

## FCC Test Report (Part 24 – 5G NR n2/n25)

**Report No.:** RFBFLF-WTW-P21010278-15

**FCC ID:** MSQI007D

**Test Model:** ASUS\_I007D

**Received Date:** Jan. 04, 2021

**Test Date:** Jan. 25 ~ Apr. 09, 2021

**Issued Date:** Apr. 09, 2021

**Applicant:** ASUSTeK COMPUTER INC.

**Address:** 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, TAIWAN

**FCC Registration /  
Designation Number:** 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate of Conformity</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty.....	6
2.2 Test Site and Instruments.....	7
<b>3 General Information</b> .....	<b>9</b>
3.1 General Description of EUT.....	9
3.2 Configuration of System under Test.....	13
3.2.1 Description of Support Units.....	13
3.3 Test Mode Applicability and Tested Channel Detail.....	14
3.4 EUT Operating Conditions.....	21
3.5 General Description of Applied Standards and References.....	21
<b>4 Test Types and Results</b> .....	<b>22</b>
4.1 Output Power Measurement.....	22
4.1.1 Limits of Output Power Measurement.....	22
4.1.2 Test Procedures.....	22
4.1.3 Test Setup.....	22
4.1.4 Test Results.....	23
4.2 Modulation Characteristics Measurement.....	35
4.2.1 Limits of Modulation Characteristics.....	35
4.2.2 Test Procedure.....	35
4.2.3 Test Setup.....	35
4.2.4 Test Results.....	36
4.3 Frequency Stability Measurement.....	38
4.3.1 Limits of Frequency Stability Measurement.....	38
4.3.2 Test Procedure.....	38
4.3.3 Conducted Setup.....	38
4.3.4 Test Results.....	39
4.4 Occupied Bandwidth Measurement.....	50
4.4.1 Test Procedure.....	50
4.4.2 Test Setup.....	50
4.4.3 Test Result.....	51
4.5 Band Edge Measurement.....	61
4.5.1 Limits of Band Edge Measurement.....	61
4.5.2 Test Setup.....	61
4.5.3 Test Procedures.....	61
4.5.4 Test Results.....	62
4.6 Peak to Average Ratio.....	73
4.6.1 Limits of Peak to Average Ratio Measurement.....	73
4.6.2 Test Setup.....	73
4.6.3 Test Procedures.....	73
4.6.4 Test Results.....	74
4.7 Conducted Spurious Emissions.....	79
4.7.1 Limits of Conducted Spurious Emissions Measurement.....	79
4.7.2 Test Setup.....	79
4.7.3 Test Procedure.....	79
4.7.4 Test Results.....	80
4.8 Radiated Emission Measurement.....	91
4.8.1 Limits of Radiated Emission Measurement.....	91
4.8.2 Test Procedure.....	91
4.8.3 Deviation from Test Standard.....	91
4.8.4 Test Setup.....	92
4.8.5 Test Results.....	93

<b>5</b>	<b>Pictures of Test Arrangements.....</b>	<b>107</b>
	<b>Appendix – Information of the Testing Laboratories .....</b>	<b>108</b>

### Release Control Record

Issue No.	Description	Date Issued
RFBFLF-WTW-P21010278-15	Original release	Apr. 09, 2021

## 1 Certificate of Conformity

**Product:** EXP21 Smartphone

**Brand:** ASUS

**Test Model:** ASUS\_I007D

**Sample Status:** Engineering sample

**Applicant:** ASUSTeK COMPUTER INC.

**Test Date:** Jan. 25 ~ Apr. 09, 2021

**Standards:** FCC Part 24, Subpart E

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

**Prepared by :** Celine Chou , **Date:** Apr. 09, 2021  
Celine Chou / Senior Specialist

**Approved by :** Bruce Chen , **Date:** Apr. 09, 2021  
Bruce Chen / Senior Project Engineer

## 2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropically Radiated Power	Pass	Meet the requirement of limit.
2.1046 24.232 (d)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -37.36dB at 33.88MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

## 2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2020	Jun. 11, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSW43	101866	Dec. 14, 2020	Dec. 13, 2021
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2020	Nov. 24, 2021
5G Wireless Test Platforms Keysight	E7515B	MY60102114	May 28, 2020	May 27, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 08, 2020	Jun. 07, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 18, 2020	Feb. 17, 2021
			Feb. 17, 2021	Feb. 16, 2022
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Jan. 16, 2021	Jan. 15, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jan. 16, 2021	Jan. 15, 2022
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Standard Temperature And Humidity Chamber GIANT FORCE	GTH-120-40-CP-A R	MAA1306-019	Sep. 10, 2020	Sep. 09, 2021

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 06, 2020	Jun. 05, 2021
DC power supply Keysight	U8002A	MY56330015	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The test was performed in HwaYa Chamber 9.

### 3 General Information

#### 3.1 General Description of EUT

Product	EXP21 Smartphone					
Brand	ASUS					
Test Model	ASUS_I007D					
Sample Status	Engineering sample					
Power Supply Rating	7.74 Vdc (Battery) 5 Vdc / 9 Vdc / 12 Vdc / 15Vdc / 20Vdc (Adapter)					
Modulation Type	$\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM					
Waveform Type	CP-OFDM, DFT-s-OFDM					
Operating Frequency	n2 (Channel Bandwidth 5MHz)	1852.5MHz ~ 1907.5MHz				
	n2 (Channel Bandwidth 10MHz)	1855.0MHz ~ 1905.0MHz				
	n2 (Channel Bandwidth 15MHz)	1857.5MHz ~ 1902.5MHz				
	n2 (Channel Bandwidth 20MHz)	1860.0MHz ~ 1900.0MHz				
	n25 (Channel Bandwidth 5MHz)	1852.5MHz ~ 1912.5MHz				
	n25 (Channel Bandwidth 10MHz)	1855.0MHz ~ 1910.0MHz				
	n25 (Channel Bandwidth 15MHz)	1857.5MHz ~ 1907.5MHz				
	n25 (Channel Bandwidth 20MHz)	1860.0MHz ~ 1905.0MHz				
	n25 (Channel Bandwidth 25MHz)	1862.5MHz ~ 1902.5MHz				
	n25 (Channel Bandwidth 30MHz)	1865.0MHz ~ 1900.0MHz				
n25 (Channel Bandwidth 40MHz)	1870.0MHz ~ 1895.0MHz					
Max. ERP Power		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
	n2 (Channel Bandwidth 5MHz)	180.302mW (22.56dBm)	179.061mW (22.53dBm)	140.605mW (21.48dBm)	99.083mW (19.96dBm)	62.230mW (17.94dBm)
	n2 (Channel Bandwidth 10MHz)	177.011mW (22.48dBm)	178.649mW (22.52dBm)	140.605mW (21.48dBm)	99.770mW (19.99dBm)	62.951mW (17.99dBm)
	n2 (Channel Bandwidth 15MHz)	178.649mW (22.52dBm)	178.649mW (22.52dBm)	140.281mW (21.47dBm)	100.000mW (20.00dBm)	62.951mW (17.99dBm)
	n2 (Channel Bandwidth 20MHz)	180.302mW (22.56dBm)	180.717mW (22.57dBm)	140.929mW (21.49dBm)	101.391mW (20.06dBm)	63.241mW (18.01dBm)
	n25 (Channel Bandwidth 5MHz)	172.187mW (22.36dBm)	179.473mW (22.54dBm)	136.458mW (21.35dBm)	96.828mW (19.86dBm)	61.944mW (17.92dBm)
	n25 (Channel Bandwidth 10MHz)	175.388mW (22.44dBm)	180.717mW (22.57dBm)	134.896mW (21.30dBm)	96.383mW (19.84dBm)	61.660mW (17.90dBm)
	n25 (Channel Bandwidth 15MHz)	174.181mW (22.41dBm)	178.649mW (22.52dBm)	135.207mW (21.31dBm)	96.383mW (19.84dBm)	61.376mW (17.88dBm)
	n25 (Channel Bandwidth 20MHz)	174.582mW (22.42dBm)	179.061mW (22.53dBm)	135.831mW (21.33dBm)	96.828mW (19.86dBm)	60.674mW (17.83dBm)
	n25 (Channel Bandwidth 25MHz)	174.582mW (22.42dBm)	179.887mW (22.55dBm)	135.831mW (21.33dBm)	96.828mW (19.86dBm)	62.087mW (17.93dBm)
	n25 (Channel Bandwidth 30MHz)	175.388mW (22.44dBm)	178.649mW (22.52dBm)	136.458mW (21.35dBm)	97.275mW (19.88dBm)	61.518mW (17.89dBm)
	n25 (Channel Bandwidth 40MHz)	173.780mW (22.40dBm)	181.134mW (22.58dBm)	136.144mW (21.34dBm)	97.499mW (19.89dBm)	60.954mW (17.85dBm)

