

# FCC Test Report

Product Name : 5G CBRS Outdoor Router  
Brand Name : BEC / Billion  
Model No. : AirConnect® 8231, BEC AirConnect® 8231, BEC 8231  
FCC ID : QI3BEC-8231

Applicant : Billion Electric Co., Ltd.  
Address : 8F., No. 192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231 Taiwan

Date of Receipt : Jul. 02, 2022  
Issued Date : Aug. 15, 2022  
Report No. : 2270054R-RFUSWW5V05-A  
Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.



This report must not be used to claim product endorsement by TAF or any agency of the government.

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.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.



Product Name : 5G CBRS Outdoor Router  
Applicant : Billion Electric Co., Ltd.  
Address : 8F., No. 192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City  
231 Taiwan  
Manufacturer : Billion Electric Co., Ltd.  
Address : 8F., No. 192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City  
231 Taiwan  
Brand Name : BEC / Billion  
Model No. : AirConnect® 8231, BEC AirConnect® 8231, BEC 8231  
FCC ID : QI3BEC-8231  
EUT Voltage : AC 100-240V, 50/60Hz  
Testing Voltage : AC 120V/60Hz  
Applicable Standard : 47 CFR FCC Part 96  
Test Result : Complied

Documented By :   
\_\_\_\_\_  
( Senior Project Specialist / Joanne Lin )  
Approved By :   
\_\_\_\_\_  
( Manager / Tim Sung )

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### Revision History

Report No.	Version	Description	Issued Date
2270054R-RFUSWW5V05-A	V1.0	Initial issue of report.	Aug. 15, 2022

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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 2270054R-Product Photos

## 1. General Information

### 1.1. EUT Description

Product Name	5G CBRS Outdoor Router	
Brand Name	BEC / Billion	
Model No.	AirConnect® 8231, BEC AirConnect® 8231, BEC 8231	
Frequency Range	3550 ~ 3700 MHz (Uplink) 3550 ~ 3700 MHz (Downlink)	
Bandwidth	SCS: 30 kHz	10 / 20 / 30 / 40 MHz
Type of Modulation	PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM	
Maximum Output Power	22.26 dBm	
Hardware Version	V2.010	
Software Version	1.00.1.93	
IMEI No.	868371050033330	

Note: The three models name AirConnect® 8231, BEC AirConnect® 8231, and BEC 8231 are for the market segment.

Accessories Information				
No.	Equipment Name	Brand Name	Model No.	Rating
1	POE Injector	BILLION	BP035-560063PAX	INPUT: AC 100-240V~50/60Hz, 0.8A OUTPUT: 56V=0.625A

Antenna Information					
Ant.	Brand Name	Part No.	Type	Gain (dBi)	Remark
0	Grand-Tek	AAZANLXIXDAB4243G1	PCB	14.8	RX
1				14.1	RX
2				14.9	TX/RX
3				14.1	RX

## 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: 5G NR n48
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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. The device was tested under all configurations, combinations, bandwidths, RB configurations and modulations, and the worst case was found in PI/2 BPSK modulation, therefore the “Maximum Power Spectral Density” & “Conducted Band Edge” & “Spurious Emission” test items perform PI/2 BPSK modulation in this report.
4. For “Peak to Average Ratio” test item shown worst case modulation PI/2 BPSK, QPSK and 16QAM on this report.
5. The product of 5G NR n48 only supports the standalone mode.

## 1.3. Comments and Remarks

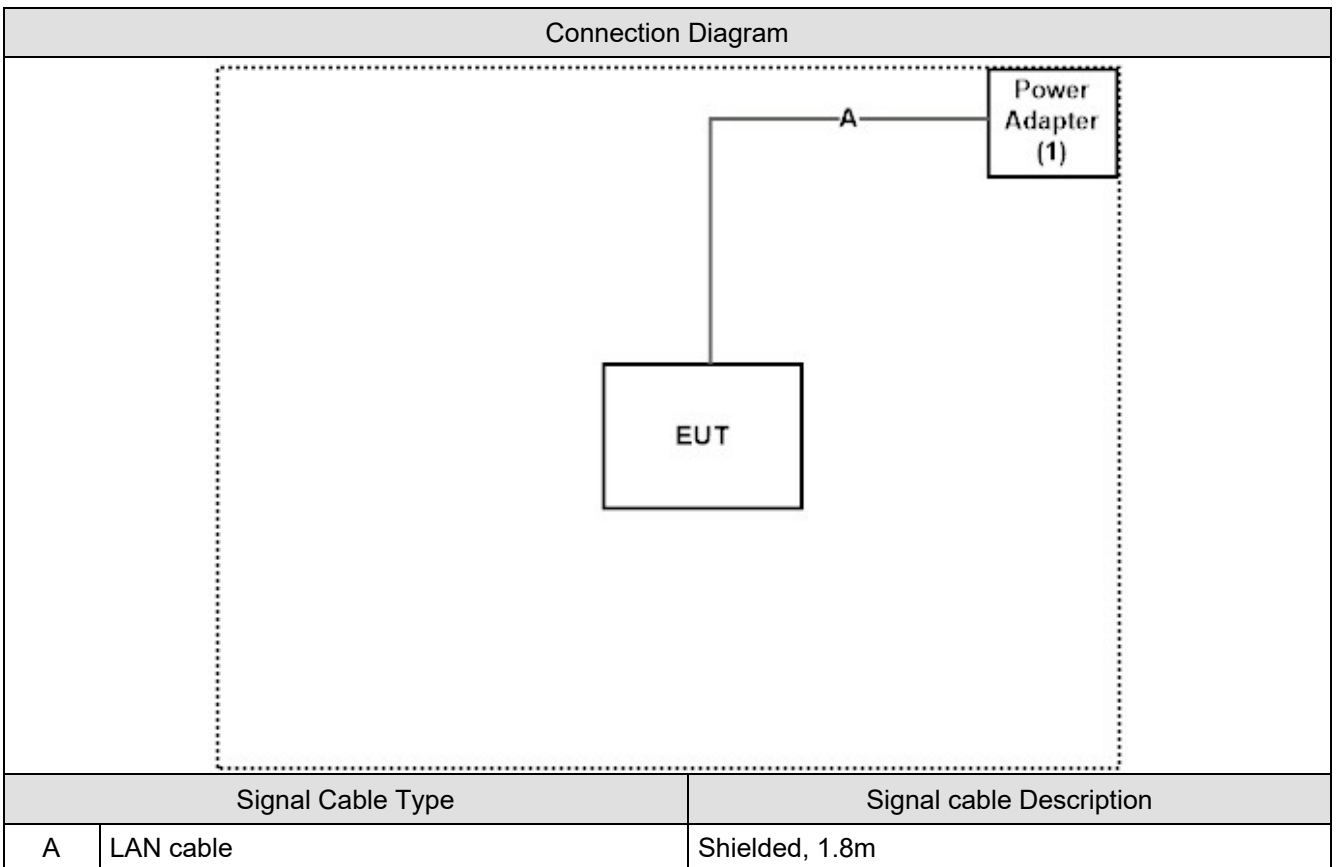
The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

### 1.4. Tested System Details

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

Product	Manufacturer	Model No.	Serial No.
1   POE Injector	BILLION	BP035-560063PAX	N/A
2   Horn Antenna	Schwarzbeck	BBHA 9120D	1640

### 1.5. Configuration of Tested System



### 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 5G NR 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	22 ~ 26	Joe Wang	2022/07/18 ~ 2022/08/09	HY-SR03
Humidity (%RH)		50 ~ 60			
Temperature (°C)	Occupied Bandwidth	22 ~ 26	Joe Wang	2022/07/18 ~ 2022/08/09	HY-SR03
Humidity (%RH)		50 ~ 60			
Temperature (°C)	Spurious Emission at Antenna	22 ~ 26	Joe Wang	2022/07/18 ~ 2022/08/09	HY-SR03
Humidity (%RH)	Terminals	50 ~ 60			
Temperature (°C)	Conducted Spurious Emission	22 ~ 26	Joe Wang	2022/07/18 ~ 2022/08/09	HY-SR03
Humidity (%RH)		50 ~ 60			
Temperature (°C)	Radiated Spurious Emission	24.4	Daniel Wu	2022/08/05	HY-CB03
Humidity (%RH)		56			
Temperature (°C)	Frequency Stability	22 ~ 26	Joe Wang	2022/07/18 ~ 2022/08/09	HY-SR03
Humidity (%RH)		50 ~ 60			
Temperature (°C)	Peak to Average Ratio	22 ~ 26	Joe Wang	2022/07/18 ~ 2022/08/09	HY-SR03
Humidity (%RH)		50 ~ 60			

Note: Test site information refers to Laboratory Information.

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

The address and introduction of DEKRA Testing and Certification Co., Ltd. Laboratories can be founded in our

Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Site Description	Accredited by TAF Accredited Number: 3023
Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	No.5-22, Ruishukeng, Linkou Dist., 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
E mail address	<a href="mailto:info.tw@dekra.com">info.tw@dekra.com</a>
Website	<a href="http://www.dekra.com.tw">http://www.dekra.com.tw</a>

## 1.8. List of Test Equipment

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2021/08/11	2022/08/10
Horn Antenna	ETS-Lindgren	3117	00201259	2021/11/09	2022/11/08
Horn Antenna	Com-Power	AH-1840	101101	2021/11/30	2022/11/29
Pre-Amplifier	SGH	0301	20211007-7	2022/02/22	2023/02/21
Pre-Amplifier	EMCI	EMC051835SE	980312	2022/02/22	2023/02/21
Pre-Amplifier	SGH	PRAMP184	20200705	2021/08/11	2022/08/10
Coaxial Cable	EMCI	EMC102-KM-KM-600	160312	2022/02/16	2023/02/15
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	MY3382/2	2022/02/16	2023/02/15
Spectrum Analyzer	R&S	FSV3044	101115	2022/01/10	2023/01/09
Coaxial Cable	SUHNER	SUCOFLEX 106	25450/6	2022/03/22	2023/03/21
Coaxial Cable	SGH	HA800	GD20110222-8	2022/03/22	2023/03/21
Coaxial Cable	SGH	SGH18	2021003-8	2022/03/22	2023/03/21
Coaxial Cable	EMCI	EMC106	151113	2022/03/22	2023/03/21
UXM 5G Wireless Test Platform	Keysight	E7515B	MY59321672	2022/05/31	2023/05/30
Temperature Chamber	KSON	THS-D4T-100	A0606	2021/08/24	2022/08/23
Radiated Software	AUDIX	e3 V9	N/A	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

## 1.9. Measurement Uncertainty

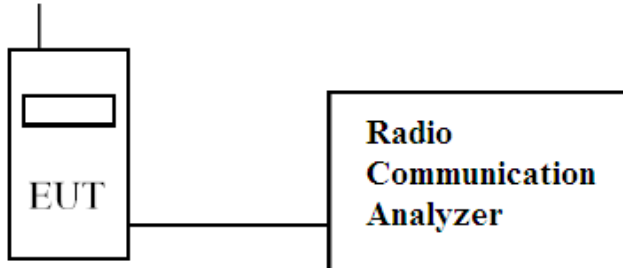
Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Test Item	Uncertainty
RF Output Power	$\pm 1.126$ dB
Occupied Bandwidth	$\pm 682.83$ Hz
Peak to Average Ratio	$\pm 1.126$ dB
Conducted Band Edge	$\pm 1.126$ dB
Conducted Spurious Emissions	$\pm 1.126$ dB
Radiated Spurious Emissions	$\pm 4.06$ dB below 1 GHz $\pm 3.73$ dB above 1 GHz
Frequency Stability	$\pm 103.92$ Hz

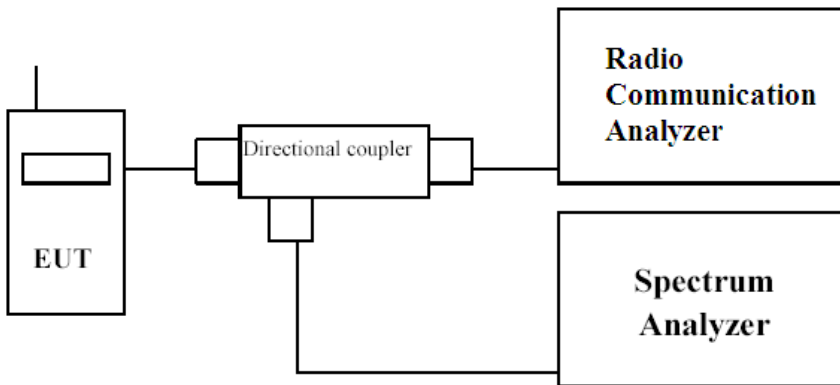
## 2. Maximum Output Power

### 2.1. Test Setup

Conducted Power



Channel Power



### 2.2. Test Limit

Type	Device	Maximum EIRP (dBm/10 MHz)	Maximum PSD (dBm/MHz)
	End User Device	23	N/A
	Category A CBSD	30	20
X	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 1MHz.
3. VBW  $\geq$  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 Maximum Output Power / EIRP

### Mode 1: 5G NR n48

5G NR n48 Power			10MHz			20MHz			30MHz			40MHz		
Modulation	Channel		637000	641666	646332	637334	641666	646000	637668	641666	645666	638000	641666	645332
	Frequency (MHz)		3555.00	3624.99	3694.98	3560.01	3624.99	3690.00	3565.02	3624.99	3684.99	3570.00	3624.99	3679.98
	RB No.	RB Offset	SCS 30kHz Conducted Maximum Average Power (dBm)											
PI/2 BPSK	1	#0	20.26	20.55	20.29	20.52	20.73	20.32	20.55	20.76	20.58	20.58	20.71	20.61
	1	#Mid	21.81	<b>22.03</b>	21.95	22.18	<b>22.24</b>	22.01	22.16	<b>22.21</b>	22.03	22.24	<b>22.26</b>	22.16
	1	#Max	20.33	20.38	20.47	20.76	20.48	20.41	20.58	20.53	20.61	20.72	20.67	20.74
	100%	#0	21.79	22.01	21.88	22.14	22.19	21.85	22.12	22.15	21.95	22.18	22.21	22.09
	100%	#Max	--	--	--	22.12	22.18	21.89	22.10	22.13	21.98	22.21	22.24	22.11
QPSK	1	#0	20.24	20.49	20.32	20.48	20.67	20.28	20.51	20.72	20.54	20.53	20.68	20.58
	1	#Mid	21.79	21.98	21.92	22.10	22.21	21.94	22.14	22.19	22.01	22.22	22.23	22.13
	1	#Max	20.31	20.38	20.43	20.74	20.45	20.37	20.54	20.48	20.57	20.68	20.64	20.72
	100%	#0	21.76	21.95	21.87	22.07	22.16	21.84	22.09	22.15	21.99	22.16	22.18	22.07
	100%	#Max	--	--	--	22.08	22.17	21.86	22.08	22.12	21.97	22.17	22.21	22.05
16QAM	1	#0	20.11	20.42	20.21	20.35	20.51	20.19	20.43	20.67	20.48	20.49	20.61	20.52
	1	#Mid	21.76	21.92	21.83	21.89	22.15	21.88	22.08	22.16	21.96	22.20	22.21	22.10
	1	#Max	20.21	20.24	20.23	20.63	20.32	20.27	20.50	20.44	20.52	20.63	20.59	20.64
	100%	#0	21.73	21.90	21.78	21.81	22.07	21.79	22.01	22.11	21.91	22.15	22.17	22.04
	100%	#Max	--	--	--	21.79	22.04	21.81	22.03	22.12	21.90	22.17	22.18	22.03
64QAM	1	#0	20.04	20.37	20.12	20.31	20.45	20.17	20.31	20.58	20.41	20.43	20.57	20.41
	1	#Mid	21.48	21.59	21.37	21.64	21.68	21.41	21.68	21.73	21.60	21.74	21.76	21.64
	1	#Max	20.13	20.18	20.21	20.58	20.29	20.24	20.44	20.37	20.49	20.56	20.51	20.57
	100%	#0	21.35	21.52	21.34	21.58	21.57	21.33	21.59	21.68	21.53	21.65	21.71	21.56
	100%	#Max	--	--	--	21.61	21.55	21.29	21.63	21.66	21.54	21.67	21.68	21.59
256QAM	1	#0	19.05	19.20	18.94	19.34	19.51	19.15	19.17	19.56	19.34	19.41	19.52	19.47
	1	#Mid	19.33	19.48	19.29	19.61	19.63	19.44	19.58	19.72	19.54	19.73	19.74	19.60
	1	#Max	19.18	19.06	19.14	19.47	19.29	19.23	19.31	19.39	19.42	19.56	19.47	19.51
	100%	#0	19.26	19.41	19.26	19.54	19.57	19.38	19.49	19.66	19.47	19.59	19.68	19.54
	100%	#Max	--	--	--	19.52	19.53	19.36	19.48	19.64	19.50	19.61	19.63	19.56

