

TEST REPORT

FCC Test for RT8808-77A
Class II Permissive Change

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2207-FC035

DATE OF ISSUE
July 29, 2022

Tested by
Kyung Soo Kang



Technical Manager
Jong Seok Lee



HCT CO., LTD.
BongJai Huh
BongJai Huh / CEO

**HCT Co., Ltd.**

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 Fax. +82 31 645 6401

TEST REPORT

FCC Test for
RT8808-77A

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Additional Model

-

Applicant**SAMSUNG Electronics Co., Ltd.**

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

**EUT Type
Model Name**

RRU(RT8808)
RT8808-77A

FCC ID

A3LRT8808-77A

Date of Test

July 08, 2022 ~ July 29, 2022

FCC Rule Parts:

CFR 47 Part 2, Part 27

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 29, 2022	Initial Release

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.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

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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	RRU(RT8808)					
EUT Serial Number	S617604339					
Power Supply	-48 VDC					
Output Power						
	Band	Carrier	Bandwidth		Power	
	3.7 GHz Service	1	60 MHz		40 W/path, Total: 320 W	
	3.7 GHz Service	1	100 MHz		40 W/path, Total: 320 W	
Frequency Range	3.7 GHz Service: 3 700 MHz ~ 3 800 MHz					
Emission Designator						
	Mode	Bandwidth	Emission Designator			
			QPSK (G7D)	Conducted (W)	16/64/256 QAM (W7D)	Conducted (W)
			3.7 GHz Service	60 MHz	58M0G7D	274.69
3.7 GHz Service	100 MHz	97M8G7D	273.66	97M8W7D	273.93	
Modulation Type	QPSK, 16QAM, 64QAM, 256QAM					

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 27
Measurement standards	ANSI C63.26-2015, KDB 662911 D01 v02r01, KDB 971168 D01 v03r01
Place of Test	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

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 April 02, 2018 (Registration Number: 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."

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 27

Description	Reference	Results
RF Output Power	§ 2.1046, § 27.50(j)(2)	Compliant
PAPR	§ 27.50(j)(4)	Compliant
Occupied Bandwidth	§ 2.1049	Compliant
Out-of-band Unwanted Emissions	§ 2.1051, § 27.53(l)(1)	Compliant
Spurious Unwanted Emissions		Compliant
Radiated Emissions	§ 2.1053, § 27.53(l)(1)	Compliant
Frequency Stability	§ 2.1055, § 27.54	Compliant

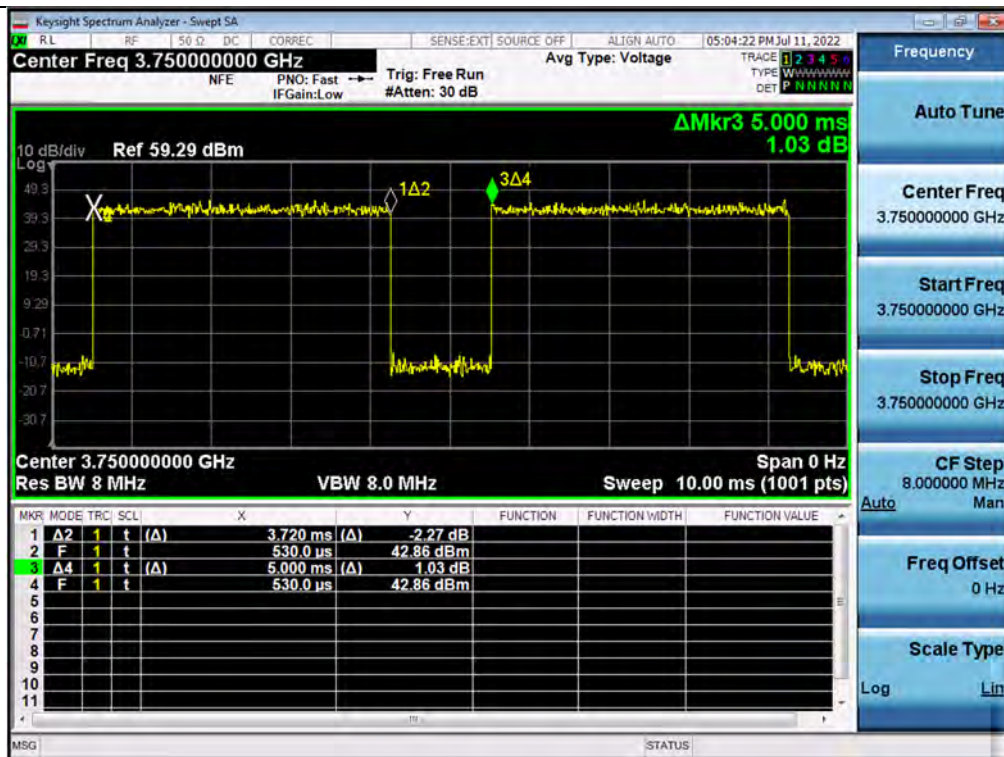
Note:

1. The equipment changes of C2PC models does not degrade the data reported to the Commission in original application report listed below.
FCC ID: A3LRT8808-77A previous report.
 - Original equipment report no. HCT-RF-2108-FC003
2. The data from that application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the test result.
3. Output power was verified to be within the expected tune up tolerances prior to performing the spot checks for radiated spurious emissions.

3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

- The EUT was operated in a manner representative of the typical usage of the equipment.
- During all testing, system components were manipulated within the confines of typical usage to maximize each emission.
- All 5G NR modulation types (QPSK, 16QAM, 64QAM, 256QAM) supported by the EUT have been tested.
- The measurement has been performed for NR carrier in the mode of full resource Block size as the worst case to transmit maximum output power.
- The dummy loads were connected to the RF output ports for radiated spurious emission testing.
- 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 performed the measurement using duty cycle method.

Measurement Result of RT8808-77A Transmit On/Off Timing



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

$$\text{Duty Cycle} = \text{On-time} / \text{Transmitter period} = 3.72 \text{ ms} / 5.00 \text{ ms} = 0.744$$

$$\text{Duty Correction} = 10 \log (1/\text{duty cycle}) = 10 \log (1/0.74) = 1.284 \text{ dB}$$

- The tests results in plots are already including the actual value of loss for the attenuator and cable combination. Please check correction factors below table.

ANT0

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.343	11 000	36.691
600	30.687	12 000	36.904
800	30.912	13 000	36.992
1 000	31.215	14 000	37.297
1 200	31.487	15 000	37.283
1 400	31.665	16 000	37.749
1 600	31.906	17 000	37.879
1 800	32.093	18 000	22.848
2 000	32.306	19 000	23.138
2 200	32.455	20 000	23.474
2 400	32.612	21 000	23.799
2 600	32.756	22 000	23.849
2 800	32.969	23 000	23.604
3 000	33.216	24 000	24.028
3 100	33.188	25 000	24.403
3 200	33.279	26 000	24.769
3 300	33.384	27 000	24.410
3 400	33.416	28 000	24.583
3 500	33.530	29 000	24.997
3 600	33.527	30 000	24.932
3 700	33.903	31 000	26.509
3 800	33.850	32 000	26.470
3 900	33.930	33 000	26.028
4 000	34.000	34 000	25.002
5 000	34.300	35 000	25.252
6 000	34.880	36 000	25.519
7 000	35.270	37 000	25.499
8 000	35.500	38 000	25.594
9 000	35.850	39 000	25.889
10 020	36.292	40 000	25.108

ANT1

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.239	11 000	36.761
600	30.582	12 000	36.974
800	30.806	13 000	37.062
1 000	31.118	14 000	37.367
1 200	31.378	15 000	37.353
1 400	31.534	16 000	37.819
1 600	31.773	17 000	37.949
1 800	31.959	18 000	22.918
2 000	32.222	19 000	23.208
2 200	32.351	20 000	23.544
2 400	32.500	21 000	23.869
2 600	32.636	22 000	23.919
2 800	32.873	23 000	23.674
3 000	33.088	24 000	24.098
3 100	33.090	25 000	24.473
3 200	33.164	26 000	24.839
3 300	33.283	27 000	24.480
3 400	33.307	28 000	24.653
3 500	33.413	29 000	25.067
3 600	33.448	30 000	25.002
3 700	33.851	31 000	26.579
3 800	33.920	32 000	26.540
3 900	34.000	33 000	26.098
4 000	34.070	34 000	25.072
5 000	34.370	35 000	25.322
6 000	34.950	36 000	25.589
7 000	35.340	37 000	25.569
8 000	35.570	38 000	25.664
9 000	35.920	39 000	25.959
10 020	36.362	40 000	25.178

ANT2

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.276	11 000	36.455
600	30.612	12 000	36.668
800	30.846	13 000	36.756
1 000	31.114	14 000	37.061
1 200	31.347	15 000	37.047
1 400	31.546	16 000	37.513
1 600	31.761	17 000	37.643
1 800	31.937	18 000	22.612
2 000	32.165	19 000	22.902
2 200	32.309	20 000	23.238
2 400	32.464	21 000	23.563
2 600	32.599	22 000	23.613
2 800	32.825	23 000	23.368
3 000	33.051	24 000	23.792
3 100	33.018	25 000	24.167
3 200	33.097	26 000	24.533
3 300	33.210	27 000	24.174
3 400	33.240	28 000	24.347
3 500	33.370	29 000	24.761
3 600	33.321	30 000	24.696
3 700	33.717	31 000	26.273
3 800	33.614	32 000	26.234
3 900	33.694	33 000	25.792
4 000	33.764	34 000	24.766
5 000	34.064	35 000	25.016
6 000	34.644	36 000	25.283
7 000	35.034	37 000	25.263
8 000	35.264	38 000	25.358
9 000	35.614	39 000	25.653
10 020	36.056	40 000	24.872

ANT3

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.101	11 000	36.404
600	30.437	12 000	36.617
800	30.659	13 000	36.705
1 000	30.933	14 000	37.010
1 200	31.180	15 000	36.996
1 400	31.380	16 000	37.462
1 600	31.601	17 000	37.592
1 800	31.785	18 000	22.561
2 000	31.988	19 000	22.851
2 200	32.123	20 000	23.187
2 400	32.283	21 000	23.512
2 600	32.432	22 000	23.562
2 800	32.655	23 000	23.317
3 000	32.861	24 000	23.741
3 100	32.851	25 000	24.116
3 200	32.917	26 000	24.482
3 300	33.026	27 000	24.123
3 400	33.072	28 000	24.296
3 500	33.164	29 000	24.710
3 600	33.184	30 000	24.645
3 700	33.584	31 000	26.222
3 800	33.563	32 000	26.183
3 900	33.643	33 000	25.741
4 000	33.713	34 000	24.715
5 000	34.013	35 000	24.965
6 000	34.593	36 000	25.232
7 000	34.983	37 000	25.212
8 000	35.213	38 000	25.307
9 000	35.563	39 000	25.602
10 020	36.005	40 000	24.821

ANT4

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	32.173	11 000	38.521
600	32.486	12 000	38.734
800	32.686	13 000	38.822
1 000	32.928	14 000	39.127
1 200	33.135	15 000	39.113
1 400	33.309	16 000	39.579
1 600	33.540	17 000	39.709
1 800	33.637	18 000	22.178
2 000	33.843	19 000	22.468
2 200	34.118	20 000	22.804
2 400	34.261	21 000	23.129
2 600	34.294	22 000	23.179
2 800	34.479	23 000	22.934
3 000	34.651	24 000	23.358
3 100	34.568	25 000	23.733
3 200	34.608	26 000	24.099
3 300	34.687	27 000	23.740
3 400	34.687	28 000	23.913
3 500	34.815	29 000	24.327
3 600	34.788	30 000	24.262
3 700	35.271	31 000	25.839
3 800	34.410	32 000	25.800
3 900	35.760	33 000	25.358
4 000	35.830	34 000	24.332
5 000	36.130	35 000	24.582
6 000	36.710	36 000	24.849
7 000	37.100	37 000	24.829
8 000	37.330	38 000	24.924
9 000	37.680	39 000	25.219
10 020	38.122	40 000	24.438

ANT5

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	31.563	11 000	37.395
600	31.808	12 000	37.608
800	31.977	13 000	37.696
1 000	32.206	14 000	38.001
1 200	32.379	15 000	37.987
1 400	32.493	16 000	38.453
1 600	32.668	17 000	38.583
1 800	32.813	18 000	21.052
2 000	32.998	19 000	21.342
2 200	33.130	20 000	21.678
2 400	33.266	21 000	22.003
2 600	33.348	22 000	22.053
2 800	33.499	23 000	21.808
3 000	33.621	24 000	22.232
3 100	33.661	25 000	22.607
3 200	33.651	26 000	22.973
3 300	33.702	27 000	22.614
3 400	33.680	28 000	22.787
3 500	33.781	29 000	23.201
3 600	33.844	30 000	23.136
3 700	34.312	31 000	24.713
3 800	34.554	32 000	24.674
3 900	34.634	33 000	24.232
4 000	34.704	34 000	23.206
5 000	35.004	35 000	23.456
6 000	35.584	36 000	23.723
7 000	35.974	37 000	23.703
8 000	36.204	38 000	23.798
9 000	36.554	39 000	24.093
10 020	36.996	40 000	23.312

ANT6

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	32.295	11 000	38.404
600	32.571	12 000	38.617
800	32.792	13 000	38.705
1 000	33.003	14 000	39.010
1 200	33.232	15 000	38.996
1 400	33.369	16 000	39.462
1 600	33.594	17 000	39.592
1 800	33.804	18 000	22.061
2 000	34.021	19 000	22.351
2 200	34.240	20 000	22.687
2 400	34.439	21 000	23.012
2 600	34.436	22 000	23.062
2 800	34.544	23 000	22.817
3 000	34.641	24 000	23.241
3 100	34.621	25 000	23.616
3 200	34.643	26 000	23.982
3 300	34.712	27 000	23.623
3 400	34.733	28 000	23.796
3 500	34.808	29 000	24.210
3 600	34.895	30 000	24.145
3 700	35.343	31 000	25.722
3 800	35.563	32 000	25.683
3 900	35.643	33 000	25.241
4 000	35.713	34 000	24.215
5 000	36.013	35 000	24.465
6 000	36.593	36 000	24.732
7 000	36.983	37 000	24.712
8 000	37.213	38 000	24.807
9 000	37.563	39 000	25.102
10 020	38.005	40 000	24.321

ANT7

Correction factor table

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	31.736	11 000	37.417
600	32.026	12 000	37.630
800	32.216	13 000	37.718
1 000	32.464	14 000	38.023
1 200	32.683	15 000	38.009
1 400	32.830	16 000	38.475
1 600	33.066	17 000	38.605
1 800	33.226	18 000	21.074
2 000	33.438	19 000	21.364
2 200	33.691	20 000	21.700
2 400	33.685	21 000	22.025
2 600	33.740	22 000	22.075
2 800	33.869	23 000	21.830
3 000	34.061	24 000	22.254
3 100	33.977	25 000	22.629
3 200	33.993	26 000	22.995
3 300	34.077	27 000	22.636
3 400	34.097	28 000	22.809
3 500	34.167	29 000	23.223
3 600	34.237	30 000	23.158
3 700	34.681	31 000	24.735
3 800	34.576	32 000	24.696
3 900	34.656	33 000	24.254
4 000	34.726	34 000	23.228
5 000	35.026	35 000	23.478
6 000	35.606	36 000	23.745
7 000	35.996	37 000	23.725
8 000	36.226	38 000	23.820
9 000	36.576	39 000	24.115
10 020	37.018	40 000	23.334

3.3. MAXIMUM MEASUREMENT UNCERTAINTY

Description	Condition	Uncertainty
Radiated Disturbance	9 kHz ~ 30 MHz	4.40 dB
	30 MHz ~ 1 GHz	5.74 dB
	1 GHz ~ 18 GHz	5.51 dB
	18 GHz ~ 40 GHz	5.92 dB

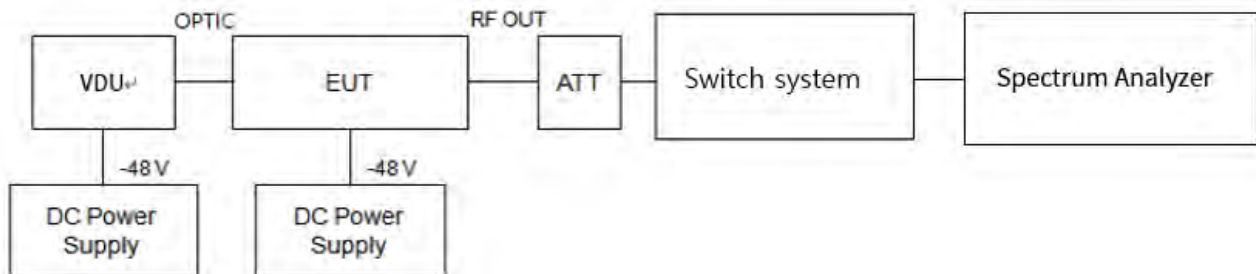
Coverage factor $k=2$, Confidence levels of 95 %

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

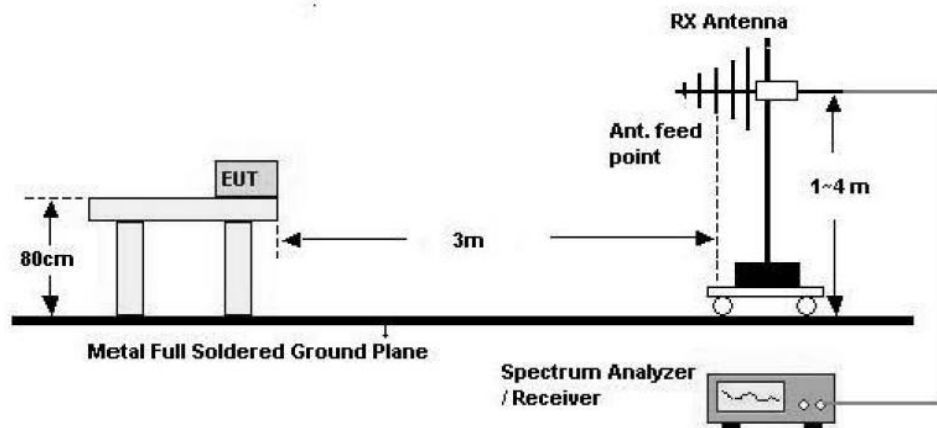
3.5. TEST DIAGRAMS

Conducted Test

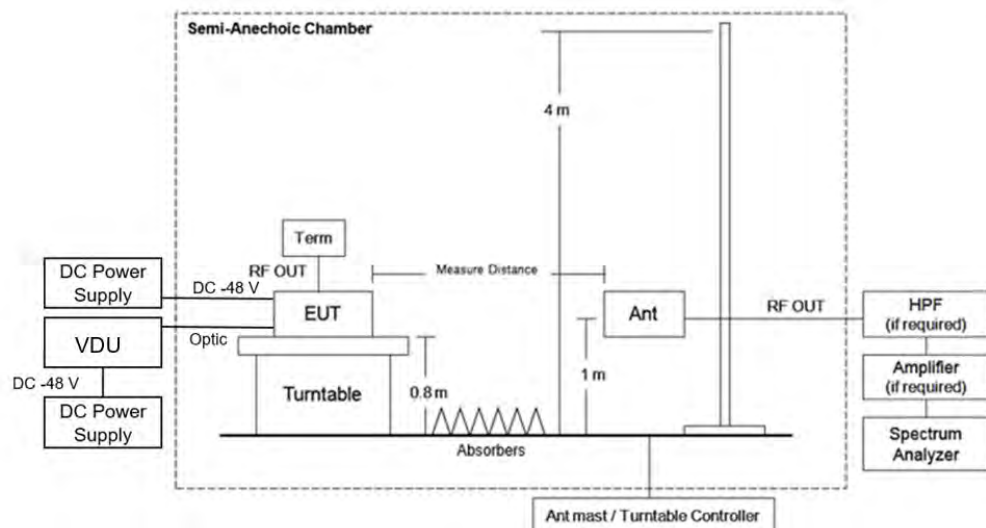


Radiated Test

30 MHz ~ 1 GHz

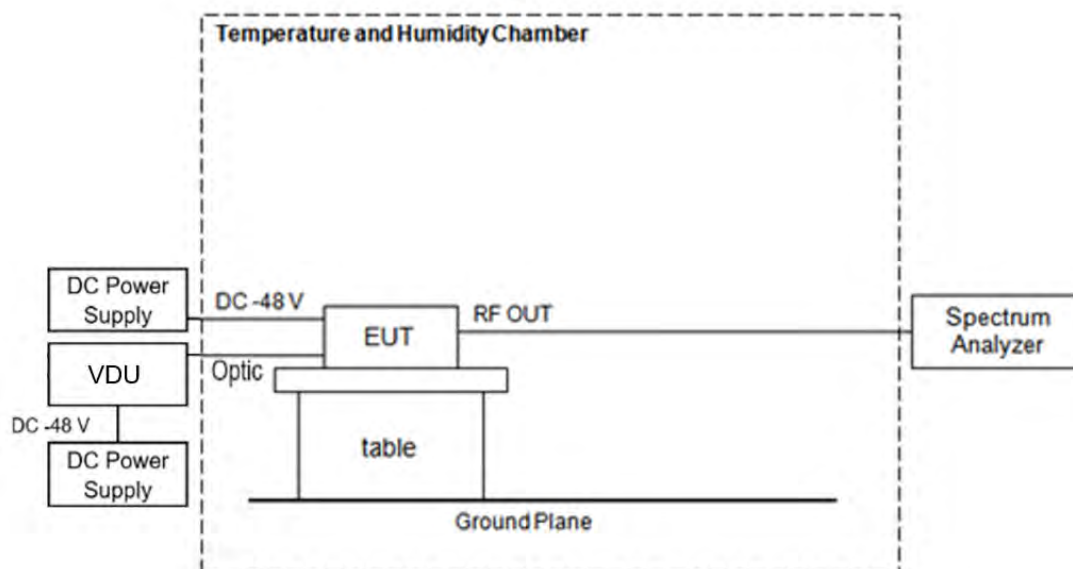


Above 1 GHz



※ EUT position is adopted by placement of floor-standing refer to section 5.5.2.3.2 of ANSI C63.26-2015

