Test report No.: 22A0288R-RFUSV26S-A

TEST REPORT

Product Name	Internet Gateway
Trademark	Verizon
Model and /or type reference	WNC-CR200A
FCC ID	NKR-LV65C-T3
Applicant´s name / address	Wistron NeWeb Corporation 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan
Manufacturer´s name	Wistron NeWeb Corporation
Test method requested, standard	47 CFR FCC Part 96
Verdict Summary	IN COMPLIANCE
Documented By (Senior Project Specialist / Ida Tung)	Ida Tung
Tested By (Engineer / Daniel Wu)	Daniel Wu
Approved By (Manager / Tim Sung)	Tim Sung
Date of Receipt	2022/10/13
Date of Issue	2023/06/09
Report Version	V1.0

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Appendix 1: EUT Test Photographs
Appendix 2: Product Photos - Please refer to the file: 22A0288R-Product Photos

Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Report No.	Version	Description	Issued Date
22A0288R-RFUSV26S-A	V1.0	Initial issue of report.	2023/06/09

1. General Information

1.1. EUT Description

Product Name	Internet Gateway		
Trademark	Verizon		
Model and /or type reference	WNC-CR200A		
EUT Rated Voltage	AC 100-120V / 60Hz		
EUT Test Voltage	AC 120V / 60Hz		
Frequency Range	LTE Band 48	3550 ~ 3700 MHz (Uplink) 3550 ~ 3700 MHz (Downlink)	
	5G NR n48	3550 ~ 3700 MHz (Uplink) 3550 ~ 3700 MHz (Downlink)	
Bandwidth	LTE Band 48	5 / 10 / 15 / 20 MHz	
	5G NR n48	SCS: 30 kHz	10 / 20 / 30 / 40 MHz
Type of Modulation	LTE Band 48	QPSK / 16QAM / 64QAM / 256QAM	
	5G NR n48	pi/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM	
Maximum RF Output Power	LTE Band 48	22.46 dBm	
	5G NR n48	22.20 dBm	
Hardware Version	0.0.4		
Software Version	3.2.0.9 (Wi-Fi)+13.00334.023 (Cellular)		
IMEI No.	35747387		
Adapter (1)	MFR: Lucent Trans, M/N: 1A100-US1230 Input: AC 100 - 120V~ 60Hz, 1.0A Output: 12.0V⎓ 3.0A, 36.0W Cable out: Non-shielded, 1.8m		
Adapter (2)	MFR: Delta, M/N: ADH-36NW B Input: AC 100 - 120V~ 60Hz, 0.9A Output: 12.0V⎓ 3.0A Cable out: Non-shielded, 1.7m		

Antenna Information					
Ant.	Brand Name	Model No.	Type	Band	Gain (dBi)
1	WNC	LV65C-LTE/FR1-S4	Dipole	LTE Band 48 5G NR n48	0.45
2	WNC	LV65C-LTE/FR1-S2	Dipole		
3	WNC	LV65C-LTE/FR1-S3	Dipole		
4	WNC	LV65C-LTE/FR1-S1	Dipole		
5	WNC	LV65C-LTE/FR1-S5	Dipole		
6	WNC	LV65C-LTE/FR1-S8	Dipole		
7	WNC	LV65C-LTE/FR1-S6	Dipole		
8	WNC	LV65C-LTE/FR1-S7	Dipole		

For SA mode:

Band	ANT1		ANT2		ANT3		ANT4	
	TX	RX	TX	RX	TX	RX	TX	RX
LTE Band 48	V	V	-	V	-	V	-	V
5G NR n48	V	V	-	V	-	V	-	V
Band	ANT5		ANT6		ANT7		ANT8	
	TX	RX	TX	RX	TX	RX	TX	RX
LTE Band 48	-	-	-	-	-	-	-	-
5G NR n48	-	-	-	-	-	-	-	-

For NSA mode:

Configuration	Band	ANT1		ANT2		ANT3		ANT4	
		TX	RX	TX	RX	TX	RX	TX	RX
LTE(LB) + 5G NR n48	LTE(LB)	V	V	-	V	-	V	-	V
	5G NR n48	-	V	V	V	-	V	-	V
LTE(MB) + 5G NR n48	LTE(MB)	-	-	V	V	-	V	-	V
	5G NR n48	V	V	-	V	-	V	-	V
LTE(CB) + 5G NR n48	LTE(CB)	-	V	V	V	-	V	-	V
	5G NR n48	V	V	-	V	-	V	-	V
Configuration	Band	ANT5		ANT6		ANT7		ANT8	
		TX	RX	TX	RX	TX	RX	TX	RX
LTE(LB) + 5G NR n48	LTE(LB)	-	-	-	-	-	-	-	-
	5G NR n48	-	-	-	-	-	-	-	-
LTE(MB) + 5G NR n48	LTE(MB)	-	V	-	-	-	-	-	-
	5G NR n48	-	-	-	-	-	-	-	-
LTE(CB) + 5G NR n48	LTE(CB)	-	-	-	-	-	-	-	-
	5G NR n48	-	-	-	-	-	-	-	-

Note:

1. The EUT description is from the customer declaration.
2. LB: Low-Band, means LTE B5/B13
3. MB: Mid-Band, means LTE B2/B66
4. CB: C-Band, means LTE B48

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Mode 1: LTE Band 48 Mode 2: 5G NR n48

Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.
3. After evaluation and investigation, the worst case for Adapter (1) and Adapter (2) is Adapter (1), so it was used to perform all testing and record in the test report.
4. The device was tested under all configurations, combinations, bandwidths, RB configurations and modulations, and the worst case was found in QPSK modulation for LTE and SA mode pi/2 BPSK modulation for 5G NR, therefore the “Conducted Band Edge” & “Spurious Emission” test items perform QPSK modulation for LTE and SA mode pi/2 BPSK modulation for 5G NR in this report.
5. For 5G NR, “Peak to Average Ratio” test item shown worst case modulation pi/2 BPSK, QPSK and 16QAM on this report.
6. The product both supports the SA and NSA mode. After evaluation and comparison, the worst case is investigated in the SA mode. Therefore, there is only displayed the test result for SA mode in the test report.

1.3. Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1.4. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system.

Mode 1: LTE Band 48

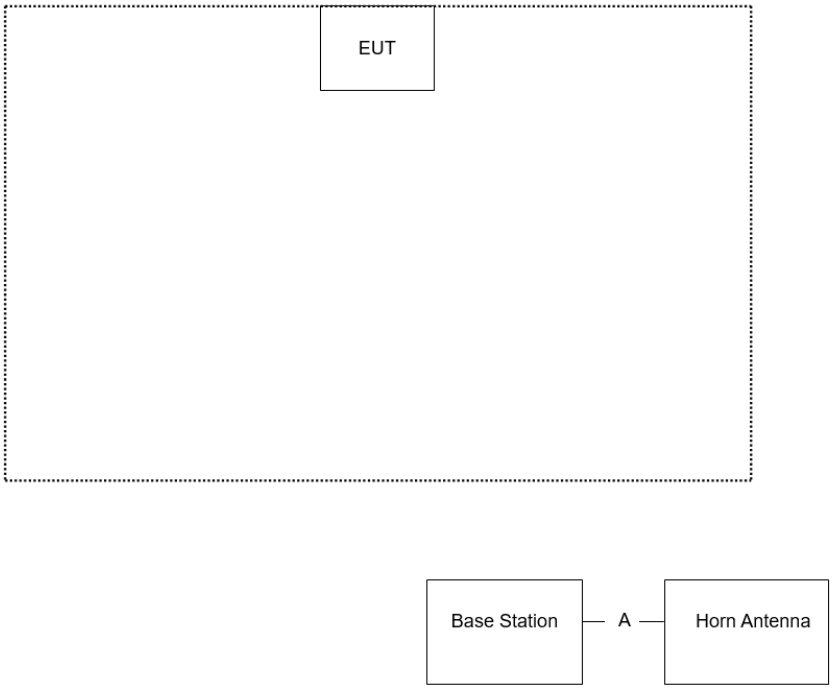
Product		Manufacturer	Model No.	Serial No.
1	Base Station	Anritsu	MT8820C	6201465467
2	Horn Antenna	Schwarzbeck	BBHA 9120D	1640

Mode 2: 5G NR n48

Product		Manufacturer	Model No.	Serial No.
1	Base Station	Keysight	E7515B	MY59321672
2	Horn Antenna	Schwarzbeck	BBHA 9120D	1640

1.5. Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	RF Cable	Shielded, 10m

1.6. EUT Operation of during Test

1	Setup the EUT and simulators as shown on.
2	Turn on the power of all equipment.
3	The EUT will continue receive the signal from LTE/5GNR function.
4	Repeat the above procedure (3)

1.7. Test Environment

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	RF Output Power	20 ~ 25	Daniel Wu	2023/03/20 ~ 2023/05/05	HY-SR03
Humidity (%RH)		58 ~ 69			
Temperature (°C)	Occupied Bandwidth	20 ~ 25	Daniel Wu		HY-SR03
Humidity (%RH)		58 ~ 69			
Temperature (°C)	Spurious Emission at Antenna Terminals	20 ~ 25	Daniel Wu		HY-SR03
Humidity (%RH)		58 ~ 69			
Temperature (°C)	Conducted Spurious Emission	20 ~ 25	Daniel Wu		HY-SR03
Humidity (%RH)		58 ~ 69			
Temperature (°C)	Radiated Spurious Emission	22.9	Ashton Chiu		HY-CB03
Humidity (%RH)		56.3			
Temperature (°C)	Frequency Stability	20 ~ 25	Daniel Wu		HY-SR03
Humidity (%RH)		58 ~ 69			
Temperature (°C)	Peak to Average Ratio	20 ~ 25	Daniel Wu		HY-SR03
Humidity (%RH)		58 ~ 69			

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA	FCC Registration Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C.
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

1.8. List of Test Equipment

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2023/08/10
Horn Antenna	Com-Power	AH-840	101100	2021/10/04	2023/10/03
Horn Antenna	RF SPIN	DRH18-E	210508A18ES	2022/06/08	2023/06/07
Pre-Amplifier	SGH	0301	20211007-10	2023/01/10	2024/01/09
Pre-Amplifier	SGH	PRAMP118	20200701	2023/01/10	2024/01/09
Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
EMI Test Receiver	R&S	ESR3	102793	2022/12/05	2023/12/04
Spectrum Analyzer	R&S	FSV3044	101114	2023/02/16	2024/02/15
Spectrum Analyzer	R&S	FSVA40	101455	2022/09/29	2023/09/28
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510357	2022/05/18	2023/05/17
Coaxial Cable	SGH	SGH18	2021005-1	2023/01/10	2024/01/09
Coaxial Cable	SGH	SGH18	202108-4		
Coaxial Cable	SGH	HA800	GD20110223-1		
Coaxial Cable	SGH	HA800	GD20110222-3		
UXM 5G Wireless Test Platform	Keysight	E7515B	MY59321672	2022/05/31	2023/05/30
Universal Radio Communication Tester	Anritsu	MT8820C	6201465467	2022/08/10	2023/08/09
Standard Temperature & Humidity Chamber	K SON	THS-D4T-100	A0606	2022/08/23	2023/08/22
AC Power Supply	EXTECH Electronics	6605	1570547	2023/01/17	2024/01/16
Radiated Software	AUDIX	e3 V9	N/A	N/A	N/A

1.9. Measurement Uncertainty

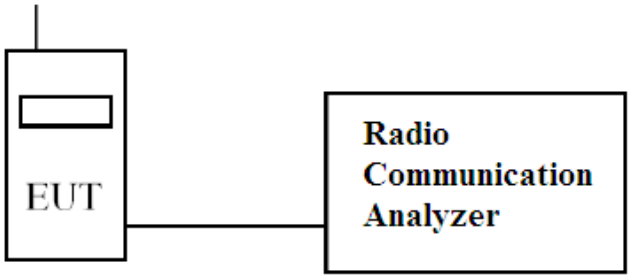
Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95 % confidence level (based on a coverage factor (k=2).

Test Item	Uncertainty
RF Output Power	± 1.58 dB
Occupied Bandwidth	± 1580.61 Hz
Peak to Average Ratio	± 2.14 dB
Conducted Band Edge	± 2.14 dB
Conducted Spurious Emissions	± 2.14 dB
Radiated Spurious Emissions	30 MHz~1 GHz: ±5.88 dB 1 GHz~18 GHz: ±3.11 dB 18 GHz~40 GHz: ±3.09 dB
Frequency Stability	± 0.42 ppm

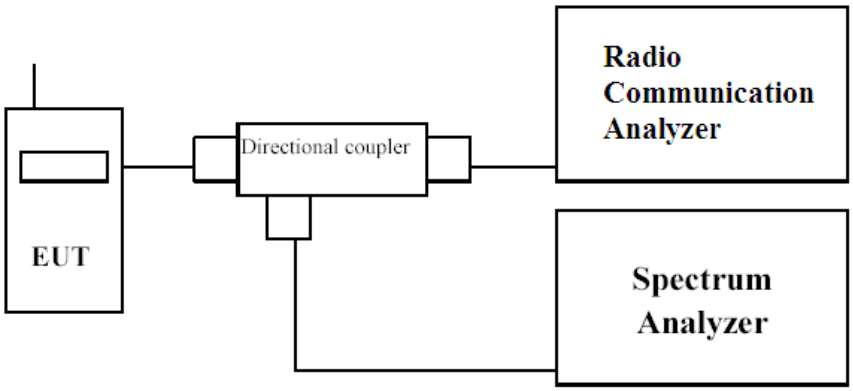
2. RF Output Power

2.1. Test Setup

Conducted Power



Channel Power



2.2. Test Limit

Type	Device	Maximum EIRP (dBm/10 MHz)	Maximum PSD (dBm/MHz)
X	End User Device	23	N/A
	Category A CBSD	30	20
	Category B CBSD	47	37

2.3. Test Procedure

Conducted Power:

The EUT is tested with maximum rated TX power via the Base Station simulator, and the output power was measured at the antenna terminals of the EUT.

Channel Power:

1. Channel power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW, not to exceed 1 MHz.
3. VBW ≥ 3 x RBW.
4. Span = 1.5 times the OBW.
5. No. of sweep points > 2 x span / RBW.
6. Detector = RMS.
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was set to 10MHz.
9. Trace mode = trace averaging (RMS) over 100 sweeps.
10. The trace was allowed to stabilize.

2.4. Test Specification

According to FCC Part 2.1046, 96.41(b)

2.5. Test Result of RF Output Power

Mode 1: LTE Band 48

Mode					Conducted Power				EIRP Power				Limit
BW (MHz)	Channel	Frequency (MHz)	RB No.	RB offset	QPSK (dBm)	16-QAM (dBm)	64-QAM (dBm)	256-QAM (dBm)	QPSK EIRP(W)	16-QAM EIRP(W)	64-QAM EIRP(W)	256-QAM EIRP(W)	Limit EIRP(W)
5	55265	3552.5	1	0	22.14	21.17	20.07	17.15	0.182	0.145	0.113	0.058	0.2
5	55265	3552.5	1	12	22.20	21.10	20.00	17.19	0.184	0.143	0.111	0.058	0.2
5	55265	3552.5	1	24	22.16	21.20	20.05	17.17	0.182	0.146	0.112	0.058	0.2
5	55265	3552.5	25	0	22.03	21.04	19.97	17.11	0.177	0.141	0.110	0.057	0.2
5	55990	3625	1	0	22.19	21.16	20.16	17.06	0.184	0.145	0.115	0.056	0.2
5	55990	3625	1	12	22.24	21.15	20.17	17.05	0.186	0.145	0.115	0.056	0.2
5	55990	3625	1	24	22.16	21.18	20.11	17.15	0.182	0.146	0.114	0.058	0.2
5	55990	3625	25	0	22.09	21.13	20.08	17.13	0.179	0.144	0.113	0.057	0.2
5	56715	3697.5	1	0	22.16	21.20	20.03	17.07	0.182	0.146	0.112	0.056	0.2
5	56715	3697.5	1	12	22.13	21.22	20.12	17.14	0.181	0.147	0.114	0.057	0.2
5	56715	3697.5	1	24	22.16	21.12	20.14	17.09	0.182	0.144	0.115	0.057	0.2
5	56715	3697.5	25	0	22.01	21.03	19.99	17.06	0.176	0.141	0.111	0.056	0.2
10	55290	3555	1	0	22.24	21.25	20.01	17.17	0.186	0.148	0.111	0.058	0.2
10	55290	3555	1	24	22.21	21.26	20.08	17.15	0.185	0.148	0.113	0.058	0.2
10	55290	3555	1	49	22.18	21.20	20.07	17.12	0.183	0.146	0.113	0.057	0.2
10	55290	3555	50	0	21.27	20.32	19.32	17.14	0.149	0.119	0.095	0.057	0.2
10	55990	3625	1	0	22.17	21.21	20.08	17.23	0.183	0.147	0.113	0.059	0.2
10	55990	3625	1	24	22.11	21.13	20.04	17.17	0.180	0.144	0.112	0.058	0.2
10	55990	3625	1	49	22.19	21.22	20.12	17.15	0.184	0.147	0.114	0.058	0.2
10	55990	3625	50	0	21.22	20.31	19.37	17.14	0.147	0.119	0.096	0.057	0.2
10	56690	3695	1	0	22.18	21.23	20.04	17.19	0.183	0.147	0.112	0.058	0.2
10	56690	3695	1	24	22.19	21.25	20.13	17.11	0.184	0.148	0.114	0.057	0.2
10	56690	3695	1	49	22.18	21.12	20.01	17.10	0.183	0.144	0.111	0.057	0.2
10	56690	3695	50	0	21.26	20.28	19.30	17.03	0.148	0.118	0.094	0.056	0.2

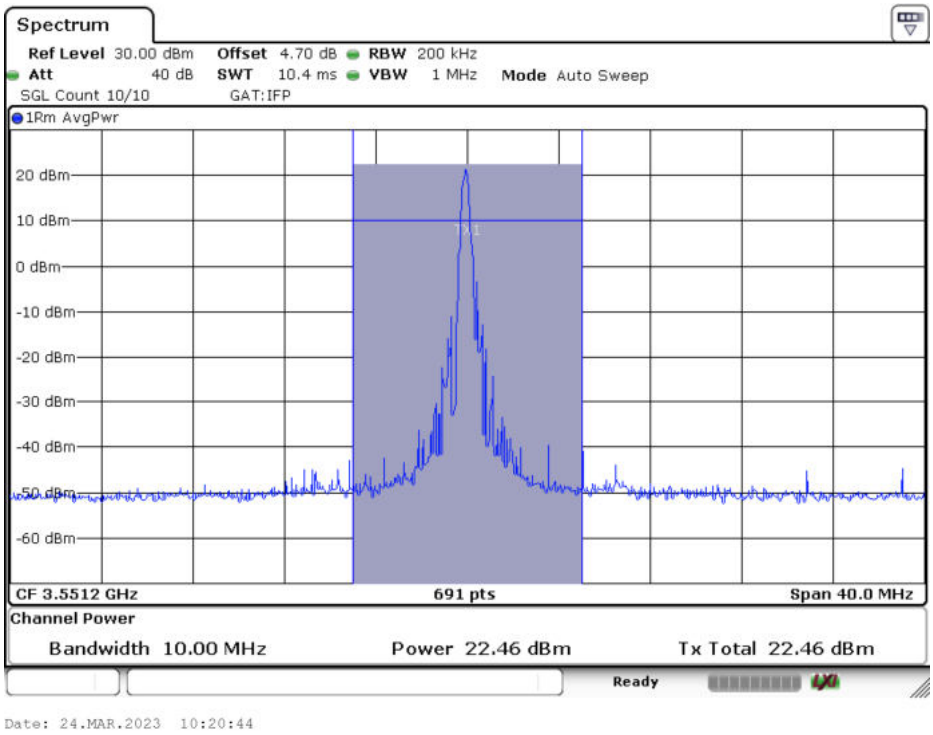
Mode					Conducted Power				EIRP Power				Limit
BW (MHz)	Channel	Frequency (MHz)	RB No.	RB offset	QPSK (dBm)	16-QAM (dBm)	64-QAM (dBm)	256-QAM (dBm)	QPSK EIRP(W)	16-QAM EIRP(W)	64-QAM EIRP(W)	256-QAM EIRP(W)	Limit EIRP(W)
15	55315	3557.5	1	0	22.26	21.41	20.11	17.26	0.187	0.153	0.114	0.059	0.2
15	55315	3557.5	1	37	22.15	21.31	20.13	17.24	0.182	0.150	0.114	0.059	0.2
15	55315	3557.5	1	74	22.14	21.29	20.11	17.17	0.182	0.149	0.114	0.058	0.2
15	55315	3557.5	75	0	19.95	18.88	17.92	15.93	0.110	0.086	0.069	0.043	0.2
15	55990	3625	1	0	22.28	21.34	20.15	17.22	0.187	0.151	0.115	0.058	0.2
15	55990	3625	1	37	22.17	21.29	20.13	17.25	0.183	0.149	0.114	0.059	0.2
15	55990	3625	1	74	22.16	21.28	20.09	17.20	0.182	0.149	0.113	0.058	0.2
15	55990	3625	75	0	19.88	18.90	17.88	15.91	0.108	0.086	0.068	0.043	0.2
15	56665	3692.5	1	0	22.04	21.24	20.09	17.24	0.177	0.148	0.113	0.059	0.2
15	56665	3692.5	1	37	22.14	21.27	20.05	17.17	0.182	0.149	0.112	0.058	0.2
15	56665	3692.5	1	74	22.07	21.23	20.09	17.15	0.179	0.147	0.113	0.058	0.2
15	56665	3692.5	75	0	19.85	18.91	17.92	15.93	0.107	0.086	0.069	0.043	0.2
20	55340	3560	1	0	22.46	21.43	20.18	17.52	0.195	0.154	0.116	0.063	0.2
20	55340	3560	1	49	22.22	21.38	20.08	17.41	0.185	0.152	0.113	0.061	0.2
20	55340	3560	1	99	22.18	21.14	19.89	17.33	0.183	0.144	0.108	0.060	0.2
20	55340	3560	100	0	18.54	17.59	16.51	14.66	0.079	0.064	0.050	0.032	0.2
20	55990	3625	1	0	22.33	21.31	20.09	17.39	0.190	0.150	0.113	0.061	0.2
20	55990	3625	1	49	22.13	21.35	20.06	17.30	0.181	0.151	0.112	0.060	0.2
20	55990	3625	1	99	22.15	21.34	20.07	17.33	0.182	0.151	0.113	0.060	0.2
20	55990	3625	100	0	18.64	17.66	16.64	14.63	0.081	0.065	0.051	0.032	0.2
20	56640	3690	1	0	22.32	21.34	20.13	17.44	0.189	0.151	0.114	0.062	0.2
20	56640	3690	1	49	22.17	21.36	20.06	17.34	0.183	0.152	0.112	0.060	0.2
20	56640	3690	1	99	22.10	21.30	20.11	17.27	0.180	0.150	0.114	0.059	0.2
20	56640	3690	100	0	18.62	17.65	16.54	14.62	0.081	0.065	0.050	0.032	0.2