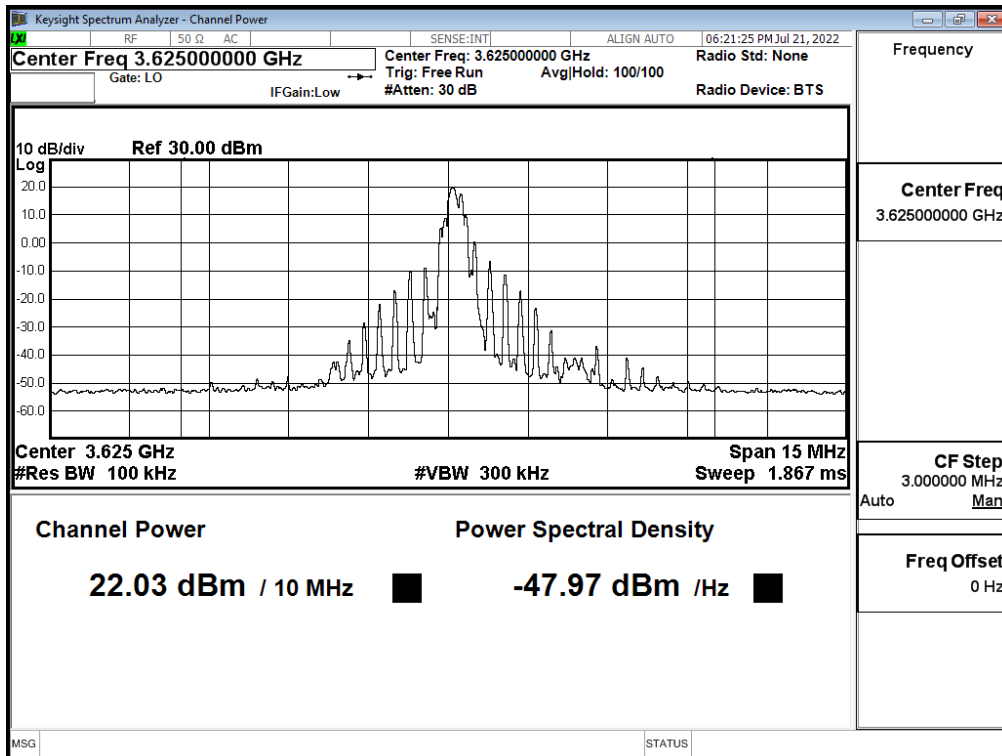
5G NR n48 EIRP			10MHz			20MHz			30MHz			40MHz		
Modulation	Channel		637000	641666	646332	637334	641666	646000	637668	641666	645666	638000	641666	645332
	Frequency (MHz)		3555.00	3624.99	3694.98	3560.01	3624.99	3690.00	3565.02	3624.99	3684.99	3570.00	3624.99	3679.98
	RB No.	RB Offset	SCS 30kHz EIRP (dBm)											
PI/2 BPSK	1	#0	35.16	35.45	35.19	35.42	35.63	35.22	35.45	35.66	35.48	35.48	35.61	35.51
	1	#Mid	36.71	<b>36.93</b>	36.85	37.08	<b>37.14</b>	36.91	37.06	<b>37.11</b>	36.93	37.14	<b>37.16</b>	37.06
	1	#Max	35.23	35.28	35.37	35.66	35.38	35.31	35.48	35.43	35.51	35.62	35.57	35.64
	100%	#0	36.69	36.91	36.78	37.04	37.09	36.75	37.02	37.05	36.85	37.08	37.11	36.99
	100%	#Max	--	--	--	37.02	37.08	36.79	37.00	37.03	36.88	37.11	37.14	37.01
QPSK	1	#0	35.14	35.39	35.22	35.38	35.57	35.18	35.41	35.62	35.44	35.43	35.58	35.48
	1	#Mid	36.69	36.88	36.82	37.00	37.11	36.84	37.04	37.09	36.91	37.12	37.13	37.03
	1	#Max	35.21	35.28	35.33	35.64	35.35	35.27	35.44	35.38	35.47	35.58	35.54	35.62
	100%	#0	36.66	36.85	36.77	36.97	37.06	36.74	36.99	37.05	36.89	37.06	37.08	36.97
	100%	#Max	--	--	--	36.98	37.07	36.76	36.98	37.02	36.87	37.07	37.11	36.95
16QAM	1	#0	35.01	35.32	35.11	35.25	35.41	35.09	35.33	35.57	35.38	35.39	35.51	35.42
	1	#Mid	36.66	36.82	36.73	36.79	37.05	36.78	36.98	37.06	36.86	37.10	37.11	37.00
	1	#Max	35.11	35.14	35.13	35.53	35.22	35.17	35.40	35.34	35.42	35.53	35.49	35.54
	100%	#0	36.63	36.80	36.68	36.71	36.97	36.69	36.91	37.01	36.81	37.05	37.07	36.94
	100%	#Max	--	--	--	36.69	36.94	36.71	36.93	37.02	36.80	37.07	37.08	36.93
64QAM	1	#0	34.94	35.27	35.02	35.21	35.35	35.07	35.21	35.48	35.31	35.33	35.47	35.31
	1	#Mid	36.38	36.49	36.27	36.54	36.58	36.31	36.58	36.63	36.50	36.64	36.66	36.54
	1	#Max	35.03	35.08	35.11	35.48	35.19	35.14	35.34	35.27	35.39	35.46	35.41	35.47
	100%	#0	36.25	36.42	36.24	36.48	36.47	36.23	36.49	36.58	36.43	36.55	36.61	36.46
	100%	#Max	--	--	--	36.51	36.45	36.19	36.53	36.56	36.44	36.57	36.58	36.49
256QAM	1	#0	33.95	34.10	33.84	34.24	34.41	34.05	34.07	34.46	34.24	34.31	34.42	34.37
	1	#Mid	34.23	34.38	34.19	34.51	34.53	34.34	34.48	34.62	34.44	34.63	34.64	34.50
	1	#Max	34.08	33.96	34.04	34.37	34.19	34.13	34.21	34.29	34.32	34.46	34.37	34.41
	100%	#0	34.16	34.31	34.16	34.44	34.47	34.28	34.39	34.56	34.37	34.49	34.58	34.44
	100%	#Max	--	--	--	34.42	34.43	34.26	34.38	34.54	34.40	34.51	34.53	34.46

Note: EIRP (dBm/10MHz) = Conducted Output Power (dBm/10MHz) + Antenna Gain (dBi)

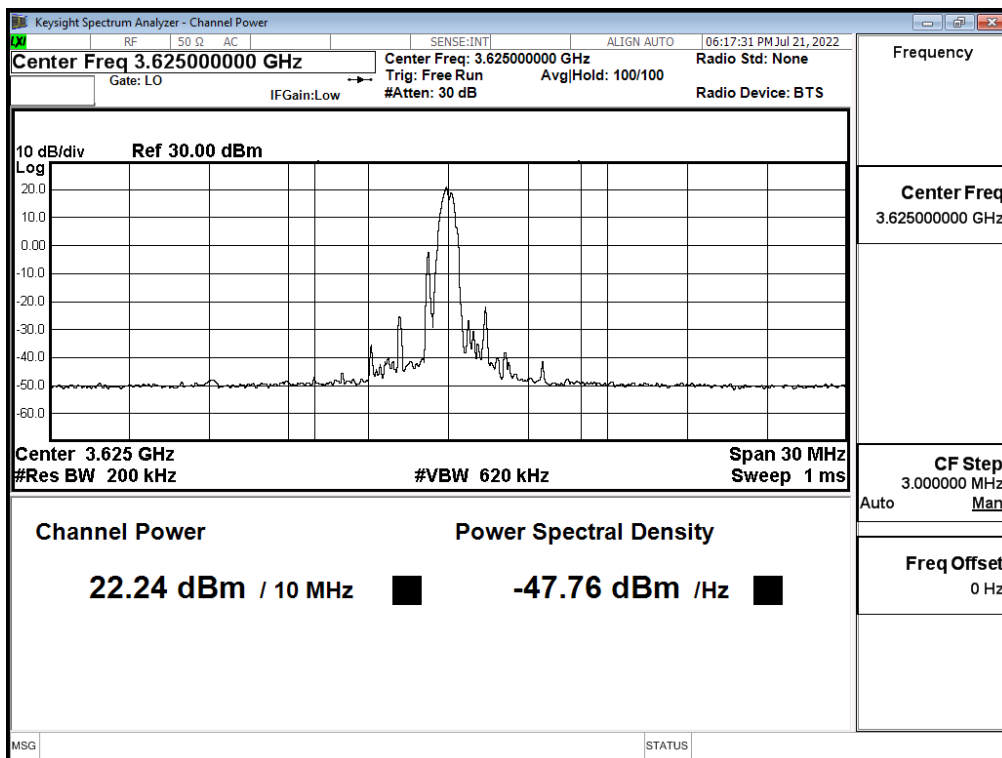


**Spectrum plot of worst value**

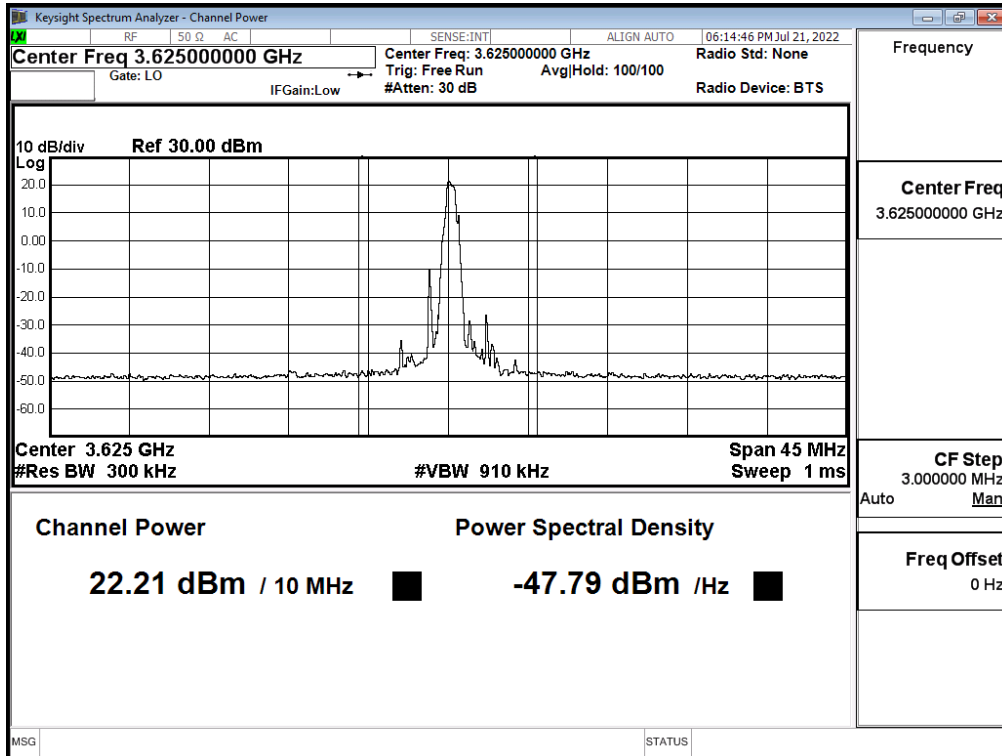
PI/2 BPSK / 10 MHz / CH641666 / 1RB12



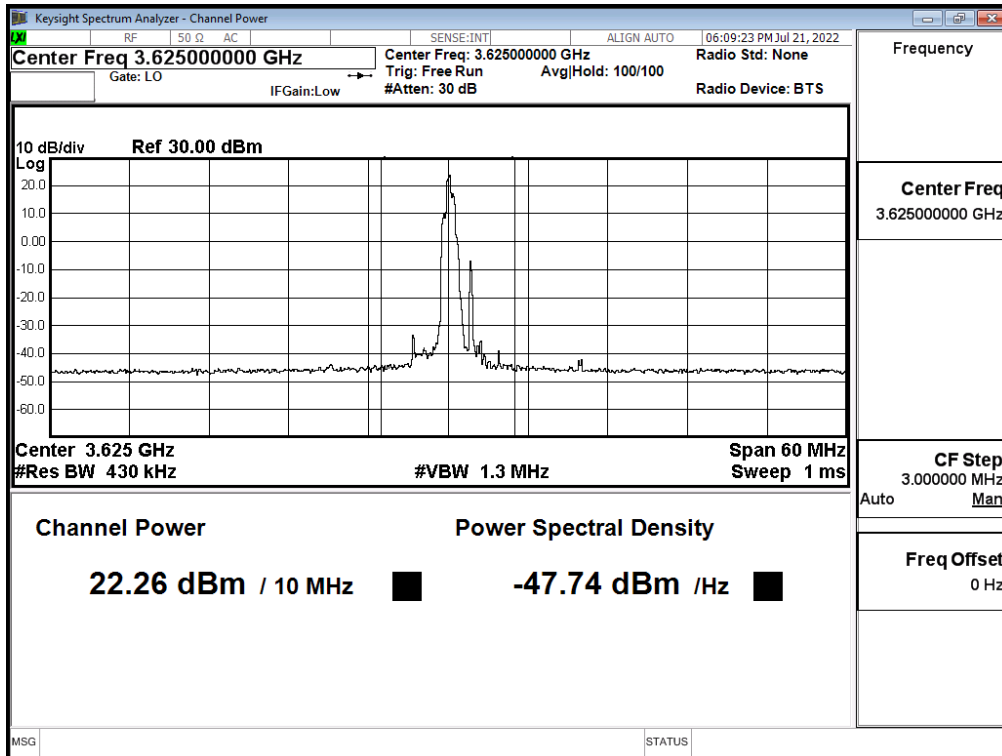
PI/2 BPSK / 20 MHz / CH641666 / 1RB25



PI/2 BPSK / 30 MHz / CH641666 / 1RB39

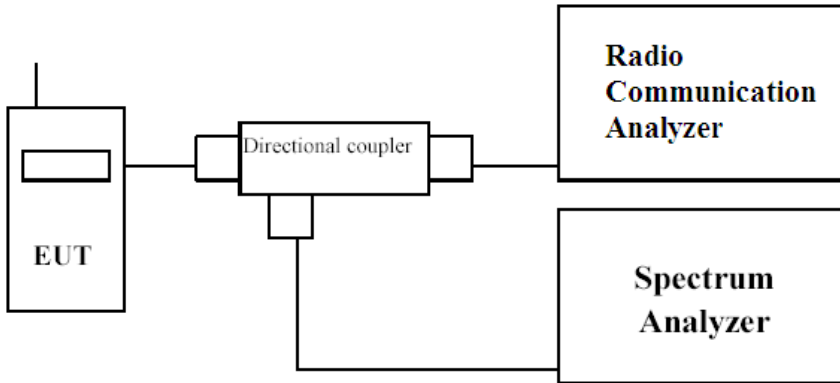


PI/2 BPSK / 40 MHz / CH641666 / 1RB53



### 3. Maximum Power Spectral Density

#### 3.1. Test Setup



#### 3.2. Test Limit

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

#### 3.3. Test Procedure

1. The EUT is tested with maximum rated TX power via the base station simulator, and connect the EUT to the spectrum analyzer.
2. Tune the spectrum analyzer to the nominal center frequency of the EBW.
3. RBW = 1MHz.
4. VBW ≥ 3 x RBW.
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. Trace mode = trace averaging (RMS) over 100 sweeps.
9. The trace was allowed to stabilize.