Emission Designator		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
	n2 (Channel Bandwidth 5MHz)	4M48G7D	4M47G7D	4M47D7W	4M47D7W	4M47D7W
	n2 (Channel Bandwidth 10MHz)	9M22G7D	9M21G7D	9M21D7W	9M22D7W	9M20D7W
	n2 (Channel Bandwidth 15MHz)	14M0G7D	14M1G7D	14M1D7W	14M1D7W	14M1D7W
	n2 (Channel Bandwidth 20MHz)	18M8G7D	18M7G7D	18M7D7W	18M9D7W	18M9D7W
	n25 (Channel Bandwidth 5MHz)	4M47G7D	4M47G7D	4M47D7W	4M47D7W	4M47D7W
	n25 (Channel Bandwidth 10MHz)	9M25G7D	9M28G7D	9M29D7W	9M28D7W	9M29D7W
	n25 (Channel Bandwidth 15MHz)	14M1G7D	14M1G7D	14M1D7W	14M1D7W	14M1D7W
	n25 (Channel Bandwidth 20MHz)	18M8G7D	18M9G7D	18M9D7W	18M9D7W	18M9D7W
	n25 (Channel Bandwidth 25MHz)	23M6G7D	23M7G7D	23M7D7W	23M7D7W	23M7D7W
	n25 (Channel Bandwidth 30MHz)	28M6G7D	28M6G7D	28M5D7W	28M6D7W	28M6D7W
	n25 (Channel Bandwidth 40MHz)	38M6G7D	38M5G7D	38M5D7W	38M5D7W	38M5D7W
Antenna Type	Refer to Note as below					
Antenna Connector	Refer to Note as below					
Accessory Device	Refer to Note as below					
Cable Supplied	Refer to Note as below					

Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Battery	SCUD	C21P2002	Rating: 7.74Vdc, 15.2Wh
Adapter	AOHAI	A320Q-200325C-US	I/P: 100-240Vac, 50/60Hz, 1.5A O/P: 5Vdc, 3A; 9Vdc, 3A; 12Vdc, 3A; 15Vdc, 3A; 20Vdc, 3.25A
Type A to Type C USB Cable	Luxshare	LA9U2026-CS-R	0.5m
Type C to Type C Cable	Luxshare	LA9UC006-CS-R	1.2m
Bluetooth Earphone	Bang & Olufsen	EQ Earbud R	FCC ID: TTUBEOPLAYEQR IC: 3775B-BEOPLAYEQR
		EQ Earbud L	FCC ID: TTUBEOPLAYEQL IC: 3775B-BEOPLAYEQL
Bluetooth Earphone Charging Case	Bang & Olufsen	EQ Charging case	I/P: 5Vdc/500mA O/P: 5Vdc/ R170mA; L170mA

2. The following antennas were provided to the EUT.

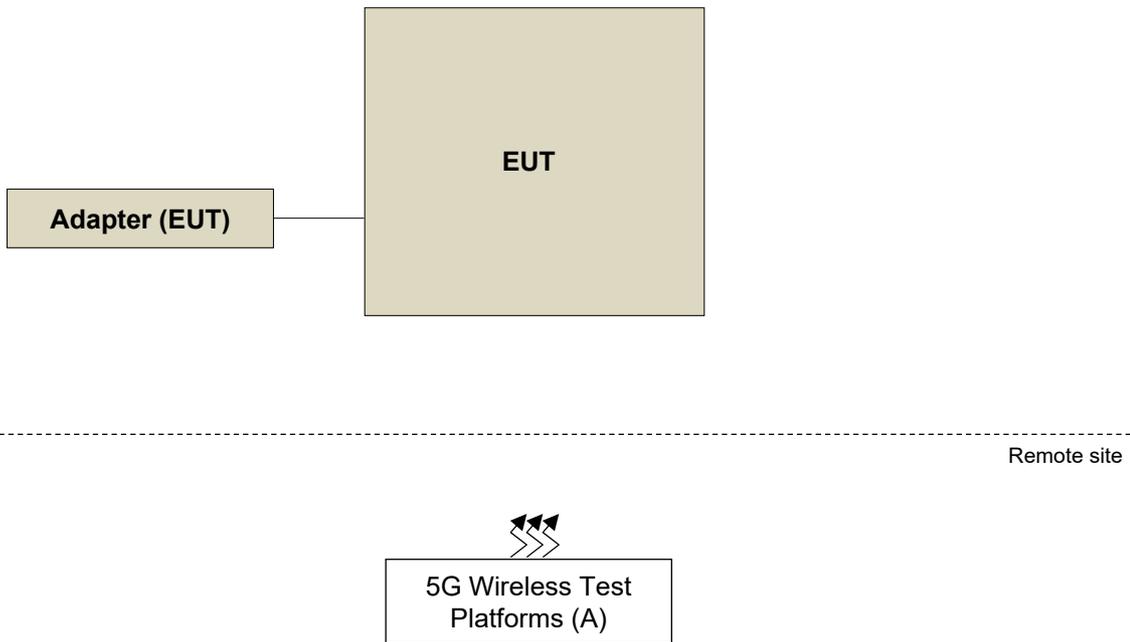
Ant. No.	Brand	Model	Ant. Type	Connector	Frequency Range
Ant 0	ASUS	ZS675KW	PIFA	LCP+IpeX	610-960MHz, 1710-2690MHz
Ant 1	ASUS	ZS675KW	PIFA	LCP+IpeX	1427-1510MHz, 1710-2690MHz
Ant 2	ASUS	ZS675KW	PIFA	LCP+IpeX	610-960MHz, 1427-1510MHz, 1710-2690MHz
Ant 3	INPAQ	ZS675KW	PIFA	IpeX	1575-1610MHz, 2400-2500MHz, 5150-5850MHz, 5925-7125MHz
Ant 4	INPAQ	ZS675KW	PIFA	IpeX	1176±10MHz, 2400-2500MHz, 5150-5850MHz, 5925-7125MHz
Ant 5	INPAQ	ZS675KW	PIFA	LCP+IpeX	3300-4000MHz, 4400-5000MHz
Ant 6	INPAQ	ZS675KW	PIFA	IpeX	1427-1510MHz, 2400-2500MHz, 5150-5850MHz, 5925-7125MHz
Ant 7	INPAQ	ZS675KW	PIFA	LCP+IpeX	3300-4000MHz, 4400-5000MHz
Ant 8	ASUS	ZS675KW	PIFA	LCP+IpeX	1427-1510MHz, 1710-2690MHz
Ant 9	ASUS	ZS675KW	PIFA	LCP+IpeX	1710-2690MHz
Ant 10	INPAQ	ZS675KW	PIFA	IpeX	3300-4000MHz, 4400-5000MHz
Ant 11	INPAQ	ZS675KW	PIFA	IpeX	3300-4000MHz, 4400-5000MHz

2G / 3G Band													
Band	Freq. Range (MHz)	Gain (dBi)											
		Ant. 0	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11
GSM-850	824 ~ 849	-1.891		-4.526									
GSM-1900	1850 ~ 1910		-1.887	-1.394						-2.89579			
WCDMA B2	1850 ~ 1910		-1.887	-1.394						-2.89579			
WCDMA B4	1710 ~ 1755		-2.884	-3.228						-3.13552			
WCDMA B5	824 ~ 849	-1.891		-4.526									
CDMA BC0	815 ~ 849	-1.891		-4.526									
CDMA BC1	1850 ~ 1910		-1.887	-1.394						-2.89579			
CDMA BC10	806 ~ 901	-1.891		-4.526									

LTE Band													
Band	Freq. Range (MHz)	Gain (dBi)											
		Ant. 0	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11
LTE B2	1850 ~ 1910		-1.887	-1.394						-2.89579	-1.804		
LTE B4	1710 ~ 1755		-2.884	-3.228						-3.13552	-1.706		
LTE B5	824 ~ 849	-1.891		-4.526									
LTE B7	2500 ~ 2570		0.185	-0.657						-0.50837	-1.117		
LTE B12	698 ~ 716	-2.135		-4.343									
LTE B13	777 ~ 787	-4.37		-8.13									
LTE B14	788 ~ 798	-4.37		-7.931									
LTE B17	704 ~ 716	-2.135		-4.343									
LTE B25	1850 ~ 1915		-1.887	-1.394						-2.89579			
LTE B26	814 ~ 849	-1.891		-4.526									
LTE B30	2305 ~ 2315		-1.326	-2.669						-1.28433			
LTE B66	1710 ~ 1780		-2.884	-2.478						-3.0668	-1.685		
LTE B71	663 ~ 698	-5.741		-7.388									
T-LTE B38	2570 ~ 2620		0.724	-0.912						-0.59557			
T-LTE B40	2300 ~ 2400		-1.326	-2.669						-1.28433			
T-LTE B41	2496 ~ 2690		1.143	-0.657						-0.59557			
T-LTE B42	3400 ~ 3600						0.313		0.5277			-2.493	-0.35195
T-LTE B43	3600 ~ 3800						-0.434		0.5277			-0.477	-0.161
T-LTE B48	3550 ~ 3700						-0.434		0.5277			-0.477	-0.161
5G FR1 Band													
Band	Freq. Range (MHz)	Gain (dBi)											
		Ant. 0	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11
n2	1850 ~ 1910		-1.887	-1.394						-2.89579	-1.804		
n5	824 ~ 849	-1.891		-4.526									
n7	2500 ~ 2570		0.185	-0.657						-0.50837	-1.117		
n12	699 ~ 716	-2.135		-4.343									
n13	777 ~ 787	-4.37		-8.13									
n14	788 ~ 798	-4.37		-7.931									
n25	1850 ~ 1915		-1.887	-1.394						-2.89579	-1.627		
n26	814 ~ 849	-1.891		-4.526									
n30	2305 ~ 2315		-1.326	-2.669						-1.28433			
n38	2570 ~ 2620		0.724	-0.912						-0.59557	-1.3		
n41	2496 ~ 2690		1.143	-0.657						-0.59557	-0.076		
n66	1710 ~ 1780		-2.884	-2.478						-3.0668	-1.685		
n71	663 ~ 698	-5.741		-7.388									
n77	3300 ~ 4200						0.313		0.5277			2.017	0.19902
n78	3300 ~ 3800						0.313		0.5277			2.017	-0.161

\* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

### 3.2 Configuration of System under Test



#### 3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	5G Wireless Test Platforms	Keysight	E7515B	MY58300759	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

### 3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
n2	Y-plane
n25	Y-plane

n2

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	EIRP	370500 to 381500	370500 (1852.5MHz), 376000 (1880.0MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 13 RB Offset 1 RB / 23 RB Offset 12 RB / 0 RB Offset 12 RB / 7 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		371000 to 381000	371000 (1855.0MHz), 376000 (1880.0MHz), 381000 (1905.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 26 RB Offset 1 RB / 50 RB Offset 25 RB / 0 RB Offset 25 RB / 14 RB Offset 25 RB / 27 RB Offset 50 RB / 0 RB Offset
		371500 to 380500	371500 (1857.5MHz), 376000 (1880.0MHz), 380500 (1902.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 40 RB Offset 1 RB / 77 RB Offset 36 RB / 0 RB Offset 36 RB / 22 RB Offset 36 RB / 43 RB Offset 75 RB / 0 RB Offset
		372000 to 380000	372000 (1860.0MHz), 376000 (1880.0MHz), 380000 (1900.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 53 RB Offset 1 RB / 104 RB Offset 50RB / 0 RB Offset 50 RB / 28 RB Offset 50 RB / 56 RB Offset 100 RB / 0 RB Offset
-	Modulation characteristics	372000 to 380000	376000 (1880.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	106 RB / 0 RB Offset
-	Frequency Stability	370500 to 381500	370500 (1852.5MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK	25 RB / 0 RB Offset
		371000 to 381000	371000 (1855.0MHz), 381000 (1905.0MHz)	10MHz	QPSK	52 RB / 0 RB Offset
		371500 to 380500	371500 (1857.5MHz), 380500 (1902.5MHz)	15MHz	QPSK	79 RB / 0 RB Offset
		372000 to 380000	372000 (1860.0MHz), 380000 (1900.0MHz)	20MHz	QPSK	106 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Occupied Bandwidth	370500 to 381500	370500 (1852.5MHz), 376000 (1880.0MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	25 RB / 0 RB Offset
		371000 to 381000	371000 (1855.0MHz), 376000 (1880.0MHz), 381000 (1905.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	52 RB / 0 RB Offset
		371500 to 380500	371500 (1857.5MHz), 376000 (1880.0MHz), 380500 (1902.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	79 RB / 0 RB Offset
		372000 to 380000	372000 (1860.0MHz), 376000 (1880.0MHz), 380000 (1900.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	106 RB / 0 RB Offset
-	Band Edge	370500 to 381500	370500 (1852.5MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		371000 to 381000	371000 (1855.0MHz), 381000 (1905.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 51 RB Offset 52 RB / 0 RB Offset
		371500 to 380500	371500 (1857.5MHz), 380500 (1902.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset 1 RB / 78 RB Offset 79 RB / 0 RB Offset
		372000 to 380000	372000 (1860.0MHz), 380000 (1900.0MHz)	20MHz	QPSK	1 RB / 0 RB Offset 1 RB / 105 RB Offset 106 RB / 0 RB Offset
-	Peak to Average Ratio	370500 to 381500	370500 (1852.5MHz), 376000 (1880.0MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		371000 to 381000	371000 (1855.0MHz), 376000 (1880.0MHz), 381000 (1905.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		371500 to 380500	371500 (1857.5MHz), 376000 (1880.0MHz), 380500 (1902.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		372000 to 380000	372000 (1860.0MHz), 376000 (1880.0MHz), 380000 (1900.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Conducted Emission	370500 to 381500	370500 (1852.5MHz), 376000 (1880.0MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 1 RB Offset
		371000 to 381000	371000 (1855.0MHz), 376000 (1880.0MHz), 381000 (1905.0MHz)	10MHz	QPSK	1 RB / 1 RB Offset
		371500 to 380500	371500 (1857.5MHz), 376000 (1880.0MHz), 380500 (1902.5MHz)	15MHz	QPSK	1 RB / 1 RB Offset
		372000 to 380000	372000 (1860.0MHz), 376000 (1880.0MHz), 380000 (1900.0MHz)	20MHz	QPSK	1 RB / 1 RB Offset
-	Radiated Emission Below 1GHz	372000 to 380000	380000 (1900.0MHz)	20MHz	QPSK	1 RB / 1 RB Offset
-	Radiated Emission Above 1GHz	370500 to 381500	370500 (1852.5MHz), 376000 (1880.0MHz), 381500 (1907.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 1 RB Offset
		372000 to 380000	372000 (1860.0MHz), 376000 (1880.0MHz), 380000 (1900.0MHz)	20MHz	QPSK	1 RB / 1 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 38.521-1 Section 6.5.3.1.4, choose the lowest and highest channel bandwidth for final test.
3. Only output power, modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under  $\pi/2$  BPSK, QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under worse mode according to the maximum output power.

n25

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	EIRP	370500 to 382500	370500 (1852.5MHz), 376500 (1882.5MHz), 382500 (1912.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 13 RB Offset 1 RB / 23 RB Offset 12 RB / 0 RB Offset 12 RB / 7 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		371000 to 382000	371000 (1855.0MHz), 376500 (1882.5MHz), 382000 (1910.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 26 RB Offset 1 RB / 50 RB Offset 25 RB / 0 RB Offset 25 RB / 14 RB Offset 25 RB / 27 RB Offset 50 RB / 0 RB Offset
		371500 to 381500	371500 (1857.5MHz), 376500 (1882.5MHz), 381500 (1907.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 40 RB Offset 1 RB / 77 RB Offset 36 RB / 0 RB Offset 36 RB / 22 RB Offset 36 RB / 43 RB Offset 75 RB / 0 RB Offset
		372000 to 381000	372000 (1860.0MHz), 376500 (1882.5MHz), 381000 (1905.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 53 RB Offset 1 RB / 104 RB Offset 50RB / 0 RB Offset 50 RB / 28 RB Offset 50 RB / 56 RB Offset 100 RB / 0 RB Offset
		372500 to 380500	372500 (1862.5MHz), 376500 (1882.5MHz), 380500 (1902.5MHz)	25MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 67 RB Offset 1 RB / 131 RB Offset 64RB / 0 RB Offset 64 RB / 35 RB Offset 64 RB / 69 RB Offset 128 RB / 0 RB Offset
		373000 to 380000	373000 (1865.0MHz), 376500 (1882.5MHz), 380000 (1900.0MHz)	30MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 80 RB Offset 1 RB / 158 RB Offset 80RB / 0 RB Offset 80 RB / 40 RB Offset 80 RB / 80 RB Offset 160 RB / 0 RB Offset
		374000 to 379000	374000 (1870.0MHz), 376500 (1882.5MHz), 379000 (1895.0MHz)	40MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset 1 RB / 108 RB Offset 1 RB / 214 RB Offset 108RB / 0 RB Offset 108 RB / 54 RB Offset 108 RB / 108 RB Offset 216 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Modulation characteristics	374000 to 379000	376500 (1882.5MHz)	40MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	216 RB / 0 RB Offset
-	Frequency Stability	370500 to 382500	370500 (1852.5MHz), 382500 (1912.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		371000 to 382000	371000 (1855.0MHz), 382000 (1910.0MHz)	10MHz	QPSK	52 RB / 0 RB Offset
		371500 to 381500	371500 (1857.5MHz), 381500 (1907.5MHz)	15MHz	QPSK	79 RB / 0 RB Offset
		372000 to 381000	372000 (1860.0MHz), 381000 (1905.0MHz)	20MHz	QPSK	106 RB / 0 RB Offset
		372500 to 380500	372500 (1862.5MHz), 380500 (1902.5MHz)	25MHz	QPSK	133 RB / 0 RB Offset
		373000 to 380000	373000 (1865.0MHz), 380000 (1900.0MHz)	30MHz	QPSK	160 RB / 0 RB Offset
		374000 to 379000	374000 (1870.0MHz), 379000 (1895.0MHz)	40MHz	QPSK	216 RB / 0 RB Offset
-	Occupied Bandwidth	370500 to 382500	370500 (1852.5MHz), 376500 (1882.5MHz), 382500 (1912.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	25 RB / 0 RB Offset
		371000 to 382000	371000 (1855.0MHz), 376500 (1882.5MHz), 382000 (1910.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	52 RB / 0 RB Offset
		371500 to 381500	371500 (1857.5MHz), 376500 (1882.5MHz), 381500 (1907.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	79 RB / 0 RB Offset
		372000 to 381000	372000 (1860.0MHz), 376500 (1882.5MHz), 381000 (1905.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	106 RB / 0 RB Offset
		372500 to 380500	372500 (1862.5MHz), 376500 (1882.5MHz), 380500 (1902.5MHz)	25MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	133 RB / 0 RB Offset
		373000 to 380000	373000 (1865.0MHz), 376500 (1882.5MHz), 380000 (1900.0MHz)	30MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	160 RB / 0 RB Offset
		374000 to 379000	374000 (1870.0MHz), 376500 (1882.5MHz), 379000 (1895.0MHz)	40MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	216 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	370500 to 382500	370500 (1852.5MHz), 382500 (1912.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		371000 to 382000	371000 (1855.0MHz), 382000 (1910.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 51 RB Offset 52 RB / 0 RB Offset
		371500 to 381500	371500 (1857.5MHz), 381500 (1907.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset 1 RB / 78 RB Offset 79 RB / 0 RB Offset
		372000 to 381000	372000 (1860.0MHz), 381000 (1905.0MHz)	20MHz	QPSK	1 RB / 0 RB Offset 1 RB / 105 RB Offset 106 RB / 0 RB Offset
		372500 to 380500	372500 (1862.5MHz), 380500 (1902.5MHz)	25MHz	QPSK	1 RB / 0 RB Offset 1 RB / 132 RB Offset 133 RB / 0 RB Offset
		373000 to 380000	373000 (1865.0MHz), 380000 (1900.0MHz)	30MHz	QPSK	1 RB / 0 RB Offset 1 RB / 159 RB Offset 160 RB / 0 RB Offset
		374000 to 379000	374000 (1870.0MHz), 379000 (1895.0MHz)	40MHz	QPSK	1 RB / 0 RB Offset 1 RB / 215 RB Offset 216 RB / 0 RB Offset
-	Peak to Average Ratio	370500 to 382500	370500 (1852.5MHz), 376500 (1882.5MHz), 382500 (1912.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		371000 to 382000	371000 (1855.0MHz), 376500 (1882.5MHz), 382000 (1910.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		371500 to 381500	371500 (1857.5MHz), 376500 (1882.5MHz), 381500 (1907.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		372000 to 381000	372000 (1860.0MHz), 376500 (1882.5MHz), 381000 (1905.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		372500 to 380500	372500 (1862.5MHz), 376500 (1882.5MHz), 380500 (1902.5MHz)	25MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		373000 to 380000	373000 (1865.0MHz), 376500 (1882.5MHz), 380000 (1900.0MHz)	30MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset
		374000 to 379000	374000 (1870.0MHz), 376500 (1882.5MHz), 379000 (1895.0MHz)	40MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB / 1 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Conducted Emission	370500 to 382500	370500 (1852.5MHz), 376500 (1882.5MHz), 382500 (1912.5MHz)	5MHz	QPSK	1 RB / 1 RB Offset
		371000 to 382000	371000 (1855.0MHz), 376500 (1882.5MHz), 382000 (1910.0MHz)	10MHz	QPSK	1 RB / 1 RB Offset
		371500 to 381500	371500 (1857.5MHz), 376500 (1882.5MHz), 381500 (1907.5MHz)	15MHz	QPSK	1 RB / 1 RB Offset
		372000 to 381000	372000 (1860.0MHz), 376500 (1882.5MHz), 381000 (1905.0MHz)	20MHz	QPSK	1 RB / 1 RB Offset
		372500 to 380500	372500 (1862.5MHz), 376500 (1882.5MHz), 380500 (1902.5MHz)	25MHz	QPSK	1 RB / 1 RB Offset
		373000 to 380000	373000 (1865.0MHz), 376500 (1882.5MHz), 380000 (1900.0MHz)	30MHz	QPSK	1 RB / 1 RB Offset
		374000 to 379000	374000 (1870.0MHz), 376500 (1882.5MHz), 379000 (1895.0MHz)	40MHz	QPSK	1 RB / 1 RB Offset
-	Radiated Emission Below 1GHz	372000 to 379000	372000 (1860.0MHz)	20MHz	QPSK	1 RB / 1 RB Offset
-	Radiated Emission Above 1GHz	370500 to 382500	370500 (1852.5MHz), 376500 (1882.5MHz), 382500 (1912.5MHz)	5MHz	QPSK	1 RB / 1 RB Offset
		372000 to 381000	372000 (1860.0MHz), 376500 (1882.5MHz), 381000 (1905.0MHz)	20MHz	QPSK	1 RB / 1 RB Offset
		374000 to 379000	374000 (1870.0MHz), 376500 (1882.5MHz), 379000 (1895.0MHz)	40MHz	QPSK	1 RB / 1 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 38.521-1 Section 6.5.3.1.4, choose the lowest, mid and highest channel bandwidth for final test.
3. Only output power, modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under  $\pi/2$  BPSK, QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under worse mode according to the maximum output power.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Modulation Characteristics	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Frequency Stability	25deg. C, 60%RH	7.74Vdc	James Yang
Occupied Bandwidth	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Band Edge	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Peak To Average Ratio	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Conducted Emission	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Radiated Emission	23deg. C, 67%RH 25deg. C, 65%RH	120Vac, 60Hz	Adair Peng Noah Chang