Note:

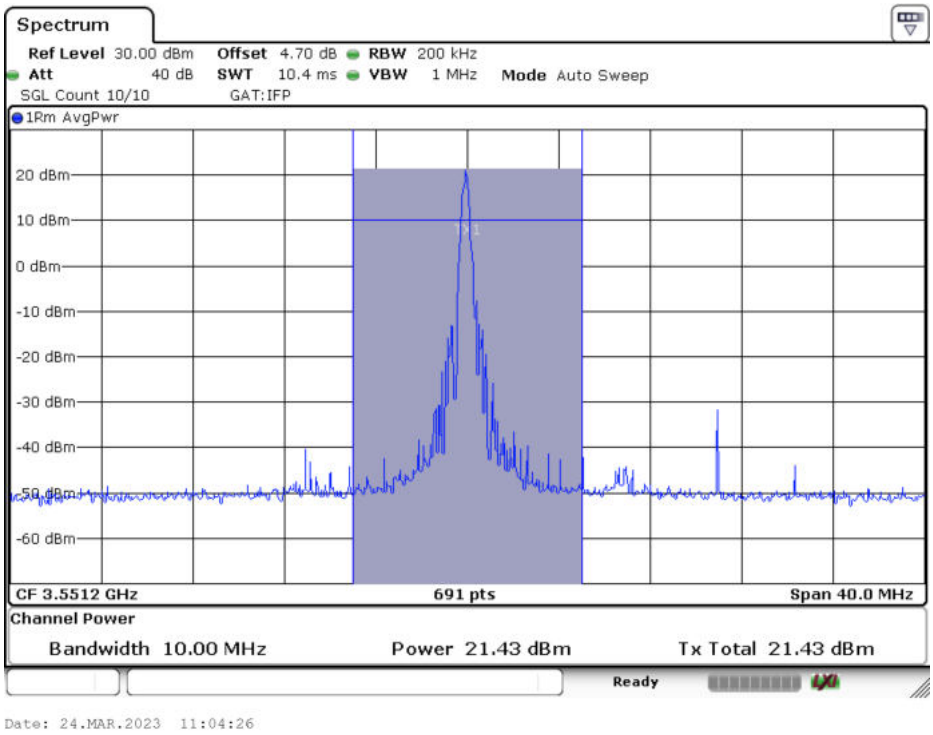
1. RF Output Power EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. Power (W)= $(10^{(Power(dBm)/10)})*10^{-3}$

Spectrum plot of worst value

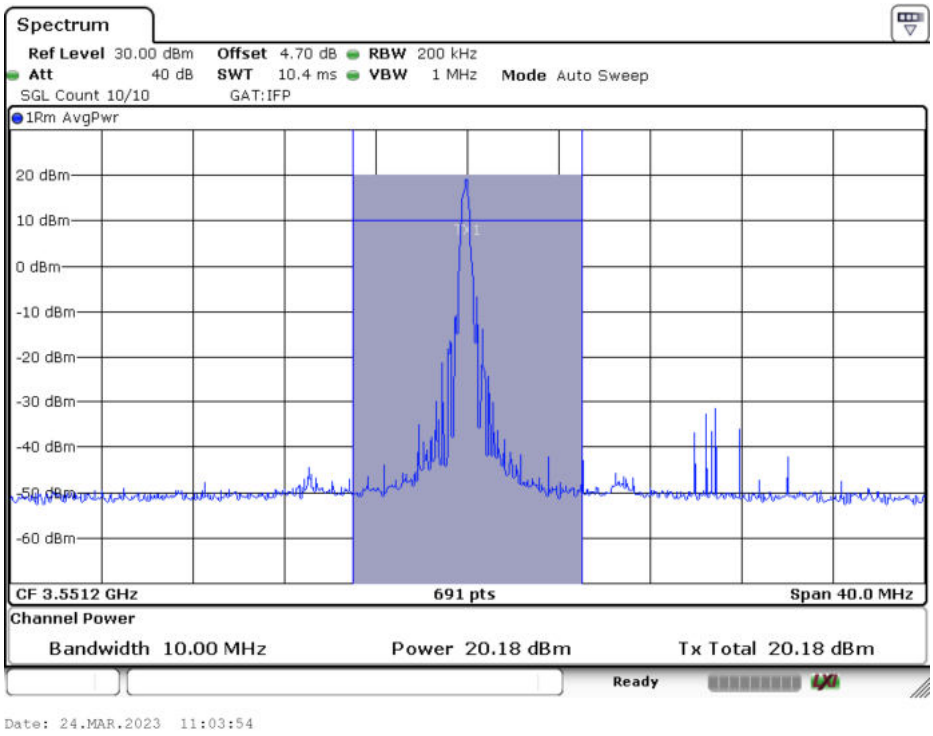
QPSK: 20 MHz / CH55340 / 1RB0



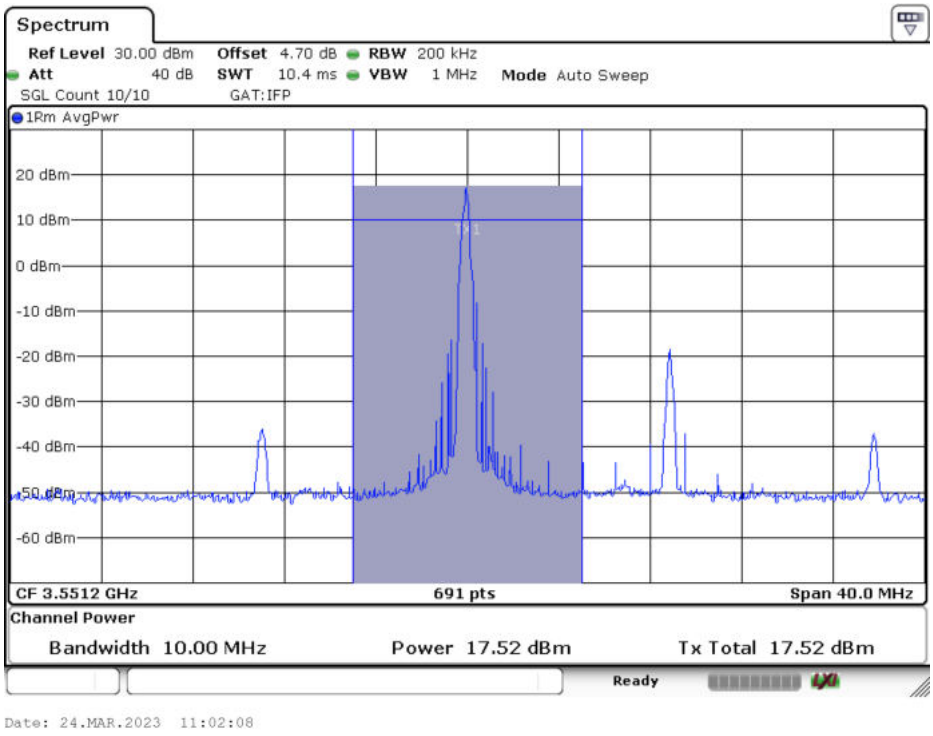
16-QAM: 20 MHz / CH55340 / 1RB0



64-QAM: 20 MHz / CH55340 / 1RB0



256-QAM: 20 MHz / CH55340 / 1RB0



Mode 2: 5G NR n48

Mode					Conducted Power					ERP Power					Limit
BW (MHz)	Channel	Frequency (MHz)	RB No.	RB offset	PI/2 BPSK (dBm)	QPSK (dBm)	16-QAM (dBm)	64-QAM (dBm)	256-QAM (dBm)	PI/2 BPSK EIRP(W)	QPSK EIRP(W)	16-QAM EIRP(W)	64-QAM EIRP(W)	256-QAM EIRP(W)	Limit EIRP(W)
10	637000	3555	1	0	21.70	21.58	21.43	21.32	20.06	0.164	0.160	0.154	0.150	0.112	0.2
10	637000	3555	1	12	21.74	21.63	21.61	21.47	20.13	0.166	0.161	0.161	0.156	0.114	0.2
10	637000	3555	1	23	21.68	21.50	21.48	21.36	20.03	0.163	0.157	0.156	0.152	0.112	0.2
10	637000	3555	24	0	22.02	21.95	21.93	21.88	20.35	0.177	0.174	0.173	0.171	0.120	0.2
10	641666	3625	1	0	21.78	21.73	21.68	21.57	20.32	0.167	0.165	0.163	0.159	0.119	0.2
10	641666	3625	1	12	21.82	21.78	21.72	21.63	20.41	0.169	0.167	0.165	0.161	0.122	0.2
10	641666	3625	1	23	21.72	21.67	21.61	21.59	20.29	0.165	0.163	0.161	0.160	0.119	0.2
10	641666	3625	24	0	22.19	22.16	22.16	22.12	20.61	0.184	0.182	0.182	0.181	0.128	0.2
10	646332	3695	1	0	21.40	21.37	21.30	21.12	19.56	0.153	0.152	0.150	0.144	0.100	0.2
10	646332	3695	1	12	21.44	21.42	21.42	21.15	19.65	0.155	0.154	0.154	0.145	0.102	0.2
10	646332	3695	1	23	21.41	21.38	21.32	21.11	19.60	0.153	0.152	0.150	0.143	0.101	0.2
10	646332	3695	24	0	21.91	21.83	21.80	21.44	19.87	0.172	0.169	0.168	0.155	0.108	0.2
20	637334	3560	1	0	21.80	21.76	21.70	21.68	20.00	0.168	0.166	0.164	0.163	0.111	0.2
20	637334	3560	1	25	21.85	21.82	21.78	21.75	20.06	0.170	0.169	0.167	0.166	0.112	0.2
20	637334	3560	1	50	21.79	21.75	21.72	21.65	20.02	0.167	0.166	0.165	0.162	0.111	0.2
20	637334	3560	50	0	19.87	19.81	19.82	19.75	18.30	0.108	0.106	0.106	0.105	0.075	0.2
20	637334	3560	50	1	19.89	19.82	19.80	19.77	18.27	0.108	0.106	0.106	0.105	0.074	0.2
20	641666	3625	1	0	21.49	21.42	21.40	21.36	21.30	0.156	0.154	0.153	0.152	0.150	0.2
20	641666	3625	1	25	21.56	21.51	21.51	21.40	21.37	0.159	0.157	0.157	0.153	0.152	0.2
20	641666	3625	1	50	21.53	21.50	21.43	21.35	21.32	0.158	0.157	0.154	0.151	0.150	0.2
20	641666	3625	50	0	19.90	19.84	19.83	19.78	18.31	0.108	0.107	0.107	0.105	0.075	0.2
20	641666	3625	50	1	19.88	19.83	19.80	19.75	18.30	0.108	0.107	0.106	0.105	0.075	0.2
20	646000	3690	1	0	21.92	21.72	21.63	21.49	19.76	0.173	0.165	0.161	0.156	0.105	0.2
20	646000	3690	1	25	21.95	21.74	21.68	21.55	19.83	0.174	0.166	0.163	0.158	0.107	0.2
20	646000	3690	1	50	21.89	21.70	21.60	21.46	19.74	0.171	0.164	0.160	0.155	0.104	0.2
20	646000	3690	50	0	19.89	19.81	19.81	19.77	18.29	0.108	0.106	0.106	0.105	0.075	0.2
20	646000	3690	50	1	19.85	19.80	19.82	19.74	18.25	0.107	0.106	0.106	0.104	0.074	0.2

Mode					Conducted Power					ERP Power					Limit
BW (MHz)	Channel	Frequency (MHz)	RB No.	RB offset	PI/2 BPSK (dBm)	QPSK (dBm)	16-QAM (dBm)	64-QAM (dBm)	256-QAM (dBm)	PI/2 BPSK EIRP(W)	QPSK EIRP(W)	16-QAM EIRP(W)	64-QAM EIRP(W)	256-QAM EIRP(W)	Limit EIRP(W)
30	637668	3565	1	0	22.11	21.90	21.85	21.69	19.89	0.180	0.172	0.170	0.164	0.108	0.2
30	637668	3565	1	39	22.20	21.95	21.89	21.72	20.00	0.184	0.174	0.171	0.165	0.111	0.2
30	637668	3565	1	77	22.07	21.87	21.83	21.66	19.95	0.179	0.171	0.169	0.163	0.110	0.2
30	637668	3565	75	0	18.05	18.02	18.01	17.95	16.58	0.071	0.070	0.070	0.069	0.050	0.2
30	637668	3565	75	3	18.08	18.04	18.05	17.99	16.58	0.071	0.071	0.071	0.070	0.050	0.2
30	641666	3625	1	0	22.13	22.10	22.01	21.92	20.31	0.181	0.180	0.176	0.173	0.119	0.2
30	641666	3625	1	39	22.19	22.16	22.05	22.00	20.35	0.184	0.182	0.178	0.176	0.120	0.2
30	641666	3625	1	77	22.01	21.98	21.93	21.90	20.29	0.176	0.175	0.173	0.172	0.119	0.2
30	641666	3625	75	0	18.10	18.10	18.09	18.06	16.65	0.072	0.072	0.071	0.071	0.051	0.2
30	641666	3625	75	3	18.06	18.05	18.01	18.00	16.63	0.071	0.071	0.070	0.070	0.051	0.2
30	645666	3685	1	0	21.92	21.76	21.61	21.54	19.83	0.173	0.166	0.161	0.158	0.107	0.2
30	645666	3685	1	39	21.97	21.81	21.65	21.58	19.87	0.175	0.168	0.162	0.160	0.108	0.2
30	645666	3685	1	77	21.89	21.74	21.63	21.51	19.80	0.171	0.166	0.161	0.157	0.106	0.2
30	645666	3685	75	0	18.03	18.00	17.98	17.98	16.62	0.070	0.070	0.070	0.070	0.051	0.2
30	645666	3685	75	3	18.02	18.06	18.05	18.02	16.60	0.070	0.071	0.071	0.070	0.051	0.2
40	638000	3570	1	0	22.13	21.75	21.69	21.50	19.87	0.181	0.166	0.164	0.157	0.108	0.2
40	638000	3570	1	53	22.15	21.78	21.73	21.53	19.95	0.182	0.167	0.165	0.158	0.110	0.2
40	638000	3570	1	105	22.02	21.72	21.67	21.48	19.88	0.177	0.165	0.163	0.156	0.108	0.2
40	638000	3570	100	0	16.90	16.82	16.82	16.73	15.35	0.054	0.053	0.053	0.052	0.038	0.2
40	638000	3570	100	6	16.88	16.83	16.78	16.75	15.31	0.054	0.053	0.053	0.052	0.038	0.2
40	641666	3625	1	0	21.97	21.95	21.90	21.82	20.30	0.175	0.174	0.172	0.169	0.119	0.2
40	641666	3625	1	53	22.10	22.08	21.99	21.86	20.32	0.180	0.179	0.175	0.170	0.119	0.2
40	641666	3625	1	105	22.02	21.97	21.91	21.83	20.28	0.177	0.175	0.172	0.169	0.118	0.2
40	641666	3625	100	0	16.91	16.87	16.84	16.79	15.38	0.054	0.054	0.054	0.053	0.038	0.2
40	641666	3625	100	6	16.85	16.83	16.80	16.72	15.37	0.054	0.053	0.053	0.052	0.038	0.2
40	645332	3680	1	0	21.59	21.55	21.51	21.32	19.86	0.160	0.158	0.157	0.150	0.107	0.2
40	645332	3680	1	53	21.65	21.61	21.57	21.36	19.90	0.162	0.161	0.159	0.152	0.108	0.2
40	645332	3680	1	105	21.61	21.56	21.49	21.34	19.88	0.161	0.159	0.156	0.151	0.108	0.2
40	645332	3680	100	0	16.85	16.80	16.77	16.70	15.32	0.054	0.053	0.053	0.052	0.038	0.2
40	645332	3680	100	6	16.86	16.80	16.72	16.65	15.37	0.054	0.053	0.052	0.051	0.038	0.2

Note:

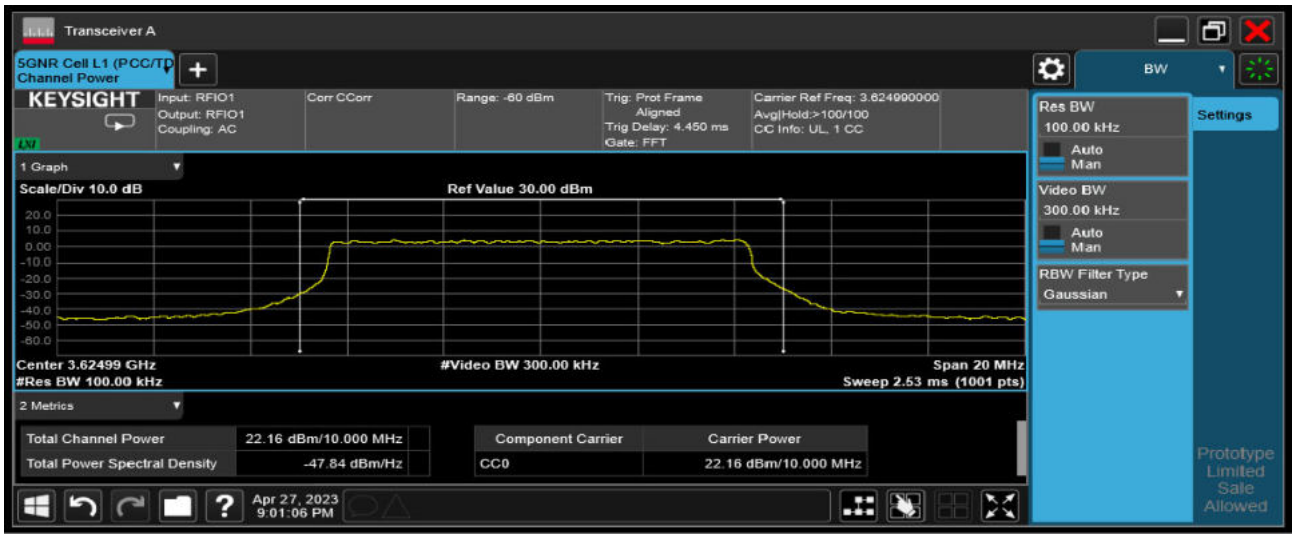
1. RF Output Power EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. Power (W) = $(10^{(Power(dBm)/10)})*10^{-3}$