#### 3.4. Test Specification

According to FCC Part 2.1046, 96.41(b)

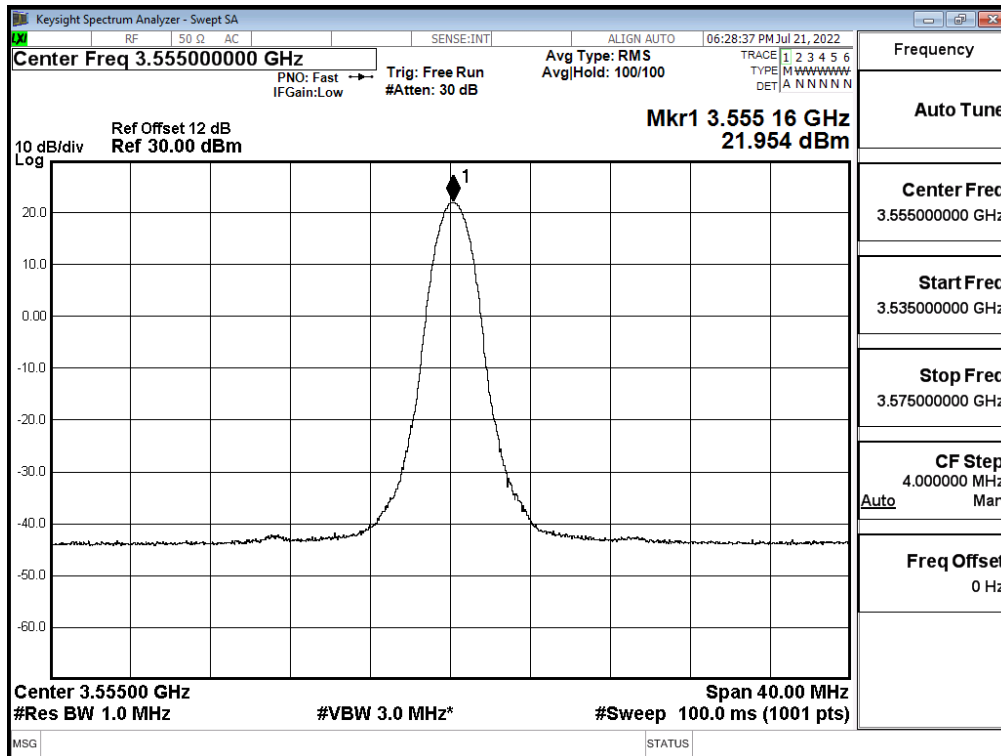
### 3.5. Test Result of Maximum Power Spectral Density

#### Mode 1: 5G NR n48

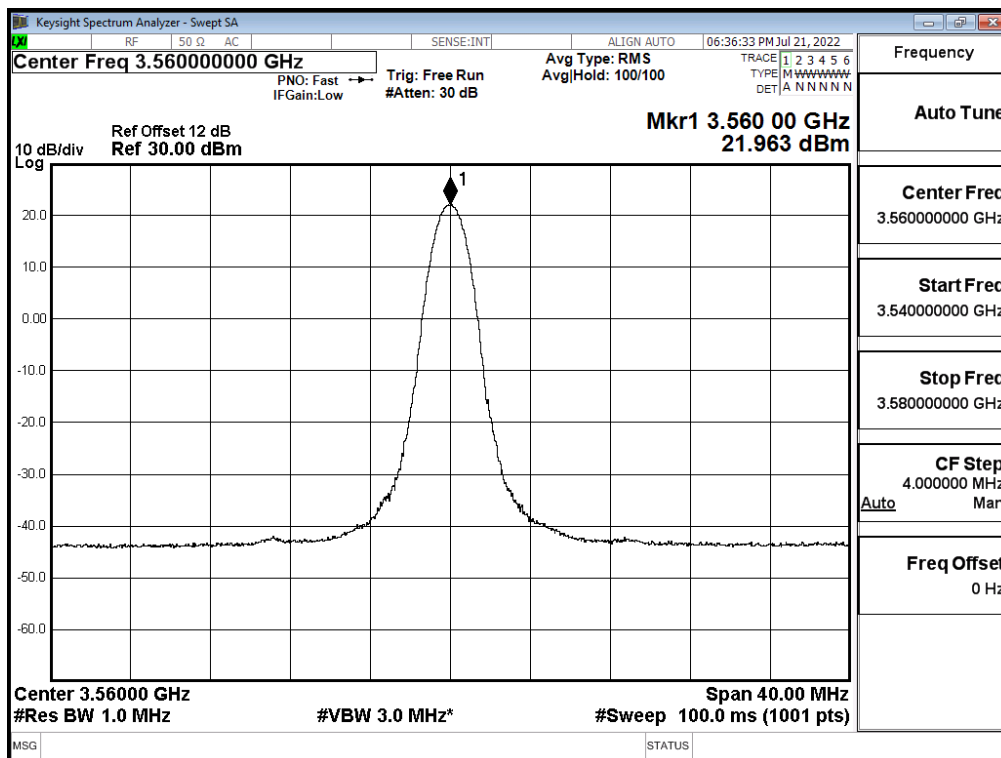
5G NR n48, SCS 30kHz, Power Spectral Density (dBm/MHz)						
Channel Bandwidth 10MHz, PI/2 BPSK						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Result
637000	3555.00	<b>21.954</b>	14.9	36.854	37	Pass
641666	3624.99	18.933	14.9	33.833	37	Pass
646332	3694.98	19.310	14.9	34.210	37	Pass
Channel Bandwidth 20MHz, PI/2 BPSK						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Result
637334	3560.01	<b>21.963</b>	14.9	36.863	37	Pass
641666	3624.99	18.961	14.9	33.861	37	Pass
646000	3690.00	19.275	14.9	34.175	37	Pass
Channel Bandwidth 30MHz, PI/2 BPSK						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Result
637668	3565.02	<b>21.992</b>	14.9	36.892	37	Pass
641666	3624.99	18.949	14.9	33.849	37	Pass
645666	3684.99	19.289	14.9	34.189	37	Pass
Channel Bandwidth 40MHz, PI/2 BPSK						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Result
638000	3570.00	<b>21.985</b>	14.9	36.885	37	Pass
641666	3624.99	18.780	14.9	33.680	37	Pass
645332	3679.98	19.288	14.9	34.188	37	Pass