Frequency Stability



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

4. TEST EQUIPMENTS

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
PXA Signal Analyzer	N9030A	Keysight	MY49431434	2023-01-05	Annual
RF Switch System	TMX0108	TNM System	TM20110001	N/A	N/A
*30 dB Attenuator	67-30-33	API Weinschel, Inc.	CL4336	2023-05-03	Annual
*50Ω Termination	908A	H.P.	N/A	N/A	N/A
20 dB Attenuator	FAS-23-20	MCLI	103756	2023-01-03	Annual
DC Power Supply	PWR800L	KIKUSUI	LJ003448	2023-05-30	Annual
DC Power Supply	6674A	H.P.	3637A01843	2023-05-30	Annual
DC Power Supply	6674A	Agilent	MY41003340	2023-07-06	Annual
DC Power Supply	PWR1600L	KIKUSUI	RL002213	2022-09-29	Annual
Temperature and Humidity Chamber	NY-THR18750	NANGYEUL CO., LTD.	NY-200912201A	2023-02-10	Annual
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090002	N/A	N/A
Controller(Antenna mast & Turn Table)	CO3000	Innco systems	CO3000/1251/48920320/P	N/A	N/A
Antenna Position Tower	MA4640/800-XP-ET	Innco systems	N/A	N/A	N/A
Turn Table	DS2000-S	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Schwarzbeck	1513-333	2024-03-17	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	2022-09-04	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	02296	2023-05-19	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	2023-04-12	Biennial
Spectrum Analyzer	FSP40	Rohde & Schwarz	100843	2022-11-08	Annual
HPF(7 ~ 18 GHz) + LNA2(6 ~ 18 GHz)	FBSR-04C	TNM system	N/A	2022-09-16	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	86	2022-09-16	Annual
Low Noise Amplifier	LLA06185030Q	LTC Microwave	102	2022-09-16	Annual
Power Amplifier	CBL18265035	CERNEX	22966	2022-12-02	Annual
Power Amplifier	CBL26405040	CERNEX	25956	2023-03-11	Annual

* This equipment has been used to each port, but we only listed one equipment for simplicity.

Note:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date, or will be tested after the calibration is completed.

5. TEST RESULT

5.1. RF OUTPUT POWER and PSD

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.

§ 27.50 Power limits and duty cycle.

- (j) The following power requirements apply to stations transmitting in the 3700-3980 MHz band:
 - (1) The power of each fixed or base station transmitting in the 3700-3980 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.
 - (2) The power of each fixed or base station transmitting in the 3700-3980 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.
 - (4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedures:

The measurement is performed in accordance with Section 5.2.4.4.1 of ANSI C63.26.

The EUT is considered to transmit continuously if it can be configured to transmit at a burst duty cycle of greater than or equal to 98 % throughout the duration of the measurement. If this condition can be achieved, then the following procedure can be used to measure the average output power of the EUT.

- a) Set span to $2 \times$ to $3 \times$ the OBW.
- b) Set RBW = 1 % to 5 % of the OBW.
- c) Set VBW $\geq 3 \times$ RBW.
- d) Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
- e) Sweep time:
 - 1) Set = auto-couple, or
 - 2) Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
- f) Detector = power averaging (rms).
- g) If the EUT can be configured to transmit continuously, then set the trigger to free run.
- h) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
- i) 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 multiple symbols, 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.
- j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The PSD measurement is performed in accordance with Section 5.2.4.5 of ANSI C63.26.

Some regulatory requirements specify the RF output power limits in terms of maximum or average PSD, (i.e., the output power or unwanted emissions power limits are defined within a specified reference bandwidth).

When average PSD limits are specified, the same fundamental measurement condition applies as previously discussed (i.e., averaging is to be performed only over durations of active transmissions at maximum output power level). Thus, when performing this measurement, the EUT must either be configured to transmit continuously at full power while the compliance measurement is performed, or else the measurement instrumentation must be configured to acquire data only over durations when the EUT is actively transmitting at full power. In circumstances where neither of these conditions can be realized, then alternative procedures are provided for both constant duty cycle and non-constant duty cycle transmissions.

The PSD is measured following the same procedures described in 5.2.4.4 for measuring the total average power, but with the RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected, based on whether the transmitter duty cycle is constant (variations $\leq \pm 2\%$) or non-constant (variations $> \pm 2\%$), respectively.

Note: The results of the Conducted output power and PSD test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:**Tabular Data of RF output power****3.7 GHz Service 60 MHz 1 Carrier(Low)**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
1	16QAM	Low	3 730.00	45.60	36.32

3.7 GHz Service 60 MHz 1 Carrier

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Middle	3 750.00	45.45	35.08
		High	3 770.00	45.42	34.80
	16QAM	Middle	3 750.00	45.49	35.36
		High	3 770.00	45.36	34.32
	64QAM	Middle	3 750.00	45.45	35.11
		High	3 770.00	45.32	34.06
	256QAM	Middle	3 750.00	45.64	36.65
		High	3 770.00	45.45	35.06
1	QPSK	Middle	3 750.00	45.26	33.60
		High	3 770.00	45.14	32.67
	16QAM	Middle	3 750.00	45.21	33.20
		High	3 770.00	45.22	33.27
	64QAM	Middle	3 750.00	45.22	33.24
		High	3 770.00	45.18	32.95
	256QAM	Middle	3 750.00	45.35	34.25
		High	3 770.00	45.31	33.98
2	QPSK	Middle	3 750.00	45.47	35.23
		High	3 770.00	45.36	34.38
	16QAM	Middle	3 750.00	45.56	35.97
		High	3 770.00	45.35	34.25
	64QAM	Middle	3 750.00	45.51	35.58
		High	3 770.00	45.31	33.94
	256QAM	Middle	3 750.00	45.65	36.75
		High	3 770.00	45.39	34.56
3	QPSK	Middle	3 750.00	45.28	33.73
		High	3 770.00	45.33	34.08
	16QAM	Middle	3 750.00	45.21	33.17
		High	3 770.00	45.17	32.86
	64QAM	Middle	3 750.00	45.28	33.74
		High	3 770.00	45.21	33.21
	256QAM	Middle	3 750.00	45.47	35.21
		High	3 770.00	45.31	33.99

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
4	QPSK	Middle	3 750.00	45.29	33.82
		High	3 770.00	45.10	32.33
	16QAM	Middle	3 750.00	45.39	34.58
		High	3 770.00	45.06	32.09
	64QAM	Middle	3 750.00	45.31	33.97
		High	3 770.00	45.18	32.96
	256QAM	Middle	3 750.00	45.48	35.32
		High	3 770.00	45.12	32.51
5	QPSK	Middle	3 750.00	45.36	34.40
		High	3 770.00	45.29	33.79
	16QAM	Middle	3 750.00	45.47	35.27
		High	3 770.00	45.22	33.25
	64QAM	Middle	3 750.00	45.39	34.57
		High	3 770.00	45.24	33.41
	256QAM	Middle	3 750.00	45.53	35.73
		High	3 770.00	45.40	34.71
6	QPSK	Middle	3 750.00	45.36	34.40
		High	3 770.00	45.36	34.39
	16QAM	Middle	3 750.00	45.50	35.52
		High	3 770.00	45.30	33.89
	64QAM	Middle	3 750.00	45.41	34.76
		High	3 770.00	45.31	33.99
	256QAM	Middle	3 750.00	45.59	36.20
		High	3 770.00	45.42	34.79
7	QPSK	Middle	3 750.00	45.37	34.45
		High	3 770.00	45.18	32.98
	16QAM	Middle	3 750.00	45.49	35.38
		High	3 770.00	45.23	33.37
	64QAM	Middle	3 750.00	45.37	34.45
		High	3 770.00	45.26	33.56
	256QAM	Middle	3 750.00	45.55	35.93
		High	3 770.00	45.34	34.20

Sum Data of Port 0 ~ Port 7

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 750.00	274.69	278.45	275.42	286.03
3 770.00	269.42	267.32	268.08	273.80

3.7 GHz Service 100 MHz 1 Carrier

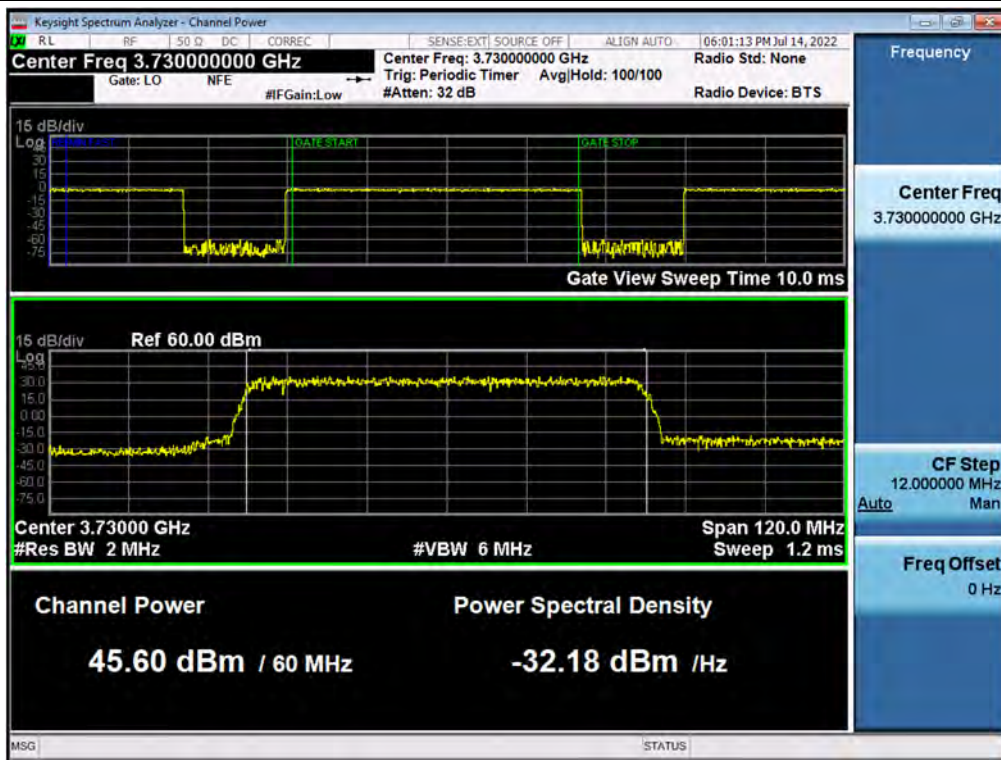
Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Middle	3 750.00	45.41	34.74
	16QAM	Middle	3 750.00	45.31	33.98
	64QAM	Middle	3 750.00	45.29	33.83
	256QAM	Middle	3 750.00	45.36	34.36
1	QPSK	Middle	3 750.00	45.10	32.34
	16QAM	Middle	3 750.00	45.13	32.56
	64QAM	Middle	3 750.00	45.13	32.58
	256QAM	Middle	3 750.00	45.22	33.29
2	QPSK	Middle	3 750.00	45.49	35.38
	16QAM	Middle	3 750.00	45.34	34.19
	64QAM	Middle	3 750.00	45.36	34.38
	256QAM	Middle	3 750.00	45.35	34.25
3	QPSK	Middle	3 750.00	45.24	33.43
	16QAM	Middle	3 750.00	45.12	32.54
	64QAM	Middle	3 750.00	45.17	32.89
	256QAM	Middle	3 750.00	45.16	32.83
4	QPSK	Middle	3 750.00	45.36	34.32
	16QAM	Middle	3 750.00	45.18	32.93
	64QAM	Middle	3 750.00	45.13	32.60
	256QAM	Middle	3 750.00	45.38	34.51
5	QPSK	Middle	3 750.00	45.39	34.61
	16QAM	Middle	3 750.00	45.40	34.64
	64QAM	Middle	3 750.00	45.37	34.45
	256QAM	Middle	3 750.00	45.48	35.32
6	QPSK	Middle	3 750.00	45.42	34.80
	16QAM	Middle	3 750.00	45.32	34.05
	64QAM	Middle	3 750.00	45.32	34.03
	256QAM	Middle	3 750.00	45.41	34.73
7	QPSK	Middle	3 750.00	45.32	34.05
	16QAM	Middle	3 750.00	45.22	33.27
	64QAM	Middle	3 750.00	45.26	33.55
	256QAM	Middle	3 750.00	45.40	34.64

Sum Data of Port 0 ~ Port 7

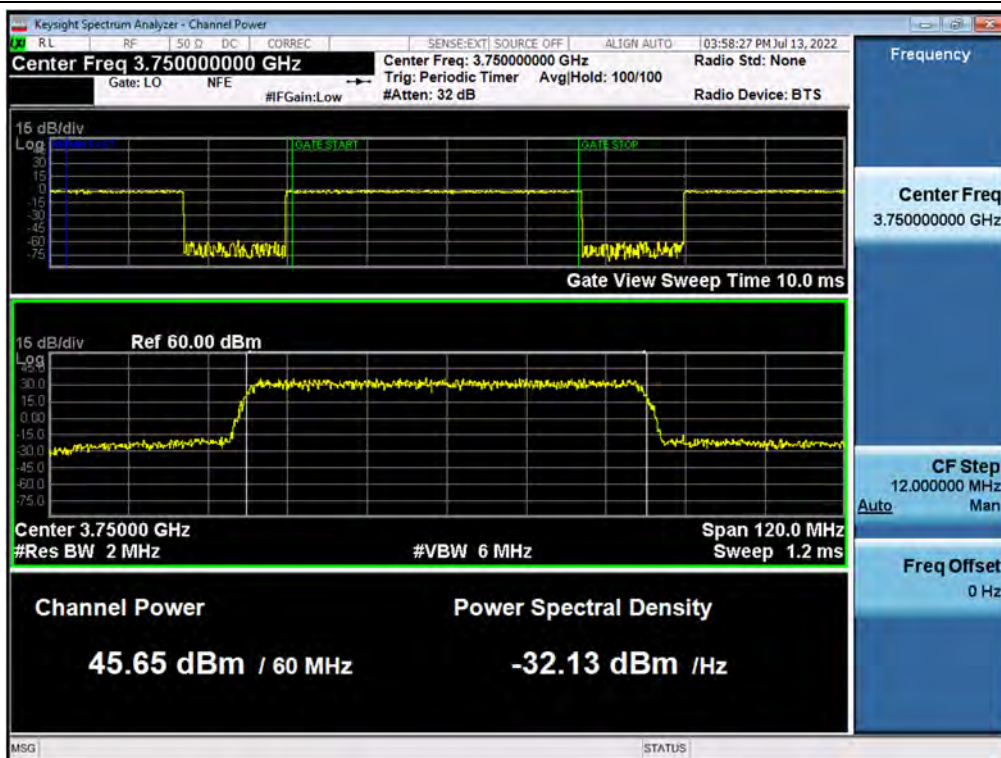
Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 750.00	273.66	268.16	268.32	273.93

Plot Data of RF Output Power

Antenna 1 / 3.7 GHz Service 60 MHz 1 Carrier / 16QAM / Low



Antenna 2 / 3.7 GHz Service 60 MHz 1 Carrier / 256QAM / Middle



Antenna 2 / 3.7 GHz Service 100 MHz 1 Carrier / QPSK / Middle



Tabular Data of PSD

3.7 GHz Service 60 MHz 1 Carrier(Low)

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Calculated (W/MHz)
1	16QAM	Low	3 730.00	34.28	2.68

3.7 GHz Service 60 MHz 1 Carrier

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Calculated (W/MHz)
0	QPSK	Middle	3 750.00	33.74	2.37
		High	3 770.00	33.58	2.28
	16QAM	Middle	3 750.00	35.21	3.32
		High	3 770.00	35.13	3.26
	64QAM	Middle	3 750.00	36.17	4.14
		High	3 770.00	36.21	4.17
	256QAM	Middle	3 750.00	34.10	2.57
		High	3 770.00	34.08	2.56
1	QPSK	Middle	3 750.00	33.84	2.42
		High	3 770.00	33.71	2.35
	16QAM	Middle	3 750.00	35.32	3.40
		High	3 770.00	35.39	3.46
	64QAM	Middle	3 750.00	36.32	4.29
		High	3 770.00	36.52	4.49
	256QAM	Middle	3 750.00	34.23	2.65
		High	3 770.00	34.29	2.69
2	QPSK	Middle	3 750.00	34.10	2.57
		High	3 770.00	33.96	2.49
	16QAM	Middle	3 750.00	35.53	3.58
		High	3 770.00	35.55	3.59
	64QAM	Middle	3 750.00	36.50	4.47
		High	3 770.00	36.52	4.48
	256QAM	Middle	3 750.00	34.52	2.83
		High	3 770.00	34.48	2.81
3	QPSK	Middle	3 750.00	33.87	2.44
		High	3 770.00	33.64	2.31
	16QAM	Middle	3 750.00	35.29	3.38
		High	3 770.00	35.38	3.45
	64QAM	Middle	3 750.00	36.34	4.31
		High	3 770.00	36.45	4.42
	256QAM	Middle	3 750.00	34.24	2.65
		High	3 770.00	34.29	2.69