**3.4 EUT Operating Conditions**

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

**3.5 General Description of Applied Standards and References**

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**Test Standard:**

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 24**

**ANSI/TIA/EIA-603-E 2016**

ANSI 63.26-2015

**References Test Guidance:**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

#### 4.1.2 Test Procedures

##### Conducted Power Measurement:

The EUT was set up for the maximum power with 5GNR link data modulation and link up with simulator.  
Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

##### Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

$$\text{ERP} = P_{\text{Meas}} + G_{\text{T}} - 2.15$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively  
(expressed in the same units as  $P_{\text{Meas}}$ , e.g., dBm or dBW)

$P_{\text{Meas}}$  measured transmitter output power or PSD, in dBm or dBW

$G_{\text{T}}$  gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

#### 4.1.3 Test Setup

Conducted Power Measurement:



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

NR Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		372000	376000	380000
		Frequency (MHz)		1860	1880	1900
20M	$\pi/2$ BPSK	1	1	23.83	23.81	23.87
		1	53	23.83	23.82	23.86
		1	104	23.74	23.81	23.92
		50	0	23.35	23.39	23.40
		50	28	23.78	23.86	23.95
		50	56	23.29	23.35	23.35
		100	0	23.37	23.40	23.42
20M	QPSK	1	1	23.89	23.91	23.96
		1	53	23.89	23.91	23.90
		1	104	23.81	23.84	23.94
		50	0	22.94	22.96	22.98
		50	28	23.87	23.90	23.91
		50	56	22.87	22.89	22.90
		100	0	22.91	22.94	22.98
20M	16QAM	1	1	22.88	22.84	22.86
20M	64QAM	1	1	21.35	21.31	21.45
20M	256QAM	1	1	19.31	19.33	19.40
BW	MCS Index	Channel		371500	376000	380500
		Frequency (MHz)		1857.5	1880	1902.5
15M	$\pi/2$ BPSK	1	1	23.77	23.75	23.86
		1	40	23.75	23.76	23.82
		1	77	23.66	23.76	23.89
		36	0	23.30	23.32	23.40
		36	22	23.76	23.80	23.91
		36	43	23.20	23.28	23.35
		75	0	23.33	23.38	23.42
15M	QPSK	1	1	23.80	23.83	23.86
		1	40	23.87	23.90	23.88
		1	77	23.80	23.75	23.89
		36	0	22.86	22.88	22.95
		36	22	23.85	23.88	23.91
		36	43	22.84	22.86	22.84
		75	0	22.86	22.84	22.89
15M	16QAM	1	1	22.86	22.77	22.82
15M	64QAM	1	1	21.26	21.24	21.39
15M	256QAM	1	1	19.31	19.32	19.38

NR Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		371000	376000	381000
		Frequency (MHz)		1855	1880	1905
10M	$\pi/2$ BPSK	1	1	23.79	23.76	23.84
		1	26	23.79	23.79	23.77
		1	50	23.69	23.77	23.86
		25	0	23.29	23.29	23.30
		25	14	23.74	23.77	23.87
		25	27	23.22	23.25	23.25
		50	0	23.36	23.31	23.42
10M	QPSK	1	1	23.84	23.90	23.90
		1	26	23.83	23.87	23.85
		1	50	23.71	23.74	23.89
		25	0	22.84	22.89	22.92
		25	14	23.78	23.83	23.91
		25	27	22.85	22.83	22.89
		50	0	22.81	22.94	22.95
10M	16QAM	1	1	22.87	22.83	22.77
10M	64QAM	1	1	21.32	21.28	21.38
10M	256QAM	1	1	19.28	19.23	19.38
BW	MCS Index	Channel		370500	376000	381500
		Frequency (MHz)		1852.5	1880	1907.5
5M	$\pi/2$ BPSK	1	1	23.79	23.71	23.85
		1	13	23.76	23.82	23.86
		1	23	23.72	23.79	23.87
		12	0	23.25	23.35	23.30
		12	7	23.71	23.81	23.95
		12	13	23.28	23.29	23.35
		25	0	23.31	23.35	23.37
5M	QPSK	1	1	23.84	23.85	23.92
		1	13	23.85	23.86	23.87
		1	23	23.74	23.74	23.87
		12	0	22.89	22.94	22.97
		12	7	23.83	23.87	23.88
		12	13	22.77	22.85	22.84
		25	0	22.90	22.89	22.92
5M	16QAM	1	1	22.87	22.80	22.83
5M	64QAM	1	1	21.27	21.25	21.35
5M	256QAM	1	1	19.21	19.28	19.33

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		374000	376500	379000
		Frequency (MHz)		1870	1882.5	1895
40M	$\pi/2$ BPSK	1	1	23.79	23.76	23.71
		1	108	23.57	23.78	23.60
		1	214	23.71	23.69	23.70
		108	0	23.35	23.33	23.28
		108	54	23.66	23.63	23.63
		108	108	23.16	23.30	23.21
		216	0	23.22	23.32	23.11
40M	QPSK	1	1	23.83	23.97	23.84
		1	108	23.75	23.90	23.71
		1	214	23.82	23.70	23.76
		108	0	22.80	22.85	22.82
		108	54	23.87	23.83	23.72
		108	108	22.73	22.87	22.73
		216	0	22.74	22.84	22.77
40M	16QAM	1	1	22.73	22.67	22.64
40M	64QAM	1	1	21.28	21.14	21.16
40M	256QAM	1	1	19.20	19.24	19.14
BW	MCS Index	Channel		373000	376500	380000
		Frequency (MHz)		1865	1882.5	1900
30M	$\pi/2$ BPSK	1	1	23.81	23.74	23.78
		1	80	23.56	23.83	23.60
		1	158	23.75	23.67	23.61
		80	0	23.31	23.31	23.20
		80	40	23.58	23.63	23.59
		80	80	23.17	23.23	23.18
		160	0	23.15	23.36	23.09
30M	QPSK	1	1	23.88	23.91	23.83
		1	80	23.76	23.88	23.66
		1	158	23.86	23.67	23.70
		80	0	22.81	22.78	22.85
		80	40	23.81	23.82	23.74
		80	80	22.73	22.86	22.71
		160	0	22.77	22.84	22.79
30M	16QAM	1	1	22.74	22.71	22.68
30M	64QAM	1	1	21.27	21.18	21.16
30M	256QAM	1	1	19.18	19.28	19.14

