InterBand_8C /
24.45 GHz Band High 1CC + 24.75 GHz ~ 25.25 GHz Band Low 1CC + 39 GHz Low 1CC + 39 GHz High 5CC / QPSK



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30 MHz ~ 1 GHz

1 GHz ~ 10 GHz

***In case of under 18 GHz and above 40 GHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured so we are attached only the worst case plots.**

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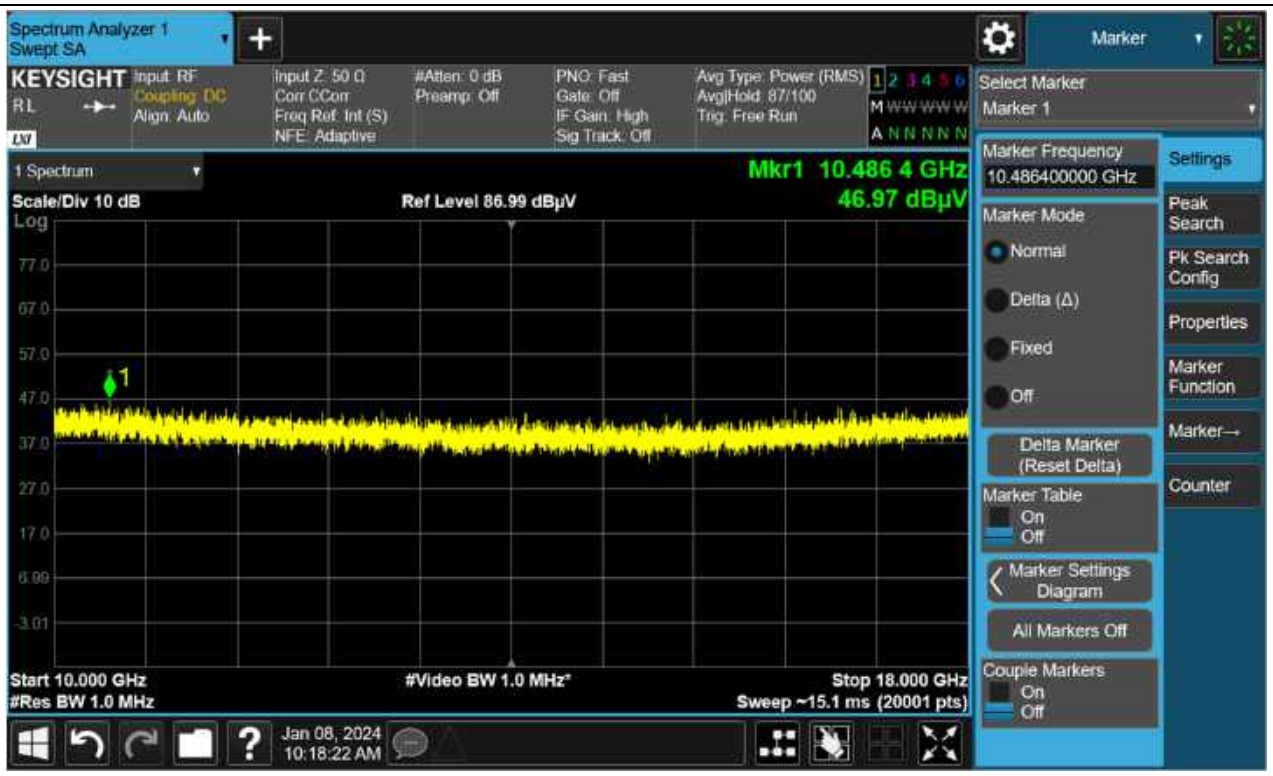
10 GHz ~ 18 GHz



*In case of under 18 GHz and above 40 GHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured so we are attached only the worst case plots.