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Calculated (W/MHz)
4	QPSK	Middle	3 750.00	33.72	2.36
		High	3 770.00	33.77	2.38
	16QAM	Middle	3 750.00	35.44	3.50
		High	3 770.00	35.38	3.45
	64QAM	Middle	3 750.00	36.39	4.35
		High	3 770.00	35.76	3.77
	256QAM	Middle	3 750.00	34.32	2.71
		High	3 770.00	34.33	2.71
5	QPSK	Middle	3 750.00	33.94	2.48
		High	3 770.00	33.78	2.39
	16QAM	Middle	3 750.00	35.40	3.47
		High	3 770.00	35.46	3.51
	64QAM	Middle	3 750.00	36.45	4.42
		High	3 770.00	36.26	4.23
	256QAM	Middle	3 750.00	34.42	2.76
		High	3 770.00	34.37	2.74
6	QPSK	Middle	3 750.00	33.89	2.45
		High	3 770.00	33.83	2.42
	16QAM	Middle	3 750.00	35.54	3.58
		High	3 770.00	35.66	3.68
	64QAM	Middle	3 750.00	36.51	4.48
		High	3 770.00	36.30	4.27
	256QAM	Middle	3 750.00	34.37	2.74
		High	3 770.00	34.50	2.82
7	QPSK	Middle	3 750.00	33.91	2.46
		High	3 770.00	33.70	2.34
	16QAM	Middle	3 750.00	35.39	3.46
		High	3 770.00	35.56	3.60
	64QAM	Middle	3 750.00	36.49	4.46
		High	3 770.00	36.14	4.11
	256QAM	Middle	3 750.00	34.29	2.68
		High	3 770.00	34.44	2.78

Sum Data of Port 0 ~ Port 7

Frequency (MHz)	PSD			
	QPSK	16QAM	64QAM	256QAM
	W/MHz			
3 750.00	19.53	27.69	34.91	21.59
3 770.00	18.96	28.01	33.94	21.78

3.7 GHz Service 100 MHz 1 Carrier

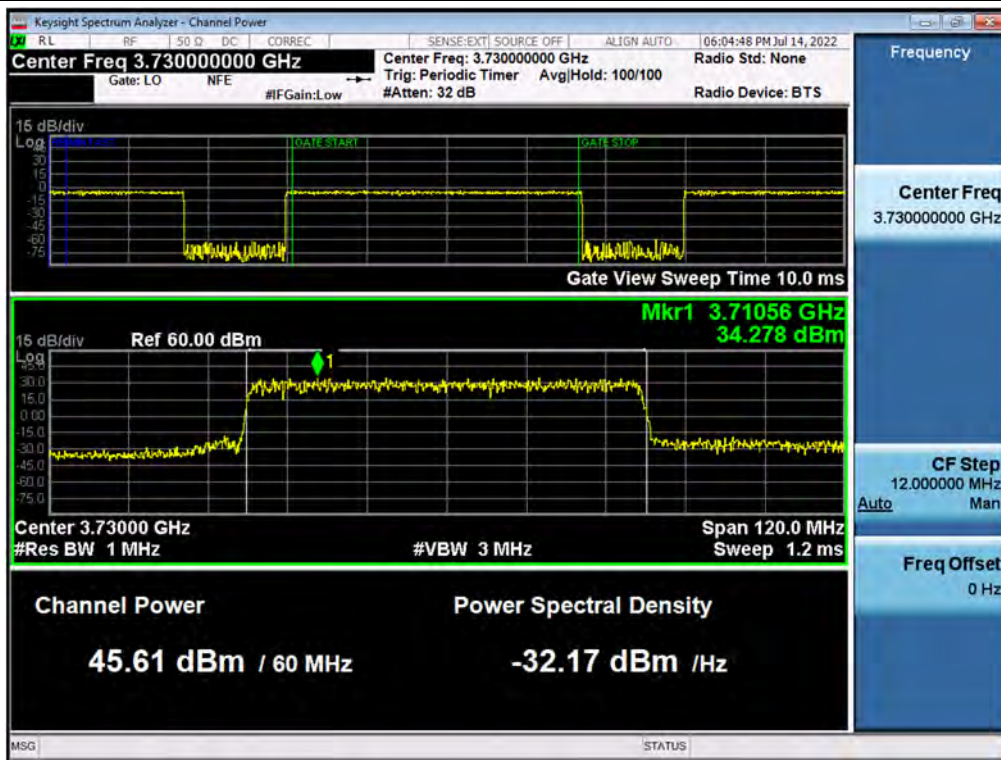
Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Calculated (W/MHz)
0	QPSK	Middle	3 750.00	30.01	1.00
	16QAM	Middle	3 750.00	30.60	1.15
	64QAM	Middle	3 750.00	30.57	1.14
	256QAM	Middle	3 750.00	30.58	1.14
1	QPSK	Middle	3 750.00	29.92	0.98
	16QAM	Middle	3 750.00	29.80	0.96
	64QAM	Middle	3 750.00	29.88	0.97
	256QAM	Middle	3 750.00	29.92	0.98
2	QPSK	Middle	3 750.00	30.06	1.01
	16QAM	Middle	3 750.00	30.13	1.03
	64QAM	Middle	3 750.00	30.08	1.02
	256QAM	Middle	3 750.00	30.07	1.02
3	QPSK	Middle	3 750.00	29.96	0.99
	16QAM	Middle	3 750.00	29.53	0.90
	64QAM	Middle	3 750.00	29.55	0.90
	256QAM	Middle	3 750.00	29.59	0.91
4	QPSK	Middle	3 750.00	29.98	1.00
	16QAM	Middle	3 750.00	30.26	1.06
	64QAM	Middle	3 750.00	30.26	1.06
	256QAM	Middle	3 750.00	30.29	1.07
5	QPSK	Middle	3 750.00	29.99	1.00
	16QAM	Middle	3 750.00	30.02	1.01
	64QAM	Middle	3 750.00	30.03	1.01
	256QAM	Middle	3 750.00	30.11	1.03
6	QPSK	Middle	3 750.00	30.10	1.02
	16QAM	Middle	3 750.00	30.08	1.02
	64QAM	Middle	3 750.00	30.08	1.02
	256QAM	Middle	3 750.00	30.13	1.03
7	QPSK	Middle	3 750.00	30.08	1.02
	16QAM	Middle	3 750.00	30.04	1.01
	64QAM	Middle	3 750.00	30.06	1.01
	256QAM	Middle	3 750.00	30.14	1.03

Sum Data of Port 0 ~ Port 7

Frequency (MHz)	PSD			
	QPSK	16QAM	64QAM	256QAM
	W/MHz			
3 750.00	8.03	8.12	8.13	8.21

Plot Data of PSD

Antenna 1 / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



Antenna 1 / 3.7 GHz Service 60 MHz 1 Carrier / 64QAM / High



Antenna 0 / 3.7 GHz Service 100 MHz 1 Carrier / 16QAM / Middle



5.2. PAPR

Test Requirements:

§ 27.50 Power limits and duty cycle.

- (j) The following power requirements apply to stations transmitting in the 3700-3980 MHz band:
 - (4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedures:

The measurement is performed in accordance with Section 5.2.3.4 of ANSI C63.26.

The following guidelines are offered for performing a CCDF measurement.

- a) Set resolution/measurement bandwidth $\geq$ OBW or specified reference bandwidth.
- b) Set the number of counts to a value that stabilizes the measured CCDF curve.
- c) Set the measurement interval as follows:
 - 1) For continuous transmissions, set to the greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d) Record the maximum PAPR level associated with a probability of 0.1%.
- e) The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

Note: The results of the PAPR test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Tabular data of PAR

3.7 GHz Service 60 MHz 1 Carrier

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Middle	3 750.00	8.70
		High	3 770.00	9.69
	16QAM	Middle	3 750.00	9.14
		High	3 770.00	9.35
	64QAM	Middle	3 750.00	8.62
		High	3 770.00	8.99
	256QAM	Middle	3 750.00	8.68
		High	3 770.00	9.24
1	QPSK	Middle	3 750.00	9.08
		High	3 770.00	9.16
	16QAM	Middle	3 750.00	8.66
		High	3 770.00	8.21
	64QAM	Middle	3 750.00	9.03
		High	3 770.00	9.71
	256QAM	Middle	3 750.00	8.80
		High	3 770.00	8.91
2	QPSK	Middle	3 750.00	8.69
		High	3 770.00	8.88
	16QAM	Middle	3 750.00	9.14
		High	3 770.00	7.69
	64QAM	Middle	3 750.00	9.10
		High	3 770.00	9.05
	256QAM	Middle	3 750.00	10.93
		High	3 770.00	8.07
3	QPSK	Middle	3 750.00	9.01
		High	3 770.00	9.72
	16QAM	Middle	3 750.00	8.96
		High	3 770.00	9.49
	64QAM	Middle	3 750.00	8.59
		High	3 770.00	8.82
	256QAM	Middle	3 750.00	9.23
		High	3 770.00	8.38

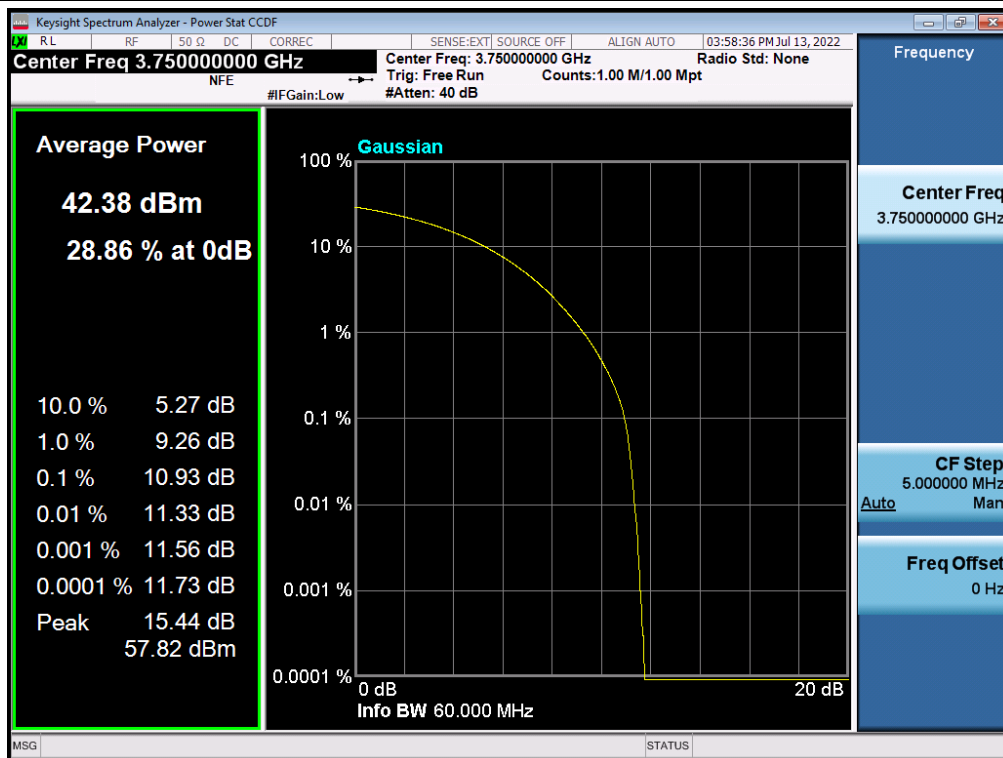
Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
4	QPSK	Middle	3 750.00	8.69
		High	3 770.00	8.96
	16QAM	Middle	3 750.00	8.78
		High	3 770.00	8.17
	64QAM	Middle	3 750.00	9.11
		High	3 770.00	8.62
	256QAM	Middle	3 750.00	8.03
		High	3 770.00	9.11
5	QPSK	Middle	3 750.00	9.20
		High	3 770.00	9.57
	16QAM	Middle	3 750.00	8.89
		High	3 770.00	9.02
	64QAM	Middle	3 750.00	8.94
		High	3 770.00	8.69
	256QAM	Middle	3 750.00	9.42
		High	3 770.00	9.15
6	QPSK	Middle	3 750.00	9.02
		High	3 770.00	8.54
	16QAM	Middle	3 750.00	9.51
		High	3 770.00	8.06
	64QAM	Middle	3 750.00	9.89
		High	3 770.00	8.66
	256QAM	Middle	3 750.00	8.79
		High	3 770.00	9.16
7	QPSK	Middle	3 750.00	8.78
		High	3 770.00	8.07
	16QAM	Middle	3 750.00	9.17
		High	3 770.00	8.86
	64QAM	Middle	3 750.00	9.04
		High	3 770.00	8.43
	256QAM	Middle	3 750.00	8.60
		High	3 770.00	9.17

3.7 GHz Service 100 MHz 1 Carrier

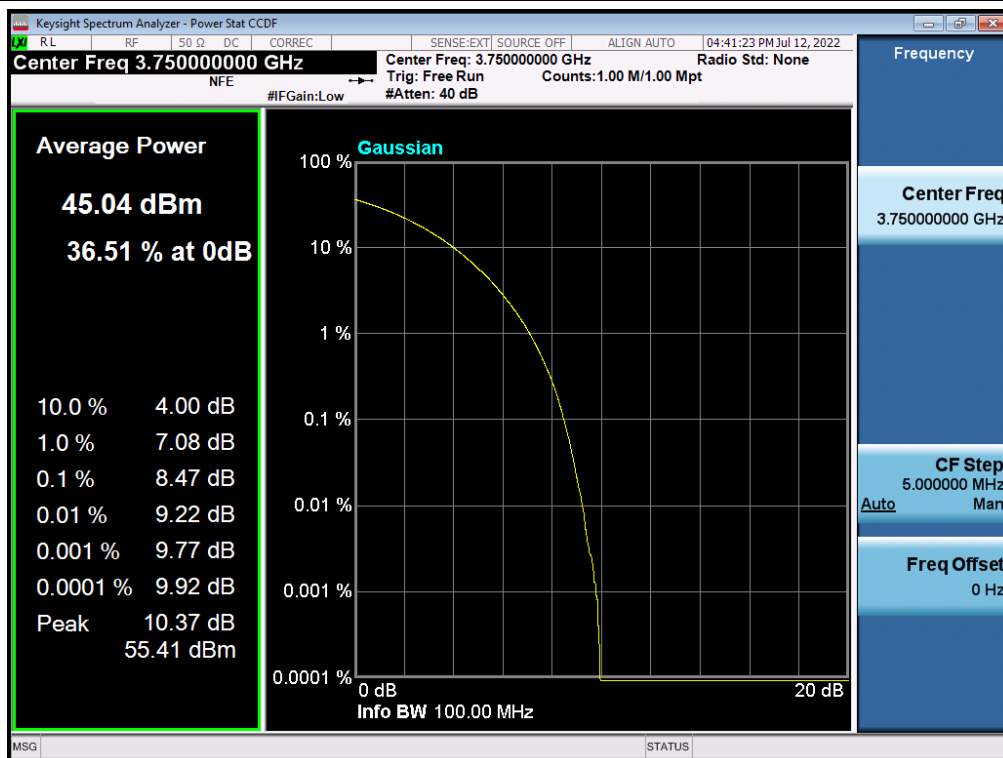
Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Middle	3 750.00	8.38
	16QAM	Middle	3 750.00	8.40
	64QAM	Middle	3 750.00	9.59
	256QAM	Middle	3 750.00	8.30
1	QPSK	Middle	3 750.00	8.83
	16QAM	Middle	3 750.00	8.34
	64QAM	Middle	3 750.00	8.28
	256QAM	Middle	3 750.00	10.24
2	QPSK	Middle	3 750.00	8.47
	16QAM	Middle	3 750.00	8.10
	64QAM	Middle	3 750.00	9.38
	256QAM	Middle	3 750.00	8.03
3	QPSK	Middle	3 750.00	8.33
	16QAM	Middle	3 750.00	9.67
	64QAM	Middle	3 750.00	8.10
	256QAM	Middle	3 750.00	8.53
4	QPSK	Middle	3 750.00	7.93
	16QAM	Middle	3 750.00	8.26
	64QAM	Middle	3 750.00	9.18
	256QAM	Middle	3 750.00	9.13
5	QPSK	Middle	3 750.00	9.75
	16QAM	Middle	3 750.00	8.55
	64QAM	Middle	3 750.00	9.04
	256QAM	Middle	3 750.00	8.63
6	QPSK	Middle	3 750.00	8.38
	16QAM	Middle	3 750.00	9.13
	64QAM	Middle	3 750.00	8.62
	256QAM	Middle	3 750.00	9.25
7	QPSK	Middle	3 750.00	7.98
	16QAM	Middle	3 750.00	8.25
	64QAM	Middle	3 750.00	8.74
	256QAM	Middle	3 750.00	8.59

Plot Data of PAPR

Antenna 2 / 3.7 GHz Service 60 MHz 1 Carrier / 256QAM / Middle



Antenna 2 / 3.7 GHz Service 100 MHz 1 Carrier / QPSK / Middle



5.3. OCCUPIED BANDWIDTH

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

The OBW is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). The typical ratio for transmitters is –26 dB, corresponding to the 26 dB BW; however, other ratios can be specified. In this subclause, the ratio is designated by “–X dB.”

- 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 $\geq 3 \times \text{RBW}$.
- 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 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

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring (99%) power bandwidth:

- 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 $1.5 \times \text{OBW}$ 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 $\geq 3 \times \text{RBW}$.
- 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).