Spectrum plot of worst value

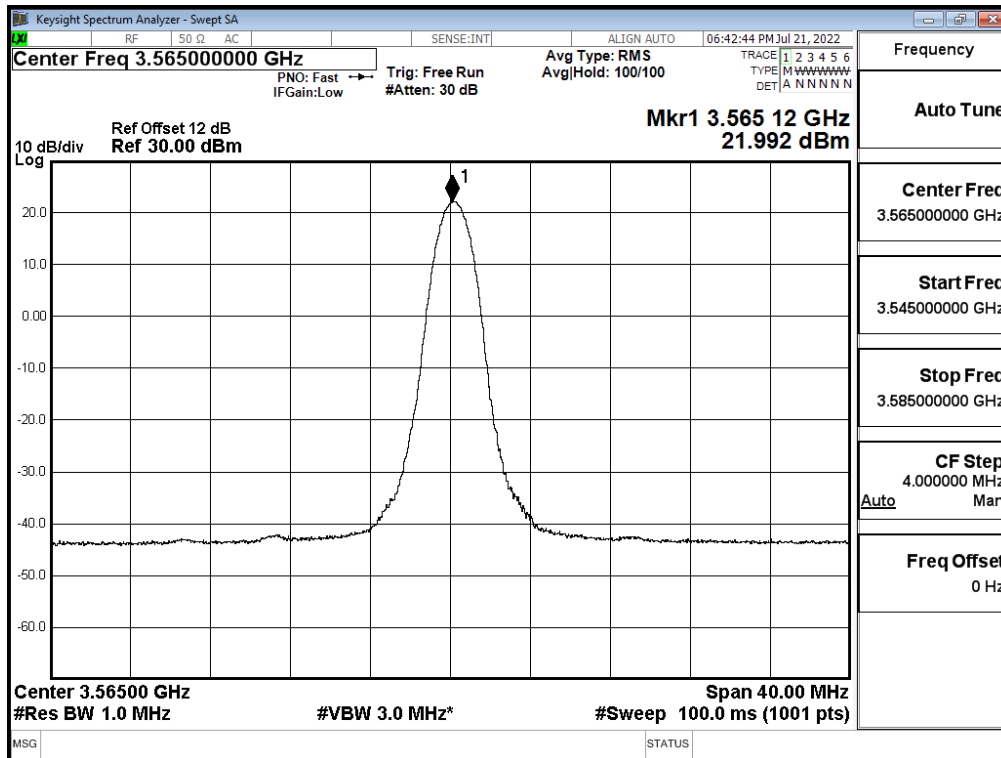
PI/2 BPSK / 10 MHz / CH637000 / 1RB12



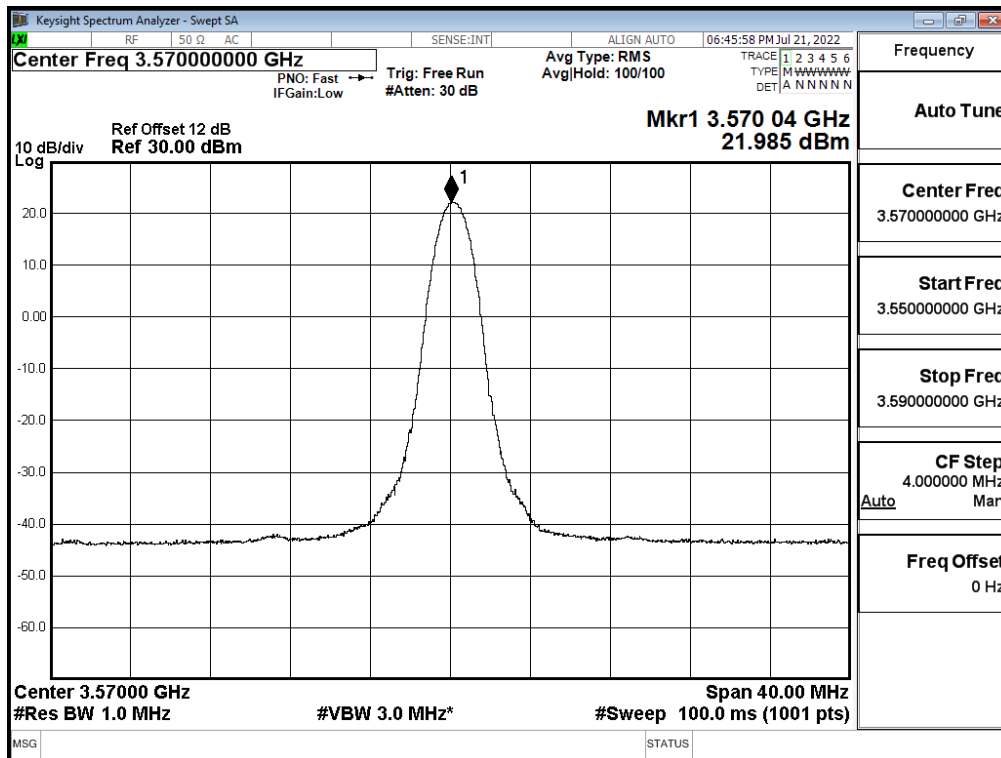
PI/2 BPSK / 20 MHz / CH637334 / 1RB25



PI/2 BPSK / 30 MHz / CH637668 / 1RB39

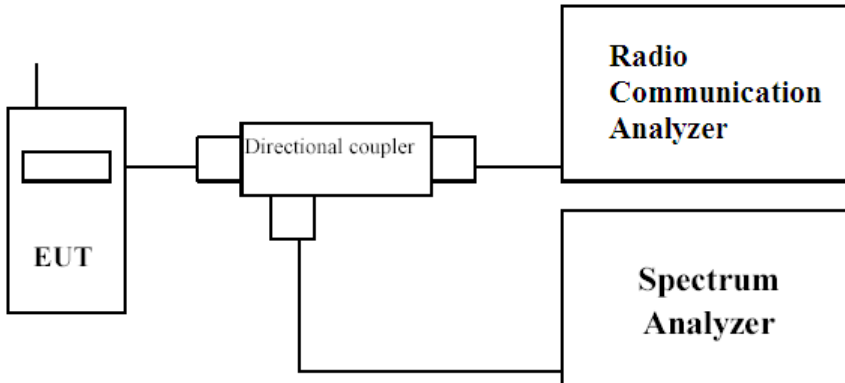


PI/2 BPSK / 40 MHz / CH638000 / 1RB53



## 4. Occupied Bandwidth

### 4.1. Test Setup



### 4.2. Test Limit

N/A

### 4.3. 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.

### 4.4. Test Specification

According to FCC Part 2.1049, 96.41

### 4.5. Test Result of Occupied Bandwidth

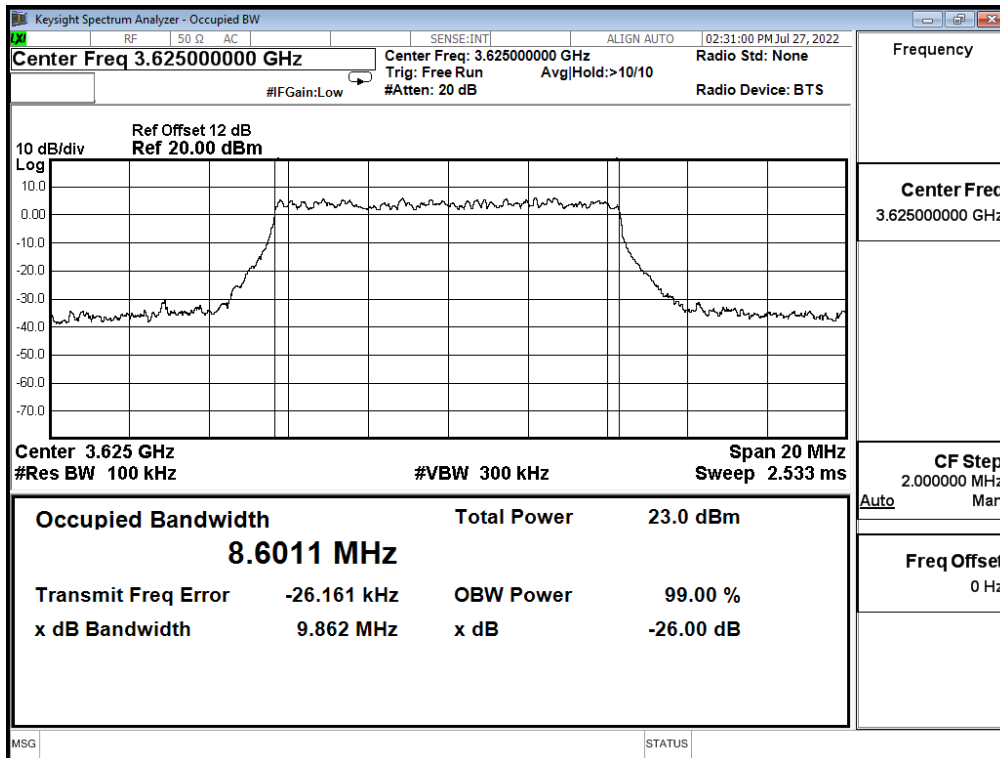
**Mode 1: 5G NR n48**

5G NR n48		10MHz			20MHz			30MHz			40MHz		
Mode	Channel	637000	641666	646332	637334	641666	646000	637668	641666	645666	638000	641666	645332
	Frequency (MHz)	3555.00	3624.99	3694.98	3560.01	3624.99	3690.00	3565.02	3624.99	3684.99	3570.00	3624.99	3679.98
	Modulation	SCS 30kHz Occupied Bandwidth (MHz)											
Occupied Bandwidth	99% PI/2 BPSK	8.579	8.581	8.580	17.795	17.826	17.798	26.805	26.757	26.824	35.693	35.729	35.727
	QPSK	8.610	8.612	8.608	17.892	17.903	17.891	26.797	26.763	26.751	35.743	35.779	35.775
	16QAM	8.630	8.626	8.624	17.851	17.853	17.843	26.794	26.764	26.795	35.697	35.728	35.749
	64QAM	8.564	8.560	8.563	17.818	17.842	17.818	26.765	26.748	26.755	35.728	35.774	35.762
	256QAM	8.595	8.601	8.591	17.831	17.814	17.815	26.811	26.822	26.837	35.720	35.721	35.707
26dB Bandwidth	PI/2 BPSK	9.518	9.557	9.551	19.160	19.130	19.310	28.550	28.500	28.520	37.560	37.740	37.660
	QPSK	9.649	9.635	9.620	19.290	19.080	19.260	28.490	28.620	28.270	37.550	37.570	37.640
	16QAM	9.806	9.787	9.739	19.190	19.180	19.060	28.670	<b>28.760</b>	28.530	37.590	37.690	37.610
	64QAM	9.500	9.519	9.536	19.160	<b>19.420</b>	19.190	28.700	28.480	28.330	37.820	37.450	<b>37.850</b>
	256QAM	9.644	<b>9.862</b>	9.600	19.150	19.320	19.110	28.300	28.690	28.510	37.440	37.380	37.460

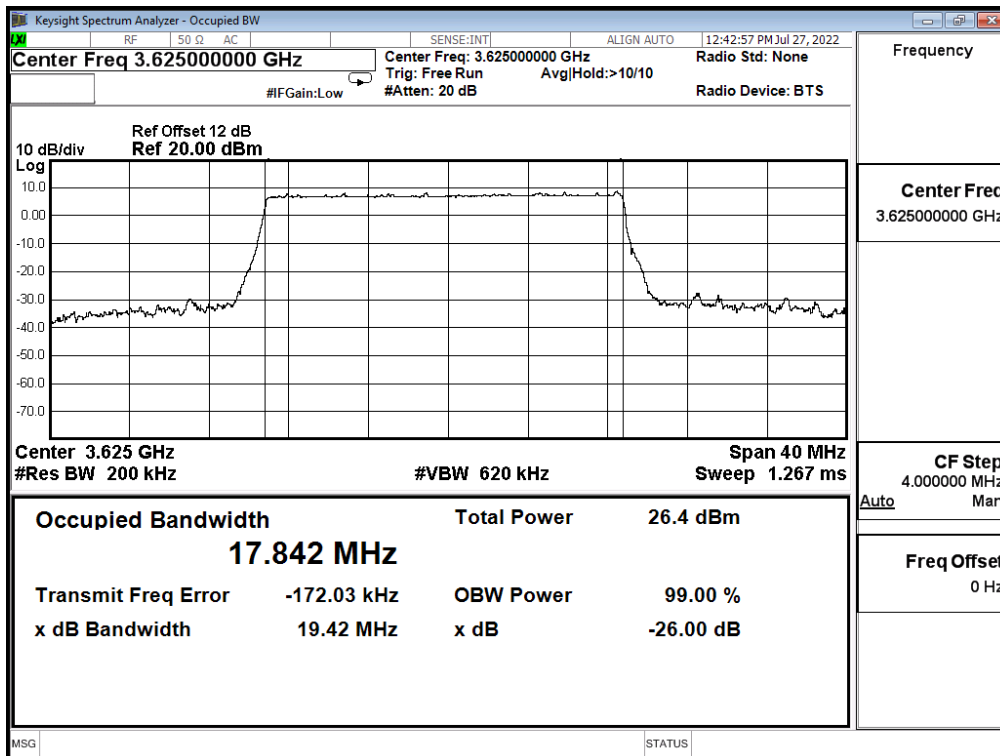


Spectrum plot of worst value

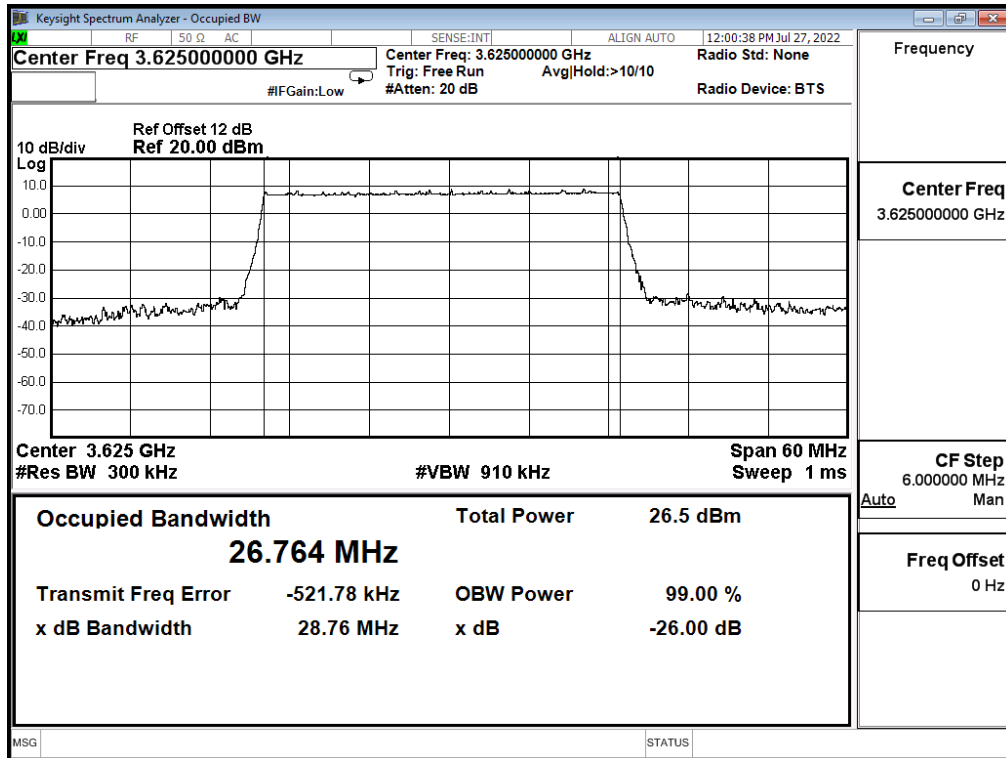
256QAM / 10 MHz / CH641666



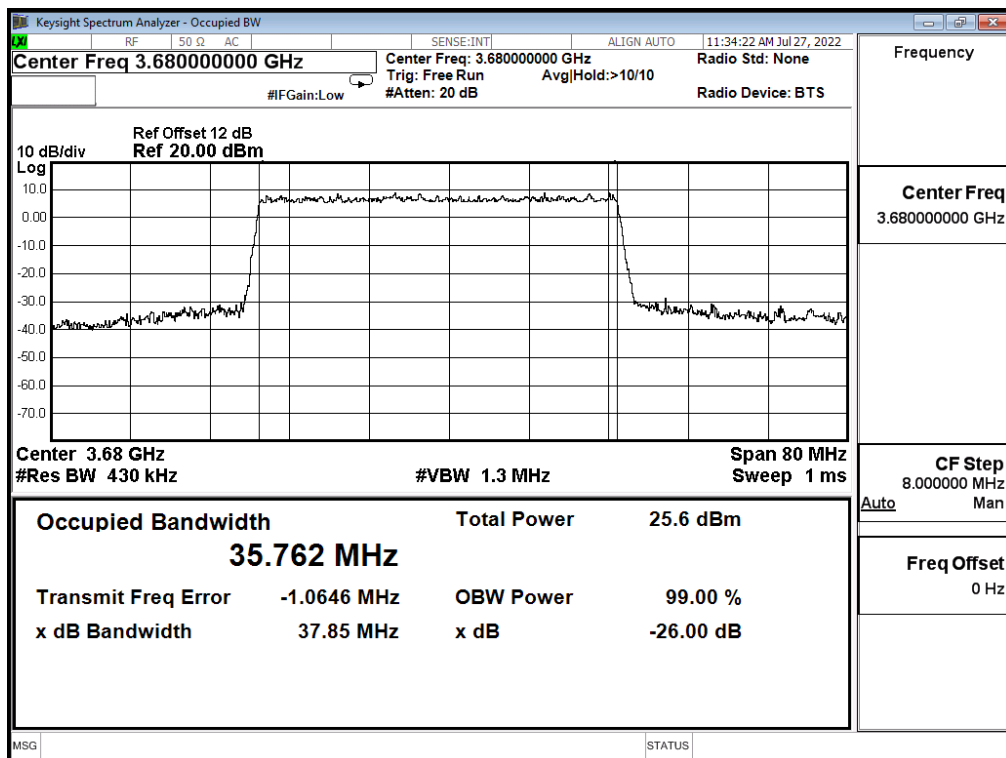
64QAM / 20 MHz / CH641666



16QAM / 30 MHz / CH641666

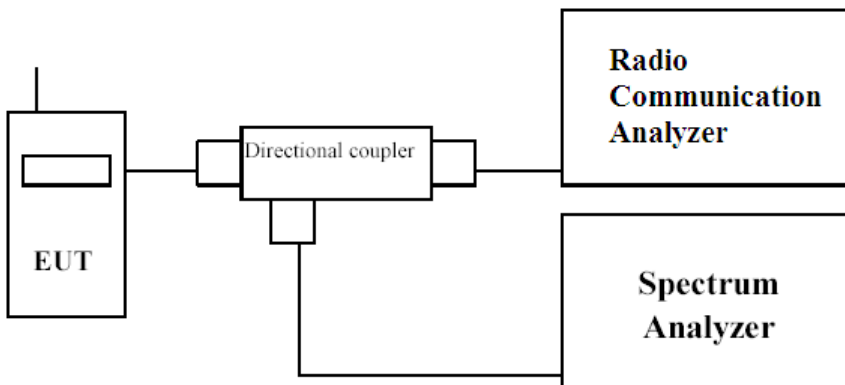


64QAM / 40 MHz / CH645332



## 5. Spurious Emission at Antenna Terminals

### 5.1. Test Setup



### 5.2. Test Limit

- (1) Within 0 MHz to 10 MHz above and below the assigned channel  $\leq -13$  dBm/MHz.
- (2) Greater than 10 MHz above and below the assigned channel  $\leq -25$  dBm/MHz.
- (3) Any emission below 3530 MHz and above 3720 MHz  $\leq -40$  dBm/MHz.

### 5.3. 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 1MHz away from the Block Edge. At greater than 1MHz, the resolution and video bandwidth were increased to 1MHz/3MHz.