Spectrum plot of worst value

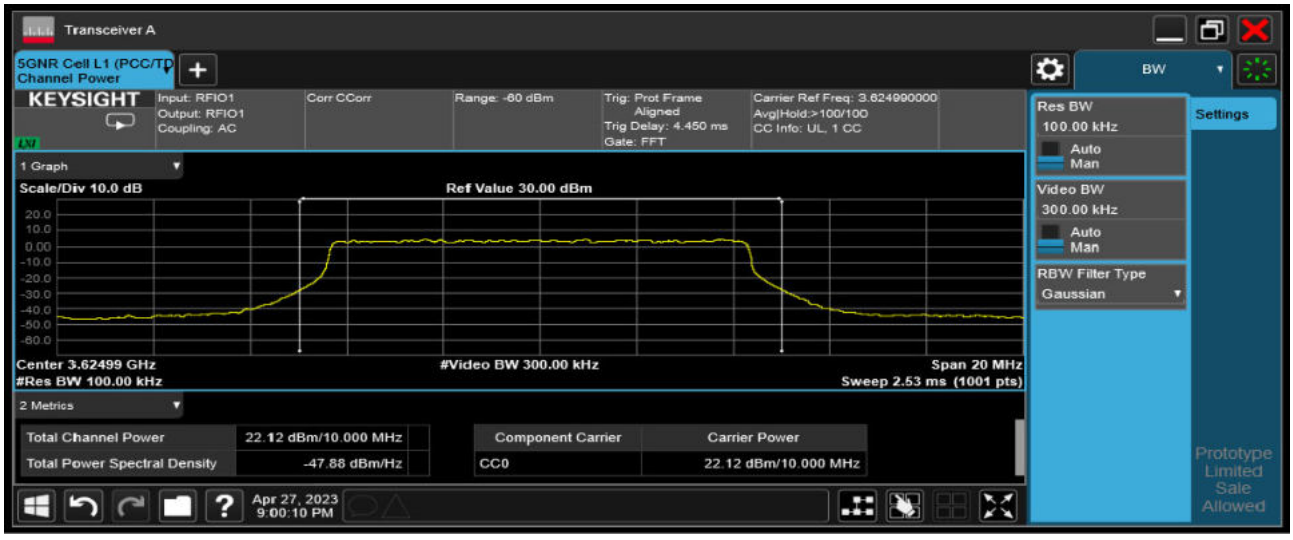
pi/2 BPSK: 30 MHz / CH637668 / 1RB39

QPSK: 30 MHz / CH641666 / 1RB39

16-QAM: 10 MHz / CH641666 / 24RB0



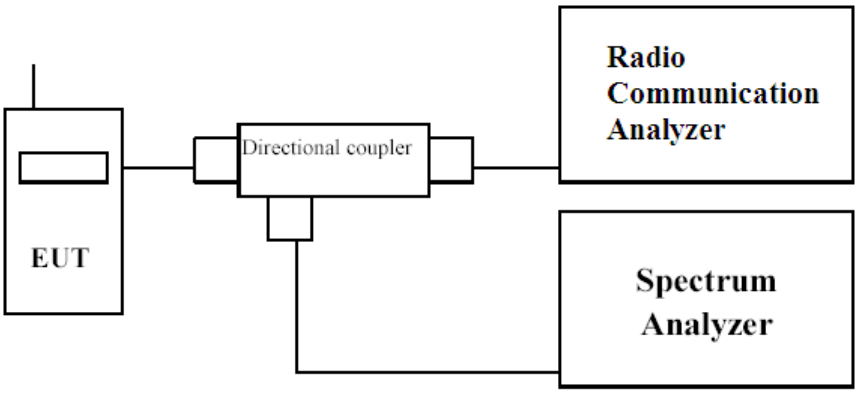
64-QAM: 10 MHz / CH641666 / 24RB0



256-QAM: 20 MHz / CH641666 / 1RB25

3. Occupied Bandwidth

3.1. Test Setup



3.2. Test Limit

N/A

3.3. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the occupied bandwidth was measured at the antenna terminals of the EUT.

The Resolution BW of the analyzer is set to 1 %~5 % of the emission bandwidth. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The plots below show the resultant display from the Spectrum Analyser.

3.4. Test Specification

According to FCC Part 2.1049, 96.41

3.5. Test Result of Occupied Bandwidth

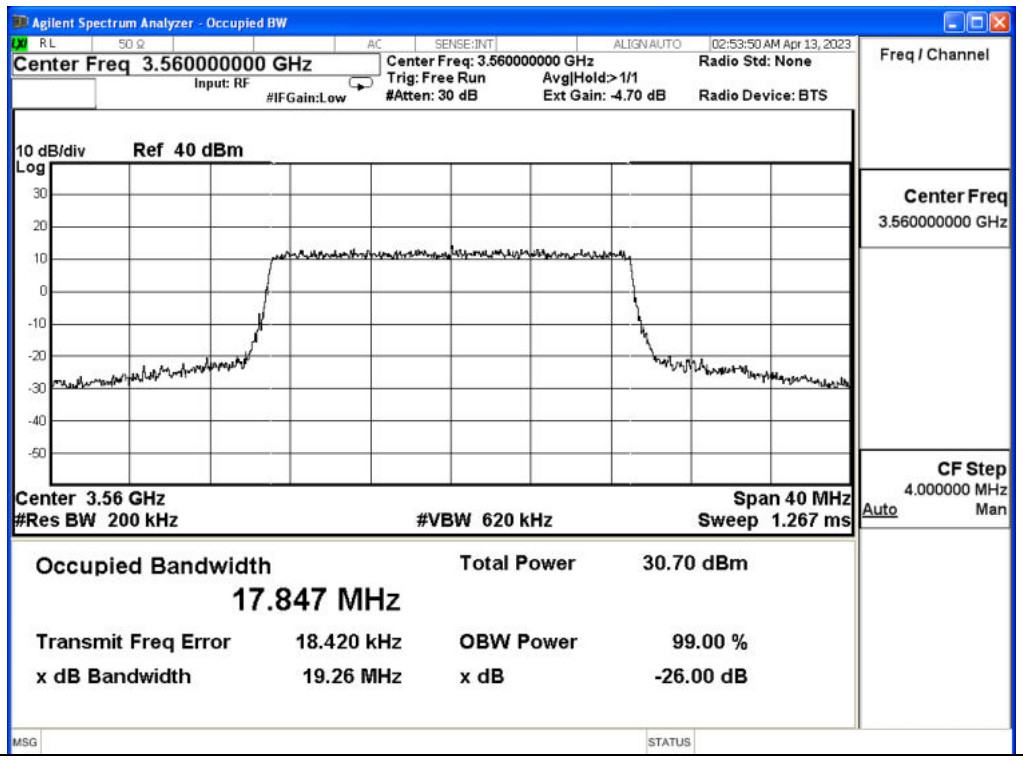
Mode 1: LTE Band 48

Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)
				26 dB BW	99 % BW	
5M	QPSK	55265	3552.5	5.002	4.479	N/A
		55990	3625.0	5.007	4.478	N/A
		56715	3697.5	5.047	4.472	N/A
	16-QAM	55265	3552.5	5.001	4.474	N/A
		55990	3625.0	4.927	4.480	N/A
		56715	3697.5	5.019	4.476	N/A
	64-QAM	55265	3552.5	4.946	4.477	N/A
		55990	3625.0	4.999	4.467	N/A
		56715	3697.5	5.014	4.484	N/A
	256-QAM	55265	3552.5	4.949	4.473	N/A
		55990	3625.0	4.942	4.482	N/A
		56715	3697.5	5.009	4.473	N/A
10M	QPSK	55290	3555.0	9.749	8.946	N/A
		55990	3625.0	9.783	8.935	N/A
		56690	3695.0	9.827	8.964	N/A
	16-QAM	55290	3555.0	9.765	8.942	N/A
		55990	3625.0	9.700	8.946	N/A
		56690	3695.0	9.714	8.944	N/A
	64-QAM	55290	3555.0	9.843	8.935	N/A
		55990	3625.0	9.770	8.949	N/A
		56690	3695.0	9.726	8.949	N/A
	256-QAM	55290	3555.0	9.737	8.946	N/A
		55990	3625.0	9.804	8.942	N/A
		56690	3695.0	9.795	8.939	N/A

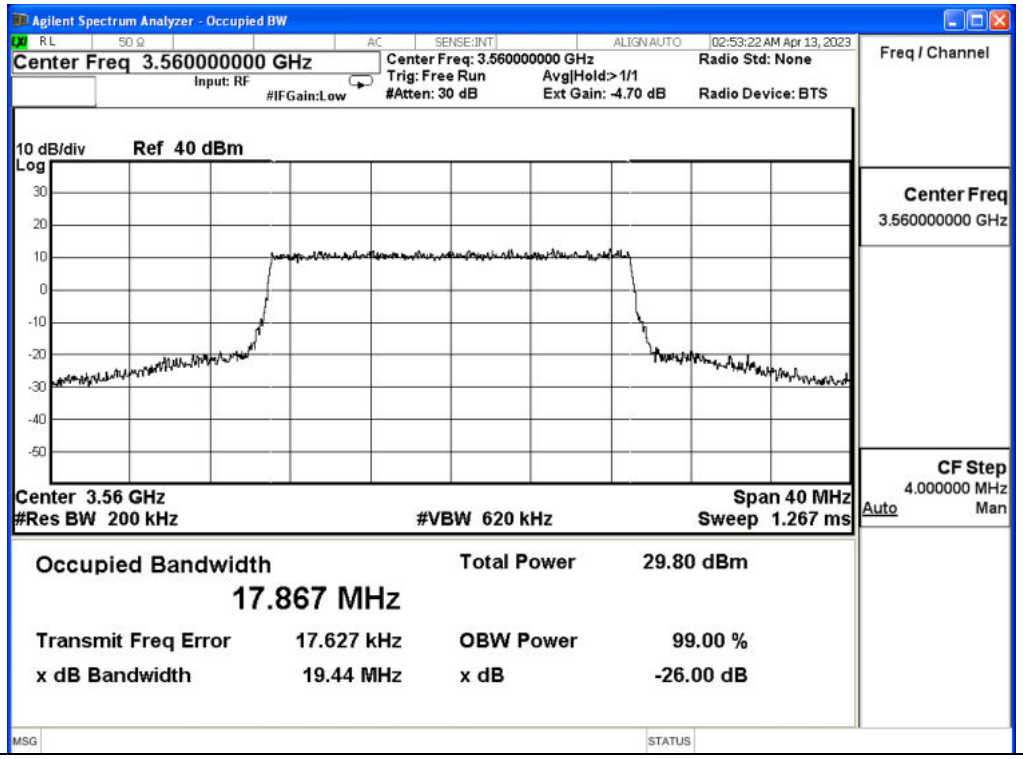
Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)
				26 dB BW	99 % BW	
15M	QPSK	55315	3557.5	14.510	13.394	N/A
		55990	3625.0	14.640	13.407	N/A
		56665	3692.5	14.560	13.428	N/A
	16-QAM	55315	3557.5	14.550	13.409	N/A
		55990	3625.0	14.560	13.391	N/A
		56665	3692.5	14.300	13.383	N/A
	64-QAM	55315	3557.5	14.510	13.421	N/A
		55990	3625.0	14.490	13.385	N/A
		56665	3692.5	14.300	13.419	N/A
	256-QAM	55315	3557.5	14.570	13.407	N/A
		55990	3625.0	14.430	13.406	N/A
		56665	3692.5	14.650	13.389	N/A
20M	QPSK	55340	3560.0	19.260	17.847	N/A
		55990	3625.0	18.880	17.846	N/A
		56640	3690.0	19.090	17.886	N/A
	16-QAM	55340	3560.0	19.440	17.867	N/A
		55990	3625.0	18.860	17.867	N/A
		56640	3690.0	19.410	17.862	N/A
	64-QAM	55340	3560.0	19.320	17.877	N/A
		55990	3625.0	18.880	17.837	N/A
		56640	3690.0	19.200	17.848	N/A
	256-QAM	55340	3560.0	19.310	17.870	N/A
		55990	3625.0	18.990	17.840	N/A
		56640	3690.0	19.460	17.865	N/A

Spectrum plot of worst value

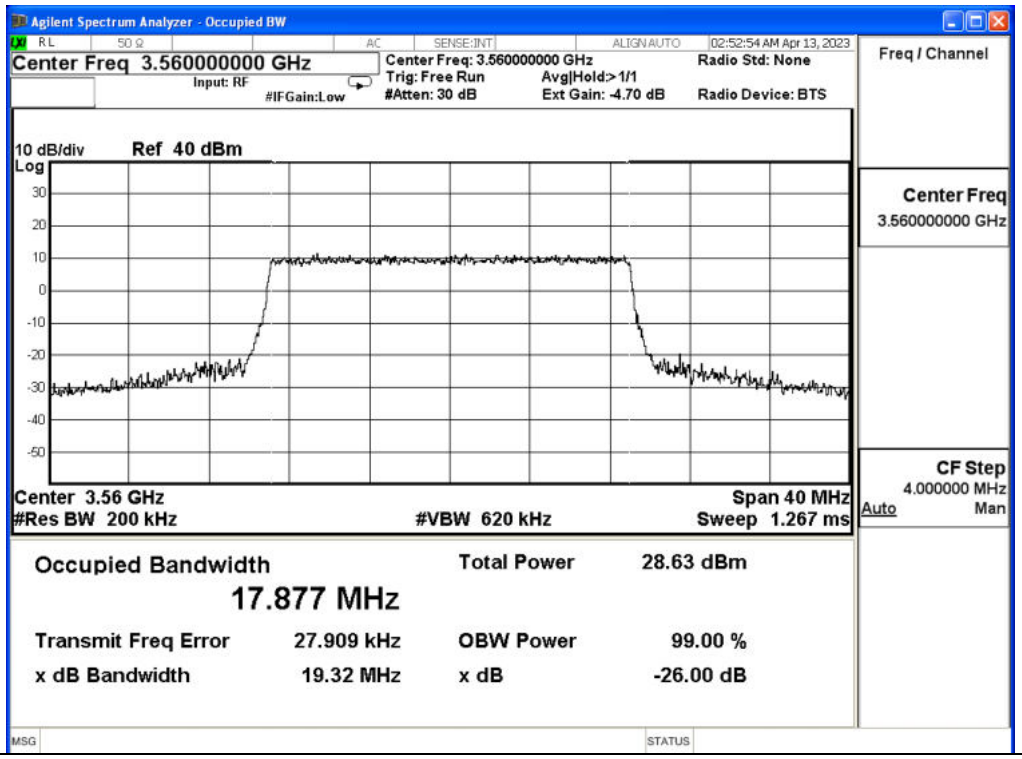
QPSK: 20 MHz / CH55340



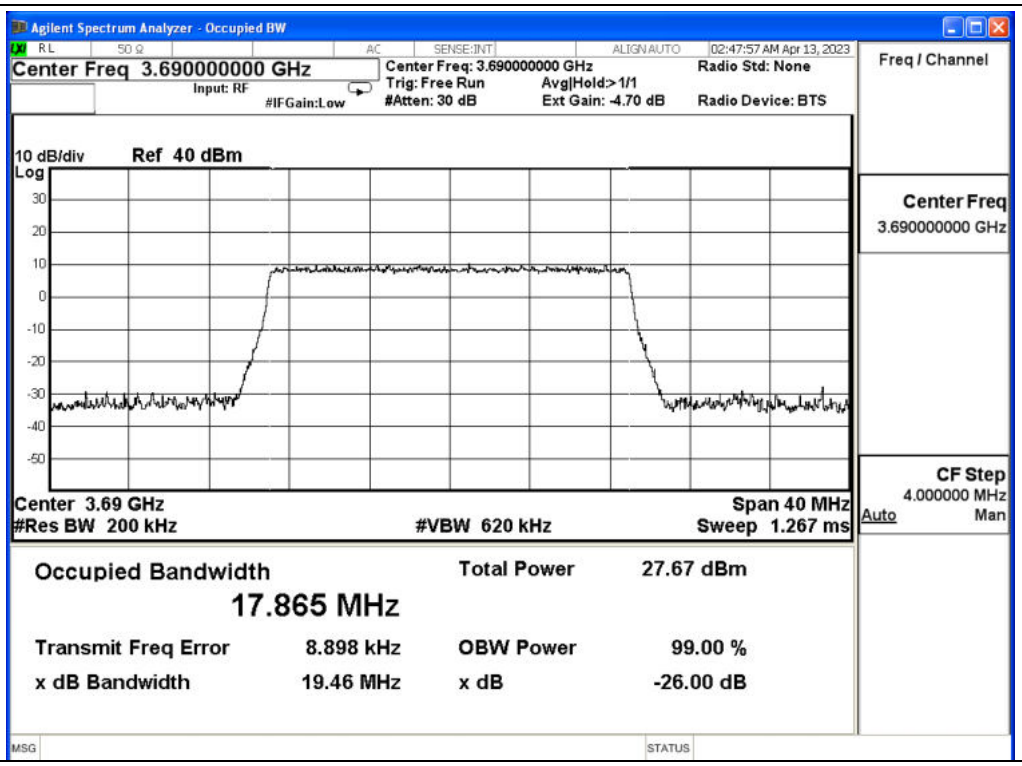
16-QAM: 20 MHz / CH55340



64-QAM: 20 MHz / CH55340



256-QAM: 20 MHz / CH56640



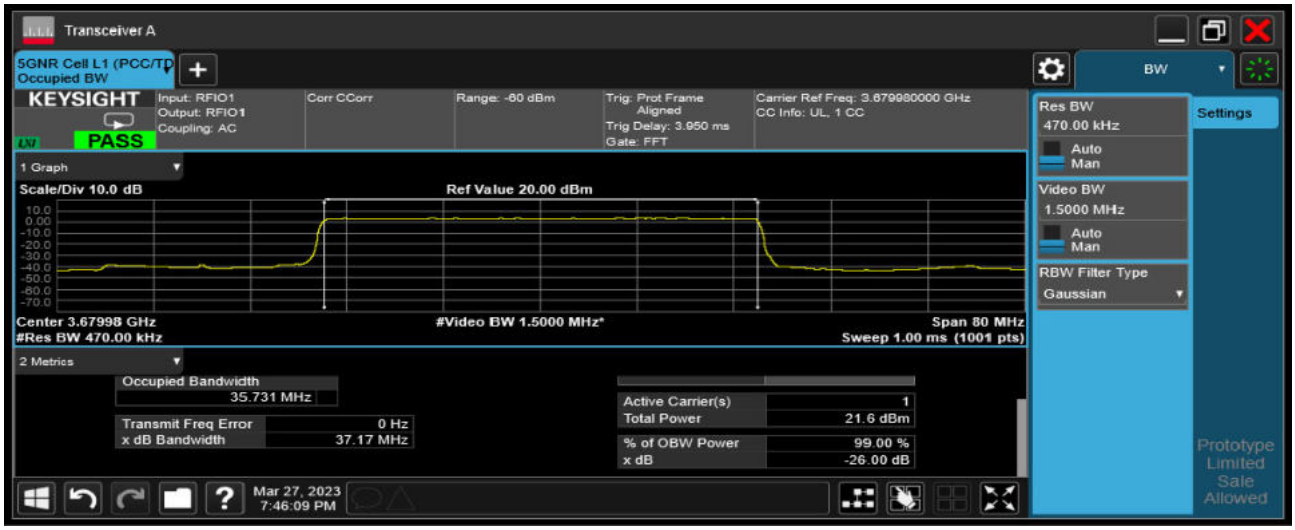
Mode 2: 5G NR n48

Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)
				26dB BW	99% BW	
10M	π/2-BPSK	637000	3555	9.341	8.573	N/A
		641666	3625	9.347	8.577	N/A
		646332	3695	9.328	8.577	N/A
	QPSK	637000	3555	9.310	8.575	N/A
		641666	3625	9.278	8.576	N/A
		646332	3695	9.241	8.577	N/A
	16-QAM	637000	3555	9.360	8.608	N/A
		641666	3625	9.438	8.611	N/A
		646332	3695	9.391	8.609	N/A
	64-QAM	637000	3555	9.257	8.577	N/A
		641666	3625	9.211	8.576	N/A
		646332	3695	9.290	8.579	N/A
	256-QAM	637000	3555	9.205	8.580	N/A
		641666	3625	9.165	8.578	N/A
		646332	3695	9.149	8.578	N/A
20M	π/2-BPSK	638000	3560	18.650	18.002	N/A
		641666	3625	18.630	17.955	N/A
		646000	3690	18.670	18.007	N/A
	QPSK	638000	3560	18.620	18.001	N/A
		641666	3625	18.640	17.954	N/A
		646000	3690	18.710	17.956	N/A
	16-QAM	638000	3560	18.670	18.006	N/A
		641666	3625	18.690	18.010	N/A
		646000	3690	18.600	18.002	N/A
	64-QAM	638000	3560	18.620	18.012	N/A
		641666	3625	18.680	18.011	N/A
		646000	3690	18.750	18.026	N/A
	256-QAM	638000	3560	18.570	18.007	N/A
		641666	3625	18.580	18.006	N/A
		646000	3690	18.590	18.008	N/A