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		372500	376500	380500
		Frequency (MHz)		1862.5	1882.5	1902.5
25M	$\pi/2$ BPSK	1	1	23.73	23.81	23.72
		1	67	23.61	23.81	23.60
		1	131	23.73	23.73	23.68
		64	0	23.33	23.33	23.21
		64	35	23.59	23.66	23.60
		64	69	23.19	23.24	23.16
		128	0	23.20	23.31	23.12
25M	QPSK	1	1	23.91	23.94	23.78
		1	67	23.76	23.82	23.70
		1	131	23.88	23.67	23.78
		64	0	22.81	22.85	22.85
		64	35	23.84	23.88	23.79
		64	69	22.79	22.83	22.77
		128	0	22.78	22.80	22.75
25M	16QAM	1	1	22.71	22.72	22.68
25M	64QAM	1	1	21.25	21.18	21.15
25M	256QAM	1	1	19.25	19.32	19.20
BW	MCS Index	Channel		372000	376500	381000
		Frequency (MHz)		1860	1882.5	1905
20M	$\pi/2$ BPSK	1	1	23.79	23.76	23.77
		1	53	23.66	23.81	23.65
		1	104	23.76	23.75	23.65
		50	0	23.34	23.29	23.24
		50	28	23.62	23.60	23.63
		50	56	23.20	23.28	23.11
		100	0	23.18	23.35	23.14
20M	QPSK	1	1	23.92	23.90	23.79
		1	53	23.78	23.87	23.74
		1	104	23.85	23.77	23.73
		50	0	22.80	22.78	22.79
		50	28	23.83	23.87	23.78
		50	56	22.80	22.87	22.71
		100	0	22.76	22.82	22.78
20M	16QAM	1	1	22.72	22.72	22.64
20M	64QAM	1	1	21.25	21.20	21.18
20M	256QAM	1	1	19.20	19.22	19.12

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		371500	376500	381500
		Frequency (MHz)		1857.5	1882.5	1907.5
15M	$\pi/2$ BPSK	1	1	23.72	23.75	23.69
		1	40	23.59	23.80	23.66
		1	77	23.70	23.77	23.69
		36	0	23.33	23.25	23.27
		36	22	23.60	23.62	23.61
		36	43	23.17	23.23	23.17
		75	0	23.23	23.34	23.13
15M	QPSK	1	1	23.87	23.89	23.78
		1	40	23.72	23.91	23.74
		1	77	23.90	23.71	23.74
		36	0	22.81	22.81	22.86
		36	22	23.81	23.91	23.76
		36	43	22.74	22.84	22.67
		75	0	22.81	22.83	22.72
15M	16QAM	1	1	22.70	22.65	22.67
15M	64QAM	1	1	21.23	21.12	21.15
15M	256QAM	1	1	19.24	19.27	19.18
BW	MCS Index	Channel		371000	376500	382000
		Frequency (MHz)		1855	1882.5	1910
10M	$\pi/2$ BPSK	1	1	23.72	23.83	23.77
		1	26	23.61	23.76	23.65
		1	50	23.67	23.76	23.61
		25	0	23.26	23.24	23.21
		25	14	23.66	23.66	23.61
		25	27	23.16	23.31	23.21
		50	0	23.18	23.32	23.09
10M	QPSK	1	1	23.89	23.96	23.82
		1	26	23.70	23.87	23.71
		1	50	23.85	23.76	23.72
		25	0	22.77	22.82	22.82
		25	14	23.82	23.86	23.69
		25	27	22.74	22.86	22.68
		50	0	22.79	22.79	22.75
10M	16QAM	1	1	22.68	22.64	22.69
10M	64QAM	1	1	21.23	21.14	21.10
10M	256QAM	1	1	19.15	19.29	19.14

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		370500	376500	382500
		Frequency (MHz)		1852.5	1882.5	1912.5
5M	$\pi/2$ BPSK	1	1	23.74	23.74	23.74
		1	13	23.66	23.75	23.60
		1	23	23.71	23.73	23.63
		12	0	23.25	23.32	23.27
		12	7	23.67	23.65	23.62
		12	13	23.17	23.26	23.12
		25	0	23.18	23.38	23.19
5M	QPSK	1	1	23.89	23.93	23.76
		1	13	23.76	23.88	23.72
		1	23	23.83	23.69	23.75
		12	0	22.82	22.85	22.76
		12	7	23.87	23.90	23.75
		12	13	22.79	22.84	22.76
		25	0	22.75	22.82	22.74
5M	16QAM	1	1	22.74	22.68	22.64
5M	64QAM	1	1	21.25	21.12	21.16
5M	256QAM	1	1	19.16	19.31	19.12

**EIRP Power (dBm)**

NR Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		372000	376000	380000
		Frequency (MHz)		1860	1880	1900
20M	$\pi/2$ BPSK	1	1	22.44	22.42	22.48
		1	53	22.44	22.43	22.47
		1	104	22.35	22.42	22.53
		50	0	21.96	22.00	22.01
		50	28	22.39	22.47	22.56
		50	56	21.90	21.96	21.96
		100	0	21.98	22.01	22.03
20M	QPSK	1	1	22.50	22.52	22.57
		1	53	22.50	22.52	22.51
		1	104	22.42	22.45	22.55
		50	0	21.55	21.57	21.59
		50	28	22.48	22.51	22.52
		50	56	21.48	21.50	21.51
		100	0	21.52	21.55	21.59
20M	16QAM	1	1	21.49	21.45	21.47
20M	64QAM	1	1	19.96	19.92	20.06
20M	256QAM	1	1	17.92	17.94	18.01
BW	MCS Index	Channel		371500	376000	380500
		Frequency (MHz)		1857.5	1880	1902.5
15M	$\pi/2$ BPSK	1	1	22.38	22.36	22.47
		1	40	22.36	22.37	22.43
		1	77	22.27	22.37	22.50
		36	0	21.91	21.93	22.01
		36	22	22.37	22.41	22.52
		36	43	21.81	21.89	21.96
		75	0	21.94	21.99	22.03
15M	QPSK	1	1	22.41	22.44	22.47
		1	40	22.48	22.51	22.49
		1	77	22.41	22.36	22.50
		36	0	21.47	21.49	21.56
		36	22	22.46	22.49	22.52
		36	43	21.45	21.47	21.45
		75	0	21.47	21.45	21.50
15M	16QAM	1	1	21.47	21.38	21.43
15M	64QAM	1	1	19.87	19.85	20.00
15M	256QAM	1	1	17.92	17.93	17.99

NR Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		371000	376000	381000
		Frequency (MHz)		1855	1880	1905
10M	$\pi/2$ BPSK	1	1	22.40	22.37	22.45
		1	26	22.40	22.40	22.38
		1	50	22.30	22.38	22.47
		25	0	21.90	21.90	21.91
		25	14	22.35	22.38	22.48
		25	27	21.83	21.86	21.86
		50	0	21.97	21.92	22.03
10M	QPSK	1	1	22.45	22.51	22.51
		1	26	22.44	22.48	22.46
		1	50	22.32	22.35	22.50
		25	0	21.45	21.50	21.53
		25	14	22.39	22.44	22.52
		25	27	21.46	21.44	21.50
		50	0	21.42	21.55	21.56
10M	16QAM	1	1	21.48	21.44	21.38
10M	64QAM	1	1	19.93	19.89	19.99
10M	256QAM	1	1	17.89	17.84	17.99
BW	MCS Index	Channel		370500	376000	381500
		Frequency (MHz)		1852.5	1880	1907.5
5M	$\pi/2$ BPSK	1	1	22.40	22.32	22.46
		1	13	22.37	22.43	22.47
		1	23	22.33	22.40	22.48
		12	0	21.86	21.96	21.91
		12	7	22.32	22.42	22.56
		12	13	21.89	21.90	21.96
		25	0	21.92	21.96	21.98
5M	QPSK	1	1	22.45	22.46	22.53
		1	13	22.46	22.47	22.48
		1	23	22.35	22.35	22.48
		12	0	21.50	21.55	21.58
		12	7	22.44	22.48	22.49
		12	13	21.38	21.46	21.45
		25	0	21.51	21.50	21.53
5M	16QAM	1	1	21.48	21.41	21.44
5M	64QAM	1	1	19.88	19.86	19.96
5M	256QAM	1	1	17.82	17.89	17.94