Note: The results of the Occupied Bandwidth test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:
Tabular Data of Occupied Bandwidth

3.7 GHz Service 60 MHz 1 Carrier

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Middle	3 750.00	57.910
		High	3 770.00	57.914
	16QAM	Middle	3 750.00	57.908
		High	3 770.00	57.996
	64QAM	Middle	3 750.00	58.009
		High	3 770.00	57.892
	256QAM	Middle	3 750.00	57.920
		High	3 770.00	57.914
1	QPSK	Middle	3 750.00	57.888
		High	3 770.00	57.942
	16QAM	Middle	3 750.00	57.960
		High	3 770.00	57.987
	64QAM	Middle	3 750.00	58.000
		High	3 770.00	57.880
	256QAM	Middle	3 750.00	57.978
		High	3 770.00	57.934
2	QPSK	Middle	3 750.00	58.002
		High	3 770.00	57.964
	16QAM	Middle	3 750.00	58.019
		High	3 770.00	57.880
	64QAM	Middle	3 750.00	58.024
		High	3 770.00	58.024
	256QAM	Middle	3 750.00	57.957
		High	3 770.00	57.923
3	QPSK	Middle	3 750.00	57.939
		High	3 770.00	57.917
	16QAM	Middle	3 750.00	57.908
		High	3 770.00	57.991
	64QAM	Middle	3 750.00	58.068
		High	3 770.00	57.923
	256QAM	Middle	3 750.00	57.802
		High	3 770.00	57.974

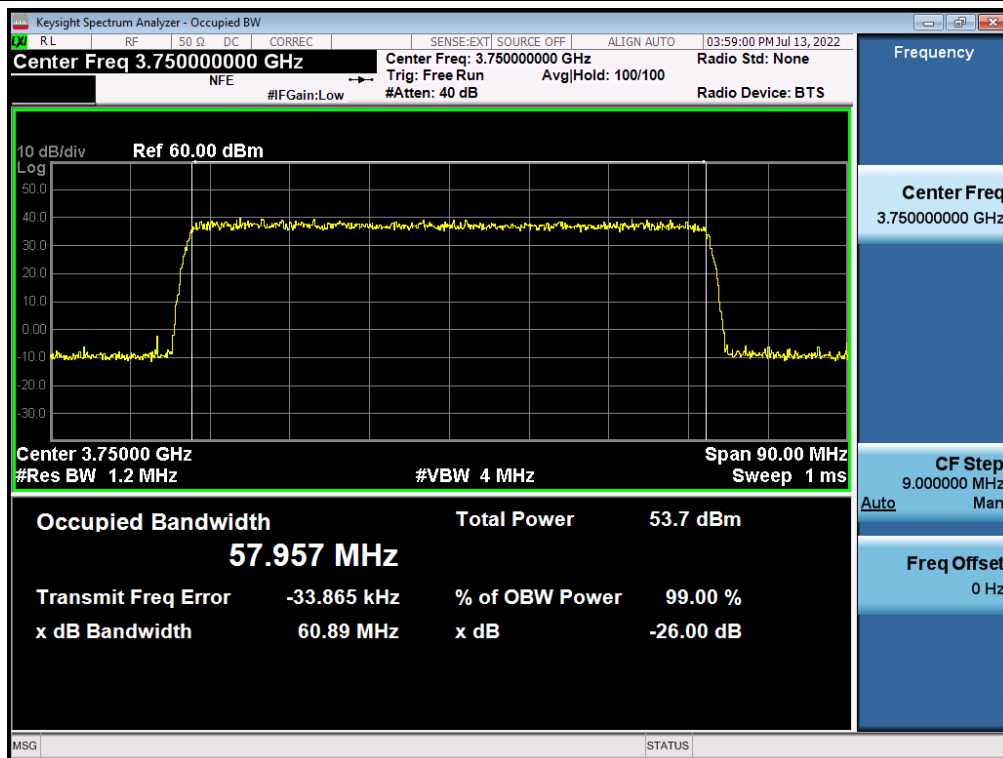
Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
4	QPSK	Middle	3 750.00	57.888
		High	3 770.00	57.760
	16QAM	Middle	3 750.00	57.916
		High	3 770.00	57.774
	64QAM	Middle	3 750.00	57.959
		High	3 770.00	57.849
	256QAM	Middle	3 750.00	57.968
		High	3 770.00	57.714
5	QPSK	Middle	3 750.00	57.900
		High	3 770.00	57.909
	16QAM	Middle	3 750.00	57.915
		High	3 770.00	57.912
	64QAM	Middle	3 750.00	57.979
		High	3 770.00	57.818
	256QAM	Middle	3 750.00	57.977
		High	3 770.00	57.828
6	QPSK	Middle	3 750.00	57.885
		High	3 770.00	57.817
	16QAM	Middle	3 750.00	57.933
		High	3 770.00	57.877
	64QAM	Middle	3 750.00	58.009
		High	3 770.00	57.949
	256QAM	Middle	3 750.00	57.865
		High	3 770.00	57.880
7	QPSK	Middle	3 750.00	57.914
		High	3 770.00	57.821
	16QAM	Middle	3 750.00	57.913
		High	3 770.00	57.855
	64QAM	Middle	3 750.00	58.000
		High	3 770.00	57.799
	256QAM	Middle	3 750.00	57.891
		High	3 770.00	57.857

3.7 GHz Service 100 MHz 1 Carrier

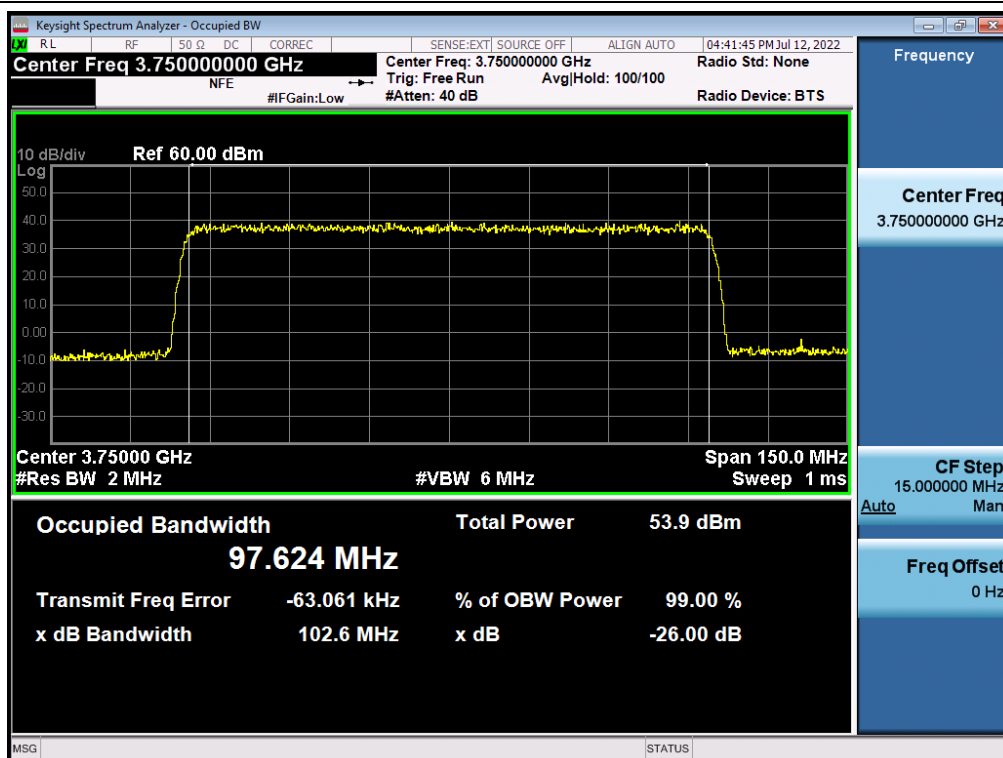
Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Middle	3 750.00	97.653
	16QAM	Middle	3 750.00	97.456
	64QAM	Middle	3 750.00	97.431
	256QAM	Middle	3 750.00	97.549
1	QPSK	Middle	3 750.00	97.476
	16QAM	Middle	3 750.00	97.542
	64QAM	Middle	3 750.00	97.392
	256QAM	Middle	3 750.00	97.521
2	QPSK	Middle	3 750.00	97.624
	16QAM	Middle	3 750.00	97.546
	64QAM	Middle	3 750.00	97.533
	256QAM	Middle	3 750.00	97.492
3	QPSK	Middle	3 750.00	97.596
	16QAM	Middle	3 750.00	97.540
	64QAM	Middle	3 750.00	97.457
	256QAM	Middle	3 750.00	97.590
4	QPSK	Middle	3 750.00	97.771
	16QAM	Middle	3 750.00	97.308
	64QAM	Middle	3 750.00	97.443
	256QAM	Middle	3 750.00	97.603
5	QPSK	Middle	3 750.00	97.643
	16QAM	Middle	3 750.00	97.349
	64QAM	Middle	3 750.00	97.588
	256QAM	Middle	3 750.00	97.600
6	QPSK	Middle	3 750.00	97.492
	16QAM	Middle	3 750.00	97.768
	64QAM	Middle	3 750.00	97.547
	256QAM	Middle	3 750.00	97.482
7	QPSK	Middle	3 750.00	97.724
	16QAM	Middle	3 750.00	97.541
	64QAM	Middle	3 750.00	97.684
	256QAM	Middle	3 750.00	97.706

Plot Data of Occupied bandwidth

Antenna 2 / 3.7 GHz Service 60 MHz 1 Carrier / 256QAM / Middle



Antenna 2 / 3.7 GHz Service 100 MHz 1 Carrier / QPSK / Middle



5.4. OUT-OF-BAND UNWANTED EMISSIONS

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.

§ 27.53 Emission limits.

(l) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:

- (1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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 $\geq 2 \times \text{span} / \text{RBW}$.
- d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:
 - 1) If the device can be configured to transmit continuously (duty cycle $\geq 98\%$), set the (sweep time) $> (\text{number of points in sweep}) \times (\text{symbol period})$ (e.g., by a factor of $10 \times \text{symbol period} \times \text{number of points}$). Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols
 - 2) If the device cannot be configured to transmit continuously (duty cycle $< 98\%$) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time $> (\text{number of points in sweep}) \times (\text{transmitter period})$ (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by $[10 \log (1/\text{duty cycle})]$. This assumes that the transmission period and duty cycle

is relatively constant (duty cycle variation $\leq \pm 2\%$).

- 3) If the device cannot be configured to transmit continuously (duty cycle $< 98\%$) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time $> (\text{number of points in sweep}) \times (\text{transmitter period})$ (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by $[10 \log (1/\text{duty cycle})]$. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation $\leq \pm 2\%$).
- 4) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations $> \pm 2\%$), set the sweep time so that the averaging is performed over the on-period by setting the sweep time $> (\text{symbol period}) \times (\text{number of points})$, while also maintaining the sweep time $< (\text{transmitter on-time})$. The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold are necessary to ensure that the maximum power is measured.
- 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. Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.
 - 8Tx MIMO correction: $10 \log(N_{\text{ANT}}) = 10 \log(8) = 9.03 \text{ dB} // -13 \text{ dBm} - 9.03 \text{ dB} = -22.03 \text{ dBm}$
2. Sample Calculations:
 - $-25.94 \text{ dBm (Measured value)} + 1.284 \text{ dB (Duty cycle factor)} = -24.66 \text{ dBm}$
3. The results of the Out-of-band Unwanted Emissions test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:**Tabular Data of Out-of-band Unwanted Emissions****3.7 GHz Service 60 MHz 1 Carrier(Low)**

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
1	16QAM	Low	3 699.70	-24.66

3.7 GHz Service 60 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
0	QPSK	High	3 800.30	-24.19
	16QAM	High	3 800.30	-24.35
	64QAM	High	3 800.30	-24.45
	256QAM	High	3 800.30	-24.39
1	QPSK	High	3 800.30	-24.78
	16QAM	High	3 800.30	-24.40
	64QAM	High	3 800.30	-25.15
	256QAM	High	3 800.30	-25.02
2	QPSK	High	3 800.30	-24.39
	16QAM	High	3 800.30	-25.39
	64QAM	High	3 800.30	-25.42
	256QAM	High	3 800.30	-25.16
3	QPSK	High	3 800.30	-25.75
	16QAM	High	3 800.30	-26.07
	64QAM	High	3 800.30	-26.03
	256QAM	High	3 800.30	-25.86
4	QPSK	High	3 800.30	-25.85
	16QAM	High	3 800.30	-25.57
	64QAM	High	3 800.30	-26.17
	256QAM	High	3 800.30	-25.99
5	QPSK	High	3 800.30	-25.85
	16QAM	High	3 800.30	-25.95
	64QAM	High	3 800.30	-26.39
	256QAM	High	3 800.30	-25.95
6	QPSK	High	3 800.30	-25.51
	16QAM	High	3 800.30	-25.63
	64QAM	High	3 800.30	-26.16
	256QAM	High	3 800.30	-25.69
7	QPSK	High	3 800.30	-26.38
	16QAM	High	3 800.30	-26.68
	64QAM	High	3 800.30	-27.04
	256QAM	High	3 800.30	-26.77

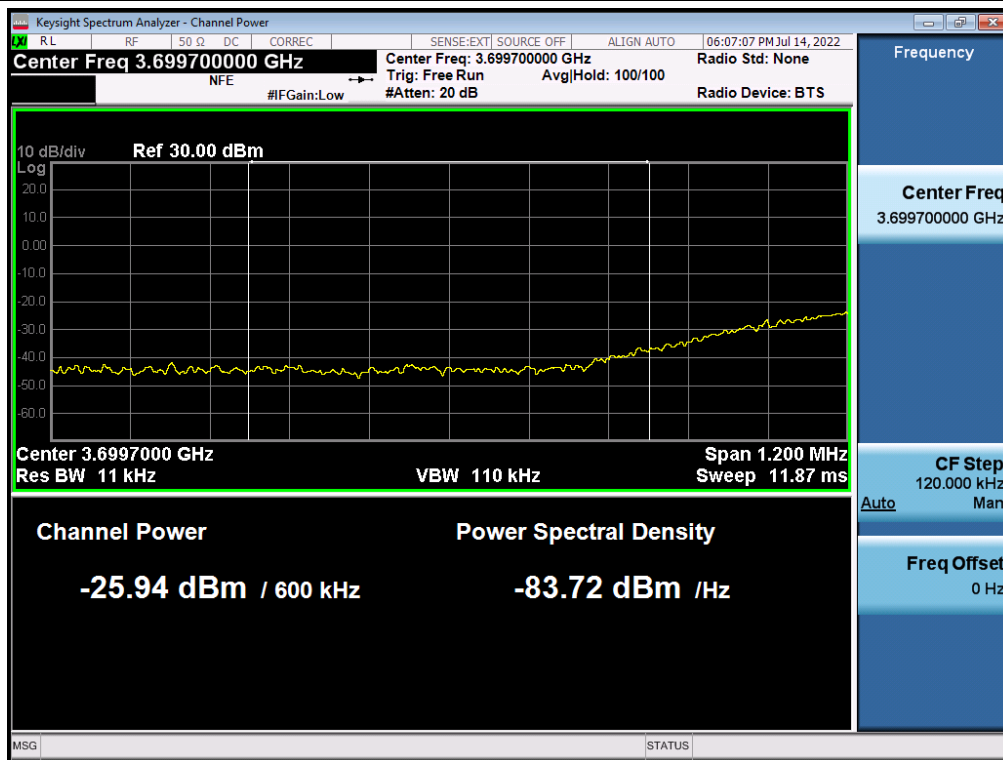
3.7 GHz Service 100 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	3 699.50	-24.44
		High	3 800.50	-23.22
	16QAM	Low	3 699.50	-24.20
		High	3 800.50	-23.17
	64QAM	Low	3 699.50	-24.25
		High	3 800.50	-23.23
	256QAM	Low	3 699.50	-24.40
		High	3 800.50	-23.58
1	QPSK	Low	3 699.50	-25.45
		High	3 800.50	-24.18
	16QAM	Low	3 699.50	-25.24
		High	3 800.50	-24.11
	64QAM	Low	3 699.50	-24.37
		High	3 800.50	-23.95
	256QAM	Low	3 699.50	-25.52
		High	3 800.50	-24.26
2	QPSK	Low	3 699.50	-25.43
		High	3 800.50	-24.59
	16QAM	Low	3 699.50	-25.52
		High	3 800.50	-24.25
	64QAM	Low	3 699.50	-25.25
		High	3 800.50	-24.38
	256QAM	Low	3 699.50	-25.57
		High	3 800.50	-24.74
3	QPSK	Low	3 699.50	-25.84
		High	3 800.50	-24.87
	16QAM	Low	3 699.50	-25.25
		High	3 800.50	-24.69
	64QAM	Low	3 699.50	-25.47
		High	3 800.50	-24.80
	256QAM	Low	3 699.50	-25.88
		High	3 800.50	-25.00

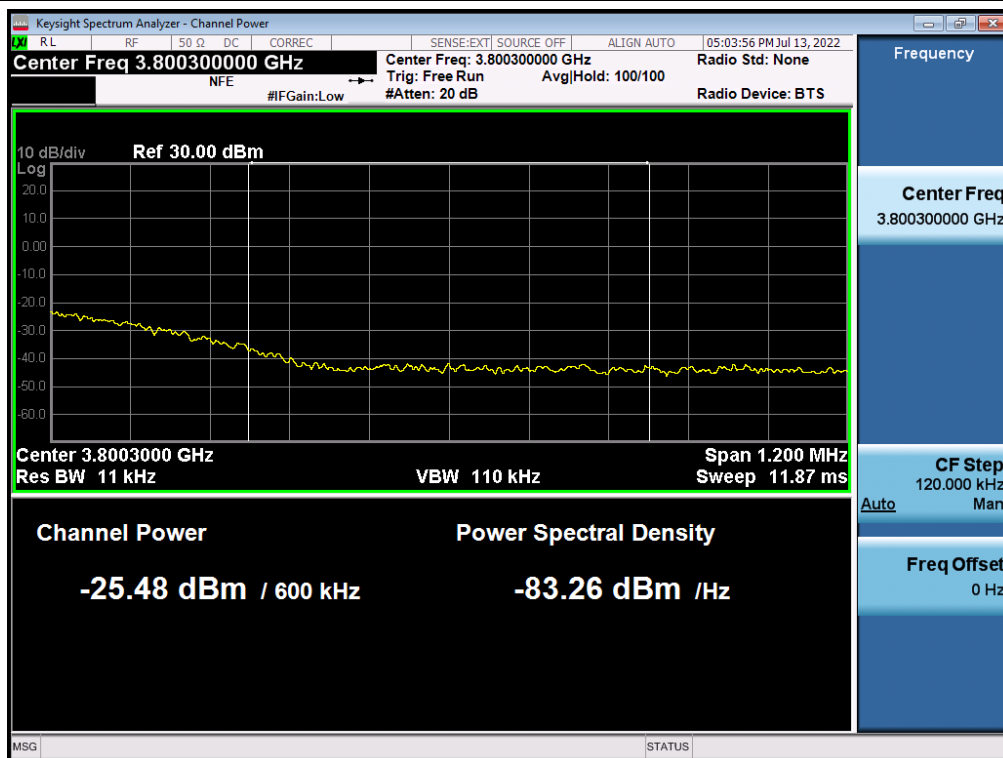
Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
4	QPSK	Low	3 699.50	-23.61
		High	3 800.50	-23.37
	16QAM	Low	3 699.50	-23.61
		High	3 800.50	-23.31
	64QAM	Low	3 699.50	-23.43
		High	3 800.50	-23.31
	256QAM	Low	3 699.50	-24.03
		High	3 800.50	-23.27
5	QPSK	Low	3 699.50	-25.48
		High	3 800.50	-24.40
	16QAM	Low	3 699.50	-25.26
		High	3 800.50	-24.20
	64QAM	Low	3 699.50	-25.45
		High	3 800.50	-24.46
	256QAM	Low	3 699.50	-25.85
		High	3 800.50	-24.31
6	QPSK	Low	3 699.50	-24.74
		High	3 800.50	-23.62
	16QAM	Low	3 699.50	-24.38
		High	3 800.50	-23.24
	64QAM	Low	3 699.50	-24.03
		High	3 800.50	-23.27
	256QAM	Low	3 699.50	-25.00
		High	3 800.50	-23.79
7	QPSK	Low	3 699.50	-25.33
		High	3 800.50	-24.61
	16QAM	Low	3 699.50	-25.14
		High	3 800.50	-24.41
	64QAM	Low	3 699.50	-25.30
		High	3 800.50	-24.46
	256QAM	Low	3 699.50	-25.49
		High	3 800.50	-24.64

Plot Data of Out-of-band Unwanted Emissions

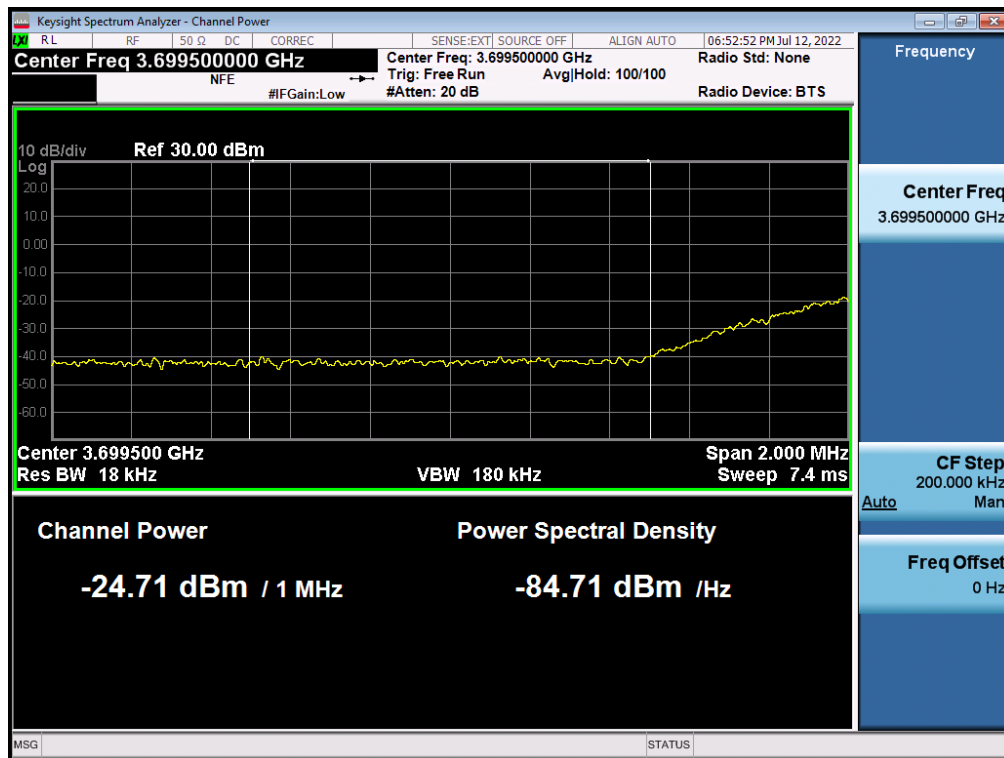
Antenna 1 / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