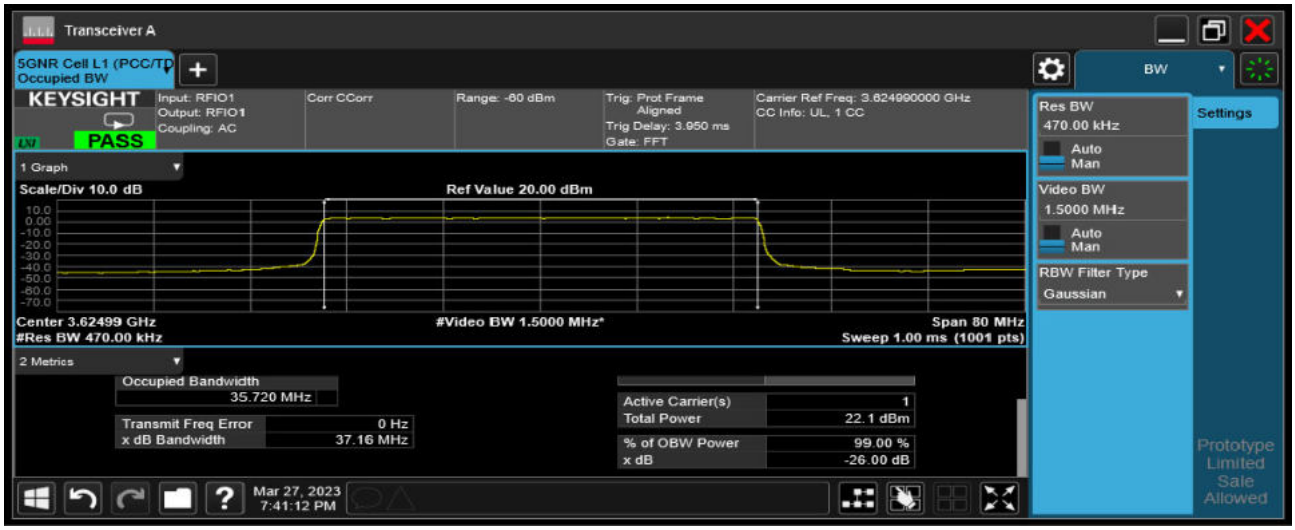
Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)
				26dB BW	99% BW	
30M	π/2-BPSK	637668	3565	27.810	26.910	N/A
		641666	3625	27.840	26.892	N/A
		645666	3685	27.820	26.917	N/A
	QPSK	637668	3565	27.850	26.924	N/A
		641666	3625	27.900	26.925	N/A
		645666	3685	27.830	26.927	N/A
	16-QAM	637668	3565	27.850	26.897	N/A
		641666	3625	27.880	26.889	N/A
		645666	3685	27.850	26.902	N/A
	64-QAM	637668	3565	27.790	26.891	N/A
		641666	3625	27.810	26.884	N/A
		645666	3685	27.840	26.894	N/A
	256-QAM	637668	3565	27.860	26.897	N/A
		641666	3625	27.800	26.897	N/A
		645666	3685	27.830	26.899	N/A
40M	π/2-BPSK	638000	3570	37.170	35.728	N/A
		641666	3625	37.150	35.729	N/A
		645332	3680	37.170	35.731	N/A
	QPSK	638000	3570	37.150	35.717	N/A
		641666	3625	37.160	35.720	N/A
		645332	3680	37.150	35.727	N/A
	16-QAM	638000	3570	37.180	35.724	N/A
		641666	3625	37.180	35.734	N/A
		645332	3680	37.190	35.732	N/A
	64-QAM	638000	3570	37.180	35.719	N/A
		641666	3625	37.180	35.723	N/A
		645332	3680	37.190	35.722	N/A
	256-QAM	638000	3570	37.130	35.707	N/A
		641666	3625	37.130	35.701	N/A
		645332	3680	37.140	35.713	N/A

Spectrum plot of worst value

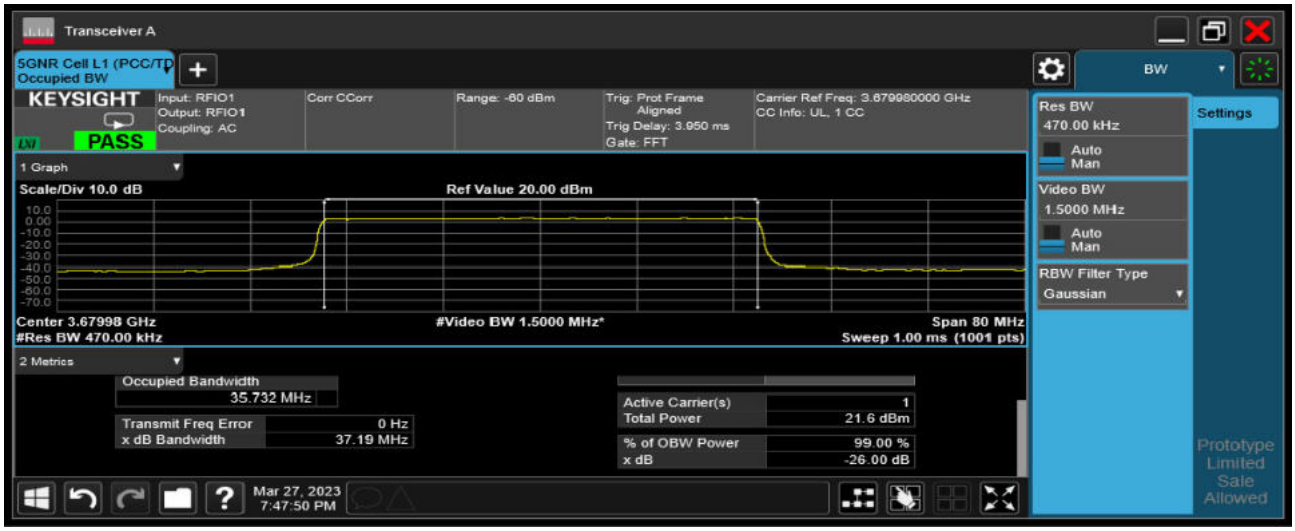
pi/2 BPSK: 40 MHz / CH645332



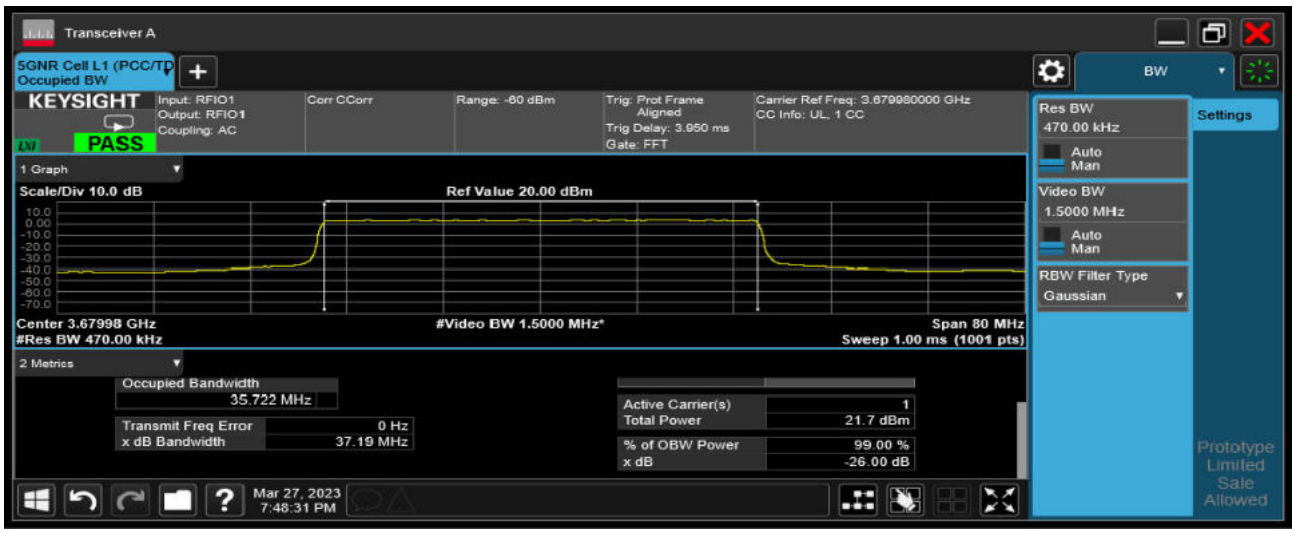
QPSK: 40 MHz / CH641666



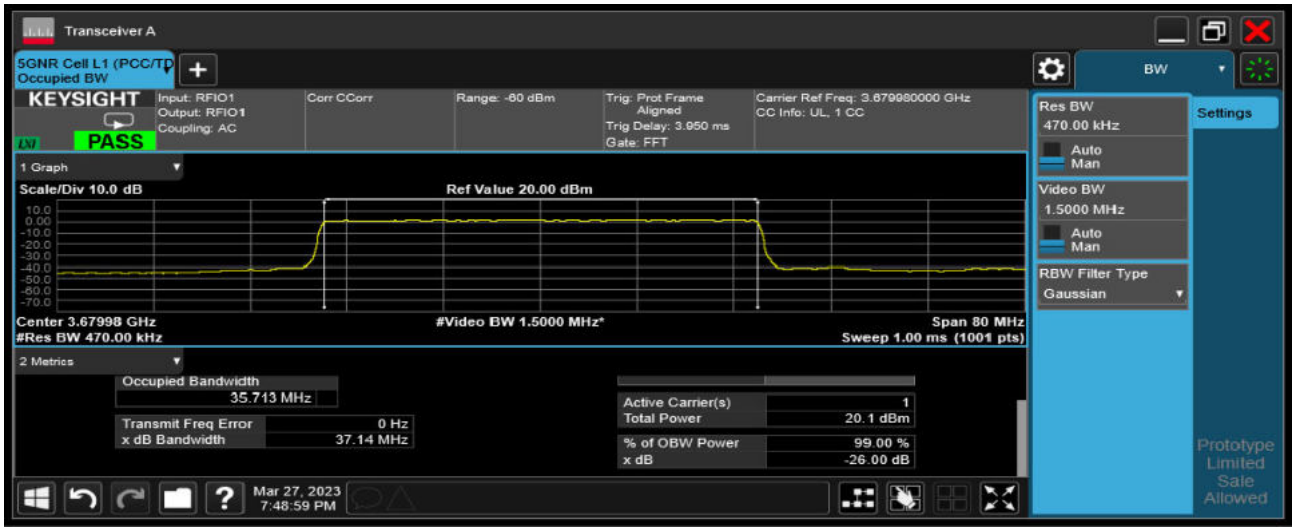
16-QAM: 40 MHz / CH645332



64-QAM: 40 MHz / CH645332

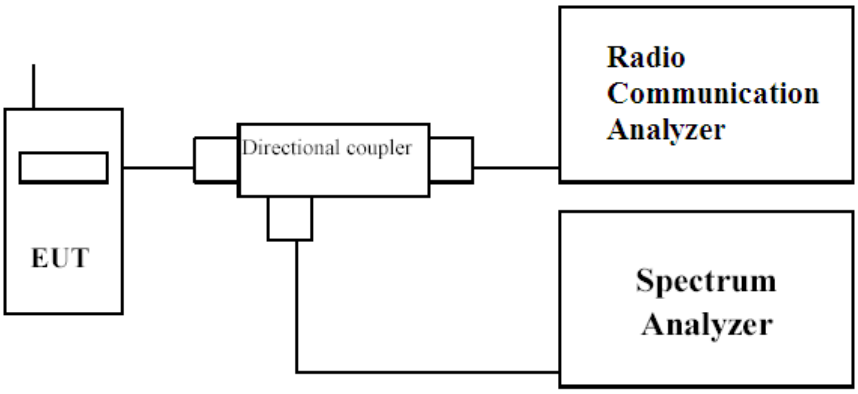


256-QAM: 40 MHz / CH645332



4. Spurious Emission at Antenna Terminals

4.1. Test Setup



4.2. Test Limit

(1) Within 0 MHz to 10 MHz above and below the assigned channel ≤ −13 dBm/MHz.

(2) Greater than 10 MHz above and below the assigned channel ≤ −25 dBm/MHz.

(3) Any emission below 3530 MHz and above 3720 MHz ≤ −40 dBm/MHz.

4.3. Test Procedure

In accordance with Part 96.41 at least 1 % of the emission bandwidth was used for the resolution and video bandwidths up to 1 MHz away from the Block Edge. At greater than 1 MHz, the resolution and video bandwidth were increased to 1 MHz/3 MHz.

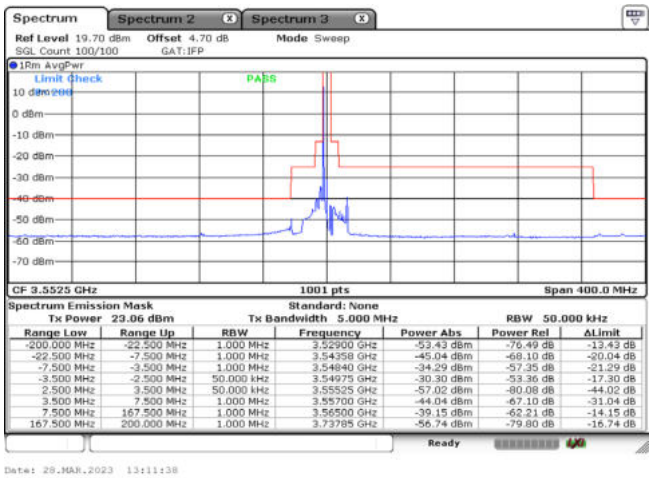
The reference power and path losses of all channels used for testing in each frequency block were measured.