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		374000	376500	379000
		Frequency (MHz)		1870	1882.5	1895
40M	$\pi/2$ BPSK	1	1	22.40	22.37	22.32
		1	108	22.18	22.39	22.21
		1	214	22.32	22.30	22.31
		108	0	21.96	21.94	21.89
		108	54	22.27	22.24	22.24
		108	108	21.77	21.91	21.82
		216	0	21.83	21.93	21.72
40M	QPSK	1	1	22.44	22.58	22.45
		1	108	22.36	22.51	22.32
		1	214	22.43	22.31	22.37
		108	0	21.41	21.46	21.43
		108	54	22.48	22.44	22.33
		108	108	21.34	21.48	21.34
		216	0	21.35	21.45	21.38
40M	16QAM	1	1	21.34	21.28	21.25
40M	64QAM	1	1	19.89	19.75	19.77
40M	256QAM	1	1	17.81	17.85	17.75
BW	MCS Index	Channel		373000	376500	380000
		Frequency (MHz)		1865	1882.5	1900
30M	$\pi/2$ BPSK	1	1	22.42	22.35	22.39
		1	80	22.17	22.44	22.21
		1	158	22.36	22.28	22.22
		80	0	21.92	21.92	21.81
		80	40	22.19	22.24	22.20
		80	80	21.78	21.84	21.79
		160	0	21.76	21.97	21.70
30M	QPSK	1	1	22.49	22.52	22.44
		1	80	22.37	22.49	22.27
		1	158	22.47	22.28	22.31
		80	0	21.42	21.39	21.46
		80	40	22.42	22.43	22.35
		80	80	21.34	21.47	21.32
		160	0	21.38	21.45	21.40
30M	16QAM	1	1	21.35	21.32	21.29
30M	64QAM	1	1	19.88	19.79	19.77
30M	256QAM	1	1	17.79	17.89	17.75

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		372500	376500	380500
		Frequency (MHz)		1862.5	1882.5	1902.5
25M	$\pi/2$ BPSK	1	1	22.34	22.42	22.33
		1	67	22.22	22.42	22.21
		1	131	22.34	22.34	22.29
		64	0	21.94	21.94	21.82
		64	35	22.20	22.27	22.21
		64	69	21.80	21.85	21.77
		128	0	21.81	21.92	21.73
25M	QPSK	1	1	22.52	22.55	22.39
		1	67	22.37	22.43	22.31
		1	131	22.49	22.28	22.39
		64	0	21.42	21.46	21.46
		64	35	22.45	22.49	22.40
		64	69	21.40	21.44	21.38
		128	0	21.39	21.41	21.36
25M	16QAM	1	1	21.32	21.33	21.29
25M	64QAM	1	1	19.86	19.79	19.76
25M	256QAM	1	1	17.86	17.93	17.81
BW	MCS Index	Channel		372000	376500	381000
		Frequency (MHz)		1860	1882.5	1905
20M	$\pi/2$ BPSK	1	1	22.40	22.37	22.38
		1	53	22.27	22.42	22.26
		1	104	22.37	22.36	22.26
		50	0	21.95	21.90	21.85
		50	28	22.23	22.21	22.24
		50	56	21.81	21.89	21.72
		100	0	21.79	21.96	21.75
20M	QPSK	1	1	22.53	22.51	22.40
		1	53	22.39	22.48	22.35
		1	104	22.46	22.38	22.34
		50	0	21.41	21.39	21.40
		50	28	22.44	22.48	22.39
		50	56	21.41	21.48	21.32
		100	0	21.37	21.43	21.39
20M	16QAM	1	1	21.33	21.33	21.25
20M	64QAM	1	1	19.86	19.81	19.79
20M	256QAM	1	1	17.81	17.83	17.73

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		371500	376500	381500
		Frequency (MHz)		1857.5	1882.5	1907.5
15M	$\pi/2$ BPSK	1	1	22.33	22.36	22.30
		1	40	22.20	22.41	22.27
		1	77	22.31	22.38	22.30
		36	0	21.94	21.86	21.88
		36	22	22.21	22.23	22.22
		36	43	21.78	21.84	21.78
		75	0	21.84	21.95	21.74
15M	QPSK	1	1	22.48	22.50	22.39
		1	40	22.33	22.52	22.35
		1	77	22.51	22.32	22.35
		36	0	21.42	21.42	21.47
		36	22	22.42	22.52	22.37
		36	43	21.35	21.45	21.28
		75	0	21.42	21.44	21.33
15M	16QAM	1	1	21.31	21.26	21.28
15M	64QAM	1	1	19.84	19.73	19.76
15M	256QAM	1	1	17.85	17.88	17.79
BW	MCS Index	Channel		371000	376500	382000
		Frequency (MHz)		1855	1882.5	1910
10M	$\pi/2$ BPSK	1	1	22.33	22.44	22.38
		1	26	22.22	22.37	22.26
		1	50	22.28	22.37	22.22
		25	0	21.87	21.85	21.82
		25	14	22.27	22.27	22.22
		25	27	21.77	21.92	21.82
		50	0	21.79	21.93	21.70
10M	QPSK	1	1	22.50	22.57	22.43
		1	26	22.31	22.48	22.32
		1	50	22.46	22.37	22.33
		25	0	21.38	21.43	21.43
		25	14	22.43	22.47	22.30
		25	27	21.35	21.47	21.29
		50	0	21.40	21.40	21.36
10M	16QAM	1	1	21.29	21.25	21.30
10M	64QAM	1	1	19.84	19.75	19.71
10M	256QAM	1	1	17.76	17.90	17.75

NR Band 25						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		370500	376500	382500
		Frequency (MHz)		1852.5	1882.5	1912.5
5M	$\pi/2$ BPSK	1	1	22.35	22.35	22.35
		1	13	22.27	22.36	22.21
		1	23	22.32	22.34	22.24
		12	0	21.86	21.93	21.88
		12	7	22.28	22.26	22.23
		12	13	21.78	21.87	21.73
		25	0	21.79	21.99	21.80
5M	QPSK	1	1	22.50	22.54	22.37
		1	13	22.37	22.49	22.33
		1	23	22.44	22.30	22.36
		12	0	21.43	21.46	21.37
		12	7	22.48	22.51	22.36
		12	13	21.40	21.45	21.37
		25	0	21.36	21.43	21.35
5M	16QAM	1	1	21.35	21.29	21.25
5M	64QAM	1	1	19.86	19.73	19.77
5M	256QAM	1	1	17.77	17.92	17.73

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

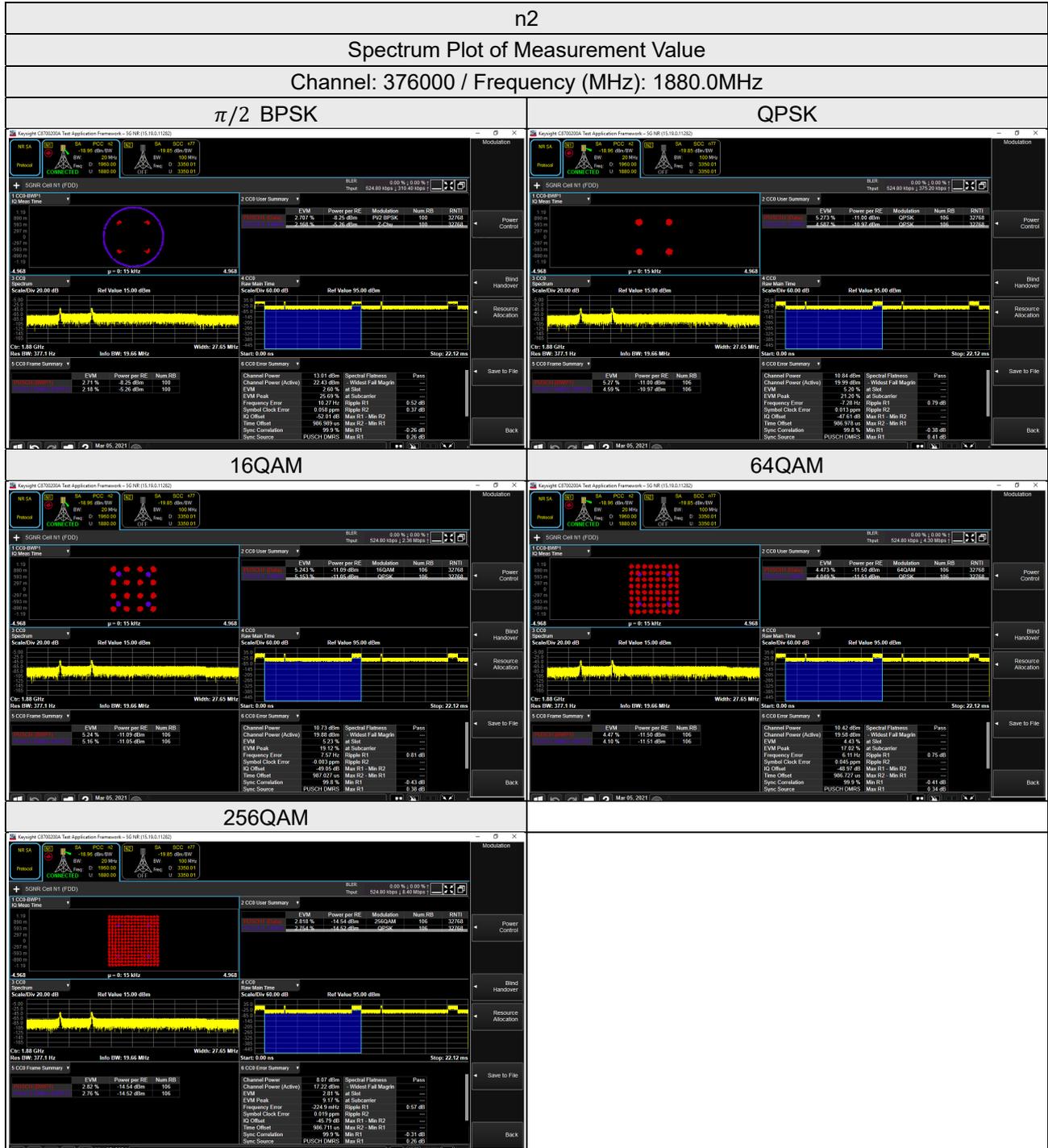
### 4.2.2 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