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

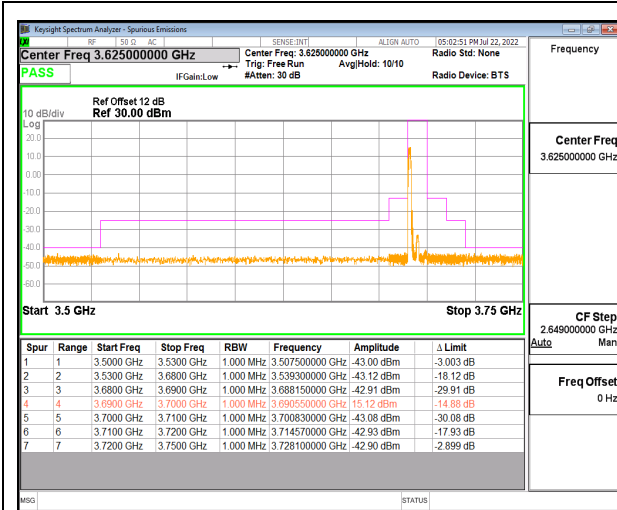
### 5.4. Test Specification

According to Part 2.1051, 96.41

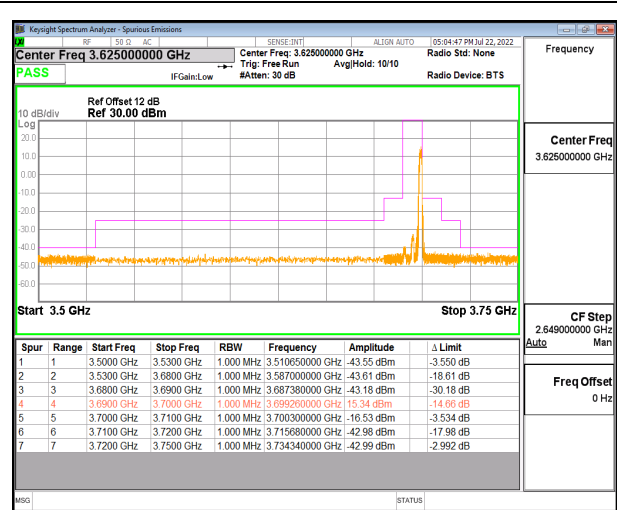
### 5.5. Test Result of Spurious Emission at Antenna Terminals

#### Mode 1: 5G NR n48

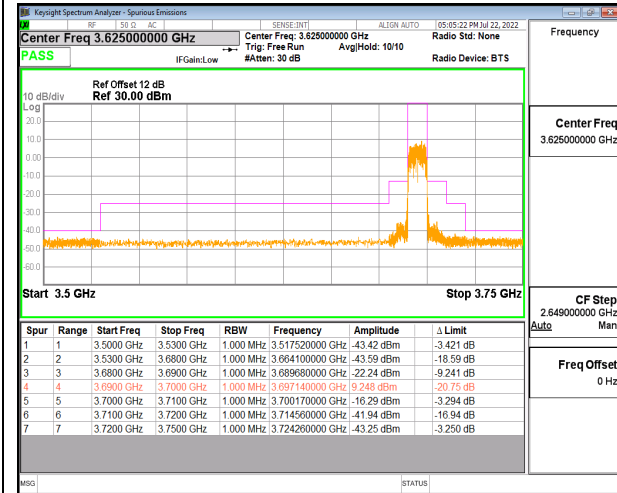




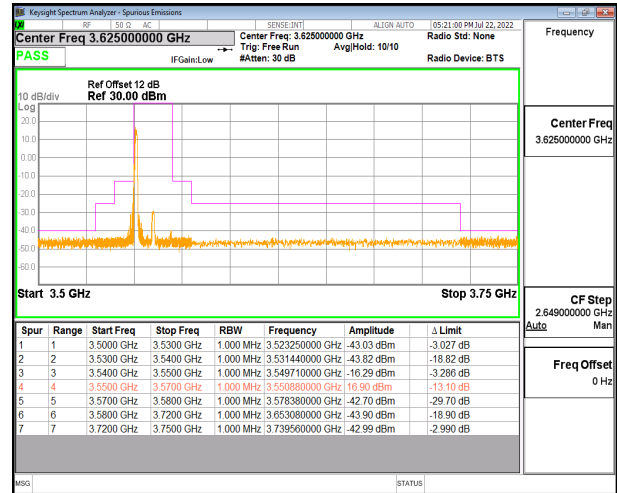
10MHz\_PI/2 BPSK\_CH646332\_1RB0



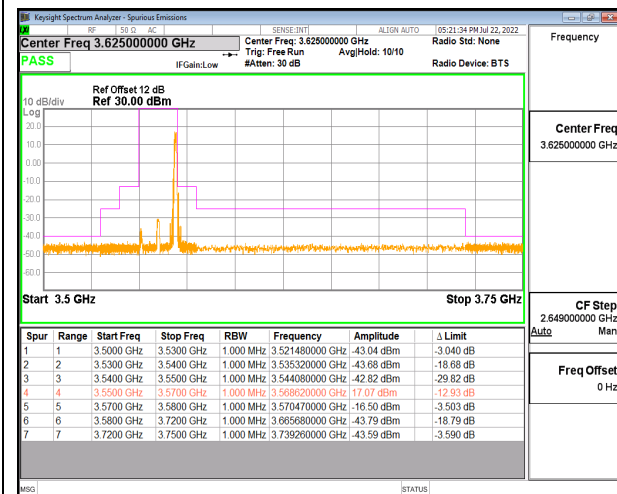
10MHz\_PI/2 BPSK\_CH646332\_3695(1,2,3)