4.4. Test Specification

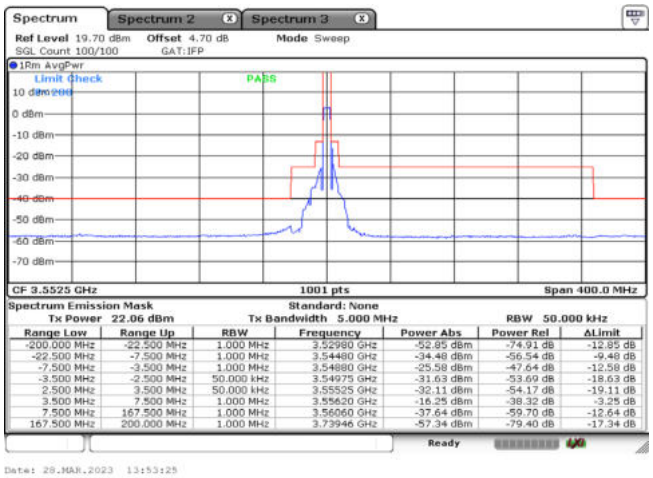
According to Part 2.1051, 96.41

4.5. Test Result of Spurious Emission at Antenna Terminals

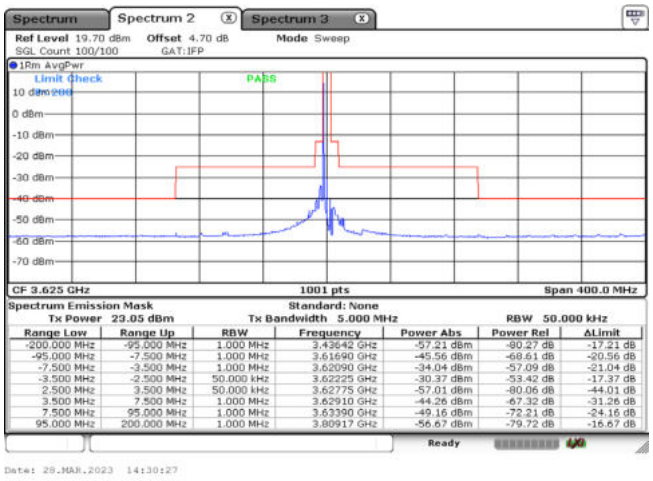
Mode 1: LTE Band 48



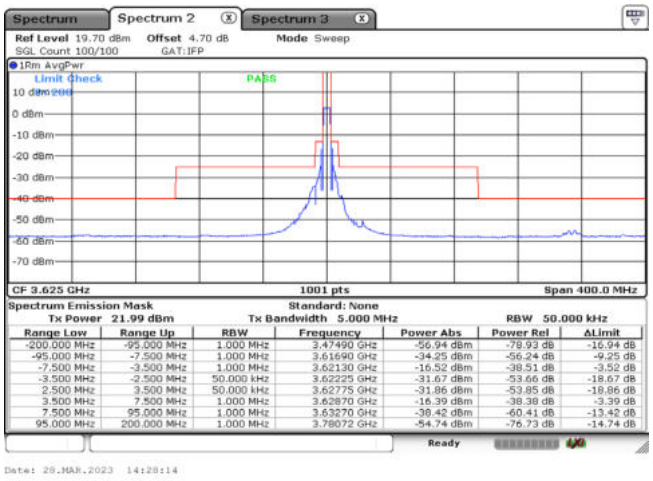
CH55265_5 MHz_QPSK_1RB0



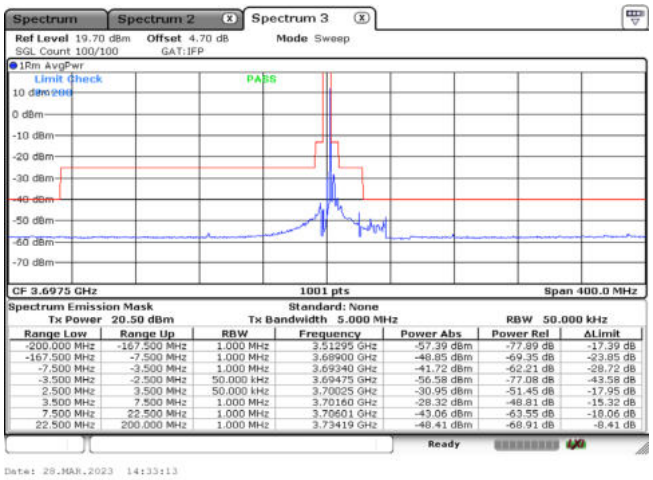
CH55265_5 MHz_QPSK_25RB0



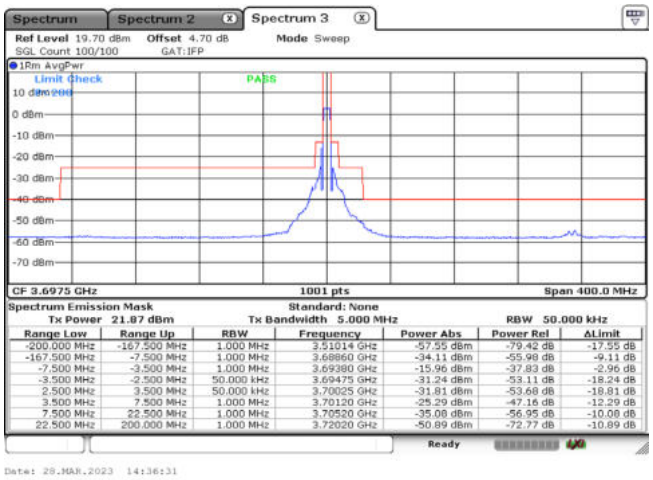
CH55990_5 MHz_QPSK_1RB0



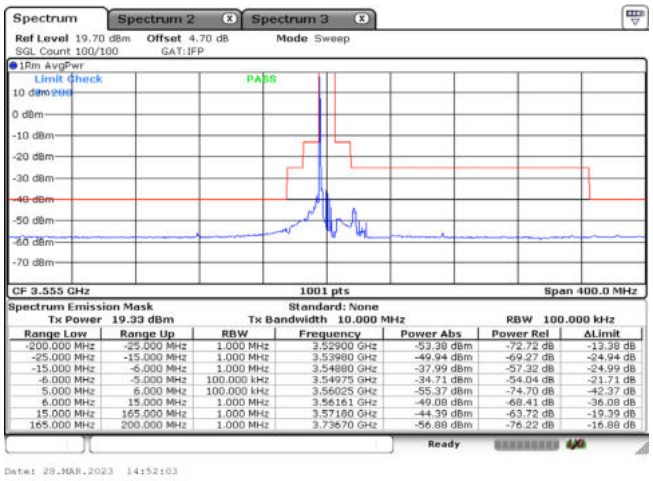
CH55990_5 MHz_QPSK_25RB0



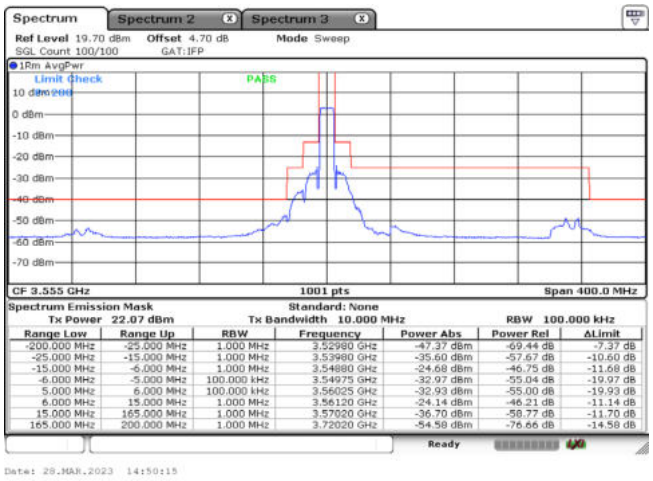
CH56715_5 MHz_QPSK_1RB24



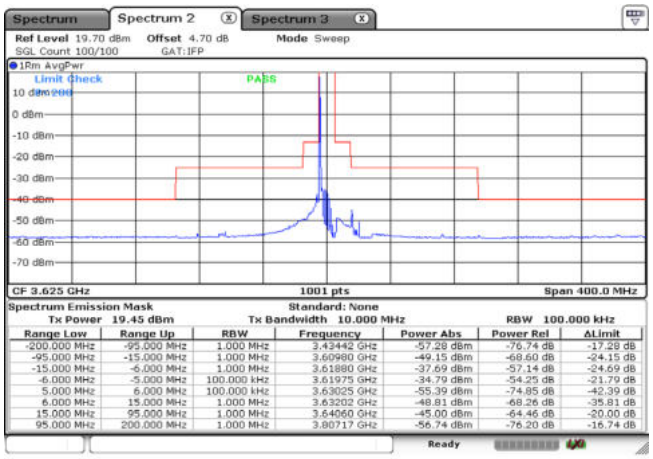
CH56715_5 MHz_QPSK_25RB0



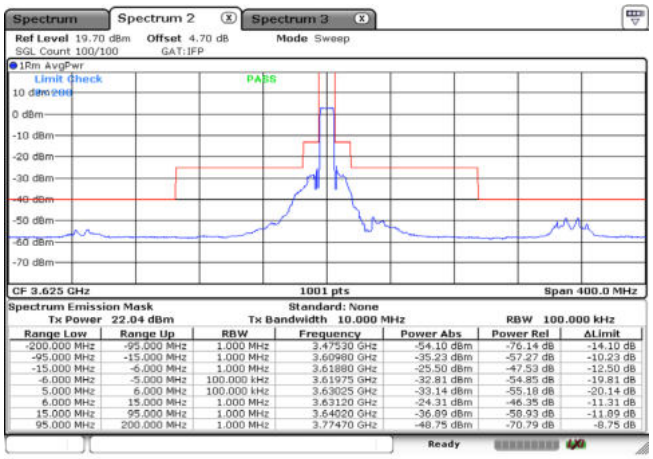
CH55290_10 MHz_QPSK_1RB0



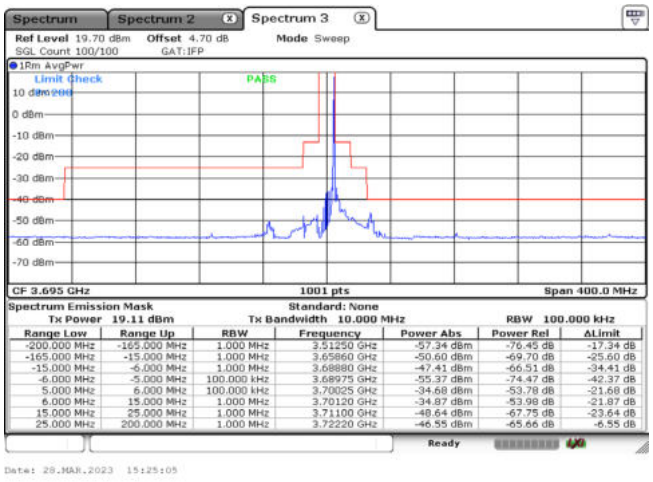
CH55290_10 MHz_QPSK_50RB0



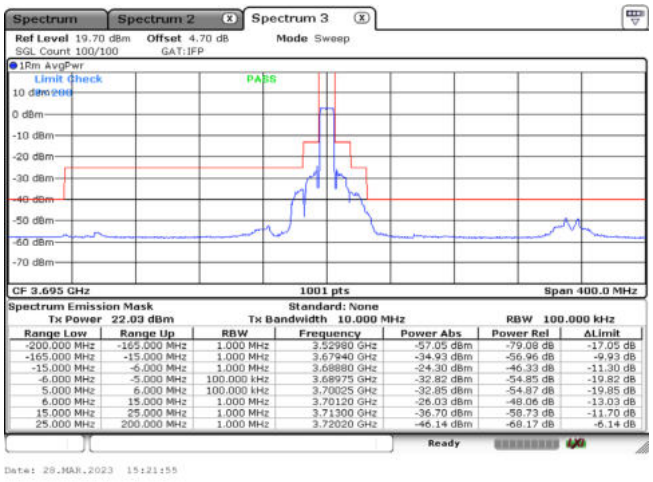
CH55990_10 MHz_QPSK_1RB0



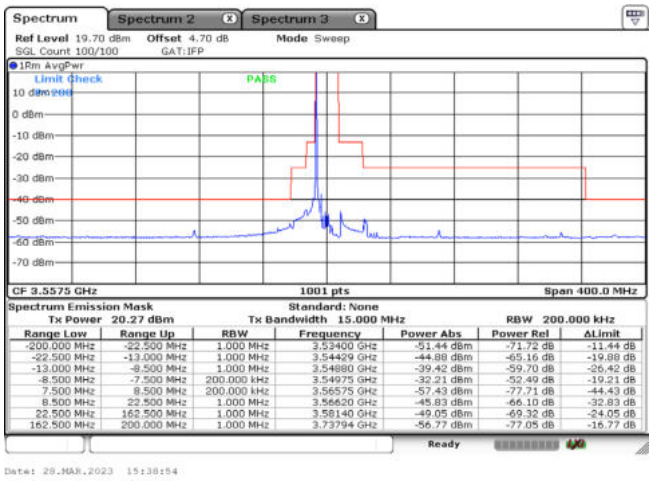
CH55990_10 MHz_QPSK_50RB0



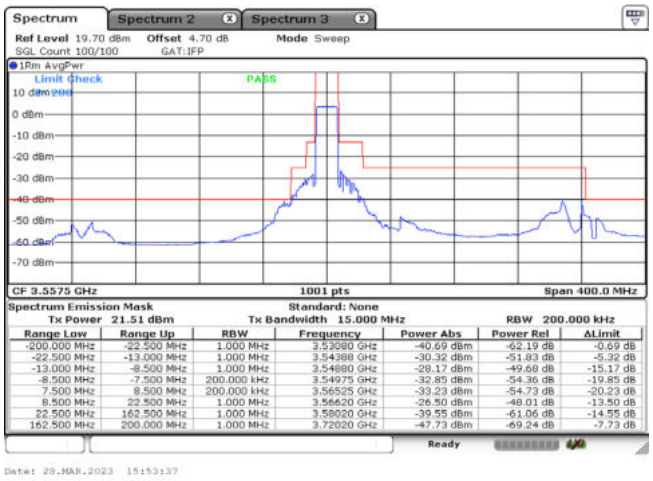
CH56690_10 MHz_QPSK_1RB49



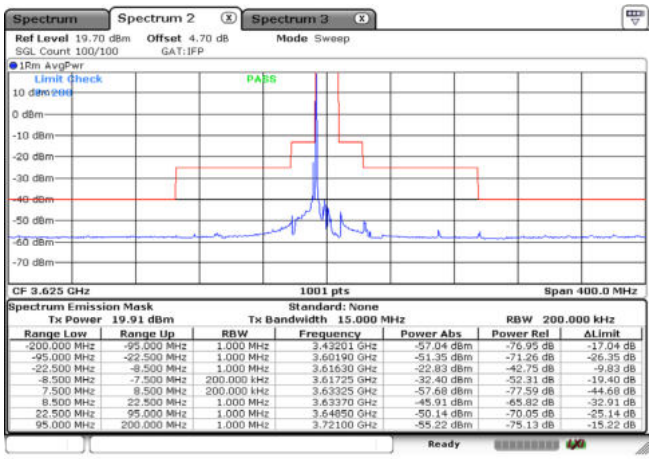
CH56690_10 MHz_QPSK_50RB0



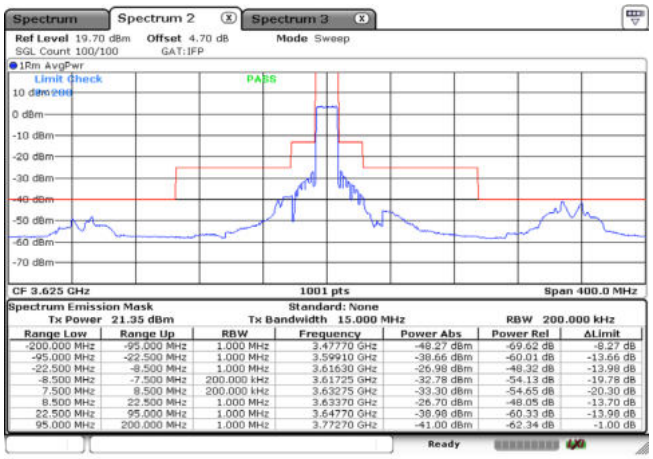
CH55315_15 MHz_QPSK_1RB0



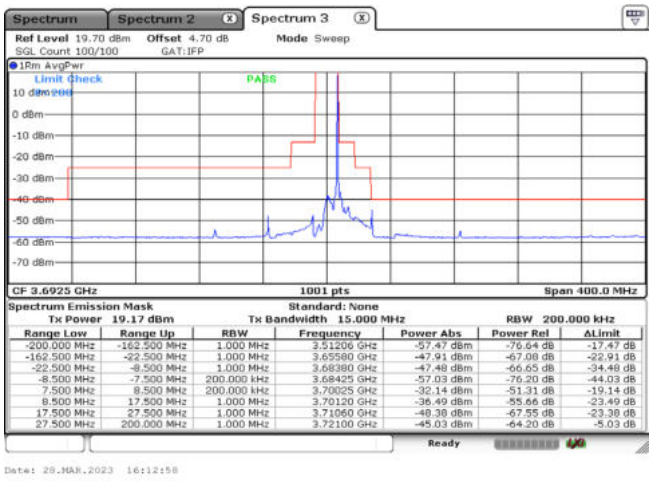
CH55315_15 MHz_QPSK_75RB0



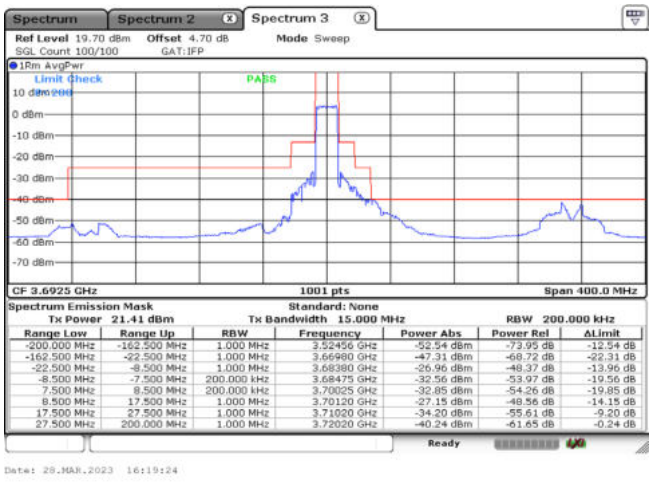
CH55990_15 MHz_QPSK_1RB0



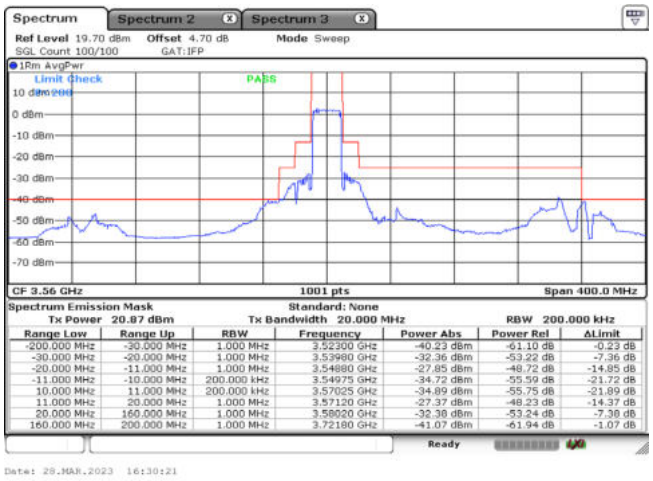
CH55990_15 MHz_QPSK_75RB0



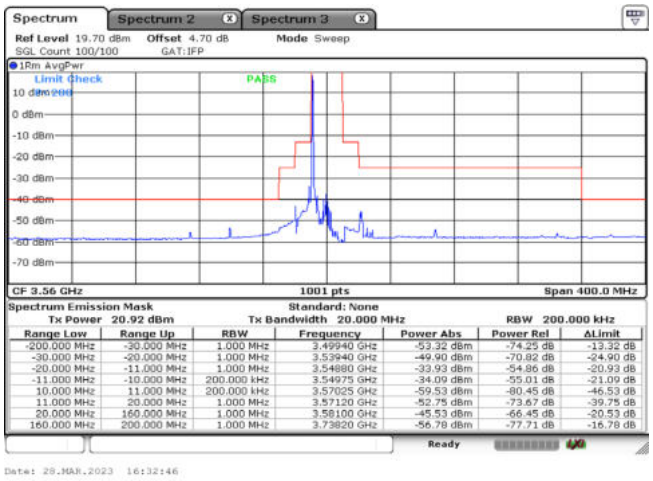
CH56665_15 MHz_QPSK_1RB74



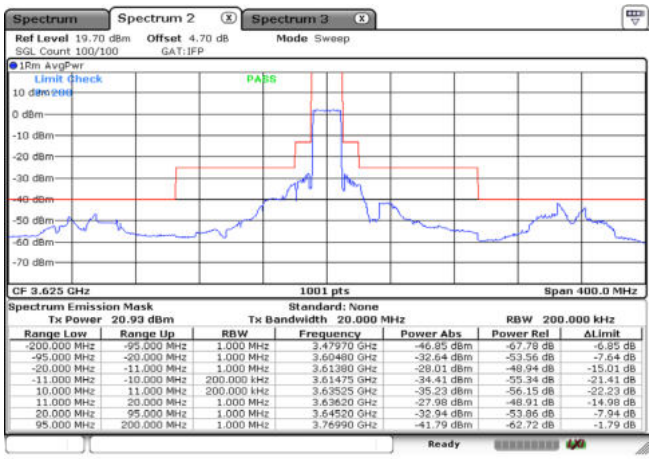
CH56665_15 MHz_QPSK_75RB0



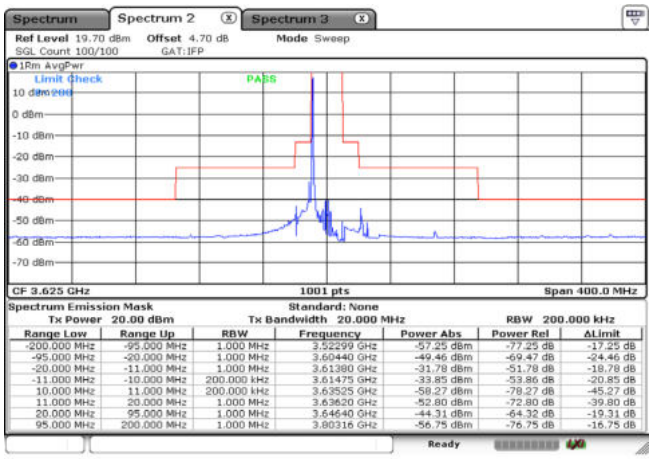
CH55340_20 MHz_QPSK_100RB0



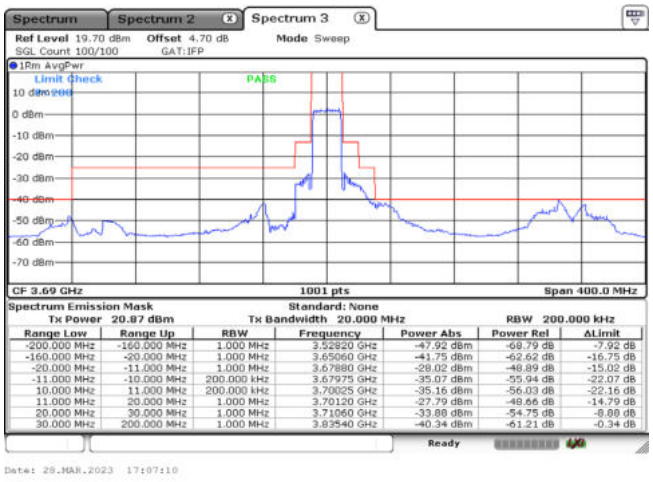
CH55340_20 MHz_QPSK_1RB0



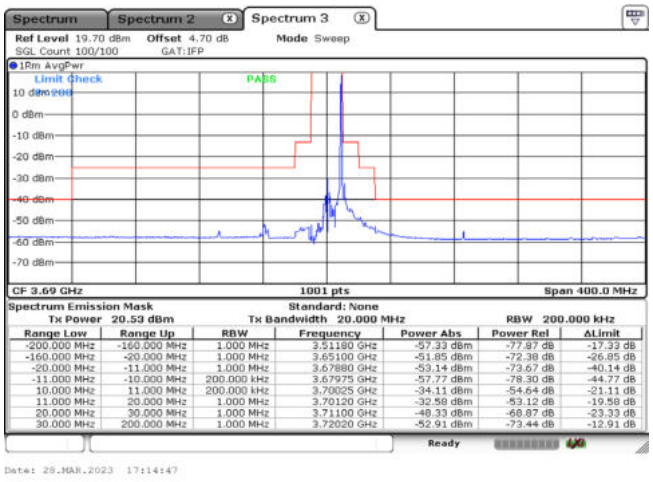
CH55990_20 MHz_QPSK_100RB0



CH55990_20 MHz_QPSK_1RB0