### 4.2.3 Test Setup



## 4.2.4 Test Results



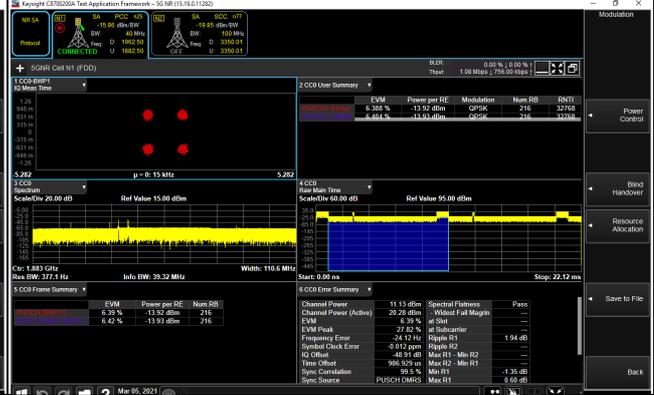
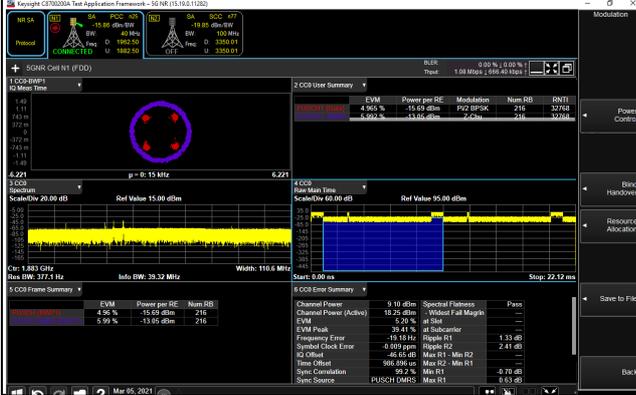
n25

Spectrum Plot of Measurement Value

Channel: 376000 / Frequency (MHz): 1882.5MHz

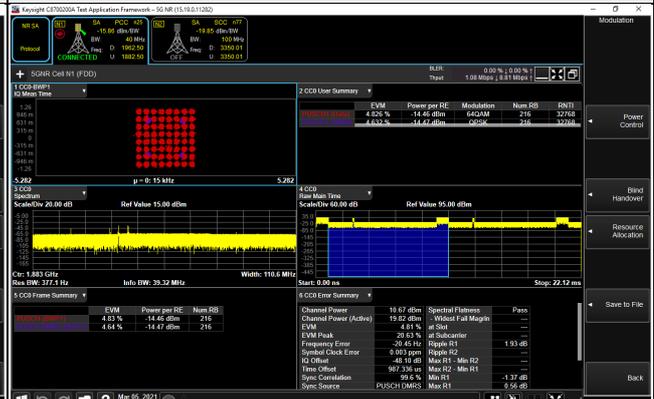
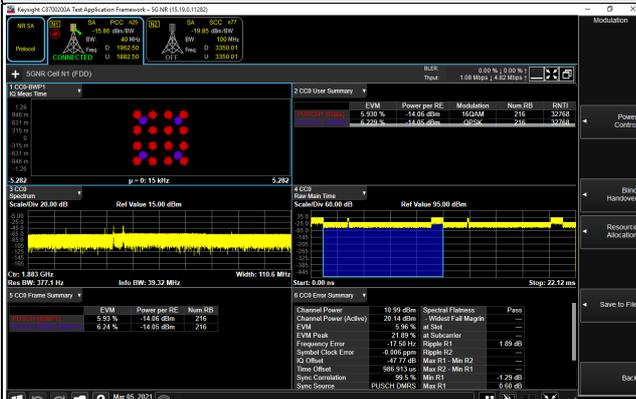
$\pi/2$  BPSK

QPSK

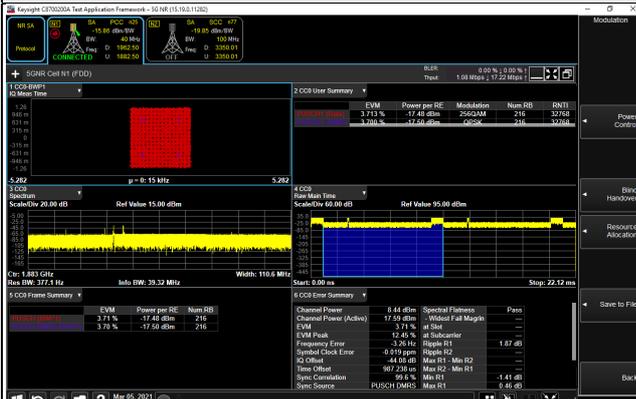


16QAM

64QAM



256QAM



### 4.3 Frequency Stability Measurement

#### 4.3.1 Limits of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### 4.3.2 Test Procedure

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5$  °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

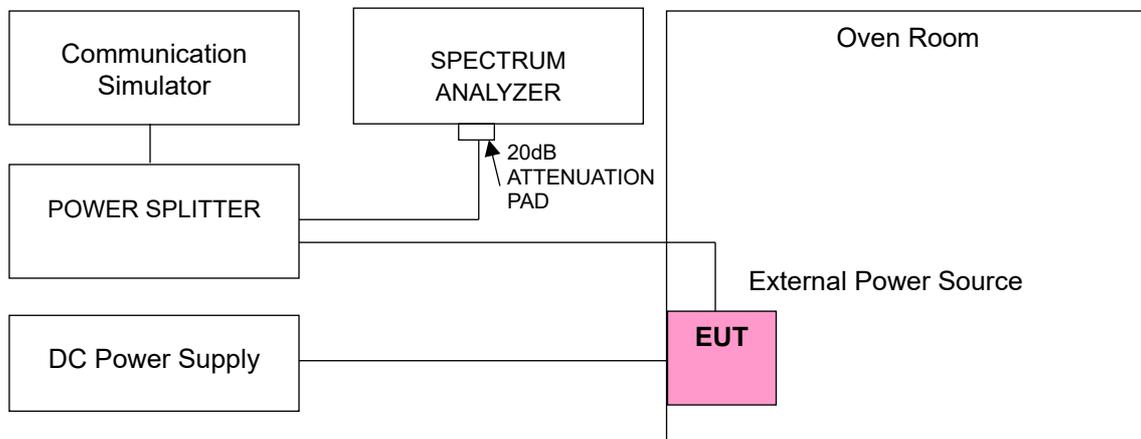
Note: The frequency error was recorded frequency error from the communication simulator.

#### 4.3.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
5G Wireless Test Platforms Keysight	E7515B	MY60102114	May 28, 2020	May 27, 2021
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Dec. 24, 2020	Dec. 23, 2021
Digital Multimeter Fluke	87-III	70360742	Jun. 23, 2020	Jun. 22, 2021
DC Power Supply Topward	6306A	727263	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.4 Conducted Setup



### 4.3.5 Test Results

#### Frequency Error vs. Voltage

Voltage (Vdc)	n2			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1852.500004	0.002	1907.500003	0.001
7.74	1852.500002	0.001	1907.500003	0.002
6.58	1852.500003	0.002	1907.500004	0.002

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

#### Frequency Error vs. Temperature

Temp. (°C)	n2			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.500003	0.002	1907.500001	0.001
-20	1852.500002	0.001	1907.500002	0.001
-10	1852.500001	0.001	1907.500003	0.001
0	1852.500003	0.001	1907.500004	0.002
10	1852.499999	-0.001	1907.499997	-0.001
20	1852.499998	-0.001	1907.499997	-0.002
30	1852.499999	-0.001	1907.499996	-0.002
40	1852.499999	-0.001	1907.499997	-0.002
50	1852.499999	-0.001	1907.499997	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n2			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1855.000004	0.002	1905.000001	0.001
7.74	1855.000001	0.001	1905.000003	0.001
6.58	1855.000004	0.002	1905.000002	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n2			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1855.000003	0.002	1905.000001	0.001
-20	1855.000004	0.002	1905.000002	0.001
-10	1855.000003	0.001	1905.000001	0.001
0	1855.000003	0.001	1905.000001	0.001
10	1854.999998	-0.001	1904.999998	-0.001
20	1854.999999	-0.001	1904.999998	-0.001
30	1854.999996	-0.002	1904.999996	-0.002
40	1854.999996	-0.002	1904.999997	-0.002
50	1854.999997	-0.002	1904.999997	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	n2			
	Channel Bandwidth 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1857.500004	0.002	1902.500002	0.001
7.74	1857.500002	0.001	1902.500001	0.001
6.58	1857.500004	0.002	1902.500001	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n2			
	Channel Bandwidth 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1857.500004	0.002	1902.500003	0.001
-20	1857.500003	0.002	1902.500004	0.002
-10	1857.500002	0.001	1902.500003	0.001
0	1857.500002	0.001	1902.500003	0.001
10	1857.499999	-0.001	1902.499997	-0.002
20	1857.499999	-0.001	1902.499998	-0.001
30	1857.499997	-0.002	1902.499997	-0.002
40	1857.499997	-0.001	1902.499997	-0.002
50	1857.499996	-0.002	1902.499997	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	n2			
	Channel Bandwidth 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1860.000002	0.001	1900.000003	0.001
7.74	1860.000003	0.001	1900.000002	0.001
6.58	1860.000001	0.001	1900.000003	0.002