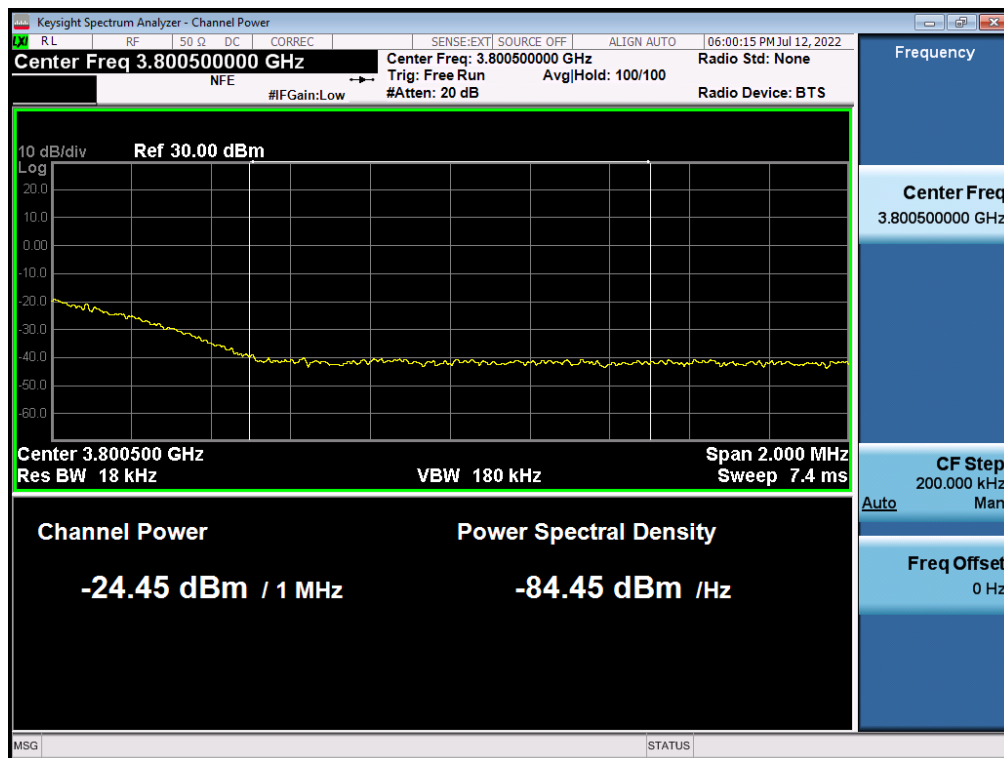
Antenna 0 / 3.7 GHz Service 60 MHz 1 Carrier / QPSK / High



Antenna 4 / 3.7 GHz Service 100 MHz 1 Carrier / 64QAM / Low



Antenna 0 / 3.7 GHz Service 100 MHz 1 Carrier / 16QAM / High



5.5. SPURIOUS UNWANTED EMISSIONS

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.

§ 27.53 Emission limits.

(l) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:

- (1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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 $\geq 2 \times (\text{span} / \text{RBW})$. 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.
- 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.

Note:

- 1. In 9 kHz to 30 MHz band, RBW narrower than reference bandwidth is used. So following correction factor is applied.
 - $10 \log [(reference\ bandwidth)/(resolution\ bandwidth)]$
: 9 kHz to 150 kHz applied 1 kHz RBW, $10 \log (1\ kHz / 1\ MHz) = -30\ dB$
: 150 kHz to 30 MHz applied 10 kHz RBW, $10 \log (10\ kHz / 1\ MHz) = -20\ dB$
- 2. Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.
 - 8Tx MIMO correction: $10 \log(N_{ANT}) = 10 \log(8) = 9.03\ dB$ // $-13\ dBm - 9.03\ dB = -22.03\ dBm$
- 3. Sample Calculations:
 - $-34.847\ dBm/MHz$ (Measured value) + $10\ dB$ (RBW correction) + $1.284\ dB$ (Duty cycle factor)
 $= -23.563\ dBm/MHz$ (Final value)
- 4. The results of the Spurious Unwanted Emissions shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:
Tabular Data of Spurious Unwanted Emissions
3.7 GHz Service 60 MHz 1 Carrier(Low)
Test Result for Output Port 1

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
16QAM	Low	-30.131	-42.475	-28.991	-23.563	-26.394	-24.907	-27.581

3.7 GHz Service 60 MHz 1 Carrier

Test Result for Output Port 0

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.681	-43.145	-23.838	-25.243	N/A	-24.107	-25.010	-25.394
	High	-31.776	-42.873	-28.536	-26.618	-22.372	-22.812	-25.182	-26.629
16QAM	Middle	-35.985	-43.234	-23.836	-25.844	N/A	-24.298	-22.831	-26.471
	High	-25.720	-44.316	-29.442	-28.286	-22.269	-22.647	-24.839	-26.968
64QAM	Middle	-33.000	-43.260	-23.396	-24.677	N/A	-23.161	-25.127	-27.804
	High	-25.779	-43.301	-29.412	-28.339	-22.276	-22.467	-24.827	-26.092
256QAM	Middle	-34.112	-42.936	-28.607	-25.062	N/A	-24.070	-24.306	-27.193
	High	-31.078	-43.345	-29.245	-28.401	-22.340	-22.373	-25.250	-27.704

Test Result for Output Port 1

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-32.426	-42.955	-23.541	-25.323	N/A	-24.852	-24.938	-27.308
	High	-31.920	-43.605	-29.735	-27.887	-22.804	-23.511	-24.528	-26.014
16QAM	Middle	-34.052	-42.665	-23.209	-26.199	N/A	-24.378	-23.518	-26.358
	High	-32.210	-43.406	-28.704	-26.888	-22.775	-23.629	-25.402	-27.233
64QAM	Middle	-33.685	-43.010	-23.269	-25.100	N/A	-24.575	-24.733	-26.679
	High	-31.922	-44.096	-29.408	-28.151	-22.656	-23.932	-24.697	-27.012
256QAM	Middle	-33.768	-42.987	-29.849	-25.784	N/A	-25.522	-24.608	-26.911
	High	-30.395	-43.654	-29.509	-28.728	-22.779	-23.147	-25.032	-26.665

Test Result for Output Port 2

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-36.015	-42.726	-23.121	-26.431	N/A	-25.018	-25.501	-27.101
	High	-38.552	-42.976	-29.087	-28.171	-22.669	-23.344	-24.903	-26.631
16QAM	Middle	-38.456	-44.325	-23.868	-26.256	N/A	-25.213	-23.442	-27.056
	High	-35.550	-43.158	-29.295	-28.253	-22.674	-23.795	-24.760	-26.929
64QAM	Middle	-38.432	-42.793	-22.778	-25.761	N/A	-25.413	-25.172	-26.918
	High	-35.911	-44.166	-29.308	-28.581	-22.351	-24.101	-25.458	-26.138
256QAM	Middle	-37.889	-43.180	-29.755	-26.083	N/A	-25.123	-24.849	-26.691
	High	-33.580	-43.721	-30.143	-28.640	-23.499	-23.968	-25.236	-27.479

Test Result for Output Port 3

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.595	-42.111	-22.926	-26.355	N/A	-26.280	-25.422	-26.570
	High	-33.052	-43.405	-30.114	-27.801	-24.420	-25.221	-25.615	-27.032
16QAM	Middle	-33.681	-42.182	-23.123	-26.771	N/A	-26.608	-23.929	-27.390
	High	-32.420	-43.486	-30.215	-28.067	-23.831	-24.955	-25.398	-27.464
64QAM	Middle	-34.841	-43.797	-22.779	-26.355	N/A	-25.947	-24.973	-27.167
	High	-31.654	-42.853	-29.685	-28.144	-24.538	-24.797	-25.647	-27.359
256QAM	Middle	-34.514	-42.764	-29.618	-26.347	N/A	-25.600	-24.700	-27.419
	High	-30.514	-42.101	-28.632	-28.382	-24.305	-25.354	-25.605	-27.125

Test Result for Output Port 4

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-33.450	-41.012	-22.789	-25.538	N/A	-25.913	-24.462	-28.550
	High	-36.221	-40.606	-28.120	-27.742	-24.123	-23.956	-24.061	-28.468
16QAM	Middle	-37.418	-40.764	-22.792	-25.558	N/A	-24.997	-22.397	-27.894
	High	-33.654	-40.954	-28.645	-27.929	-22.884	-23.382	-24.598	-28.949
64QAM	Middle	-36.284	-41.305	-22.487	-25.586	N/A	-26.177	-23.427	-28.862
	High	-34.953	-41.375	-28.063	-27.868	-23.137	-23.944	-24.574	-28.335
256QAM	Middle	-36.247	-40.246	-28.362	-25.025	N/A	-25.938	-24.244	-28.880
	High	-31.930	-41.458	-28.473	-27.776	-23.412	-24.048	-23.643	-28.737

Test Result for Output Port 5

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.994	-41.374	-23.386	-26.274	N/A	-26.145	-25.042	-29.568
	High	-22.933	-41.479	-29.237	-28.026	-24.673	-24.616	-25.556	-30.059
16QAM	Middle	-23.390	-40.698	-22.872	-26.693	N/A	-26.395	-23.227	-29.704
	High	-25.387	-42.394	-29.205	-28.610	-24.583	-24.881	-25.675	-29.787
64QAM	Middle	-24.182	-41.182	-23.209	-26.046	N/A	-26.241	-24.861	-29.301
	High	-25.157	-41.218	-28.476	-28.883	-25.280	-25.250	-25.238	-29.698
256QAM	Middle	-25.399	-41.288	-28.818	-26.607	N/A	-26.103	-25.595	-30.248
	High	-24.376	-42.313	-28.705	-28.685	-24.218	-25.093	-25.212	-29.382

Test Result for Output Port 6

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.585	-41.182	-22.782	-25.908	N/A	-25.629	-24.417	-29.105
	High	-33.167	-40.680	-28.760	-28.176	-23.297	-24.585	-24.031	-29.075
16QAM	Middle	-35.759	-40.661	-22.345	-25.851	N/A	-25.620	-22.387	-28.689
	High	-33.192	-41.529	-27.417	-28.043	-23.060	-24.578	-24.613	-29.274
64QAM	Middle	-34.756	-41.298	-27.950	-25.457	N/A	-25.641	-24.173	-28.844
	High	-34.267	-40.210	-27.592	-28.306	-23.702	-24.487	-24.810	-28.442
256QAM	Middle	-34.390	-39.837	-27.889	-26.011	N/A	-25.690	-24.121	-28.045
	High	-32.978	-40.099	-28.144	-28.295	-22.738	-24.327	-24.730	-28.483

Test Result for Output Port 7

Mod.	Channel	Measured Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-35.604	-41.549	-22.710	-26.257	N/A	-27.013	-25.091	-29.215
	High	-33.795	-41.666	-28.052	-28.410	-25.278	-25.515	-25.413	-29.900
16QAM	Middle	-33.117	-41.212	-22.883	-26.363	N/A	-26.991	-23.710	-29.640
	High	-35.363	-42.352	-28.554	-28.586	-25.047	-25.517	-25.620	-29.391
64QAM	Middle	-34.928	-41.824	-29.011	-25.507	N/A	-26.817	-24.832	-30.069
	High	-33.692	-41.677	-29.317	-28.509	-24.609	-25.499	-25.616	-29.011
256QAM	Middle	-33.837	-41.163	-28.627	-25.630	N/A	-27.139	-24.905	-29.531
	High	-34.108	-42.179	-28.293	-28.781	-25.085	-25.157	-25.337	-29.113

Summation of all ports

Mod.	Channel	Measured Level (dBm)								Limit
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge ~ High Edge + 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz	
QPSK	Middle	-25.373	-32.905	-14.089	-16.861	N/A	-16.502	-15.939	-18.592	-13
	High	-20.878	-32.984	-19.870	-18.791	-14.561	-15.074	-15.838	-18.696	
16QAM	Middle	-21.718	-32.760	-14.058	-17.143	N/A	-16.428	-14.114	-18.698	
	High	-20.848	-33.543	-19.835	-19.020	-14.265	-15.048	-16.061	-19.073	
64QAM	Middle	-22.140	-33.173	-14.800	-16.502	N/A	-16.320	-15.594	-19.023	
	High	-20.759	-33.120	-19.816	-19.307	-14.409	-15.184	-16.058	-18.555	
256QAM	Middle	-22.820	-32.586	-19.858	-16.755	N/A	-16.540	-15.613	-18.921	
	High	-20.859	-33.169	-19.817	-19.419	-14.430	-15.039	-15.935	-18.957	

3.7 GHz Service 100 MHz 1 Carrier

Test Result for Output Port 0

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-36.627	-43.038	-22.923	-23.761	-22.414	-23.612	-27.134
16QAM	Middle	-36.144	-43.610	-23.553	-24.128	-22.364	-23.143	-26.148
64QAM	Middle	-39.511	-43.868	-23.724	-23.963	-22.587	-23.722	-26.313
256QAM	Middle	-35.415	-42.180	-23.097	-23.993	-22.721	-23.288	-25.727

Test Result for Output Port 1

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.274	-44.206	-22.916	-24.586	-23.745	-22.530	-26.597
16QAM	Middle	-33.685	-43.749	-22.801	-24.857	-23.596	-23.441	-26.928
64QAM	Middle	-39.209	-44.418	-22.893	-24.779	-23.664	-23.148	-26.543
256QAM	Middle	-33.199	-43.640	-23.215	-24.956	-23.872	-23.522	-26.884

Test Result for Output Port 2

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-37.309	-43.182	-23.781	-24.849	-23.630	-23.627	-27.066
16QAM	Middle	-37.826	-42.085	-23.495	-25.114	-23.982	-23.986	-26.822
64QAM	Middle	-41.957	-42.606	-23.479	-24.374	-24.122	-23.135	-27.147
256QAM	Middle	-36.568	-43.736	-24.242	-25.355	-23.174	-23.749	-26.289

Test Result for Output Port 3

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.315	-42.799	-23.685	-25.114	-24.187	-23.605	-27.390
16QAM	Middle	-34.054	-42.820	-23.766	-24.576	-24.385	-23.545	-27.888
64QAM	Middle	-39.992	-41.420	-23.689	-24.882	-24.900	-23.393	-26.399
256QAM	Middle	-33.575	-44.277	-23.130	-25.417	-24.732	-23.640	-27.378

Test Result for Output Port 4

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-36.912	-41.849	-22.811	-22.797	-23.078	-23.072	-28.673
16QAM	Middle	-36.762	-41.253	-22.452	-23.134	-22.688	-22.626	-29.203
64QAM	Middle	-37.405	-40.260	-22.451	-22.916	-22.815	-22.276	-28.439
256QAM	Middle	-36.668	-41.094	-22.799	-23.145	-22.599	-23.040	-28.112

Test Result for Output Port 5

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-23.552	-42.037	-23.096	-25.390	-23.755	-23.997	-29.698
16QAM	Middle	-28.646	-42.796	-22.886	-25.201	-24.216	-23.289	-30.233
64QAM	Middle	-28.685	-42.033	-23.348	-24.932	-24.072	-23.932	-30.275
256QAM	Middle	-31.447	-42.207	-22.785	-24.998	-23.862	-24.182	-30.225

Test Result for Output Port 6

Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-34.928	-41.461	-22.702	-23.890	-22.905	-22.627	-28.396
16QAM	Middle	-35.811	-40.681	-22.888	-23.272	-22.866	-23.099	-29.153
64QAM	Middle	-34.880	-40.959	-22.264	-23.987	-22.986	-22.957	-28.396
256QAM	Middle	-28.997	-41.960	-22.726	-24.428	-23.097	-22.383	-28.151

Test Result for Output Port 7

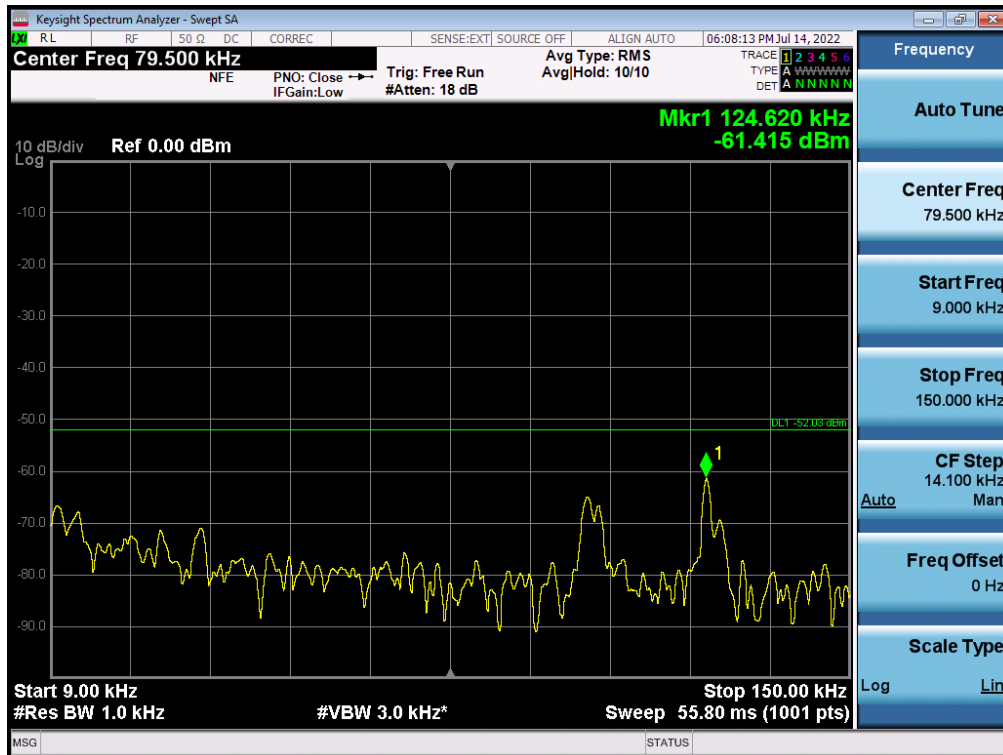
Mod.	Channel	Measured Level (dBm)						
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz
QPSK	Middle	-24.462	-41.711	-22.771	-24.998	-24.208	-24.004	-30.077
16QAM	Middle	-24.413	-42.150	-22.863	-24.341	-24.355	-23.752	-29.428
64QAM	Middle	-25.958	-41.547	-23.105	-24.703	-24.453	-23.548	-29.799
256QAM	Middle	-24.939	-42.451	-22.927	-24.702	-24.375	-23.678	-29.648