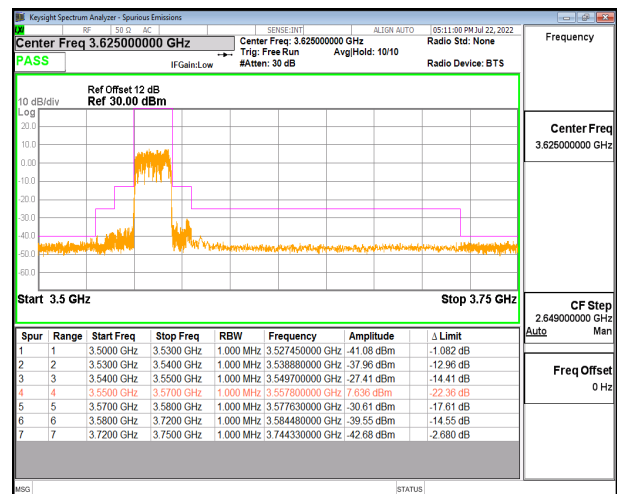
10MHz\_PI/2 BPSK\_CH646332\_24RB0



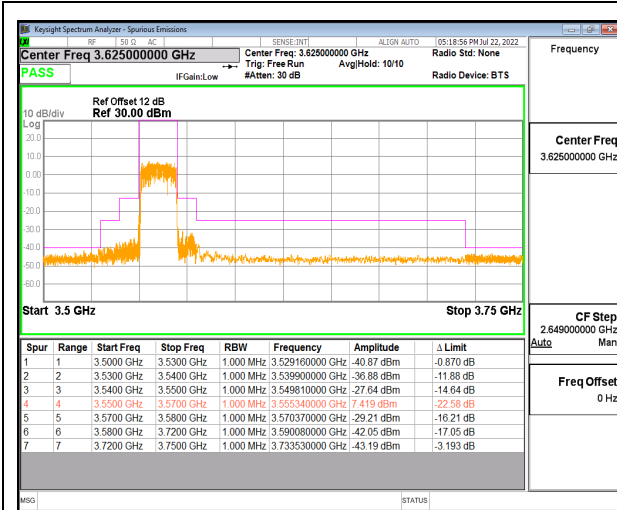
20MHz\_PI/2 BPSK\_CH637334\_1RB0



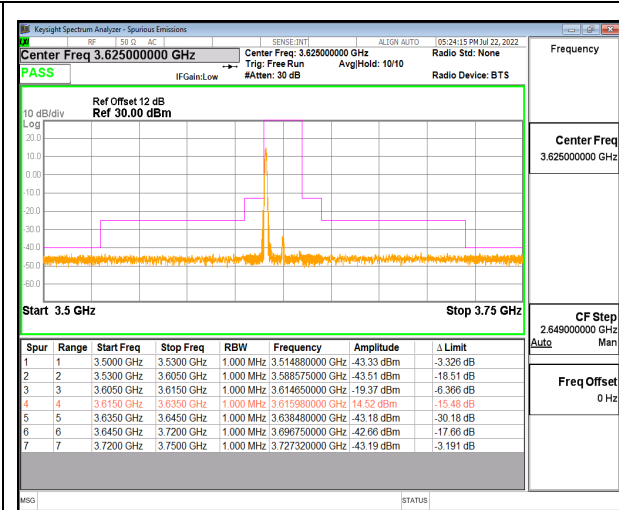
20MHz\_PI/2 BPSK\_CH637334\_1RB50



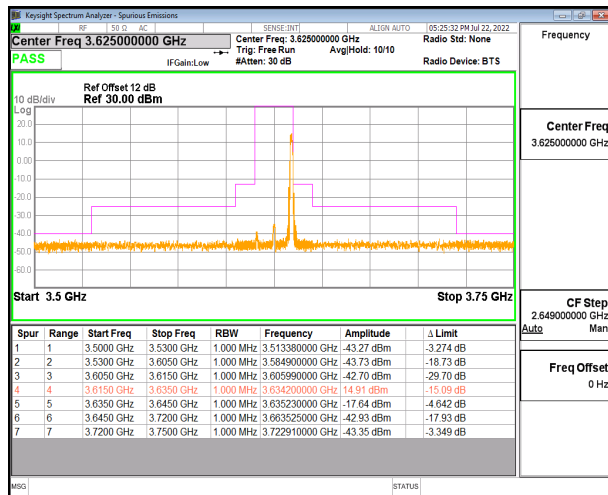
20MHz\_PI/2 BPSK\_CH637334\_50RB0



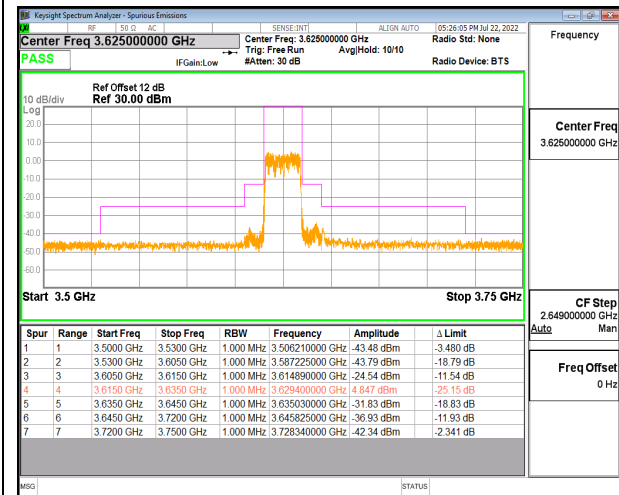
20MHz\_PI/2 BPSK\_CH637334\_50RB1



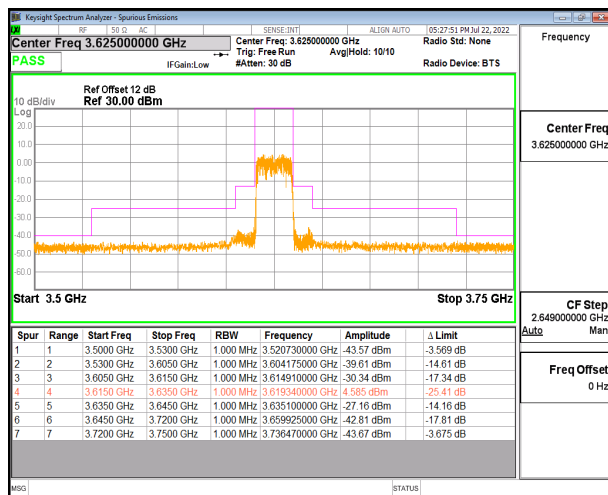
20MHz\_PI/2 BPSK\_CH641666\_1RB0



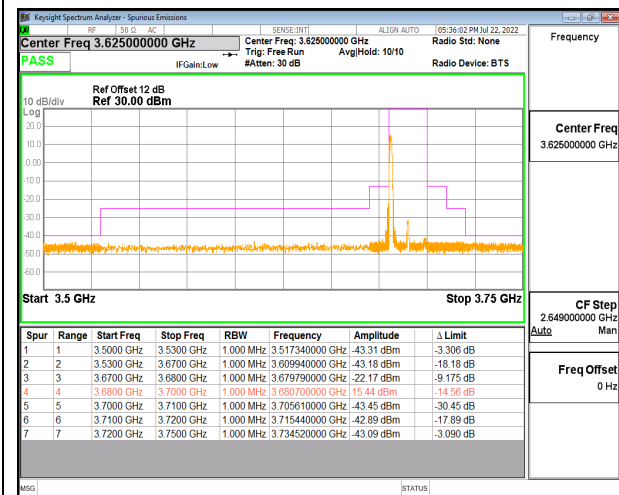
20MHz\_PI/2 BPSK\_CH641666\_1RB50



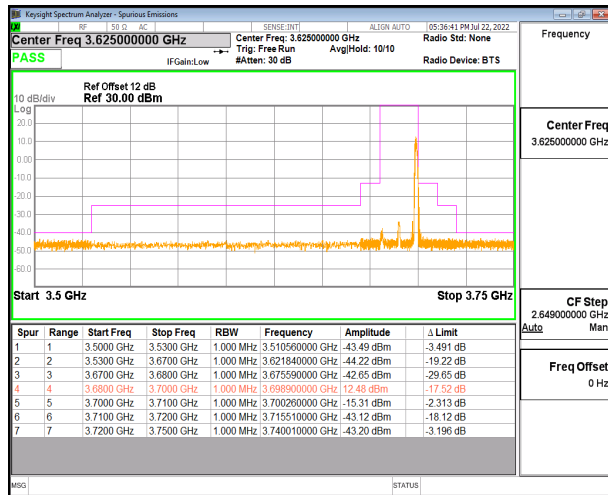
20MHz\_PI/2 BPSK\_CH641666\_50RB0



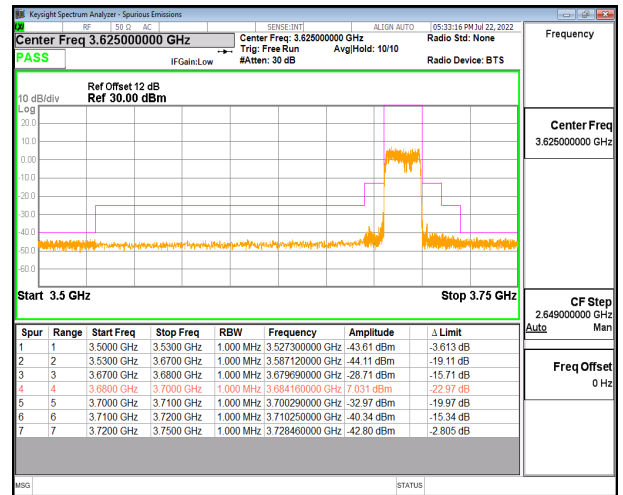
20MHz\_PI/2 BPSK\_CH641666\_50RB1



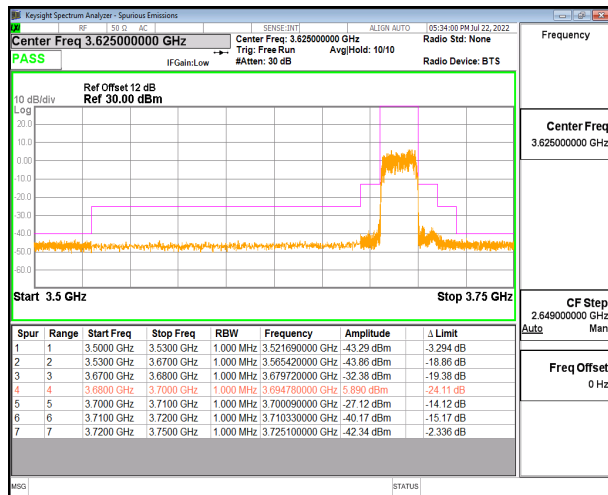
20MHz\_PI/2 BPSK\_CH646000\_1RB0



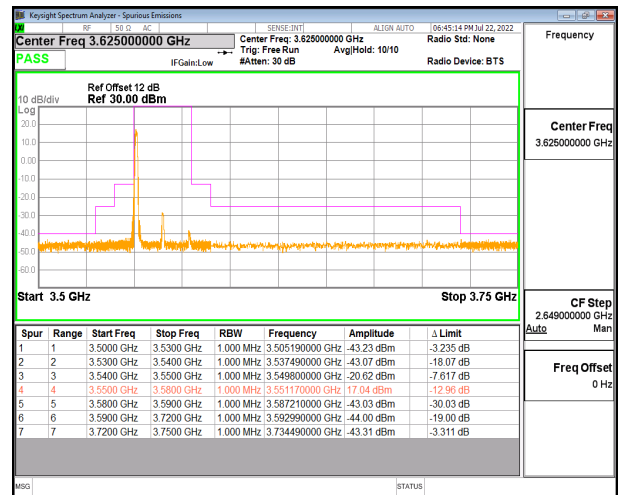
20MHz\_PI/2 BPSK\_CH646000\_1RB50



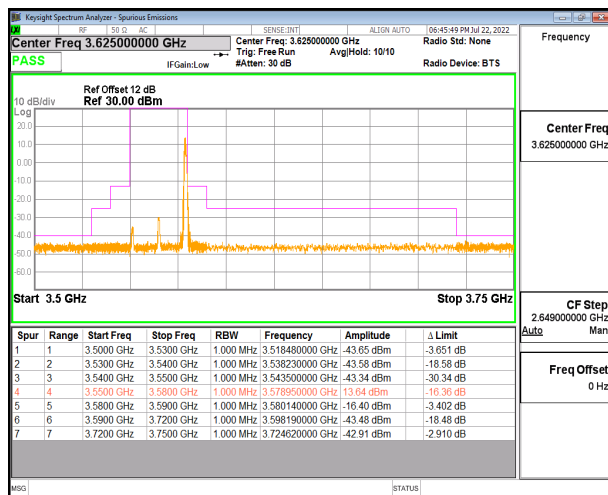
20MHz\_PI/2 BPSK\_CH646000\_50RB0



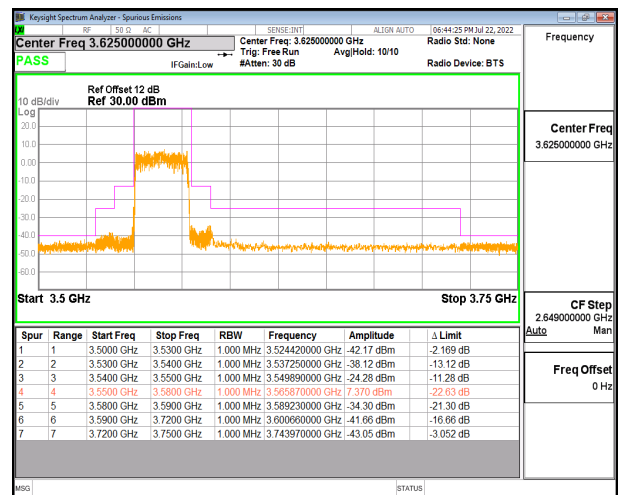
20MHz\_PI/2 BPSK\_CH646000\_50RB1



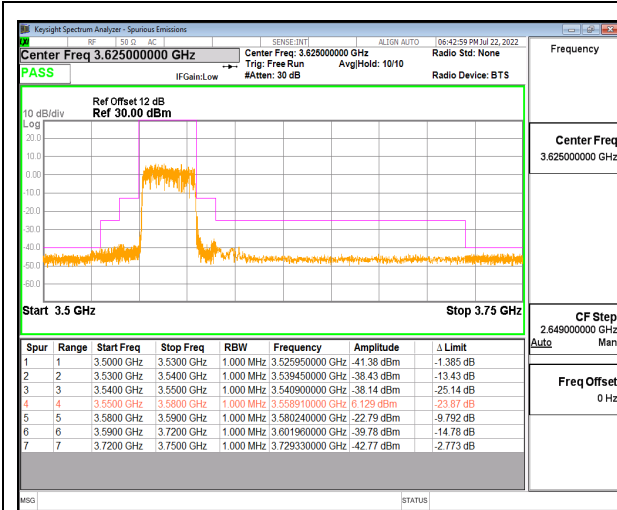
30MHz\_PI/2 BPSK\_CH637668\_1RB0



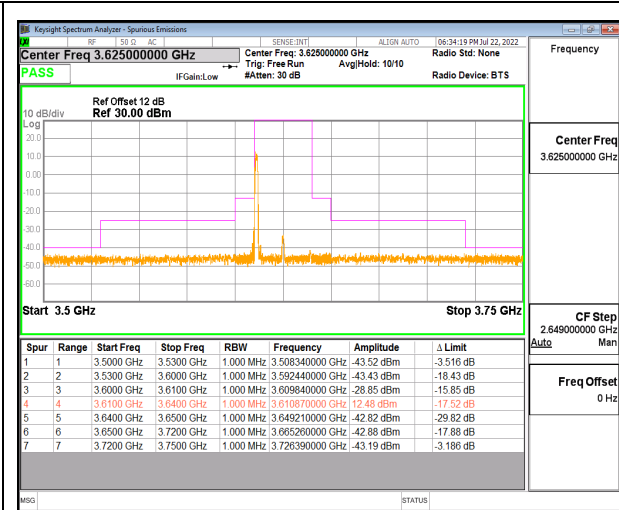
30MHz\_PI/2 BPSK\_CH637668\_1RB77



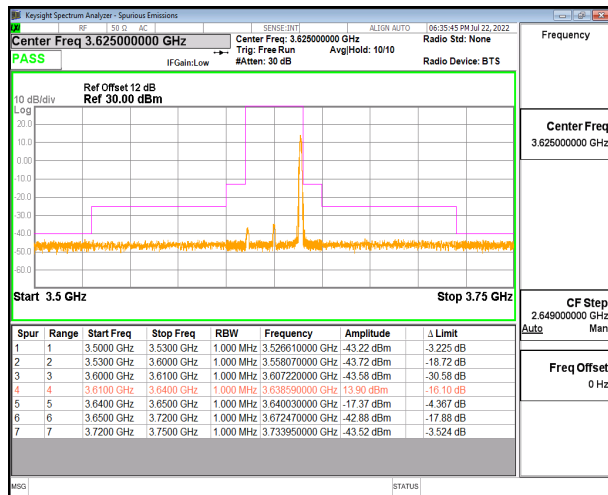
30MHz\_PI/2 BPSK\_CH637668\_75RB0



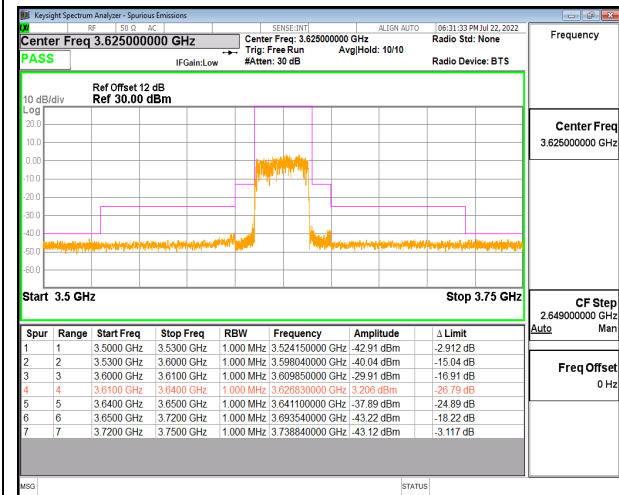
30MHz\_PI/2 BPSK\_CH637668\_75RB3



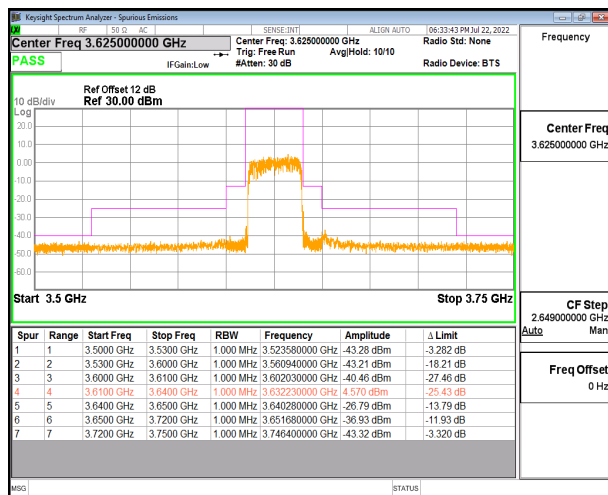
30MHz\_PI/2 BPSK\_CH641666\_1RB0



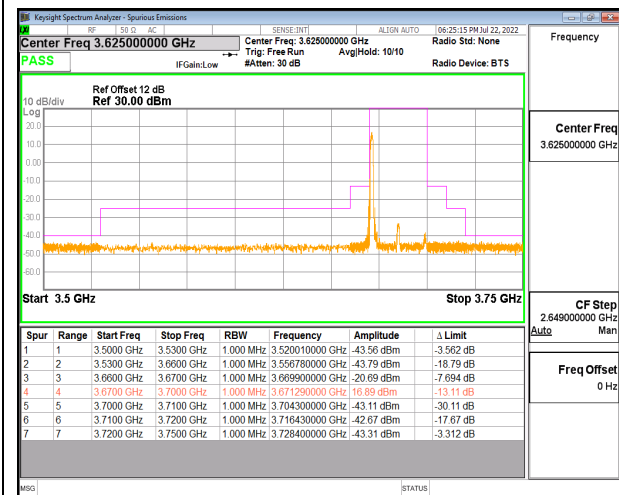
30MHz\_PI/2 BPSK\_CH641666\_1RB77



30MHz\_PI/2 BPSK\_CH641666\_75RB0

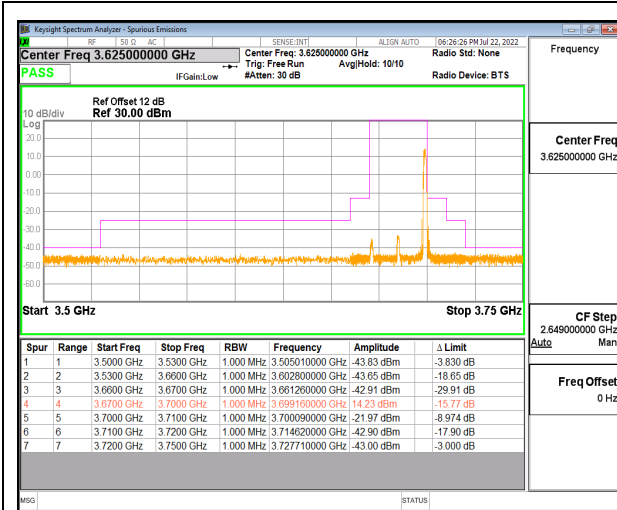


30MHz\_PI/2 BPSK\_CH641666\_75RB3

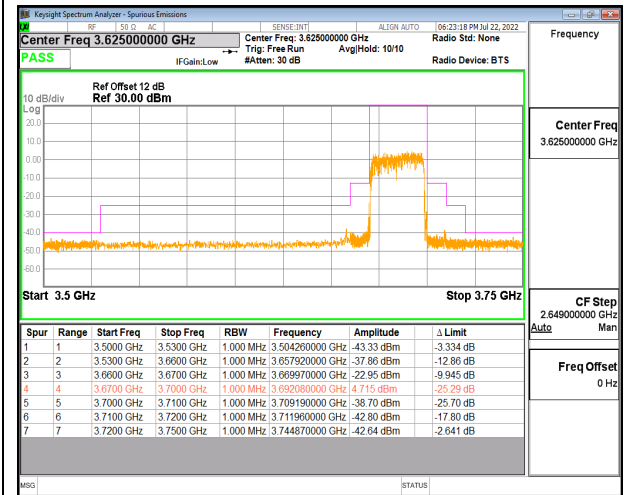


30MHz\_PI/2 BPSK\_CH645666\_1RB0

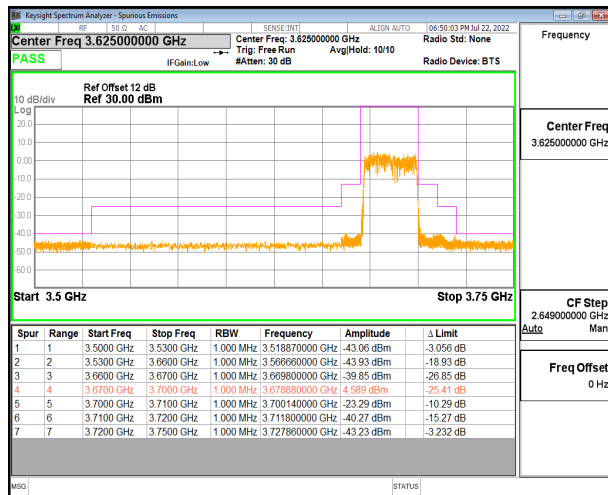