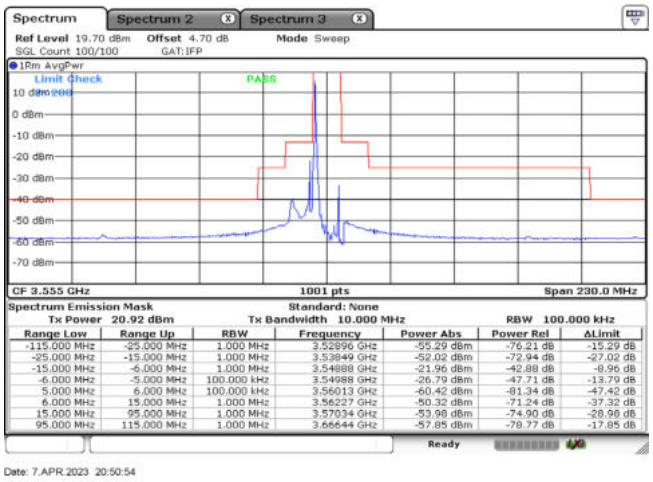


CH56640_20 MHz_QPSK_100RB0

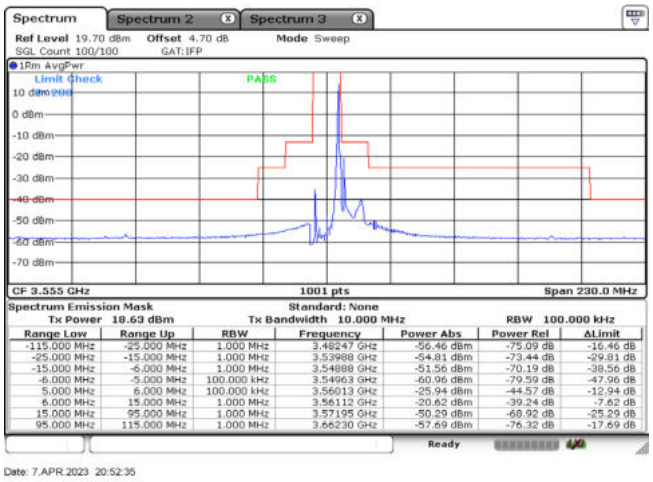


CH56640_20 MHz_QPSK_1RB99

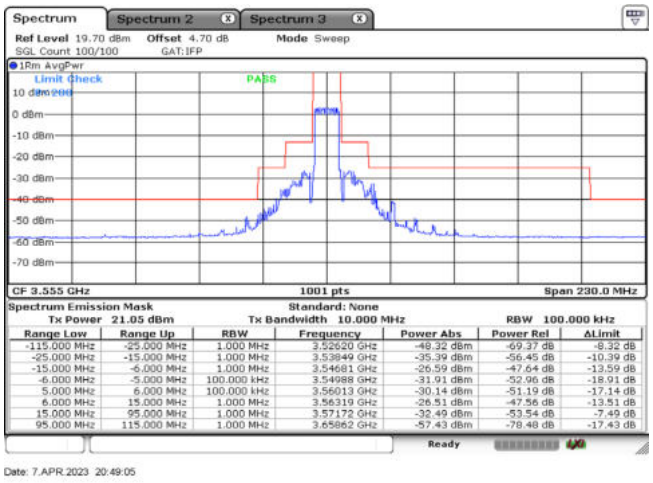
Mode 2: 5G NR n48



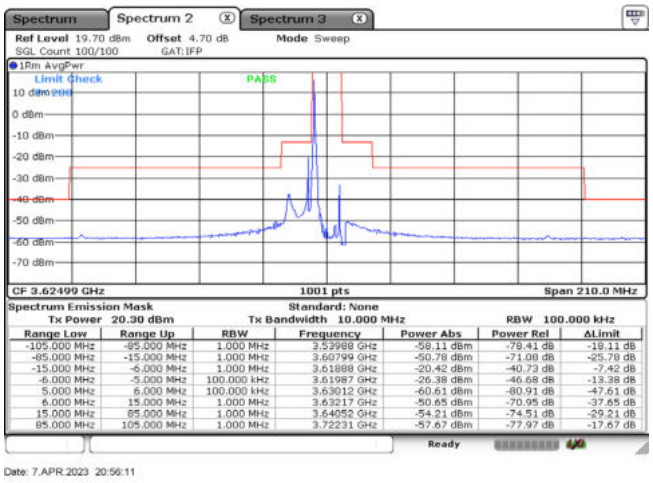
10 MHz_CH637000_BPSK_1RB0



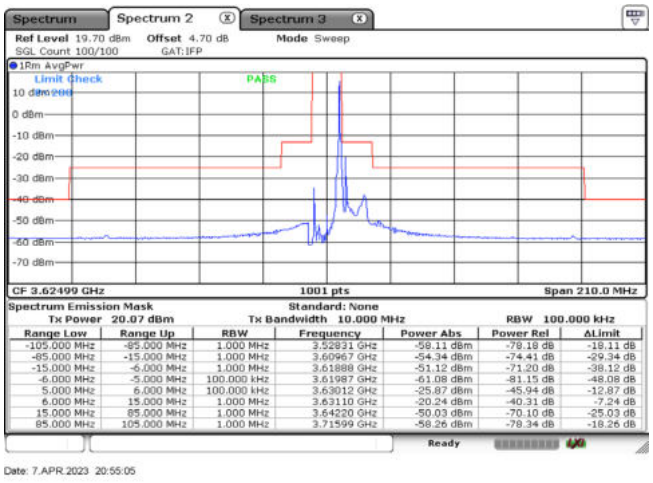
10 MHz_CH637000_BPSK_1RB23



10 MHz_CH637000_BPSK_24RB0



10 MHz_CH641666_BPSK_1RB0



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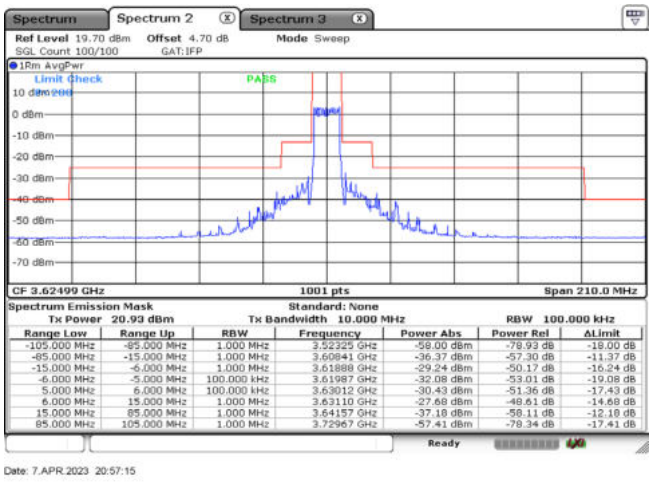
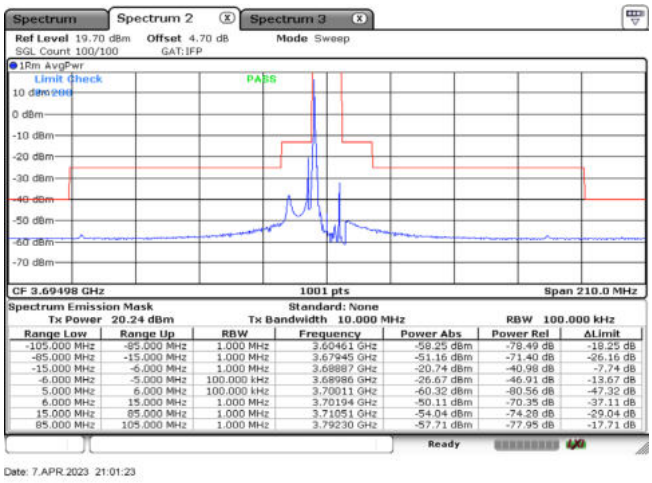
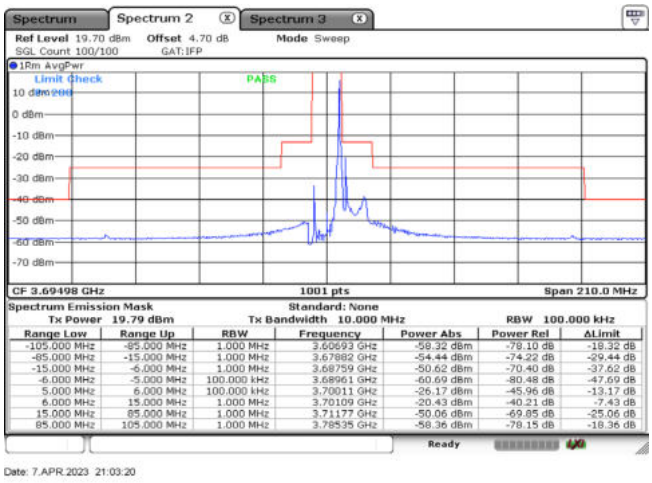


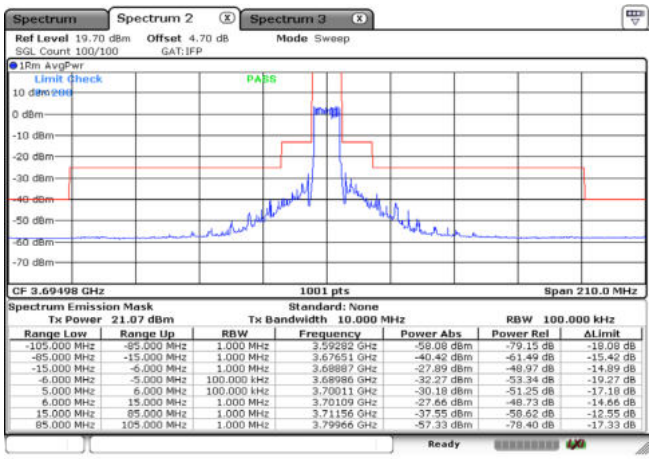
10 MHz_CH641666_BPSK_24RB0



10 MHz_CH646332_BPSK_1RB0



10 MHz_CH646332_BPSK_1RB23



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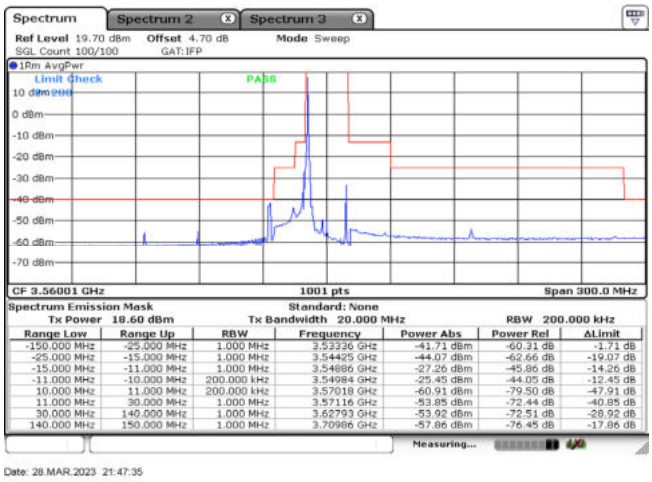
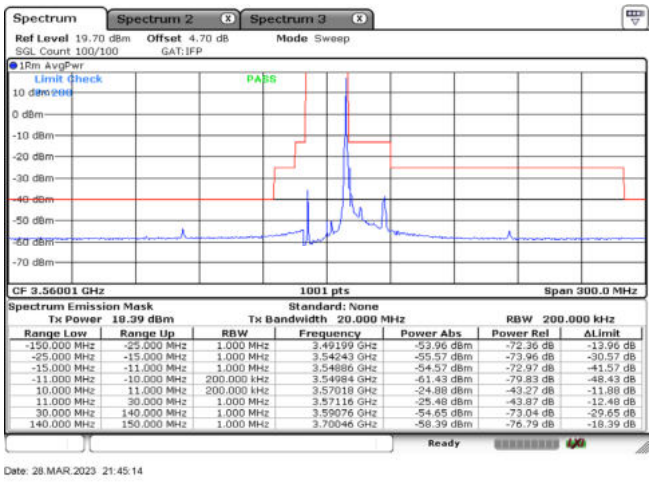
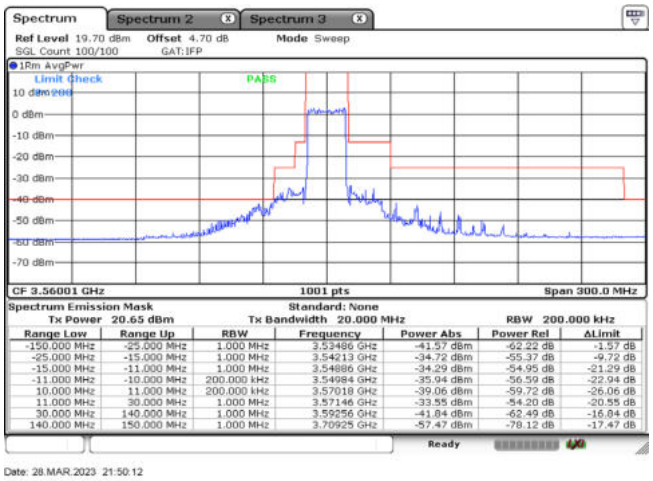


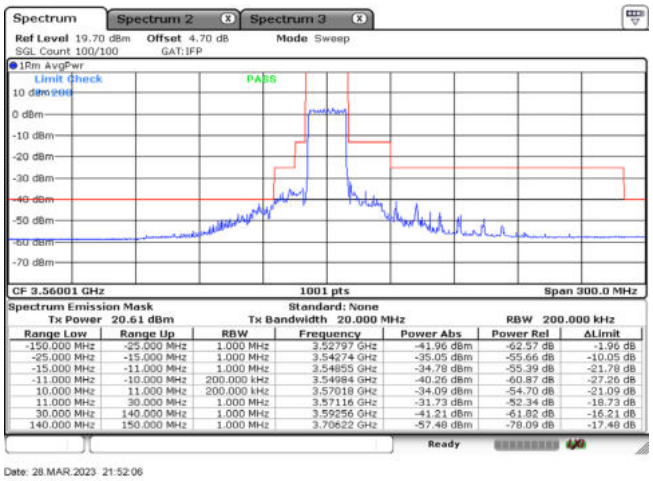
20 MHz_CH637334_BPSK_1RB0



20 MHz_CH637334_BPSK_1RB50



20 MHz_CH637334_BPSK_50RB0



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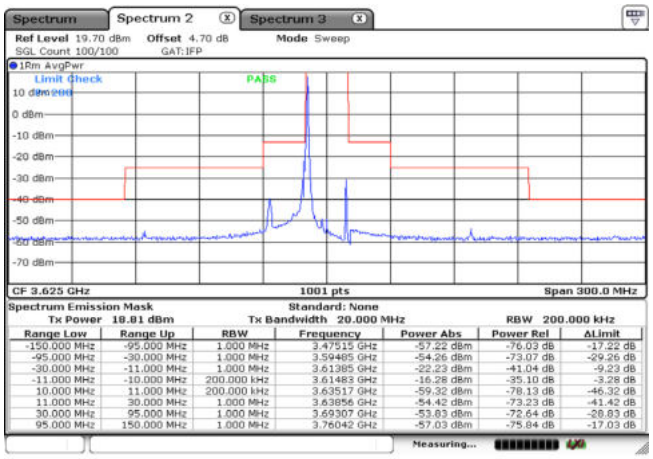
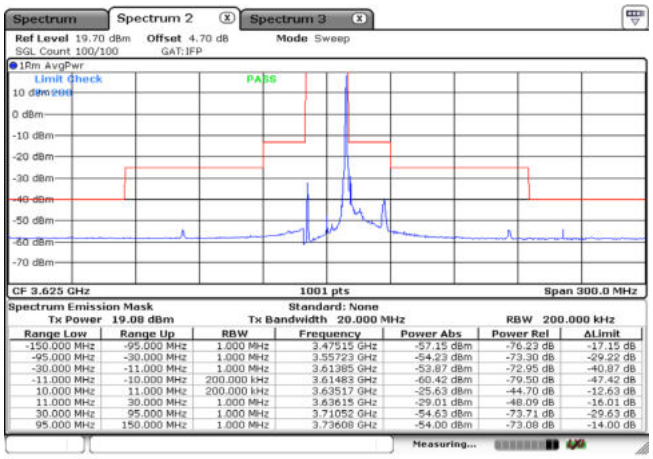


20 MHz_CH641666_BPSK_1RB0



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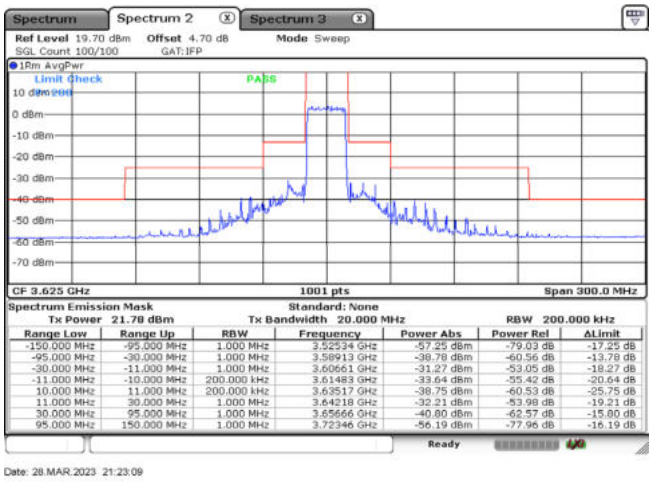
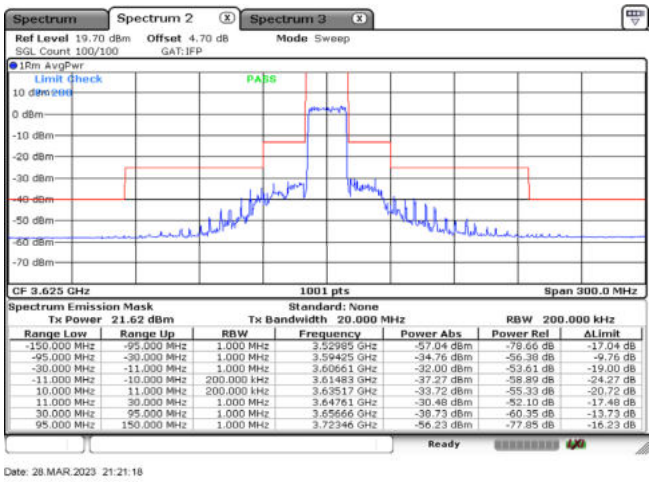


20 MHz_CH641666_BPSK_50RB0



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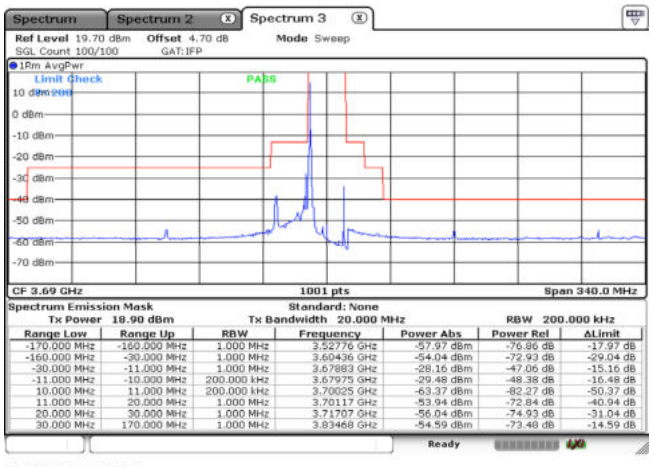
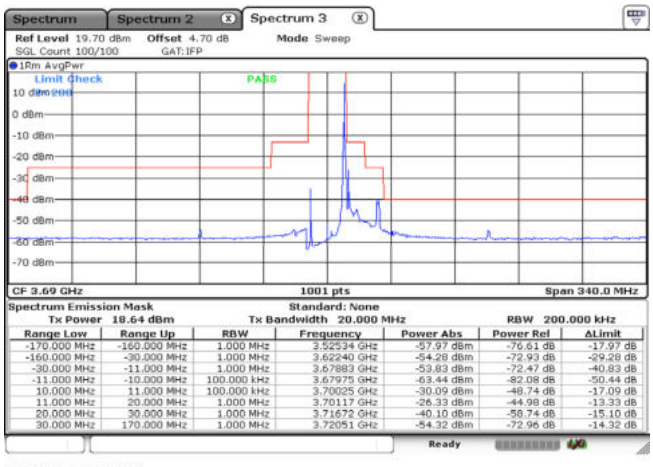


20 MHz_CH646000_BPSK_1RB0



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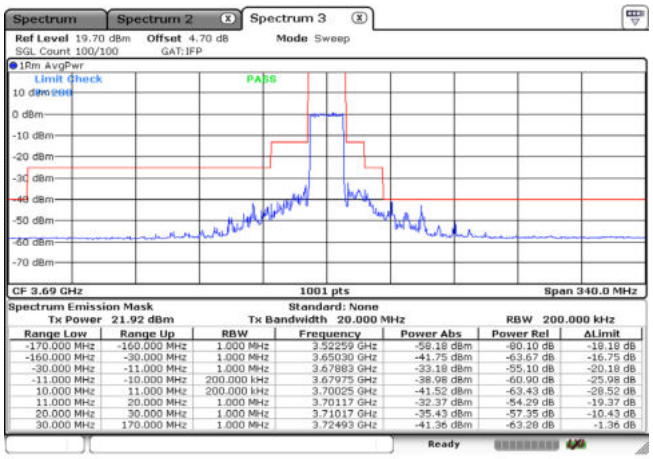

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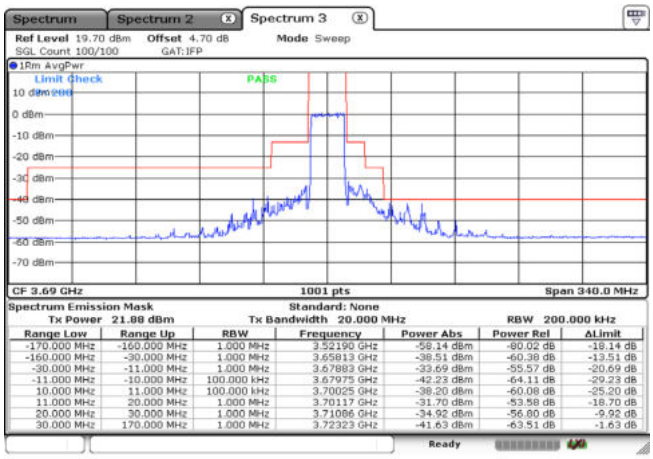