Summation of all ports

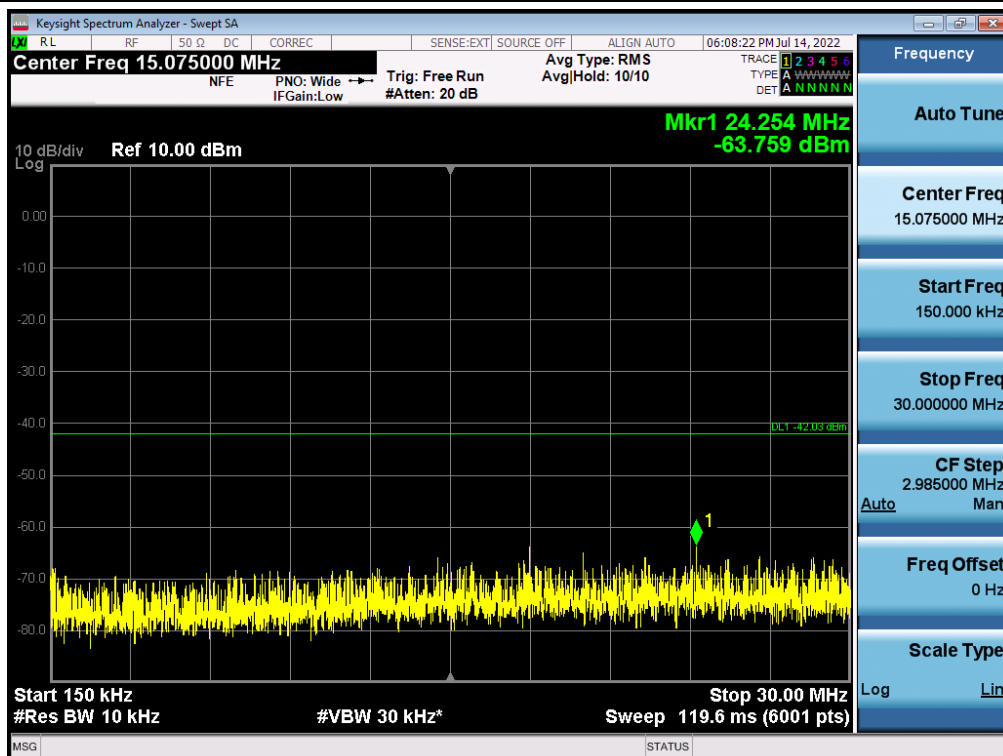
Mod.	Channel	Measured Level (dBm)							Limit
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge - 1 MHz	High Edge + 1 MHz ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 18 GHz	18 GHz ~ 40 GHz	
QPSK	Middle	-20.148	-33.420	-14.038	-15.312	-14.418	-14.319	-18.937	-13
16QAM	Middle	-21.747	-33.244	-14.036	-15.233	-14.458	-14.319	-18.973	
64QAM	Middle	-23.194	-32.914	-14.057	-15.236	-14.599	-14.205	-18.652	
256QAM	Middle	-21.659	-33.547	-14.061	-15.532	-14.463	-14.374	-18.535	

Plot Data of Spurious Unwanted Emissions

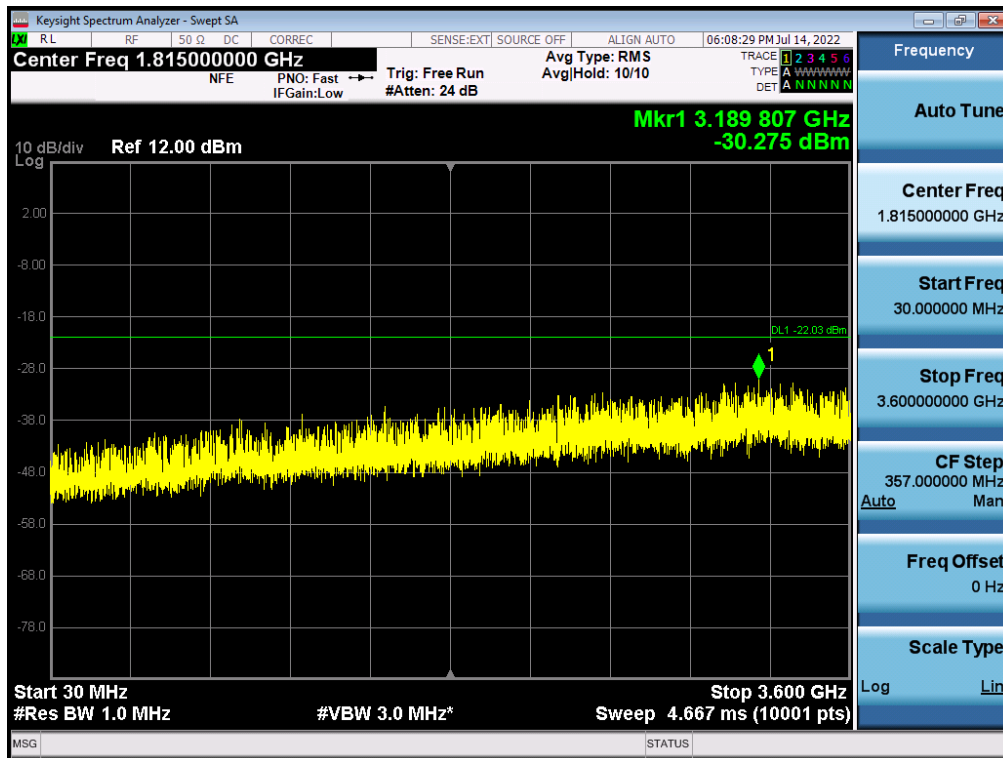
Antenna 1 / 9 kHz ~ 150 kHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



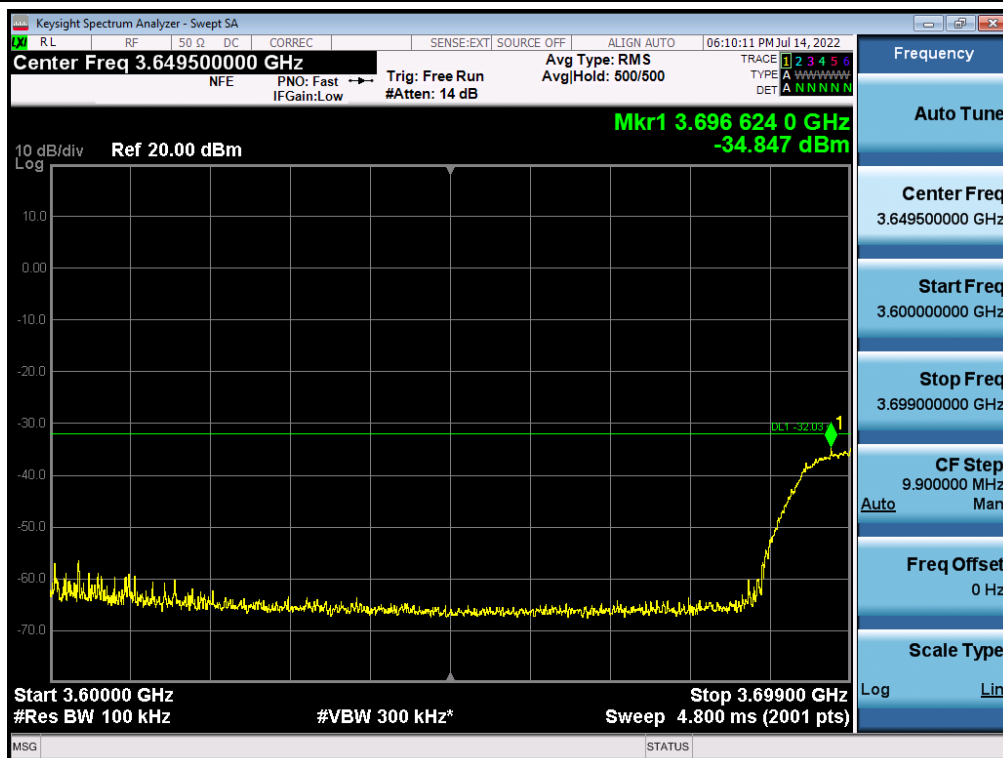
Antenna 1 / 150 kHz ~ 30 MHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



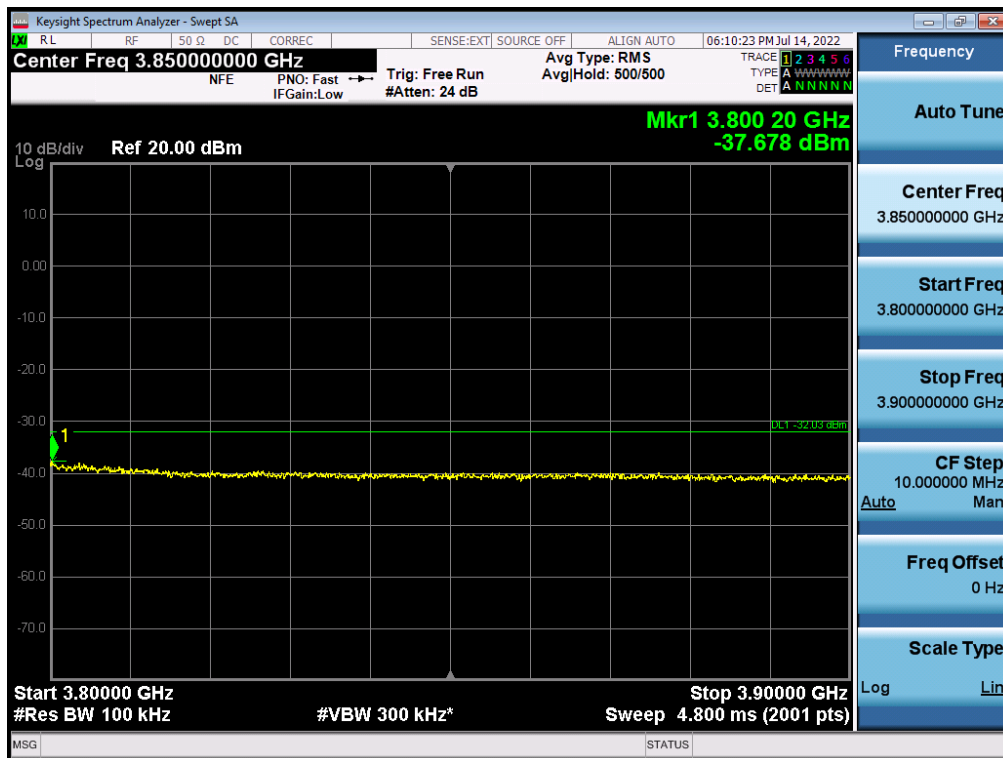
Antenna 1 / 30 MHz ~ Low Edge - 100 MHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



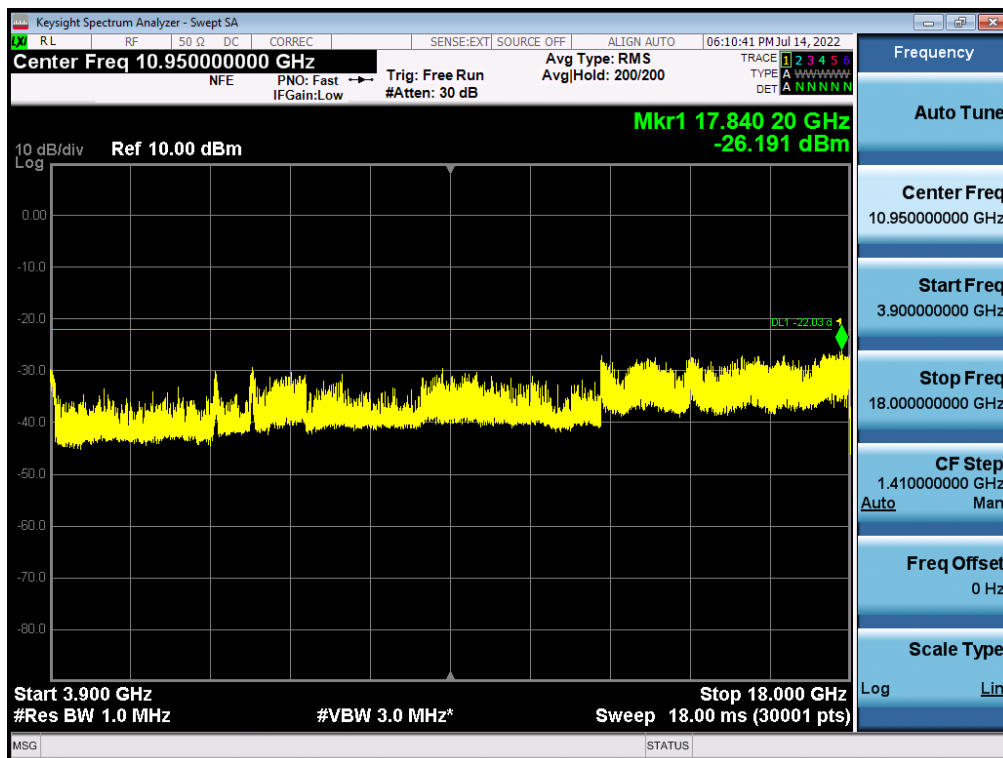
Antenna 1 / Low Edge - 100 MHz ~ Low Edge - 1 MHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



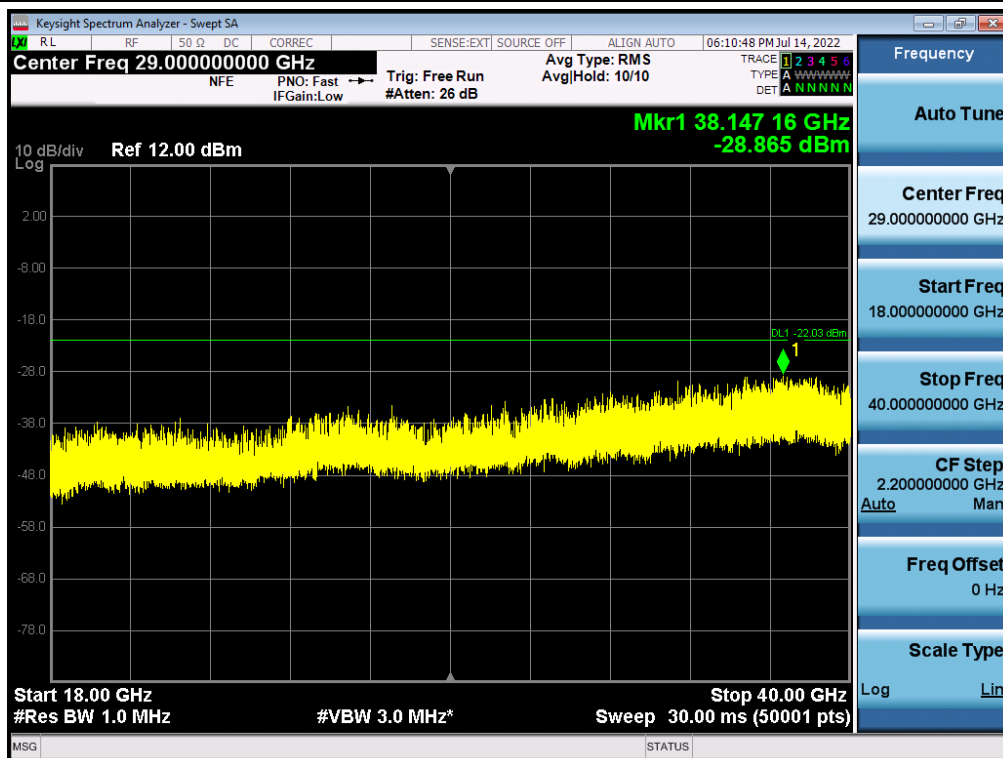
Antenna 1 / High Edge + 1 MHz ~ High Edge + 100 MHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



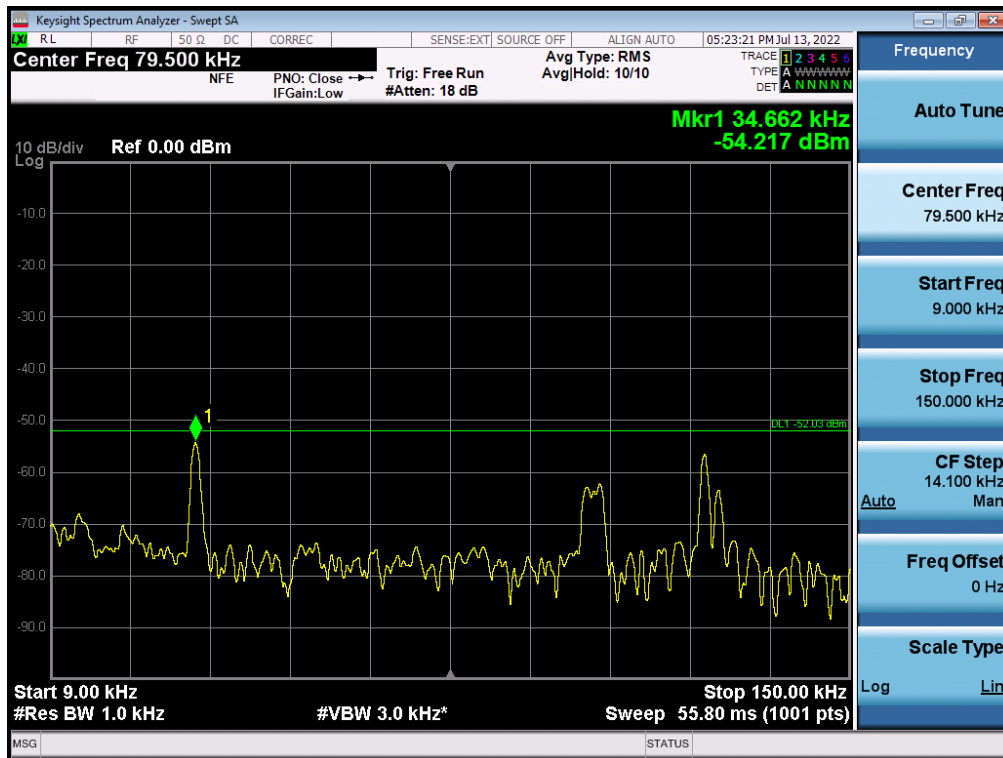
Antenna 1 / High Edge + 100 MHz ~ 18 GHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



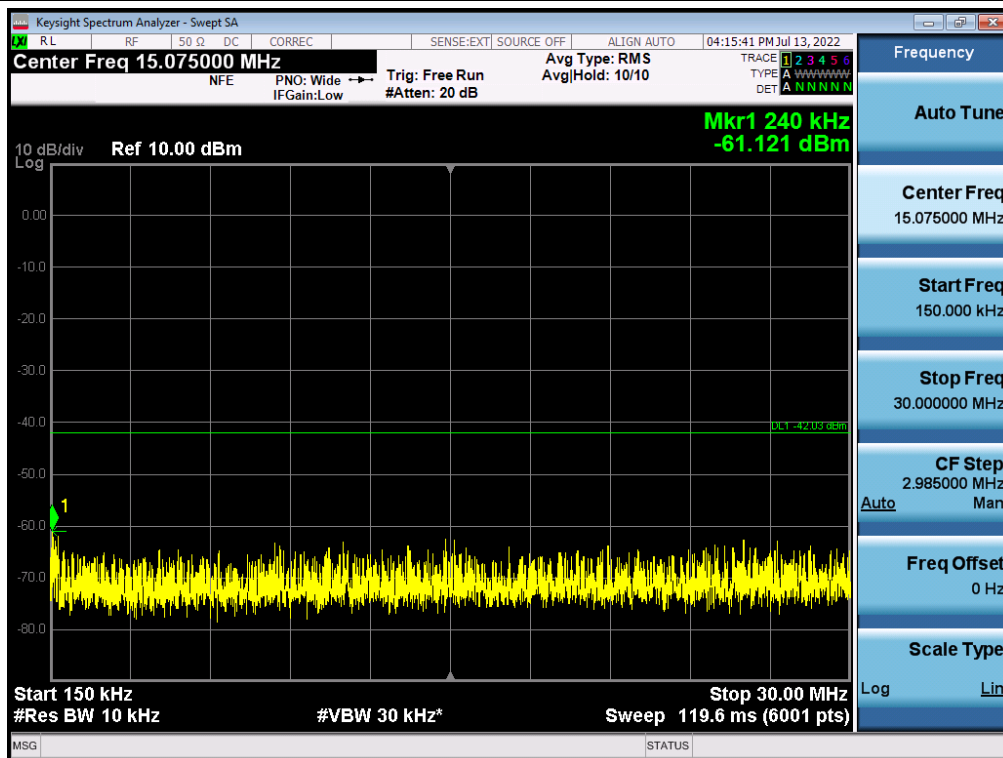
Antenna 1 / 18 GHz ~ 40 GHz / 3.7 GHz Service 60 MHz 1 Carrier(Low) / 16QAM / Low