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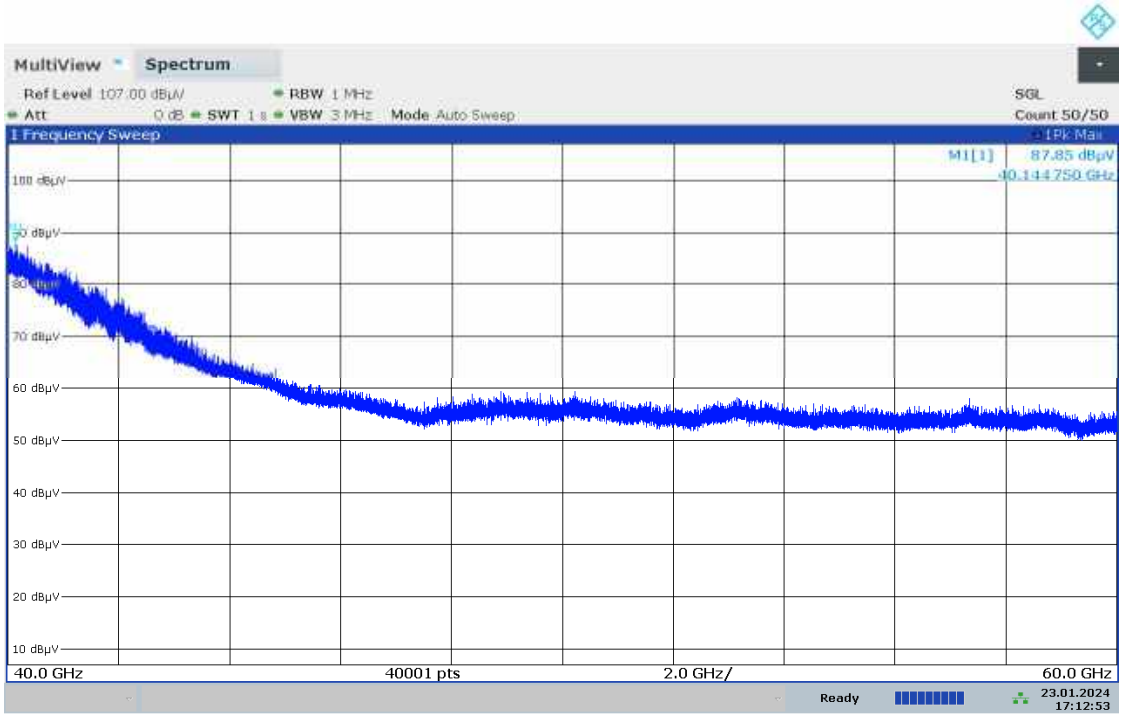
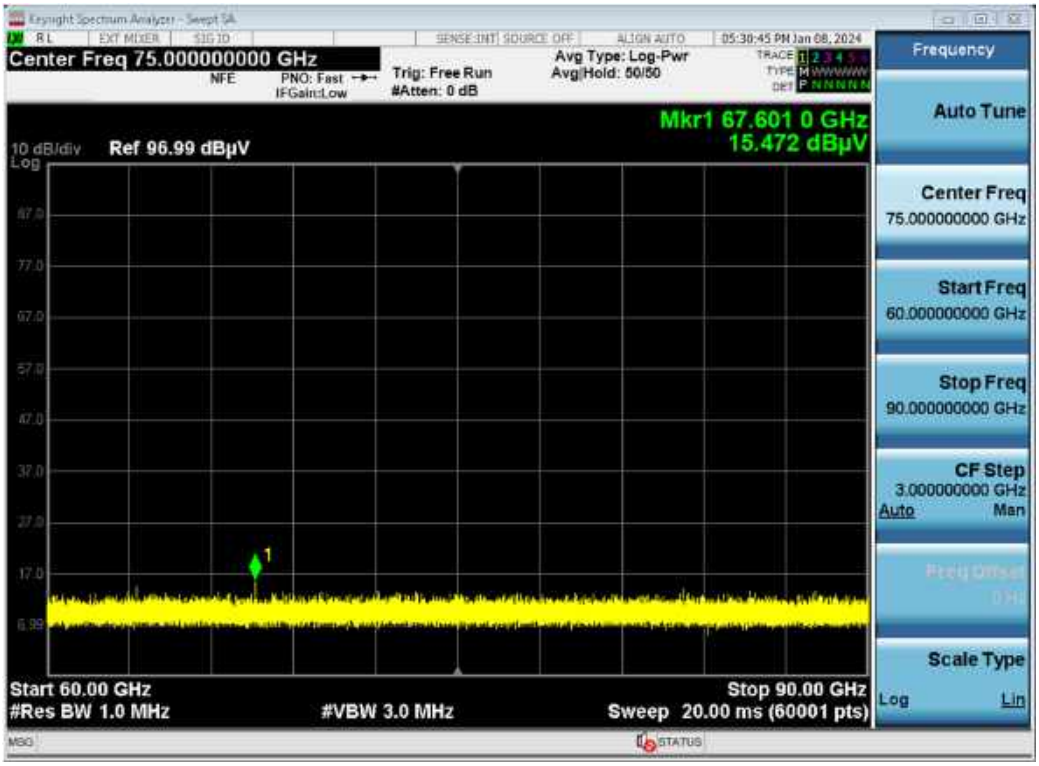
40 GHz ~ 60 GHz



17:12:54 23.01.2024

60 GHz ~ 90 GHz



*In case of under 18 GHz and above 40 GHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured so we are attached only the worst case plots.