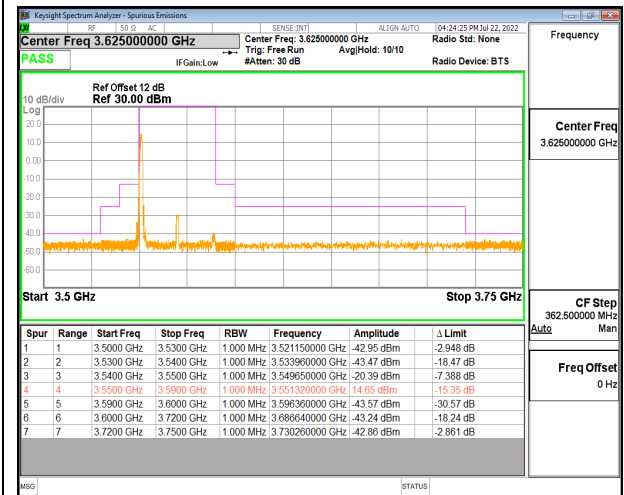
30MHz\_PI/2 BPSK\_CH645666\_1RB77



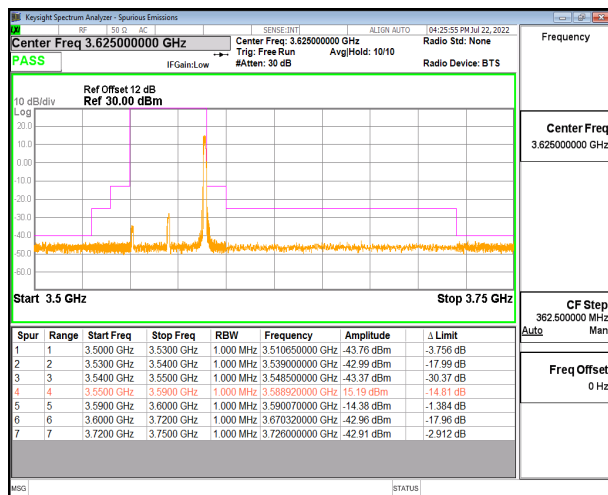
30MHz\_PI/2 BPSK\_CH645666\_75RB0



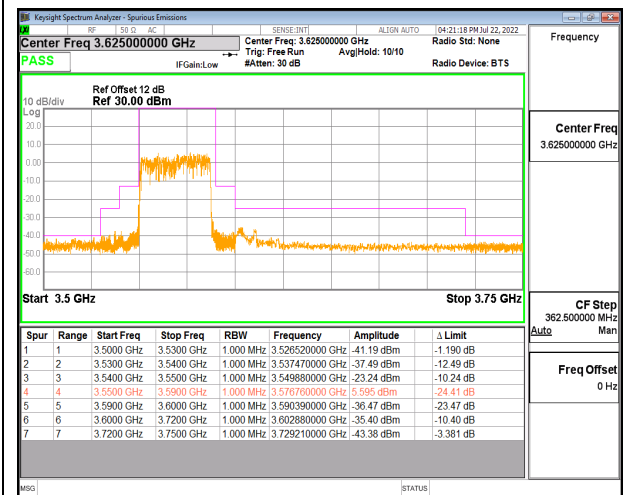
30MHz\_PI/2 BPSK\_CH645666\_75RB3



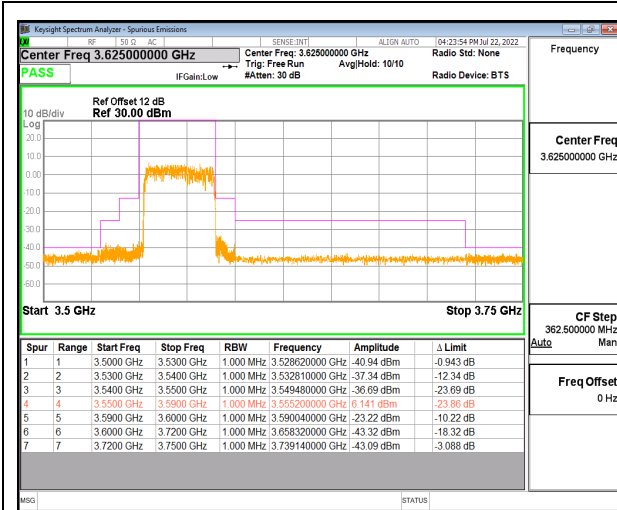
40MHz\_PI/2 BPSK\_CH638000\_1RB0



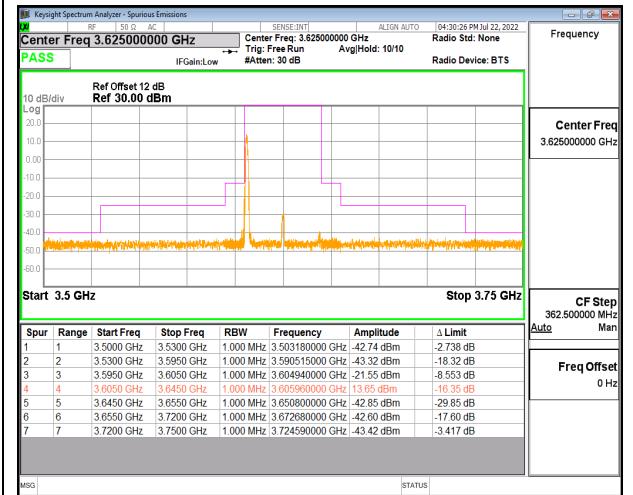
40MHz\_PI/2 BPSK\_CH638000\_1RB105



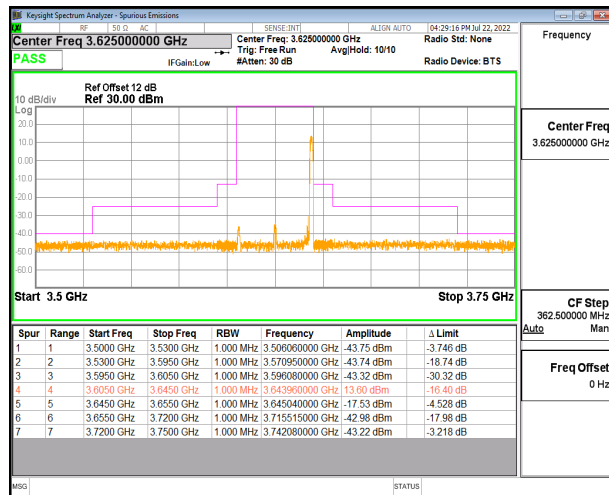
40MHz\_PI/2 BPSK\_CH638000\_100RB0



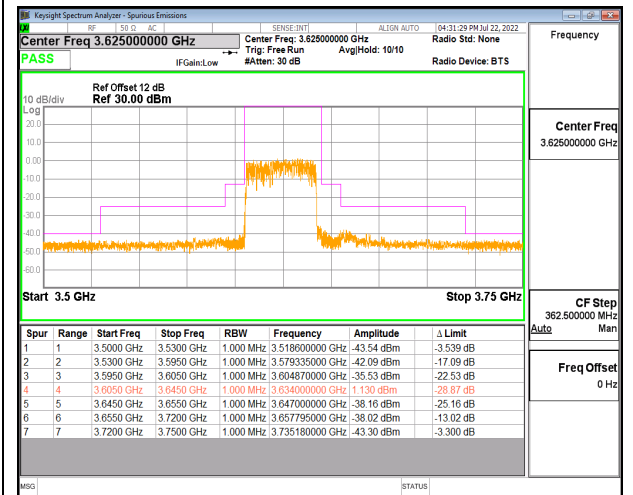
40MHz\_PI/2 BPSK\_CH638000\_100RB6



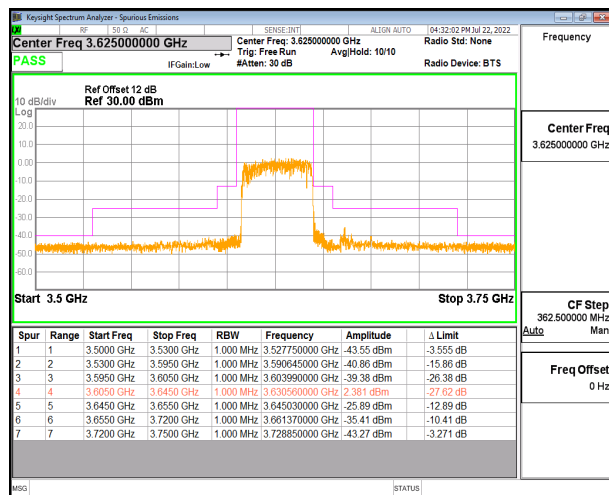
40MHz\_PI/2 BPSK\_CH641666\_1RB0



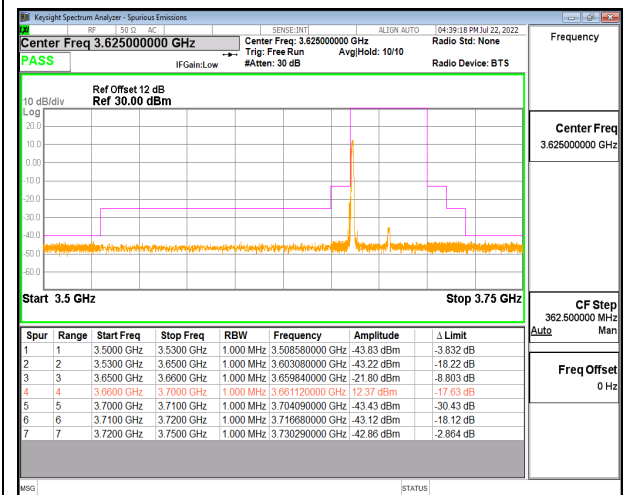
40MHz\_PI/2 BPSK\_CH641666\_1RB105



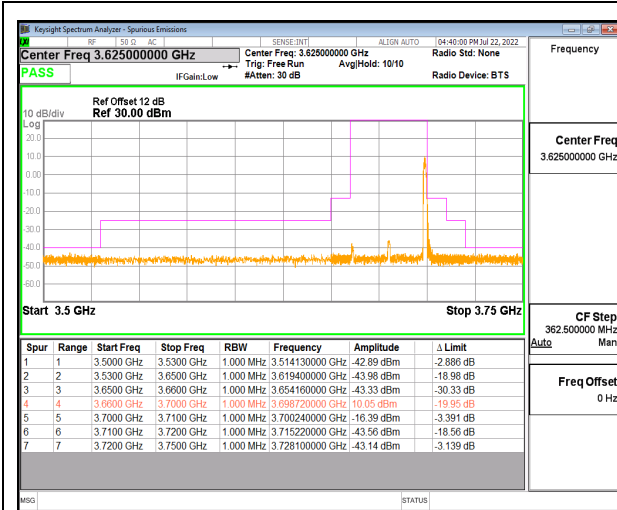
40MHz\_PI/2 BPSK\_CH641666\_100RB0



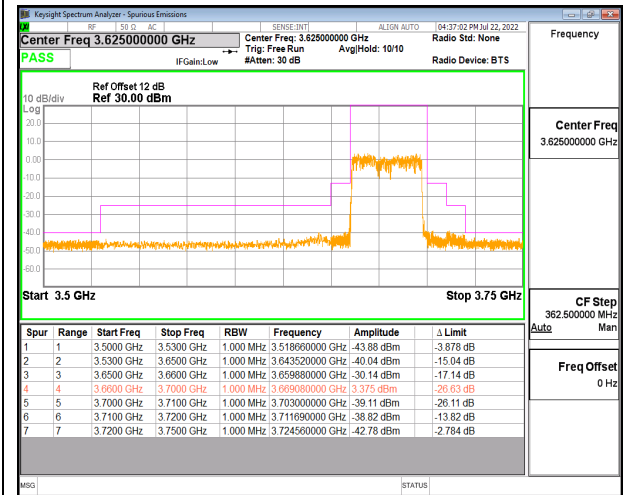
40MHz\_PI/2 BPSK\_CH641666\_100RB6



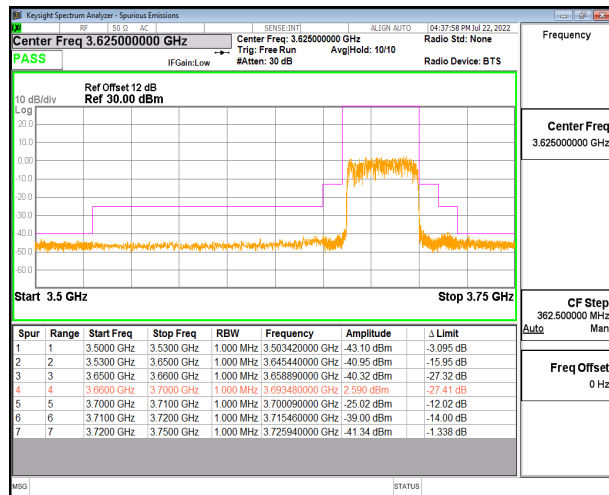
40MHz\_PI/2 BPSK\_CH645332\_1RB0



40MHz\_PI/2 BPSK\_CH645332\_1RB105



40MHz\_PI/2 BPSK\_CH645332\_100RB0

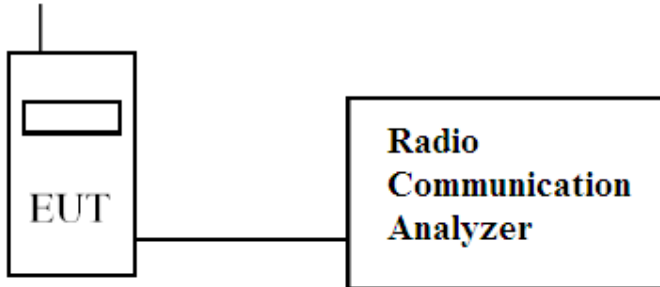


40MHz\_PI/2 BPSK\_CH645332\_100RB6

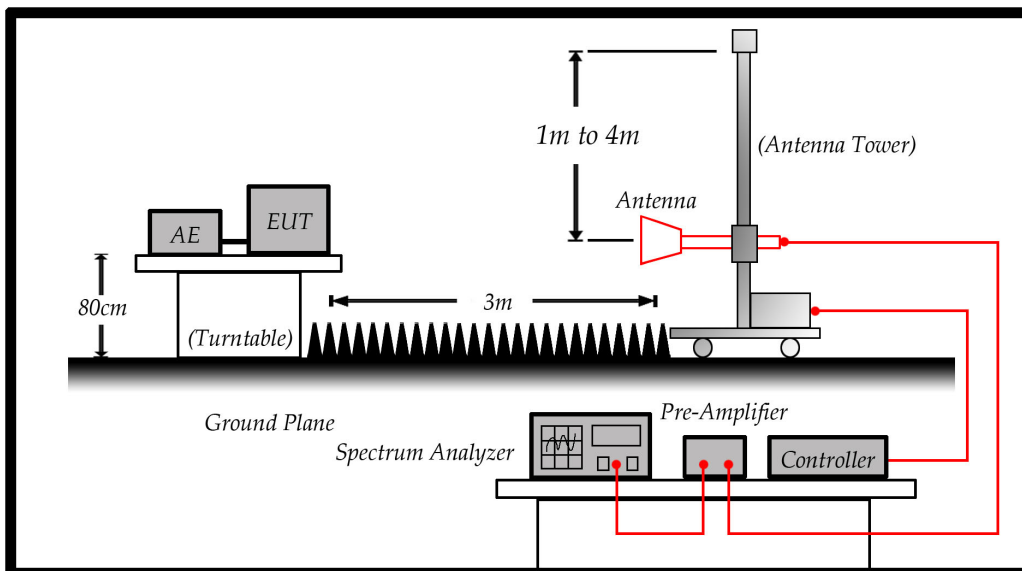
## 6. Spurious Emissions

### 6.1. Test Setup

Conducted Spurious Emission.



Radiated Spurious.



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

### 6.2. Test Limit

Limit: <-40 dBm

$43 + 10\text{Log}(P)$  down on the carrier where P is the power in Watts.

### 6.3. 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 30MHz to 40GHz. 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 1MHz/3MHz 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.

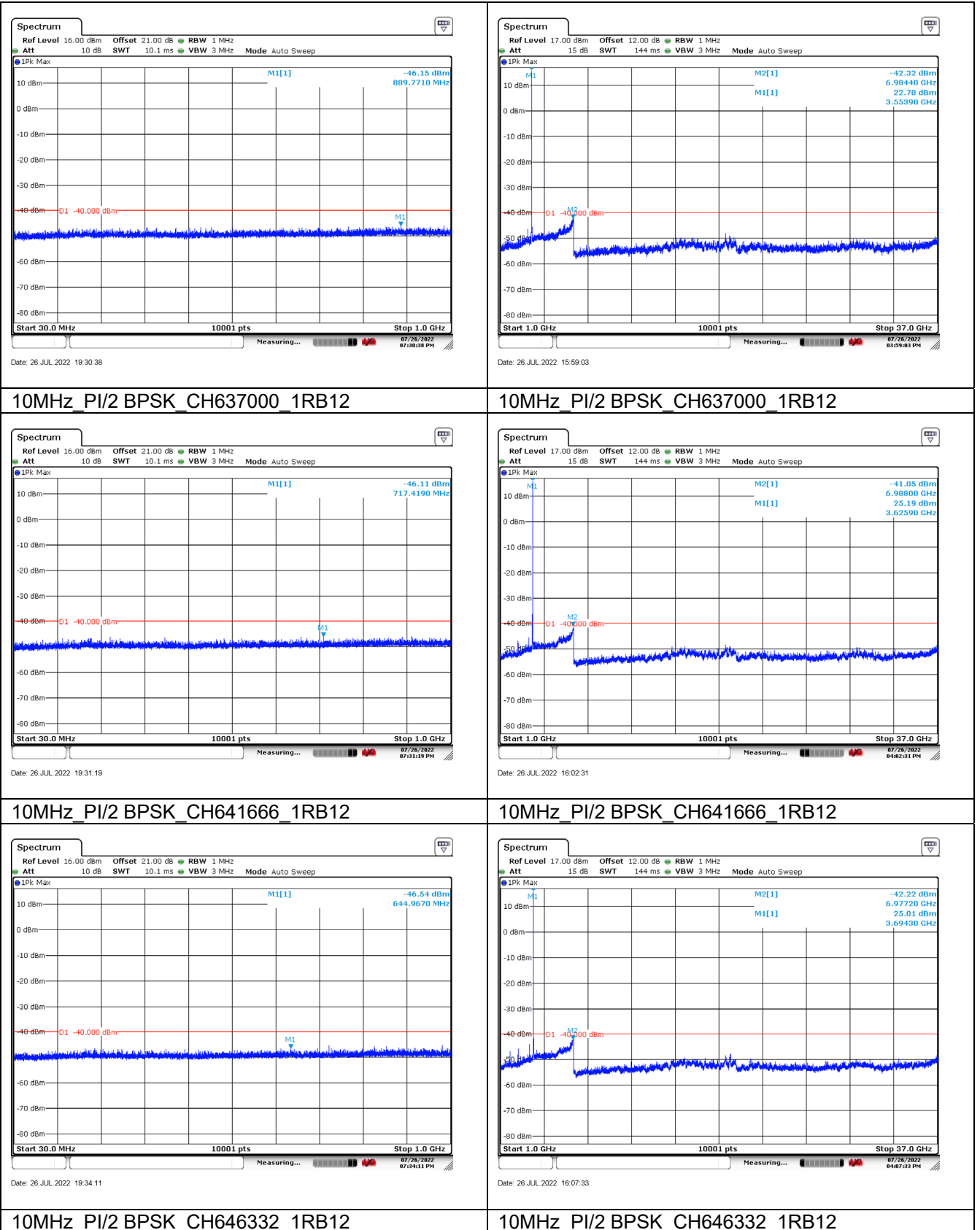
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to TIA/EIA 603-E on radiated measurement.