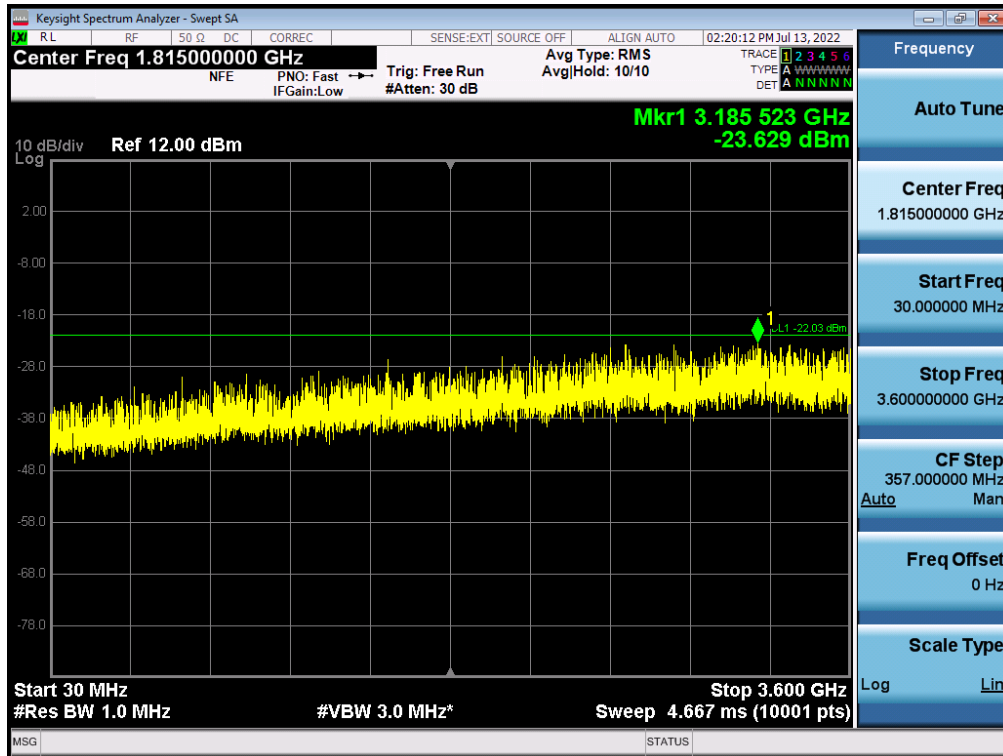
Antenna 5 / 9 kHz ~ 150 kHz / 3.7 GHz Service 60 MHz 1 Carrier / QPSK / High



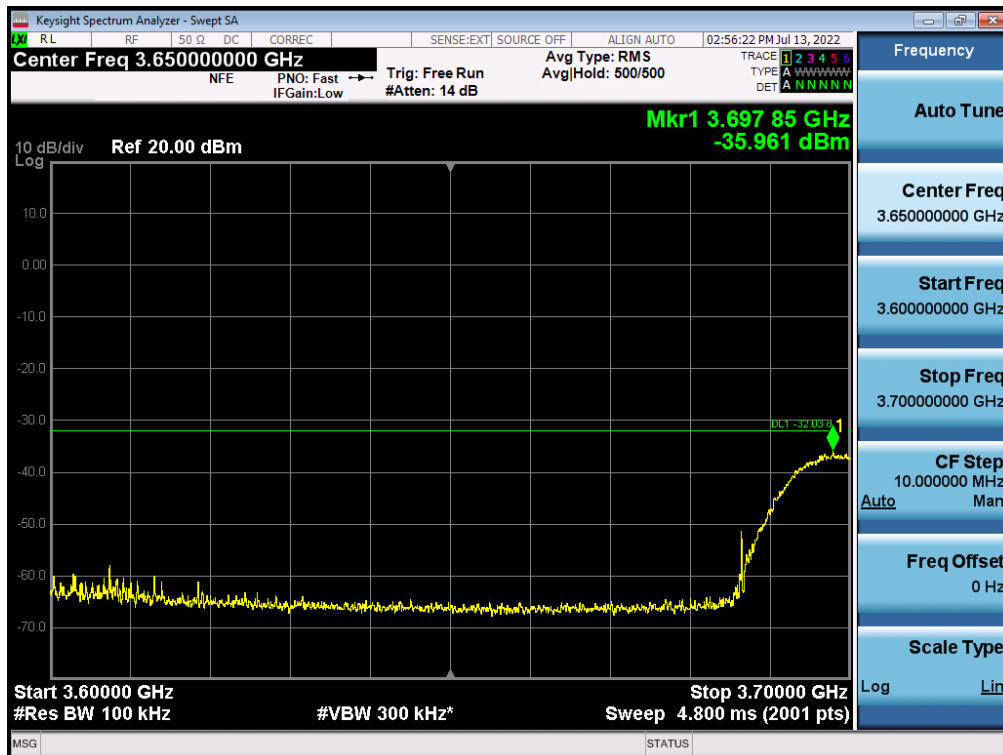
Antenna 6 / 150 kHz ~ 30 MHz / 3.7 GHz Service 60 MHz 1 Carrier / 256QAM / Middle



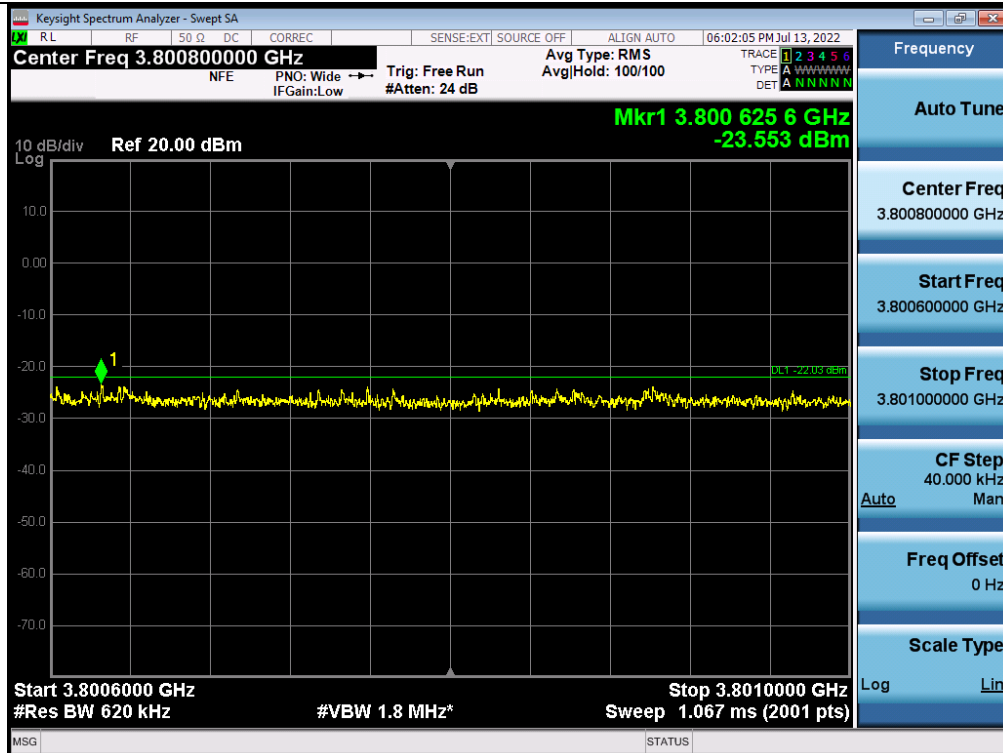
Antenna 6 / 30 MHz ~ Low Edge - 100 MHz / 3.7 GHz Service 60 MHz 1 Carrier / 16QAM / Middle



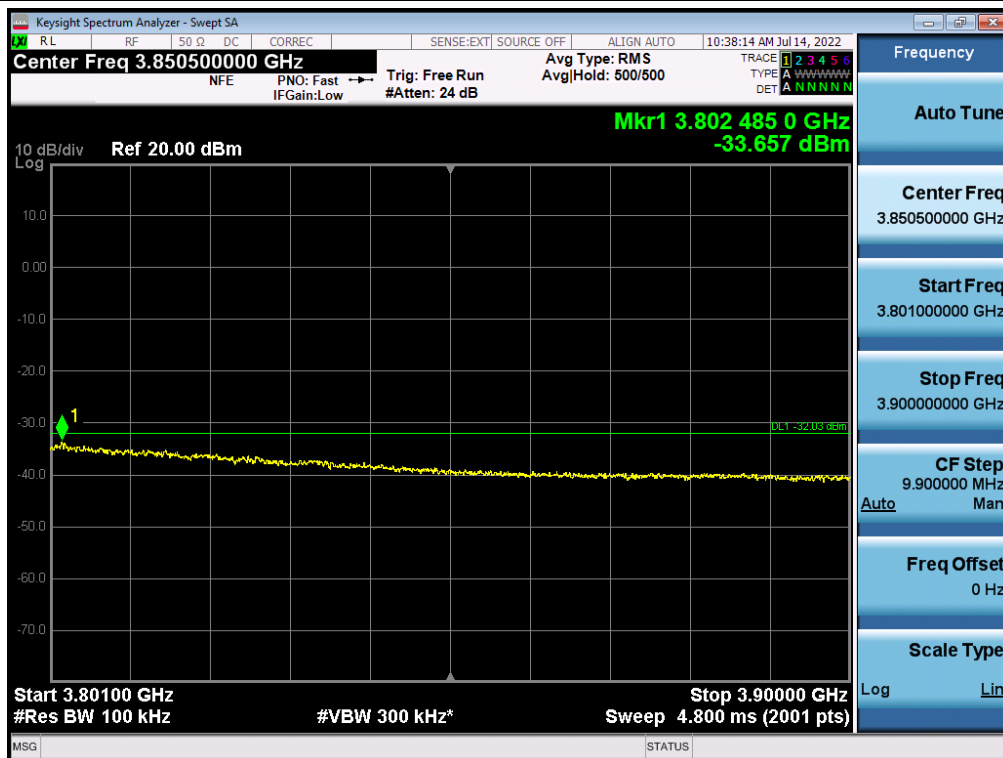
Antenna 0 / Low Edge - 100 MHz ~ Low Edge - 1 MHz / 3.7 GHz Service 60 MHz 1 Carrier / 64QAM / Middle



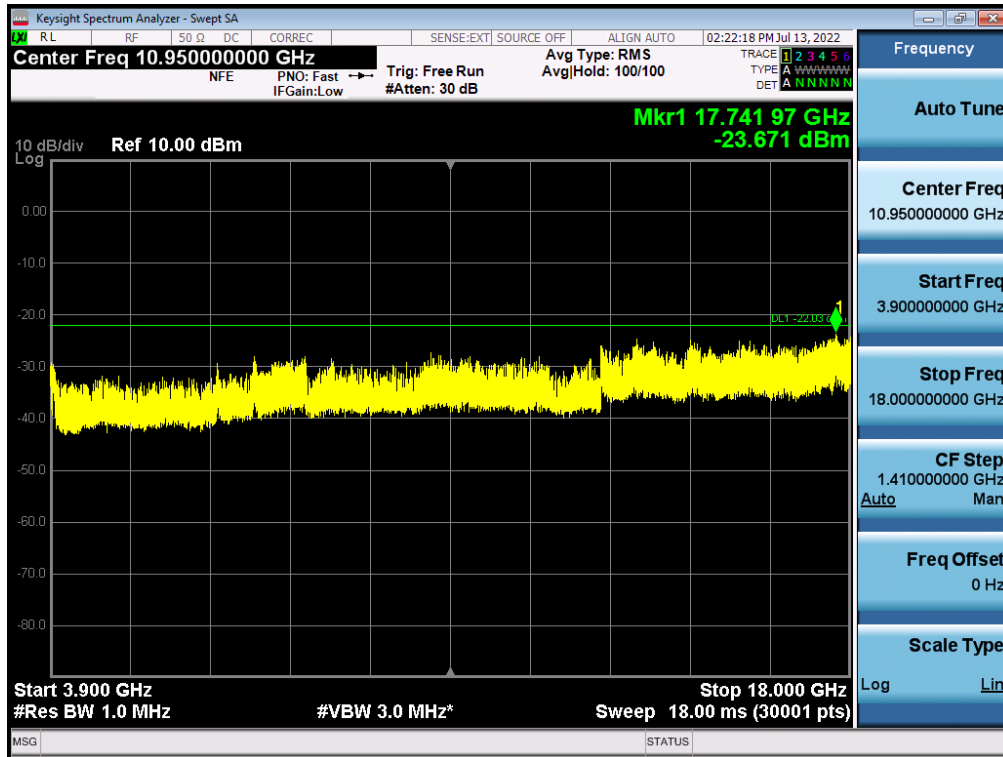
Antenna 0 / High Edge ~ High Edge + 1 MHz / 3.7 GHz Service 60 MHz 1 Carrier / 16QAM / High



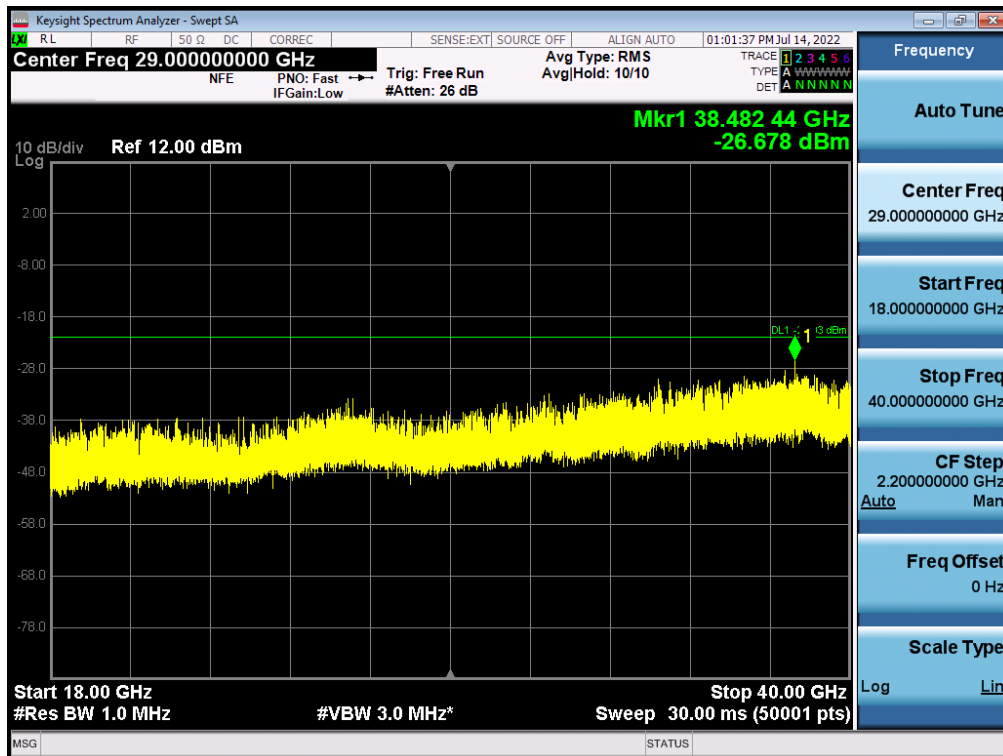
Antenna 0 / High Edge + 1 MHz ~ High Edge + 100 MHz / 3.7 GHz Service 60 MHz 1 Carrier / 256QAM / High



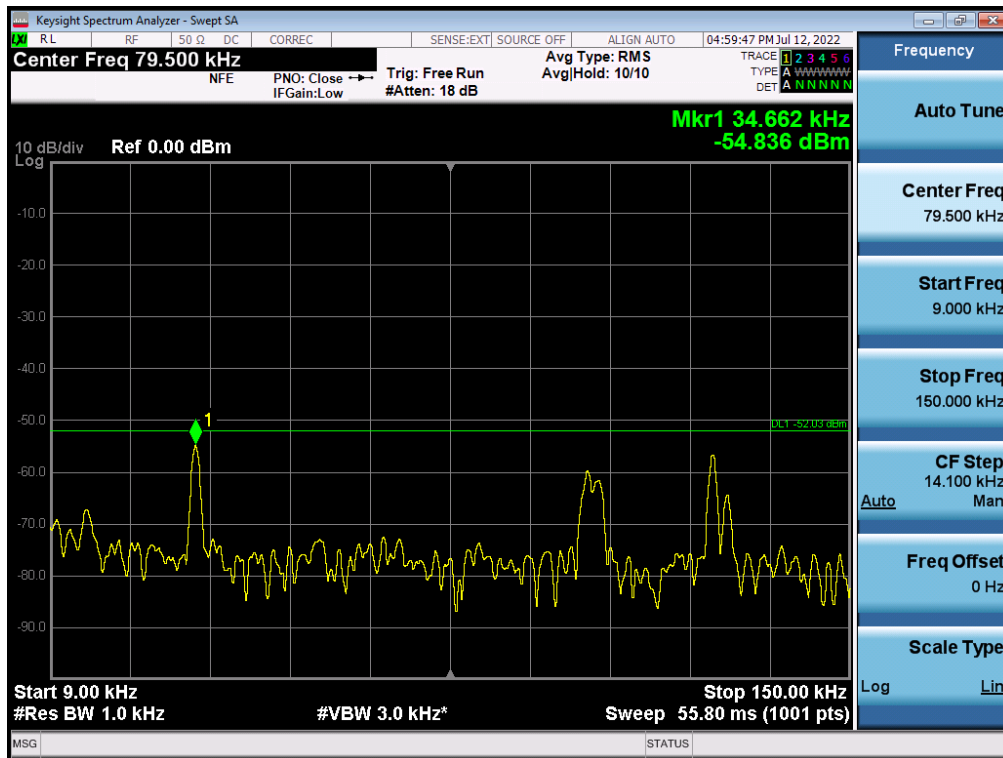
Antenna 6 / High Edge + 100 MHz ~ 18 GHz / 3.7 GHz Service 60 MHz 1 Carrier / 16QAM / Middle



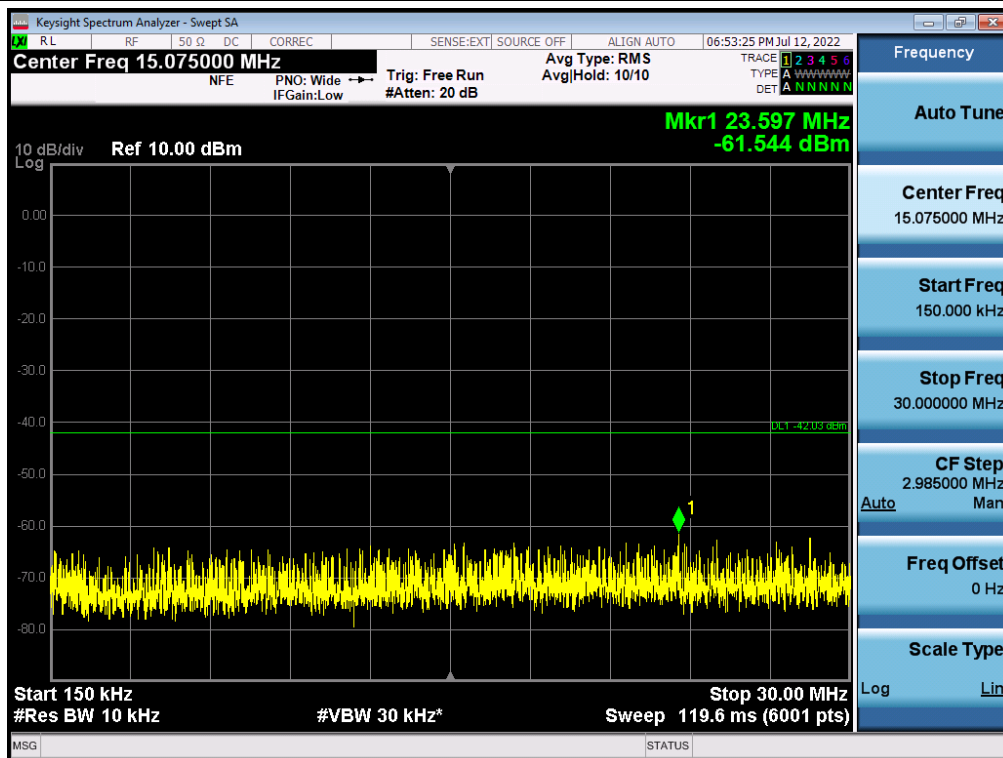
Antenna 0 / 18 GHz ~ 40 GHz / 3.7 GHz Service 60 MHz 1 Carrier / QPSK / Middle