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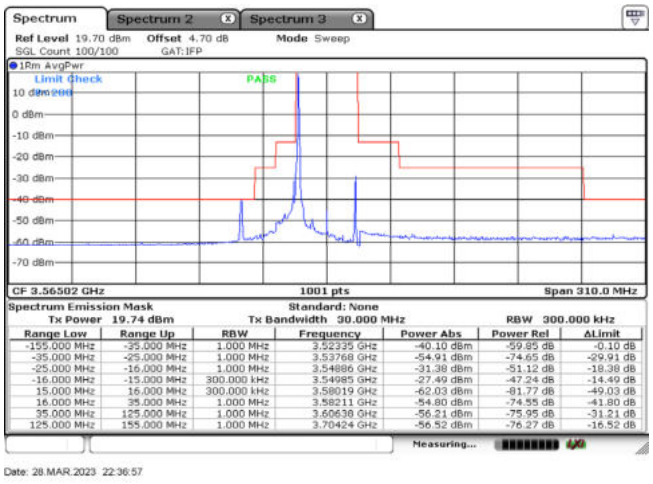

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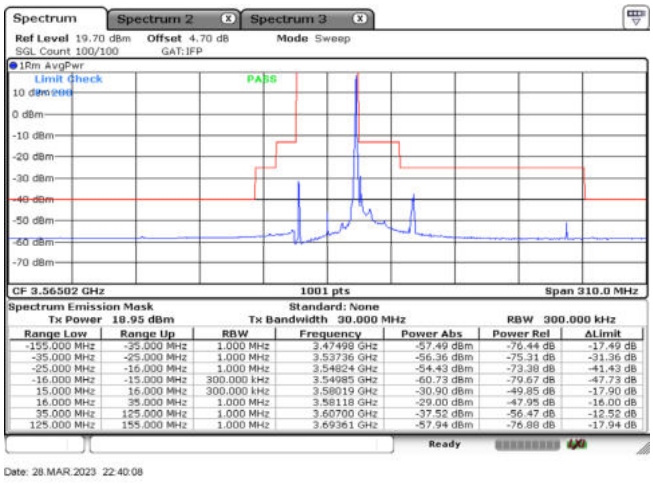

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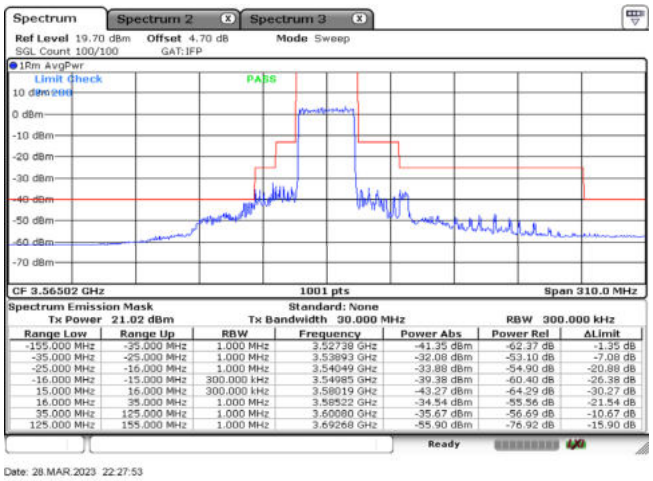

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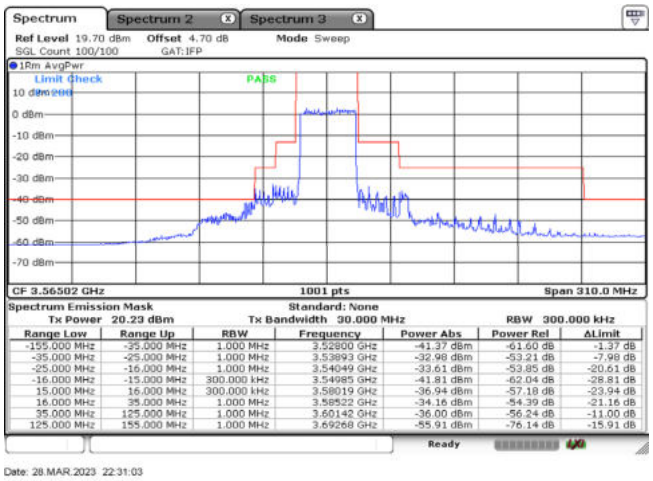

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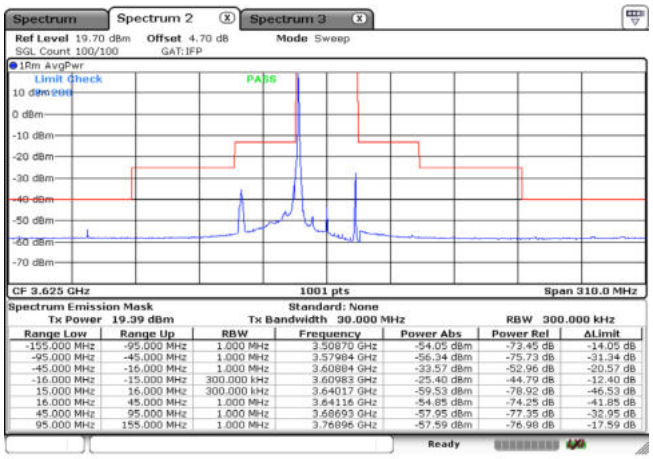

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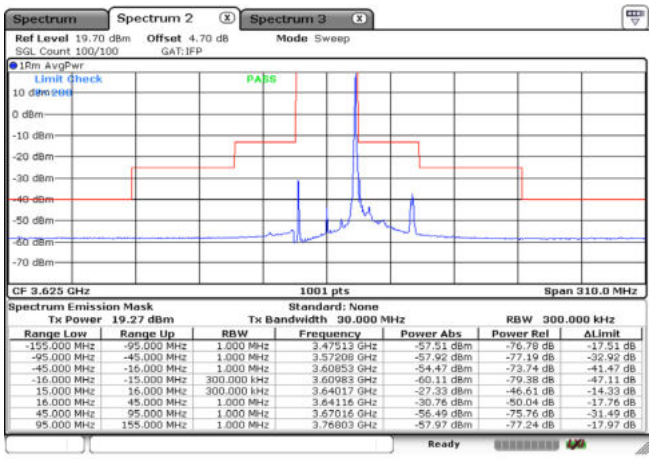

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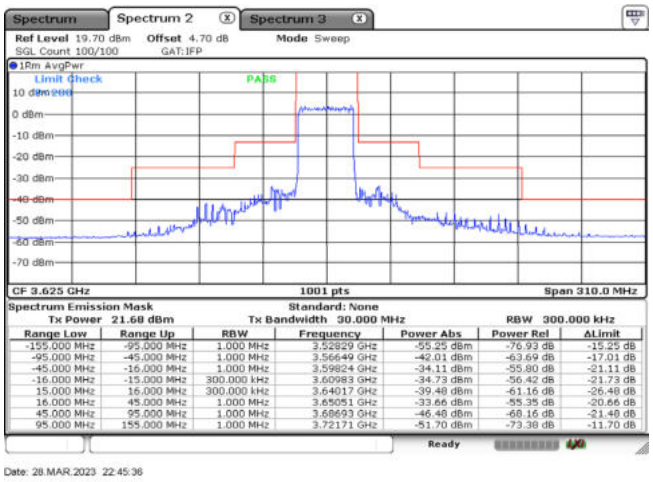

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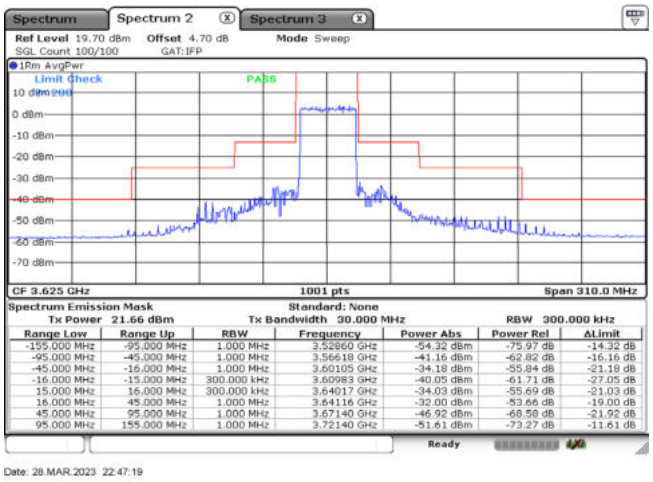

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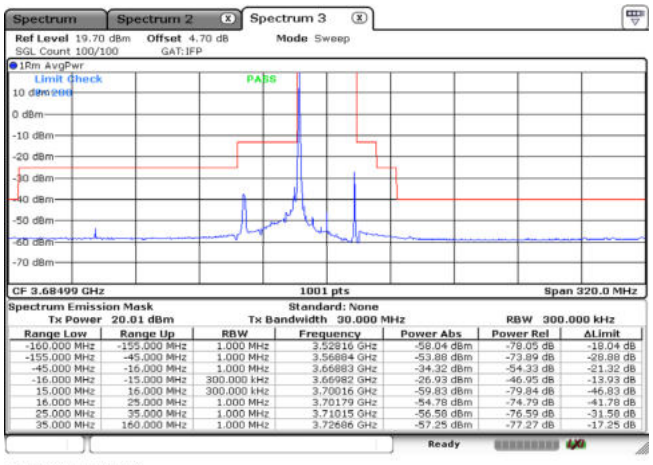

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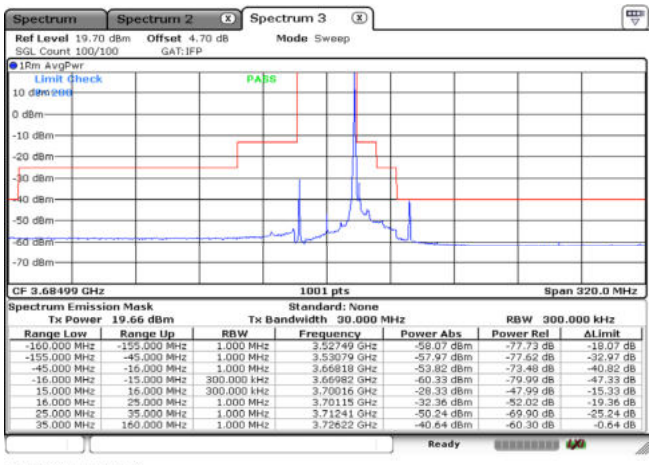

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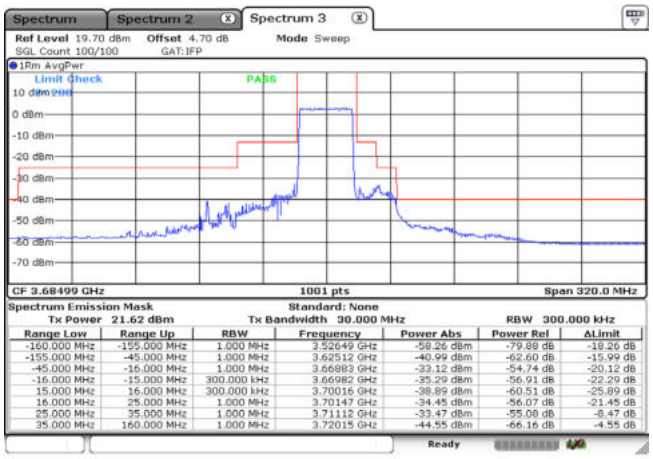

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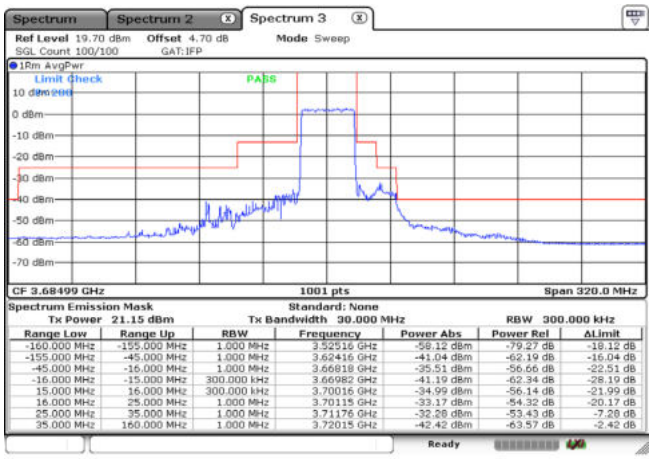

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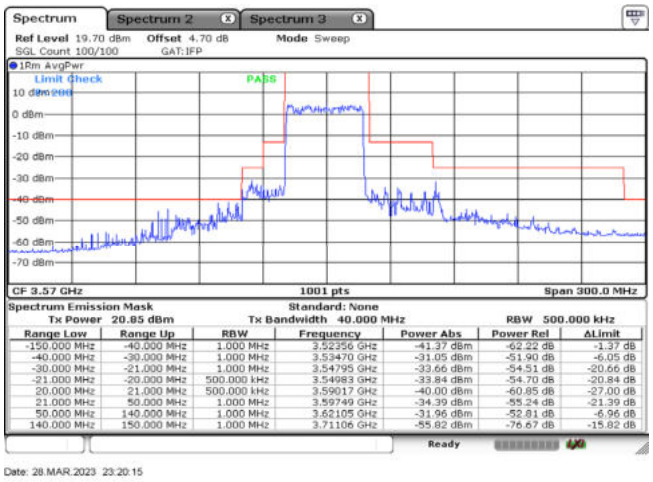
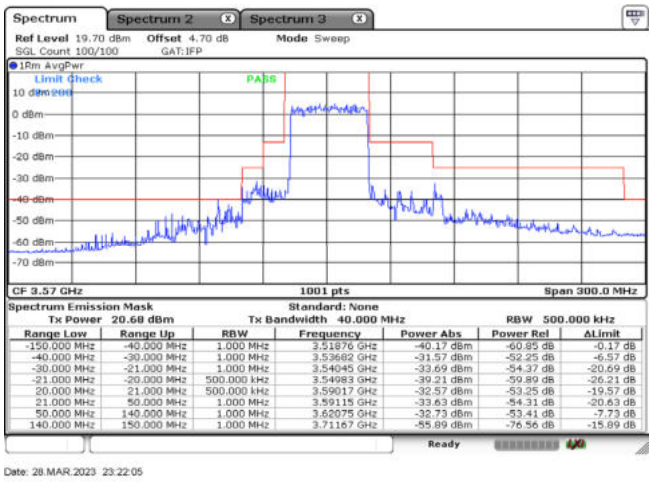


40 MHz_CH638000_BPSK_100RB0



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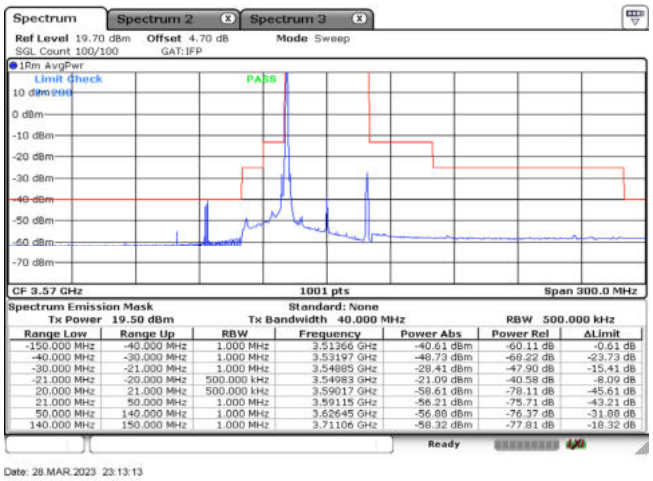

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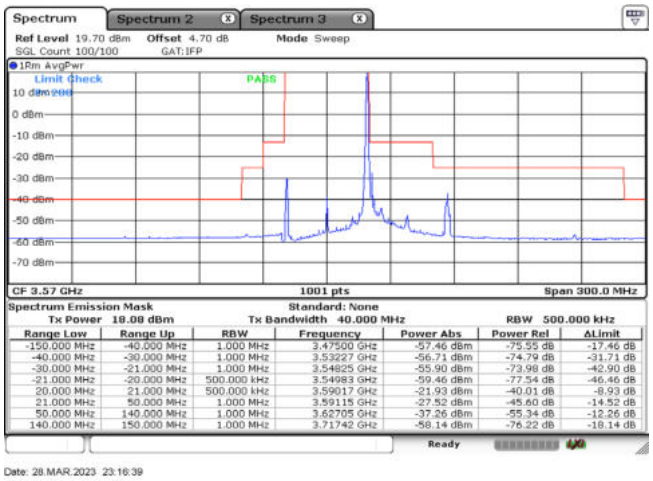

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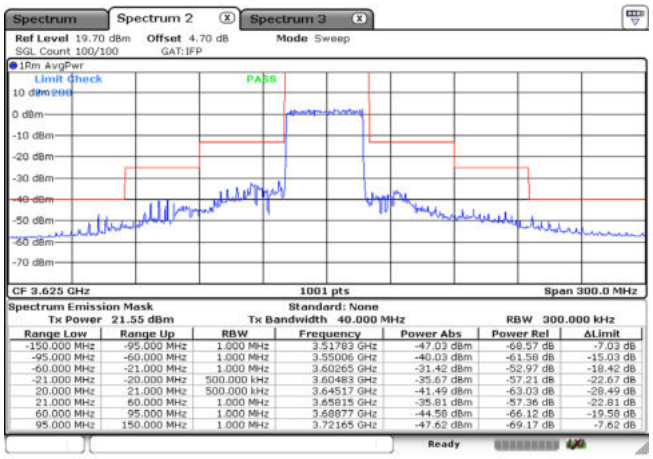
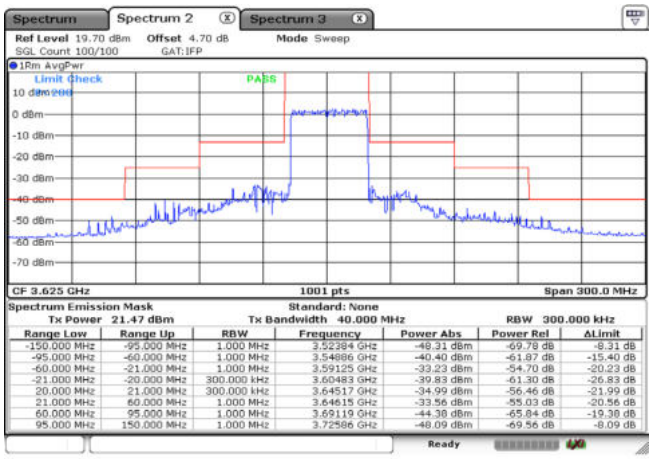


40 MHz_CH641666_BPSK_100RB0



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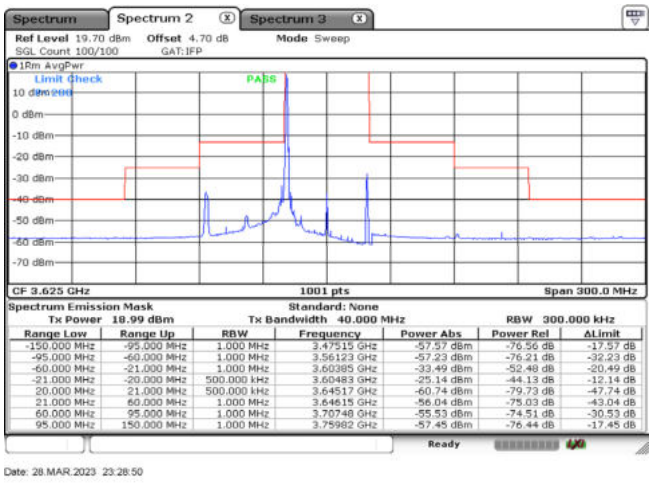

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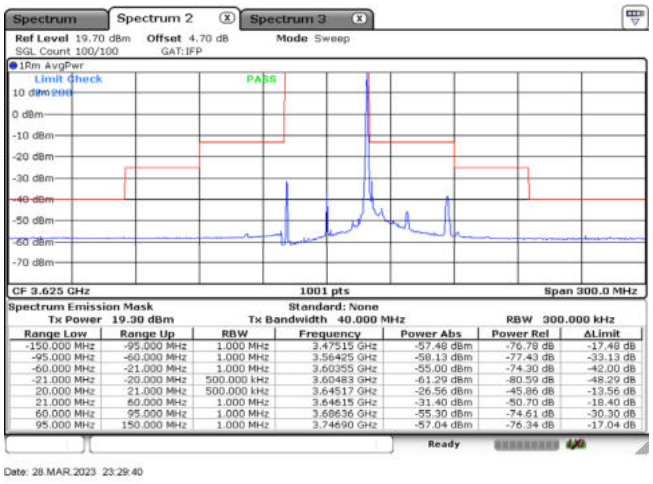