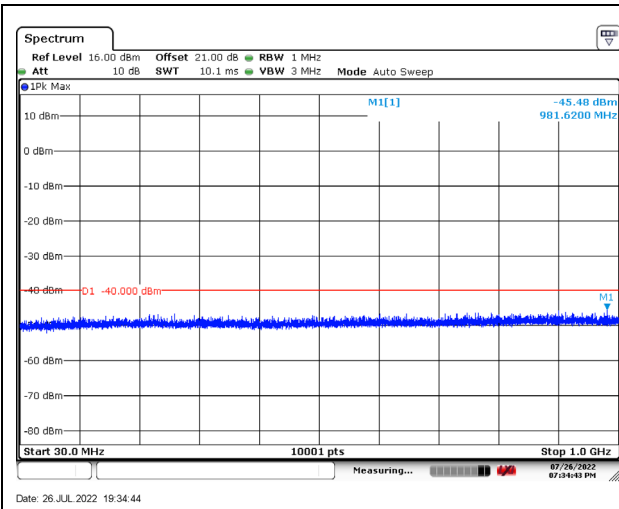
### 6.4. Test Specification

According to Part 2.1051, 96.41

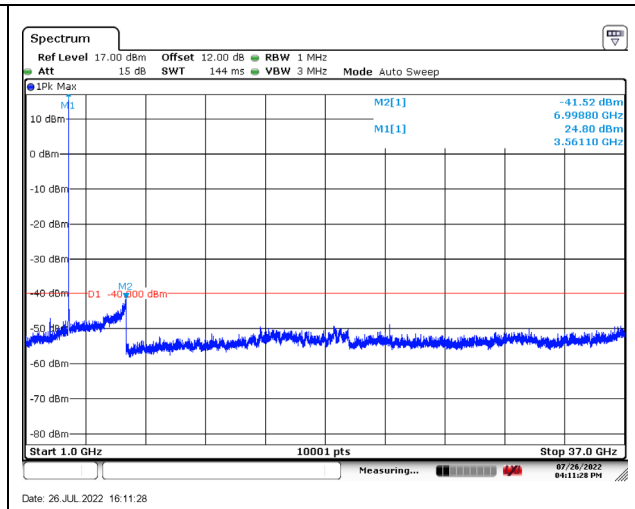
### 6.5. Test Result of Conducted Spurious Emission

#### Mode 1: 5G NR n48

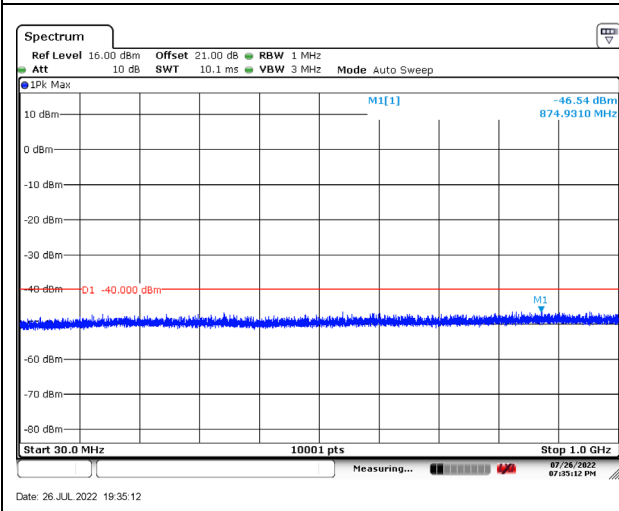




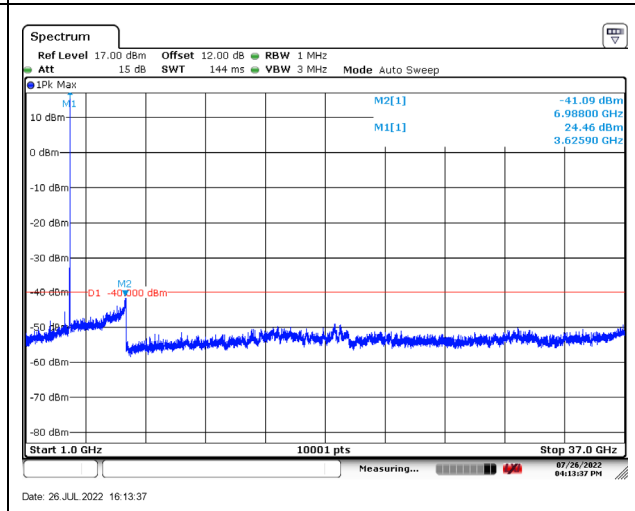
20MHz\_PI/2 BPSK\_CH637334\_1RB25



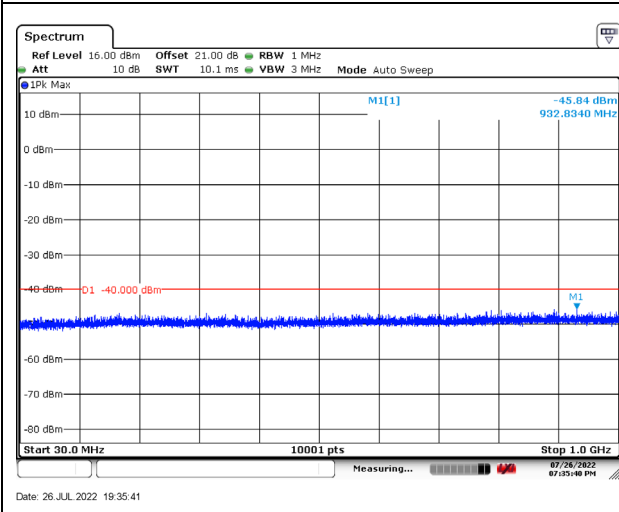
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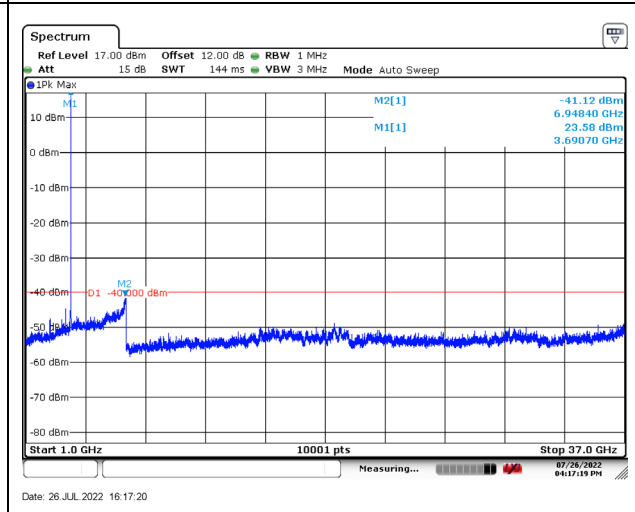
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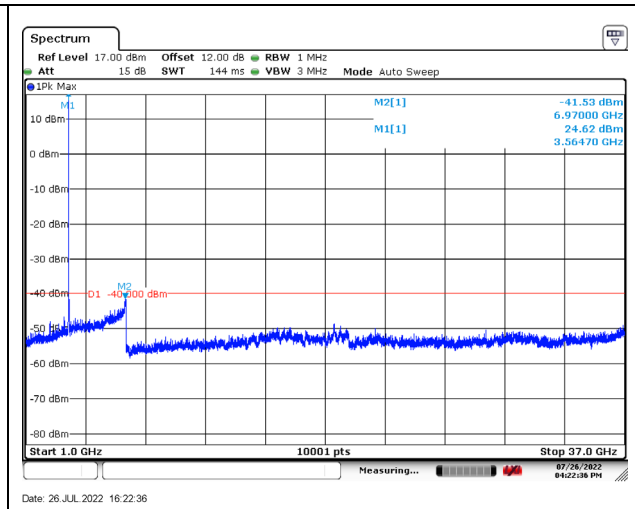
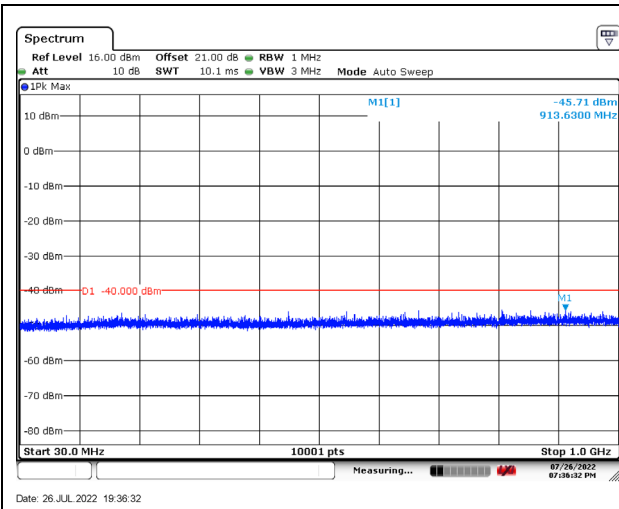
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20MHz\_PI/2 BPSK\_CH646000\_1RB25

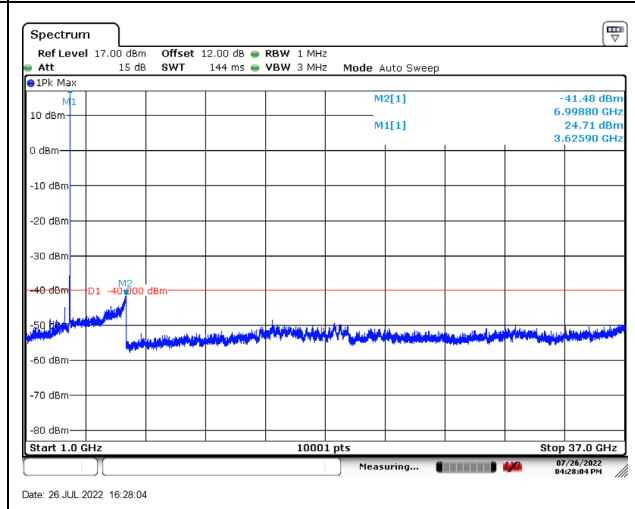
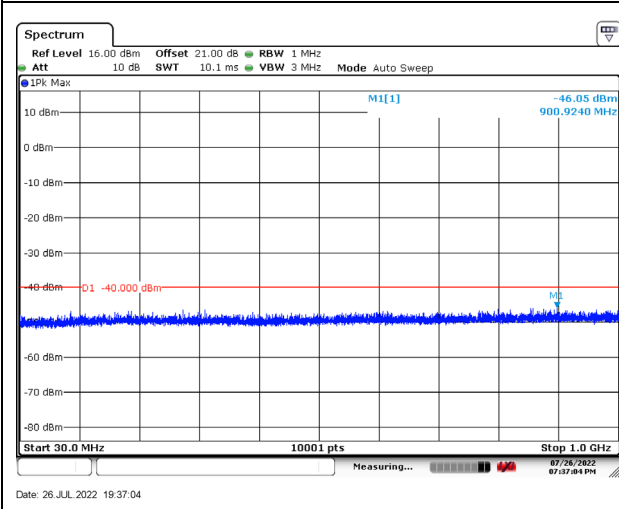


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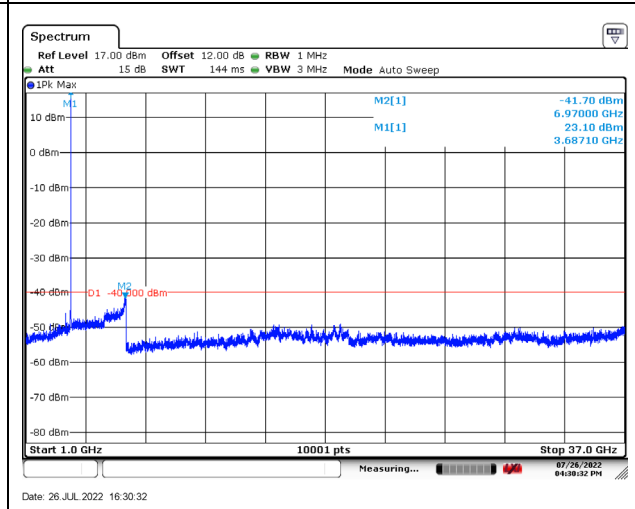
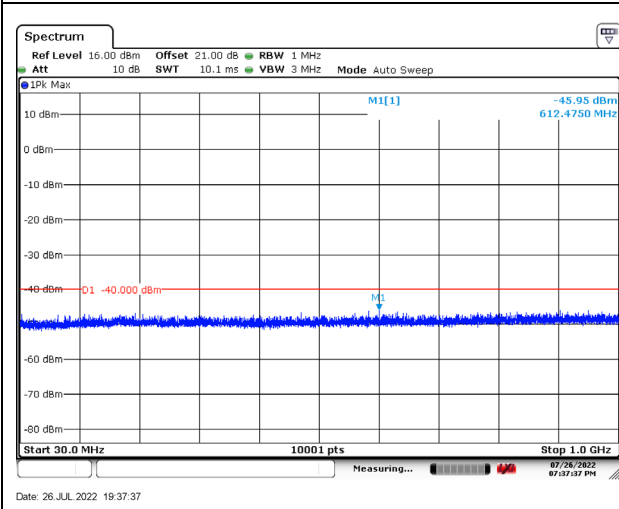
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30MHz\_PI/2 BPSK\_CH637668\_1RB39



30MHz\_PI/2 BPSK\_CH641666\_1RB39

30MHz\_PI/2 BPSK\_CH641666\_1RB39



30MHz\_PI/2 BPSK\_CH645666\_1RB39

30MHz\_PI/2 BPSK\_CH645666\_1RB39