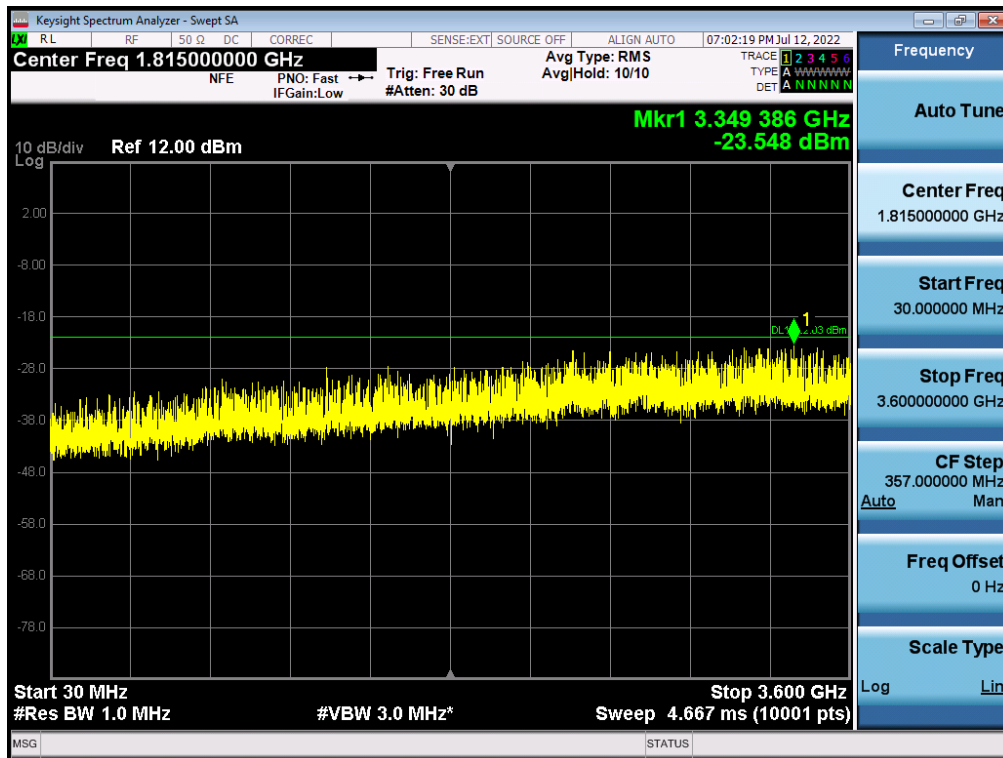
Antenna 5 / 9 kHz ~ 150 kHz / 3.7 GHz Service 100 MHz 1 Carrier / QPSK / Middle



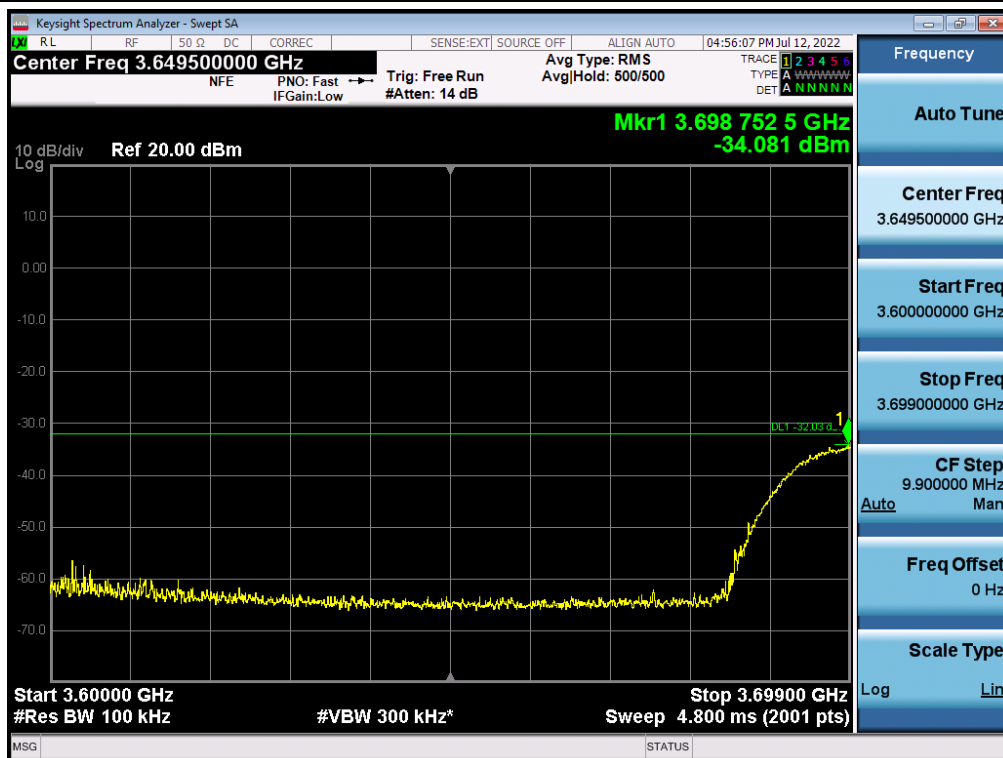
Antenna 4 / 150 kHz ~ 30 MHz / 3.7 GHz Service 100 MHz 1 Carrier / 64QAM / Middle



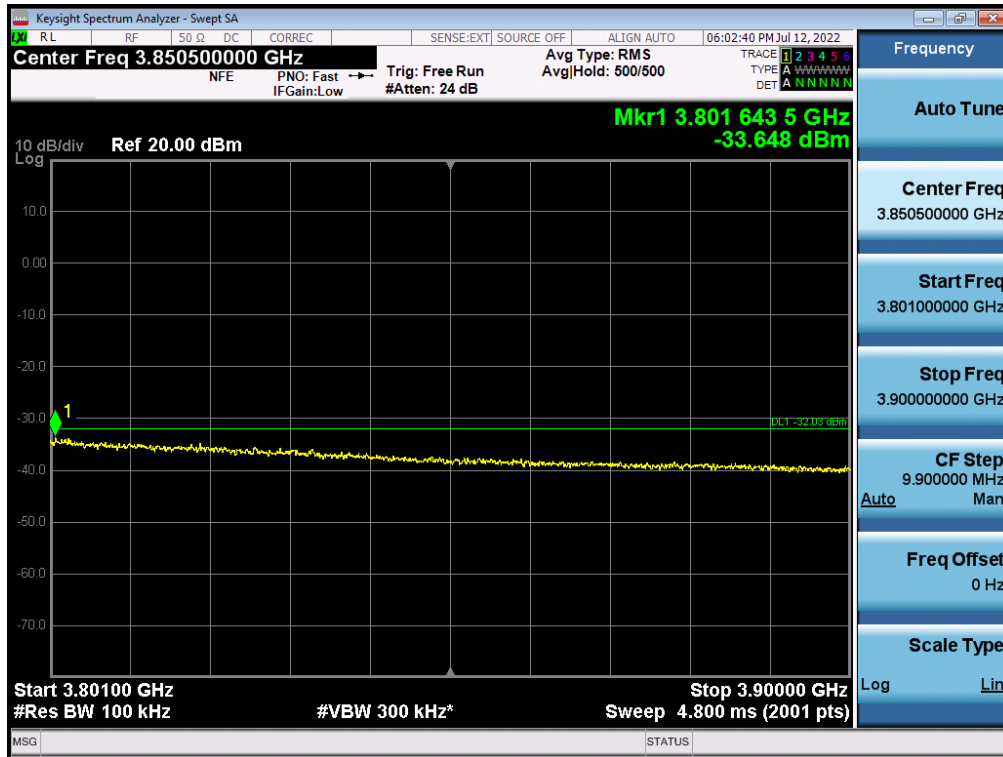
Antenna 6 / 30 MHz ~ Low Edge - 100 MHz / 3.7 GHz Service 100 MHz 1 Carrier / 64QAM / Middle



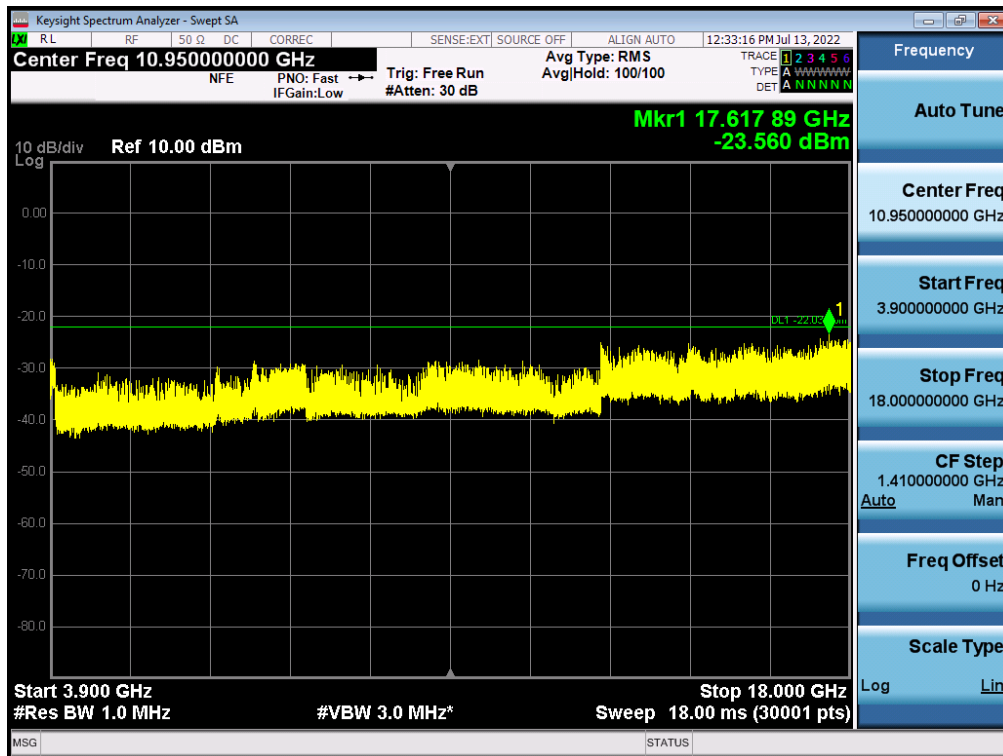
Antenna 4 / Low Edge - 100 MHz ~ Low Edge - 1 MHz / 3.7 GHz Service 100 MHz 1 Carrier / QPSK / Middle



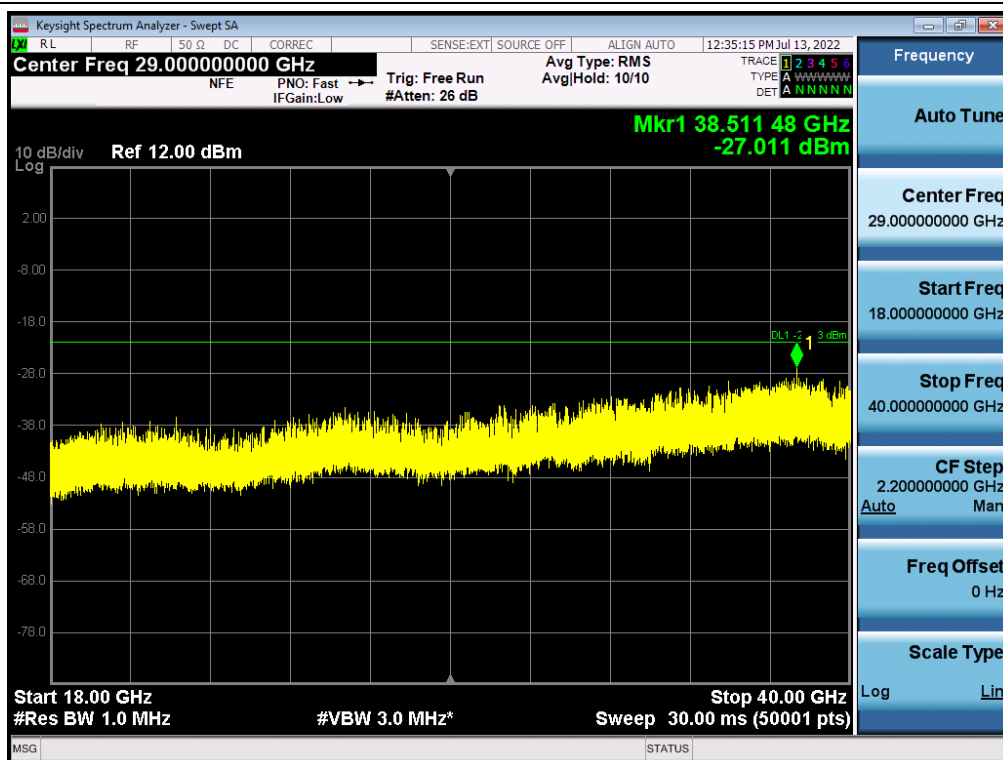
Antenna 0 / High Edge + 1 MHz ~ High Edge + 100 MHz / 3.7 GHz Service 100 MHz 1 Carrier / 16QAM / Middle



Antenna 4 / High Edge + 100 MHz ~ 18 GHz / 3.7 GHz Service 100 MHz 1 Carrier / 64QAM / Middle



Antenna 0 / 18 GHz ~ 40 GHz / 3.7 GHz Service 100 MHz 1 Carrier / 256QAM / Middle



5.6. RADIATED EMISSIONS

Test Requirements:

§ 2.1053 Measurements required: Field strength of spurious radiation.

- (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
- (b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
 - (2) All equipment operating on frequencies higher than 25 MHz.
 - (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
 - (4) Other types of equipment as required, when deemed necessary by the Commission.

§ 27.53 Emission limits.

- (l) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:
- (1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test Procedures:

The measurement is performed in accordance with Section 5.5.3.2 of ANSI C63.26.

- a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.
- b) Each emission under consideration shall be evaluated:
 - 1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - 2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - 3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - 4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - 5) Record the measured emission amplitude level and frequency using the appropriate RBW.
- c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
- d) ~ j) Omitted
- k) Provide the complete measurement results as a part of the test report.

Note:

1. We have done horizontal and vertical polarization in detecting antenna.
2. The amplitude of the spurious domain emission attenuated by more than 20 dB over the permissible value was not recorded according to ANSI C63.26, clause 5.1.1., c).
3. The results of the Radiated Emissions test shown above are measured at maximum power, and data values are attached only in the worst case.
4. Measure distance = 3 m

Test Results:

3.7 GHz Service 100 MHz 1 Carrier

Freq.(MHz)	Measured Level	Ant. Factor	A.G.+C.L.+H.P.F.	Pol.	Measured Power	Result
	[dBuV]	[dB/m]	[dB]		[dBm]	[dBm/m]

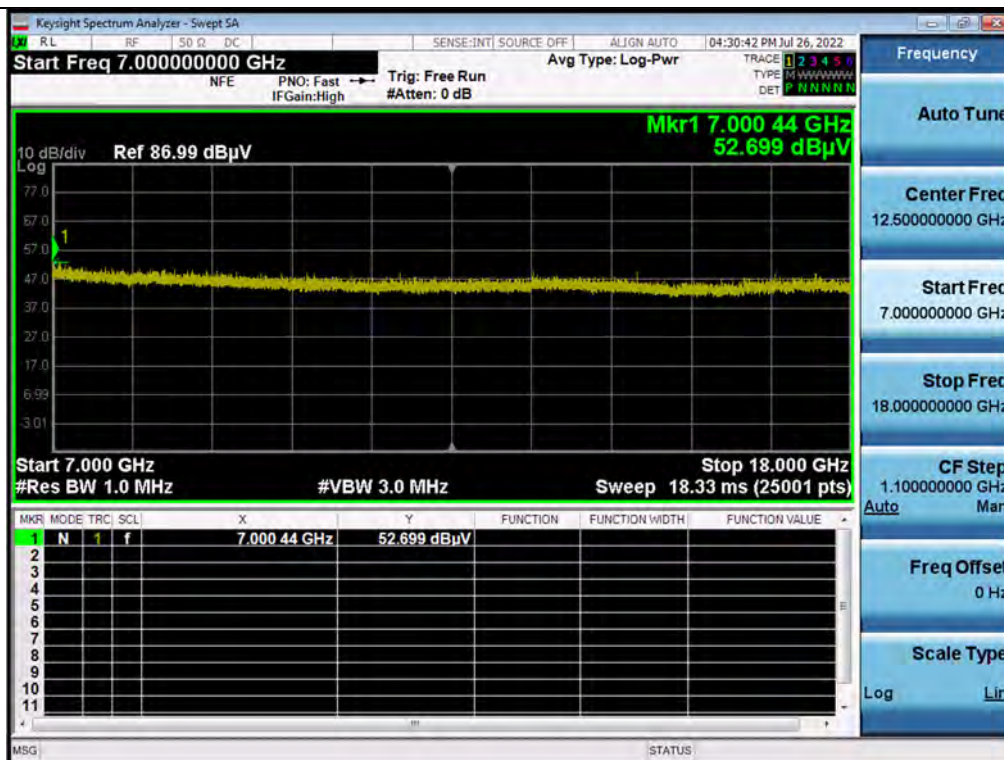
No Peaks Found

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

*Result: (Measured Level – 95.2) + Ant. Factor – (A.G.+C.L.+H.P.F.)

Plot data of Radiated Emissions

3.7 GHz Service 100 MHz 1 Carrier



Note: Only the worst case plots for Radiated Spurious Emissions.

5.7. FREQUENCY STABILITY

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 $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

§ 27.54 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Procedures:

The measurement is performed in accordance with Section 5.6.3, 5.6.4 and 5.6.5 of ANSI C63.26.

5.6.3 Procedure for frequency stability testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at $+20^{\circ}\text{C}$ and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

- a) At 10°C intervals of temperatures between -30°C and $+50^{\circ}\text{C}$ at the manufacturer's rated supply voltage, and
- b) At $+20^{\circ}\text{C}$ temperature and $\pm 15\%$ supply voltage variations. If a product is specified to operate over a range of input voltage then the -15% variation is applied to the lowermost voltage and the $+15\%$ is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

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 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: The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each port, so we are attached only the worst case data.

Test Results:

Reference: - 48 Vdc at 20°C Freq. = 3,750,000,000 Hz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100 %	+20(Ref)	3 750 000 007	7.042	0.000	0.00000
	-30	3 750 000 006	6.132	0.910	0.00024
	-20	3 750 000 002	1.545	4.588	0.00122
	-10	3 750 000 005	4.875	3.330	0.00089
	0	3 750 000 004	4.146	0.729	0.00019
	+10	3 750 000 006	5.903	1.757	0.00047
	+30	3 750 000 002	1.642	4.261	0.00114
	+40	3 750 000 008	7.815	6.173	0.00165
	+50	3 750 000 003	2.945	4.870	0.00130
115 %	+20	3 750 000 010	9.821	6.876	0.00183
85 %	+20	3 750 000 012	11.992	2.171	0.00058

Note: The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each port, so attached datas were only the port 0.

6. Annex B_EUT AND TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2207-FC035-P