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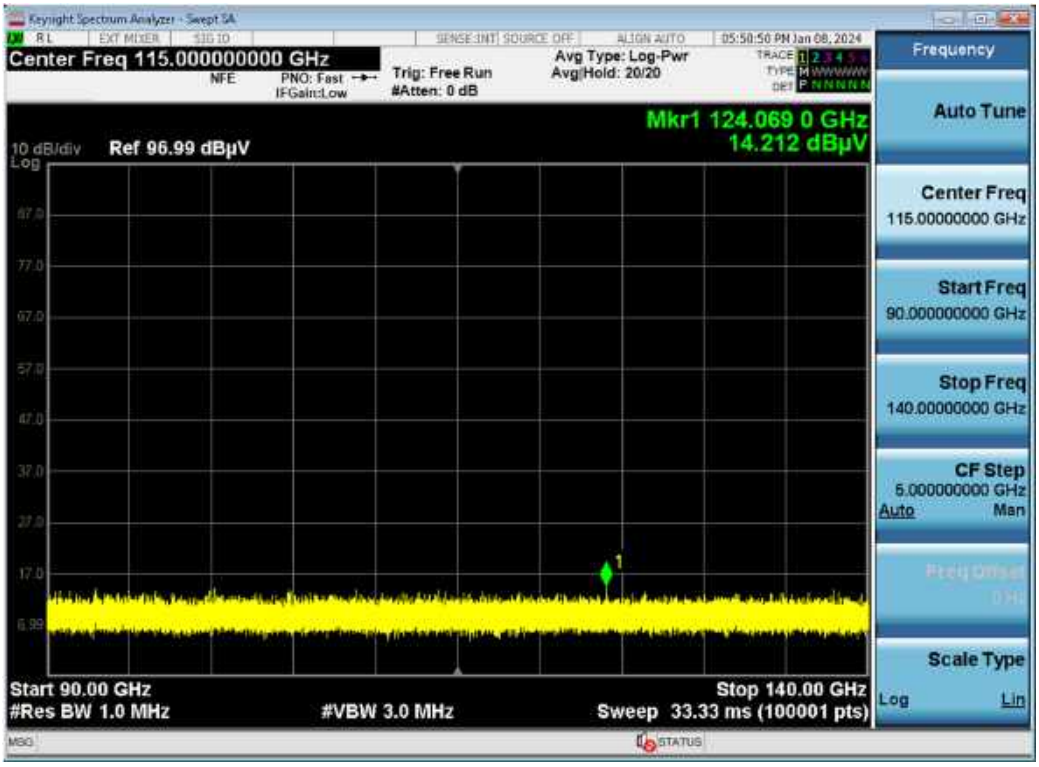
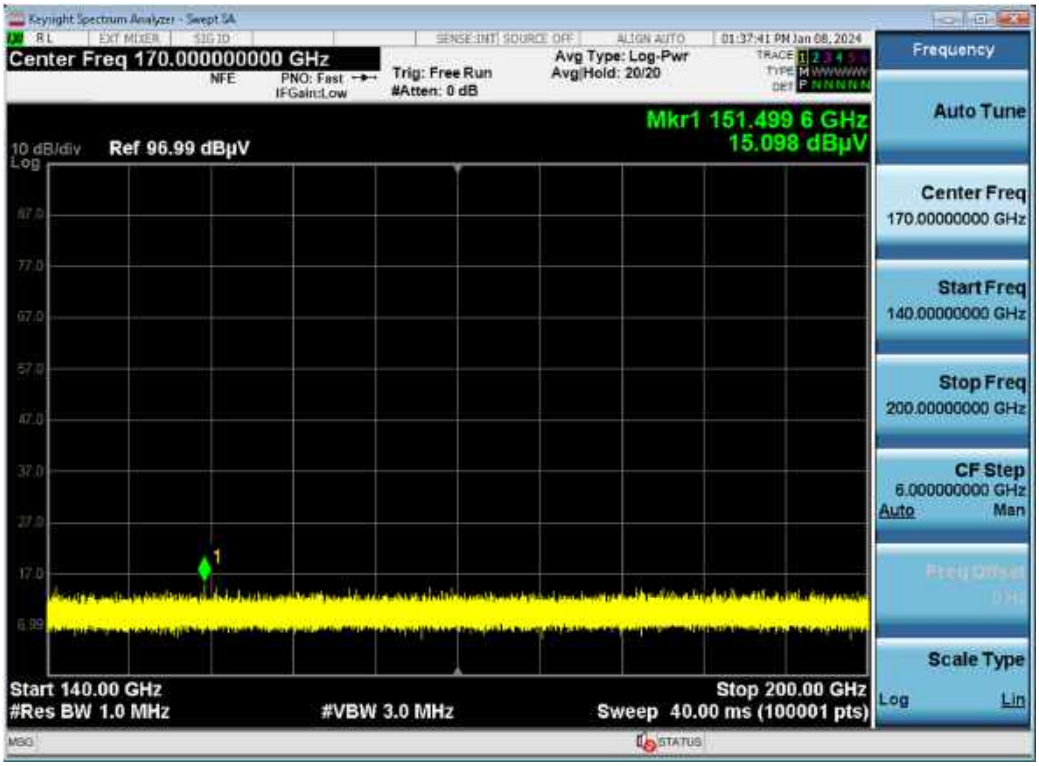
90 GHz ~ 140 GHz