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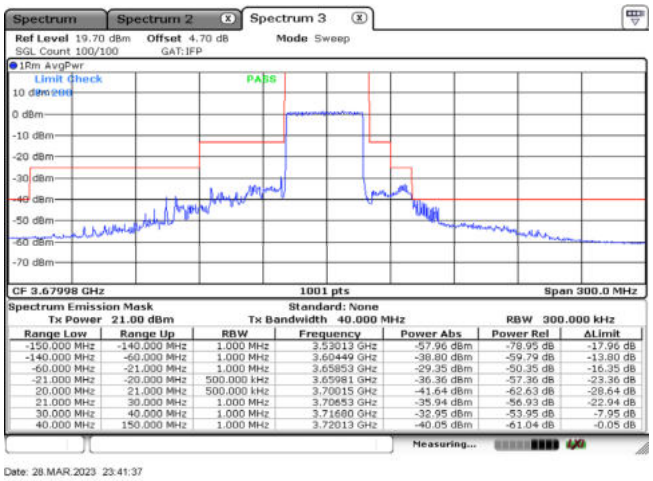
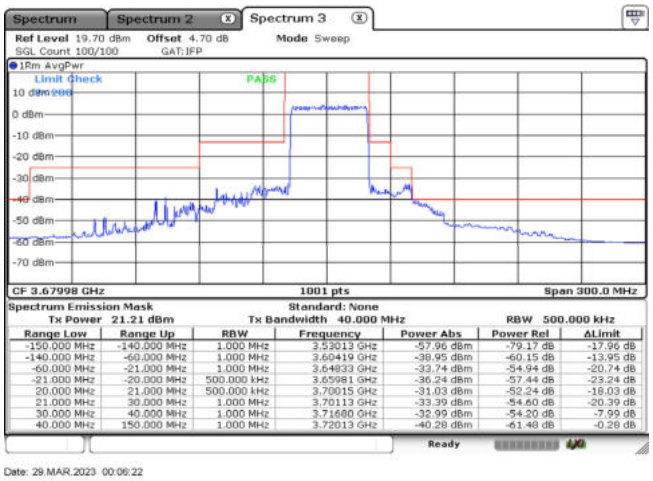


40 MHz_CH645332_BPSK_100RB0



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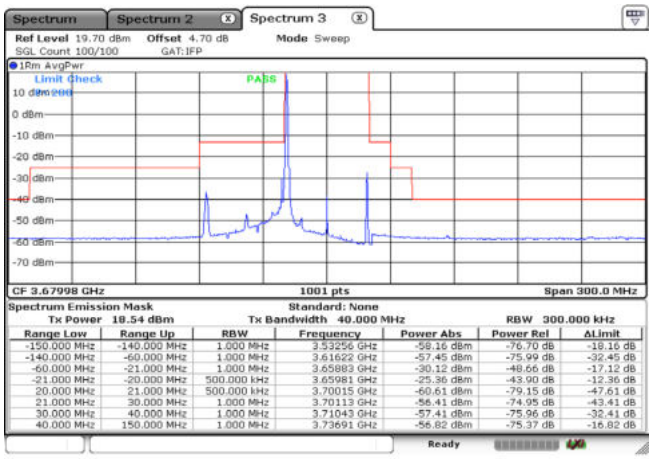
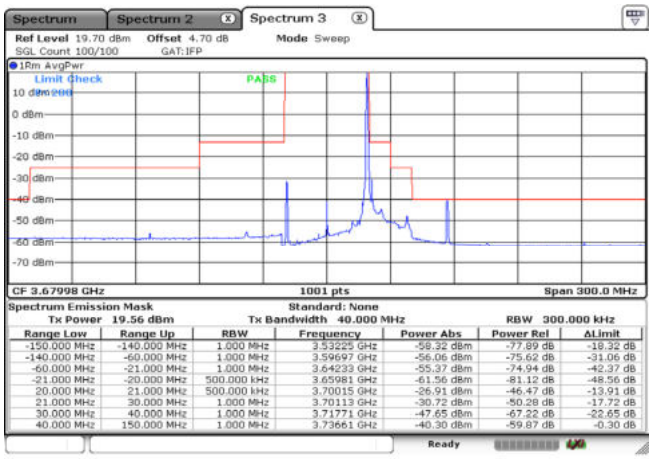


40 MHz_CH645332_BPSK_1RB0

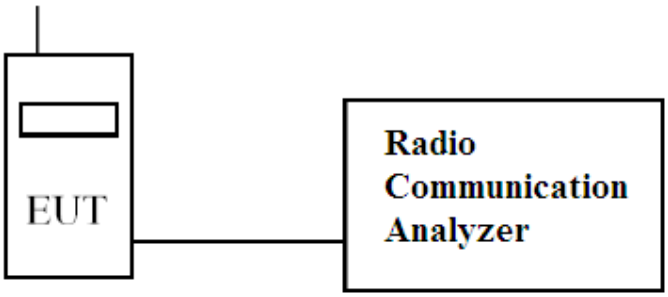


40 MHz_CH645332_BPSK_1RB105

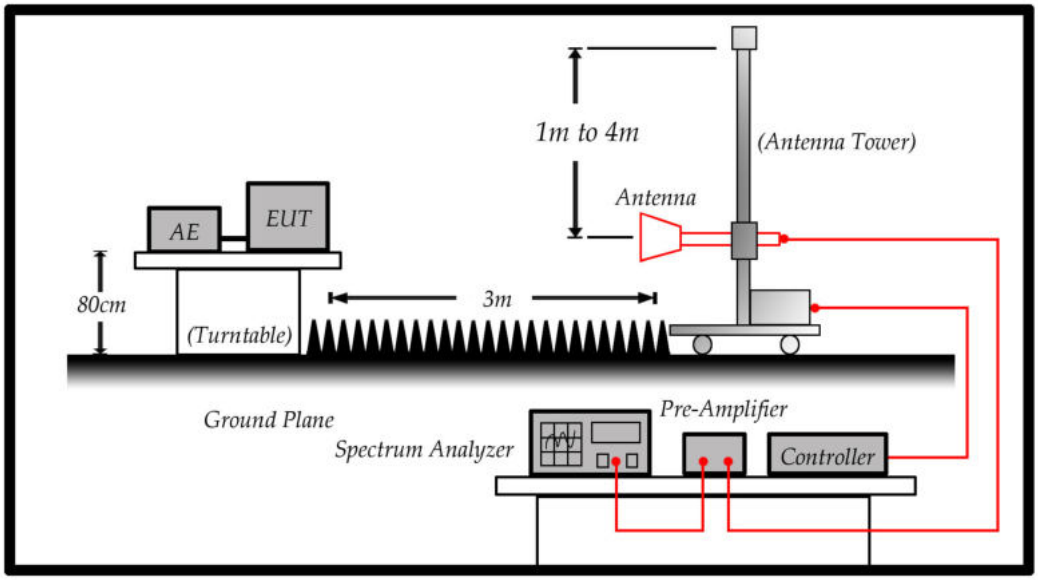
5. Spurious Emissions

5.1. Test Setup

Conducted Spurious Emission.



Radiated Spurious.



Note: The Worst case Mode is QPSK Mode for Radiated spurious emissions.

5.2. Test Limit

Limit: <-40 dBm

43 + 10Log(P) down on the carrier where P is the power in Watts.

5.3. Test Procedure

In accordance with Part 2.1051, 96.41, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 30 MHz to 40 GHz. The EUT was set to transmit on full power. The EUT was tested on Low, middle and High channels for both power levels. The resolution and video bandwidth was set to 1 MHz/3 MHz in accordance with Part 2.1051, 96.41. The spectrum analyzer detector was set to Max Hold. In addition, measurements were made up to the 10th harmonic of the fundamental. The device was then replaced with a substitution antenna, which input signal was adjusted until the received level matched that of the previously detected emission.

(1) The EUT is tested with maximum rated TX power via the Base Station simulator.

(2) The EUT is tested in three orthogonal planes, The worst case was showing in this report.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

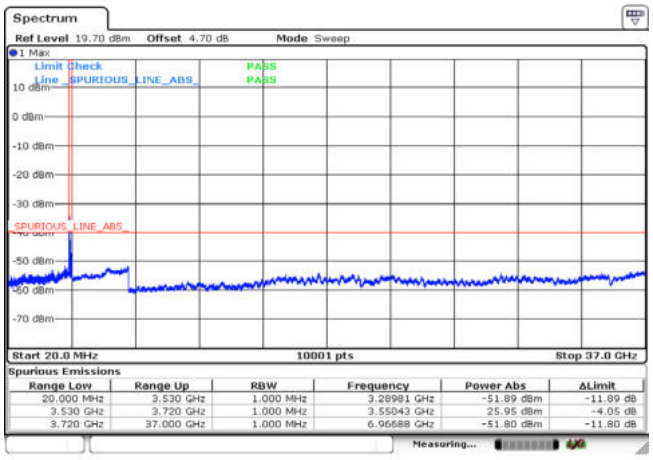
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to TIA/EIA 603-E on radiated measurement.

5.4. Test Specification

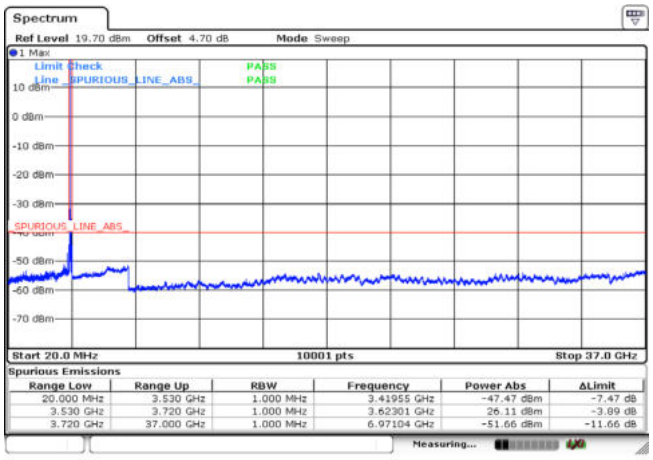
According to Part 2.1051, 96.41

5.5. Test Result of Conducted Spurious Emission

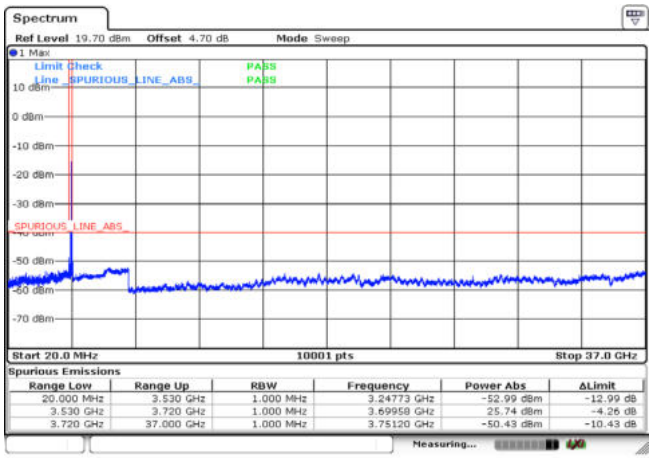
Mode 1: LTE Band 48



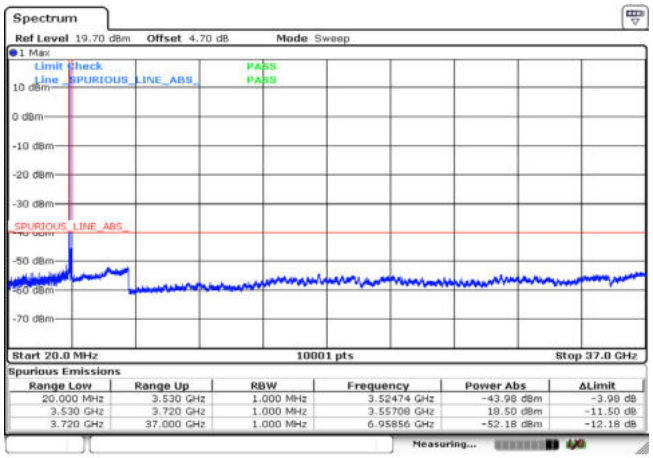
CH55265_5 MHz_QPSK_1RB0



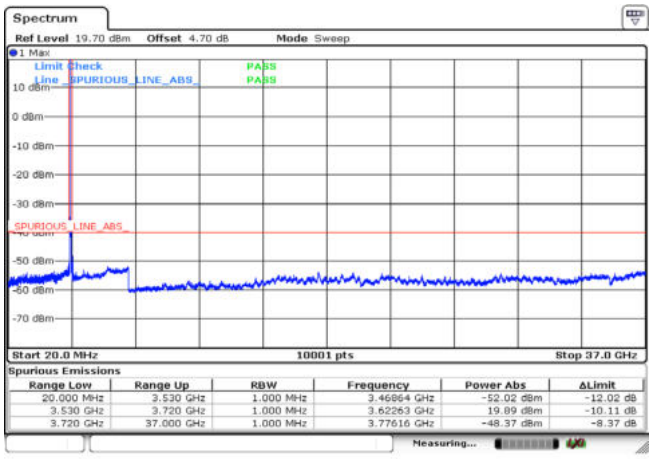
CH55990_5 MHz_QPSK_1RB0



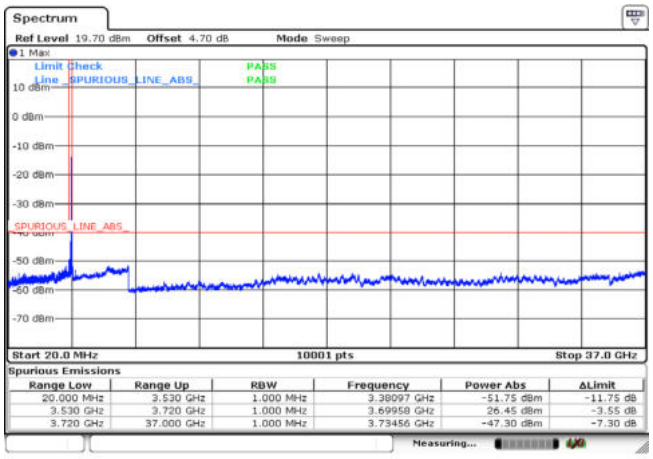
CH56715_5 MHz_QPSK_1RB24



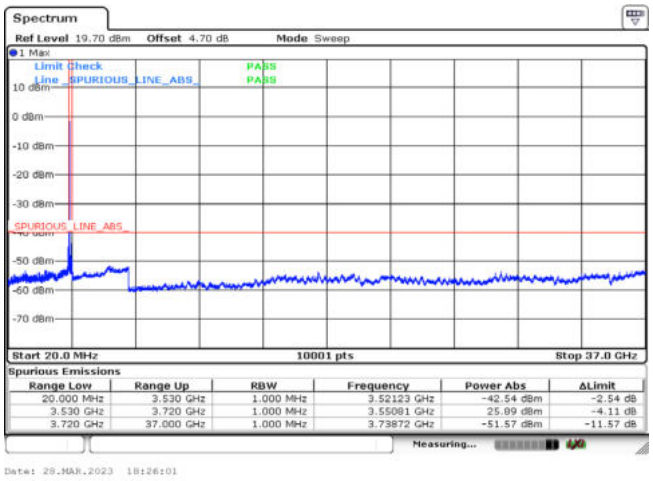
CH55290_10 MHz_QPSK_1RB0



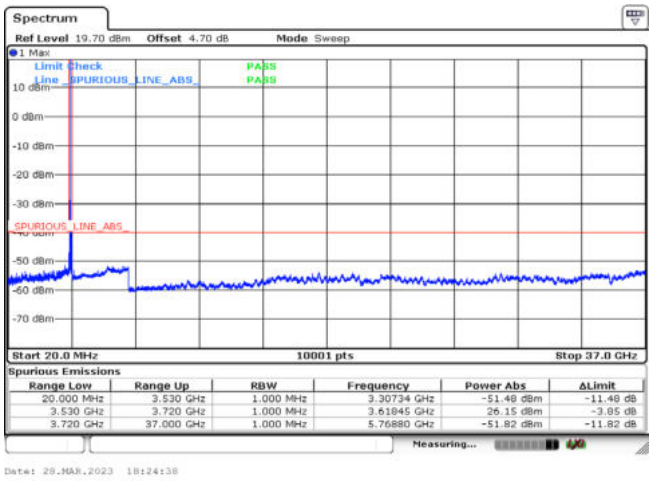
CH55990_10 MHz_QPSK_1RB0



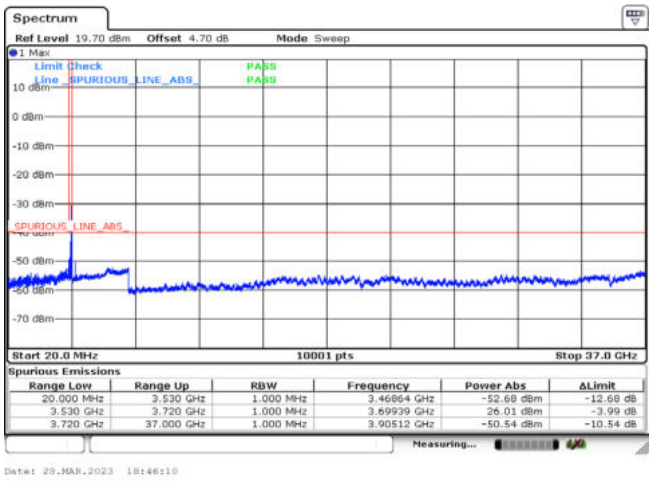
CH56690_10 MHz_QPSK_1RB49



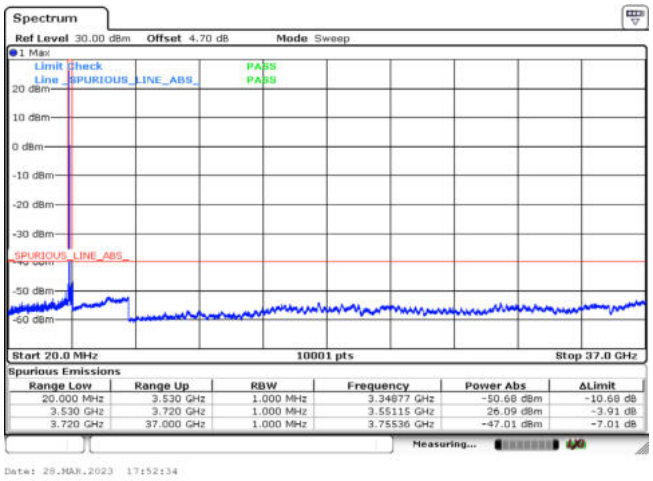
CH55315_15 MHz_QPSK_1RB0



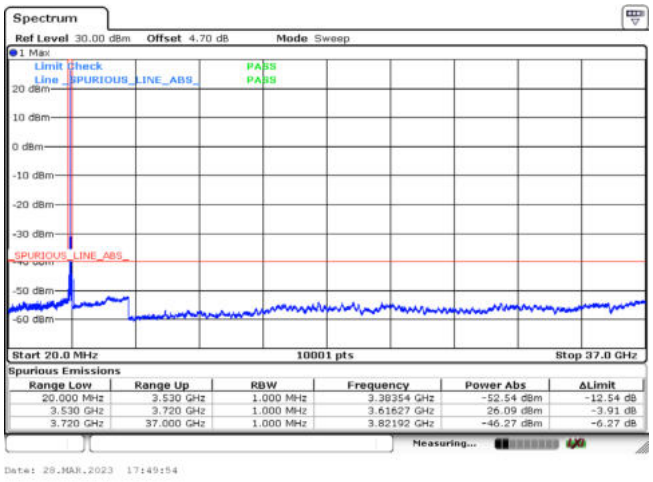
CH55990_15 MHz_QPSK_1RB0



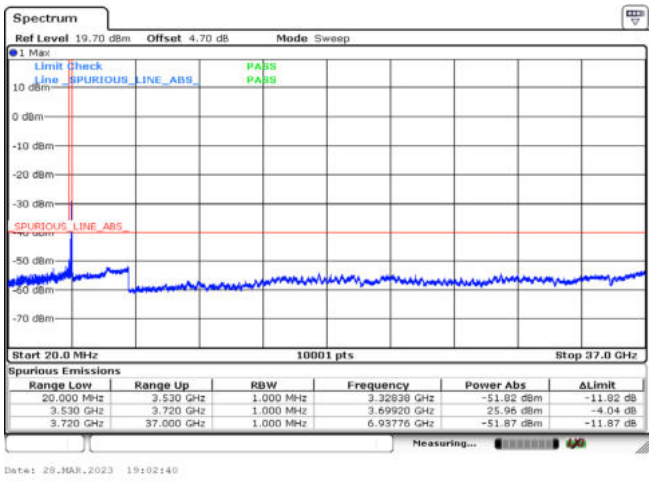
CH56665_15 MHz_QPSK_1RB74



CH55340_20 MHz_QPSK_1RB0



CH55990_20 MHz_QPSK_1RB0



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