140 GHz ~ 200 GHz



*In case of under 18 GHz and above 40 GHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured so we are attached only the worst case plots.

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5.6. FREQUENCY STABILITY

FCC Rules

Test Requirements:

§ 2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

Test Procedures:

The measurement is performed in accordance with Section 5.6.4 and 5.6.5 of ANSI C63.26.

5.6.4 Frequency stability over variations in temperature

a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.

b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.

c) Turn on the EUT, and tune it to the center frequency of the operating band.

d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

g) Set the temperature control on the chamber to the highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50 °C.

h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.

i) Measure the frequency.

j) Switch off the EUT, but do not switch off the oscillator heater.

k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.

l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be −30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the

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applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.

m) Omitted

5.6.5 Frequency stability when varying supply voltage

a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)

b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.

d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Measure the frequency.

f) Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

g) For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

h) Repeat the frequency measurement.

NOTE—For band-edge compliance, it can be required to make these measurements at the low and high channel of the operating band.

Note:

1. The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each path, so we are attached only the worst case data.
2. Test signal is CW signal for frequency stability.

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Test Results:

24.25 GHz - 24.45 GHz

Reference: Voltage = -48 VDC at 20°C, Frequency = 24.35 GHz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100 %	+20(Ref)	24 350 000 003	3.015	0.000	0.00000
	-30	24 350 000 005	2.450	-0.565	-0.00002
	-20	24 350 000 013	9.700	6.685	0.00027
	-10	24 350 000 009	6.301	3.286	0.00013
	0	24 350 000 008	5.184	2.169	0.00009
	+10	24 350 000 012	8.574	5.559	0.00023
	+30	24 350 000 012	8.625	5.610	0.00023
	+40	24 350 000 010	7.421	4.406	0.00018
	+50	24 350 000 005	1.770	-1.245	-0.00005
115 %	+20	24 350 000 003	0.059	-2.956	-0.00012
85 %	+20	24 350 000 013	9.678	6.663	0.00027

24.75 GHz - 25.25 GHz

Reference: Voltage = -48 VDC at 20°C, Frequency = 25.00 GHz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100 %	+20(Ref)	25 000 000 008	7.689	0.000	0.00000
	-30	24 350 000 010	6.592	3.577	0.00015
	-20	24 350 000 006	2.729	-0.286	-0.00001
	-10	24 350 000 006	3.239	0.224	0.00001
	0	24 350 000 004	0.962	-2.053	-0.00008
	+10	24 350 000 006	2.590	-0.425	-0.00002
	+30	24 350 000 011	7.596	4.581	0.00019
	+40	24 350 000 006	3.314	0.299	0.00001
	+50	24 350 000 009	6.128	3.113	0.00013
115 %	+20	24 350 000 012	9.160	6.145	0.00025
85 %	+20	24 350 000 005	2.344	-0.671	-0.00003

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38.30 GHz - 40.00 GHz

Reference: Voltage = -48 VDC at 20°C, Frequency = 39.15 GHz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100 %	+20(Ref)	39 150 000 004	4.219	0.000	0.00000
	-30	39 150 000 014	9.788	6.773	0.00028
	-20	39 150 000 011	6.630	3.615	0.00015
	-10	39 150 000 006	1.567	-1.448	-0.00006
	0	39 150 000 011	6.307	3.292	0.00014
	+10	39 150 000 013	9.254	6.239	0.00026
	+30	39 150 000 008	3.291	0.276	0.00001
	+40	39 150 000 005	0.300	-2.715	-0.00011
	+50	39 150 000 004	0.195	-2.820	-0.00012
115 %	+20	39 150 000 012	7.388	4.373	0.00018
85 %	+20	39 150 000 010	5.599	2.584	0.00011

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6. Annex A_Test Equipment CERTIFIED DOCUMENTS

Please refer to test equipment certified documents.

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7. Annex B_EUT AND TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2402-FC019-P

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