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n2			
	Channel Bandwidth 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1860.000002	0.001	1900.000002	0.001
-20	1860.000001	0.001	1900.000003	0.001
-10	1860.000002	0.001	1900.000004	0.002
0	1860.000002	0.001	1900.000001	0.001
10	1859.999997	-0.002	1899.999997	-0.002
20	1859.999998	-0.001	1899.999996	-0.002
30	1859.999997	-0.002	1899.999996	-0.002
40	1859.999998	-0.001	1899.999997	-0.002
50	1859.999996	-0.002	1899.999998	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1852.500002	0.001	1912.500000	0.001
7.74	1852.500004	0.002	1912.500000	0.002
6.58	1852.500001	0.001	1912.500000	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.500002	0.001	1912.500000	0.001
-20	1852.500003	0.002	1912.500000	0.001
-10	1852.500003	0.001	1912.500000	0.002
0	1852.500004	0.002	1912.500000	0.002
10	1852.499997	-0.002	1912.500000	-0.001
20	1852.499999	-0.001	1912.500000	-0.002
30	1852.499998	-0.001	1912.500000	-0.001
40	1852.499997	-0.002	1912.500000	-0.001
50	1852.499997	-0.002	1912.500000	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1855.000002	0.001	1910.000002	0.001
7.74	1855.000004	0.002	1910.000002	0.001
6.58	1855.000004	0.002	1910.000003	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1855.000001	0.001	1910.000003	0.002
-20	1855.000002	0.001	1910.000003	0.002
-10	1855.000003	0.002	1910.000003	0.002
0	1855.000002	0.001	1910.000004	0.002
10	1854.999997	-0.002	1909.999997	-0.001
20	1854.999997	-0.001	1909.999999	-0.001
30	1854.999996	-0.002	1909.999996	-0.002
40	1854.999997	-0.002	1909.999997	-0.001
50	1854.999996	-0.002	1909.999997	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1857.500002	0.001	1907.500001	0.001
7.74	1857.500003	0.002	1907.500003	0.001
6.58	1857.500004	0.002	1907.500002	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1857.500003	0.002	1907.500001	0.001
-20	1857.500003	0.001	1907.500004	0.002
-10	1857.500004	0.002	1907.500003	0.001
0	1857.500004	0.002	1907.500003	0.001
10	1857.499997	-0.002	1907.499996	-0.002
20	1857.499996	-0.002	1907.499997	-0.002
30	1857.499997	-0.002	1907.499998	-0.001
40	1857.499996	-0.002	1907.499999	-0.001
50	1857.499996	-0.002	1907.499999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1860.000002	0.001	1905.000002	0.001
7.74	1860.000003	0.002	1905.000002	0.001
6.58	1860.000001	0.001	1905.000002	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1860.000001	0.001	1905.000002	0.001
-20	1860.000004	0.002	1905.000002	0.001
-10	1860.000001	0.001	1905.000003	0.002
0	1860.000004	0.002	1905.000004	0.002
10	1859.999999	-0.001	1904.999999	-0.001
20	1859.999998	-0.001	1904.999996	-0.002
30	1859.999998	-0.001	1904.999996	-0.002
40	1859.999997	-0.002	1904.999997	-0.002
50	1859.999998	-0.001	1904.999999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 25 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1862.500001	0.001	1902.500002	0.001
7.74	1862.500002	0.001	1902.500002	0.001
6.58	1862.500002	0.001	1902.500003	0.002

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 25 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1862.500003	0.001	1902.500004	0.002
-20	1862.500003	0.001	1902.500001	0.001
-10	1862.500004	0.002	1902.500001	0.001
0	1862.500003	0.002	1902.500002	0.001
10	1862.499996	-0.002	1902.499999	-0.001
20	1862.499997	-0.001	1902.499998	-0.001
30	1862.499997	-0.001	1902.499996	-0.002
40	1862.499999	-0.001	1902.499997	-0.002
50	1862.499999	-0.001	1902.499996	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 30 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1865.000002	0.001	1900.000002	0.001
7.74	1865.000003	0.001	1900.000003	0.002
6.58	1865.000003	0.001	1900.000004	0.002

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 30 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1865.000004	0.002	1900.000003	0.001
-20	1865.000002	0.001	1900.000003	0.001
-10	1865.000003	0.001	1900.000003	0.002
0	1865.000001	0.001	1900.000004	0.002
10	1864.999998	-0.001	1899.999997	-0.002
20	1864.999999	-0.001	1899.999996	-0.002
30	1864.999998	-0.001	1899.999998	-0.001
40	1864.999996	-0.002	1899.999997	-0.001
50	1864.999998	-0.001	1899.999998	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	n25			
	Channel Bandwidth 40 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
8.90	1870.000002	0.001	1895.000002	0.001
7.74	1870.000002	0.001	1895.000001	0.001
6.58	1870.000004	0.002	1895.000002	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	n25			
	Channel Bandwidth 40 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1870.000001	0.001	1895.000002	0.001
-20	1870.000004	0.002	1895.000001	0.001
-10	1870.000002	0.001	1895.000003	0.002
0	1870.000003	0.001	1895.000002	0.001
10	1869.999997	-0.001	1894.999996	-0.002
20	1869.999999	-0.001	1894.999999	-0.001
30	1869.999997	-0.001	1894.999999	-0.001
40	1869.999999	-0.001	1894.999997	-0.002
50	1869.999998	-0.001	1894.999996	-0.002

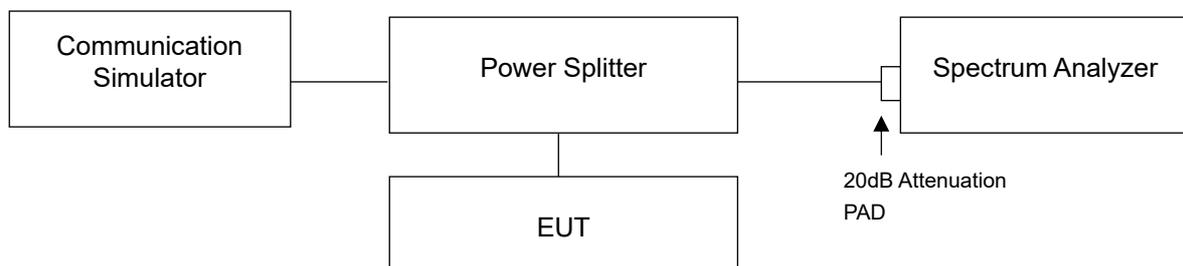
## 4.4 Occupied Bandwidth Measurement

### 4.4.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Measurement method, please refer to section 5.4.4 of ANSI C63.26. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

### 4.4.2 Test Setup



### 4.4.3 Test Result

#### Occupied Bandwidth

n2, Channel Bandwidth: 5MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.48	4.47	4.47	4.47	4.47
376000	1880.0	4.47	4.47	4.47	4.47	4.47
381500	1907.5	4.46	4.45	4.47	4.46	4.47
n2, Channel Bandwidth: 10MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	9.22	9.18	9.20	9.18	9.17
376000	1880.0	9.17	9.18	9.20	9.18	9.20
381000	1905.0	9.21	9.21	9.21	9.22	9.20
n2, Channel Bandwidth: 15MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	13.94	14.10	14.07	14.11	14.07
376000	1880.0	13.99	14.11	14.11	14.11	14.11
380500	1902.5	14.04	14.11	14.11	14.11	14.12
n2, Channel Bandwidth: 20MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	18.73	18.68	18.67	18.89	18.90
376000	1880.0	18.75	18.74	18.74	18.74	18.73
380000	1900.0	18.75	18.74	18.74	18.75	18.75

## Spectrum Plot of Worst Value

### 5MHz / $\pi/2$ BPSK



### 10MHz / $\pi/2$ BPSK



### 15MHz / 256QAM



### 20MHz / 256QAM



n25, Channel Bandwidth: 5MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.47	4.47	4.47	4.47	4.47
376500	1882.5	4.47	4.47	4.47	4.46	4.47
382500	1912.5	4.47	4.47	4.47	4.47	4.46
n25, Channel Bandwidth: 10MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	9.21	9.28	9.26	9.28	9.26
376500	1882.5	9.18	9.28	9.29	9.28	9.28
382000	1910.0	9.25	9.28	9.29	9.28	9.29
n25, Channel Bandwidth: 15MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	14.01	14.11	14.11	14.10	14.11
376500	1882.5	13.99	14.11	14.11	14.11	14.11
381500	1907.5	14.06	14.11	14.11	14.11	14.11
n25, Channel Bandwidth: 20MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	18.74	18.90	18.90	18.89	18.90
376500	1882.5	18.74	18.91	18.91	18.90	18.91
381000	1905.0	18.75	18.91	18.91	18.91	18.90
n25, Channel Bandwidth: 25MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372500	1862.5	23.60	23.72	23.72	23.73	23.72
376500	1882.5	23.52	23.73	23.74	23.73	23.73
380500	1902.5	23.64	23.73	23.73	23.73	23.73

n25, Channel Bandwidth: 30MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
373000	1865.0	28.60	28.50	28.49	28.50	28.50
376500	1882.5	28.59	28.56	28.49	28.57	28.56
380000	1900.0	28.59	28.50	28.48	28.49	28.49
n25, Channel Bandwidth: 40MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
374000	1870.0	38.62	38.47	38.46	38.47	38.47
376500	1882.5	38.59	38.47	38.48	38.47	38.47
379000	1895.0	38.58	38.45	38.45	38.45	38.45

## Spectrum Plot of Worst Value

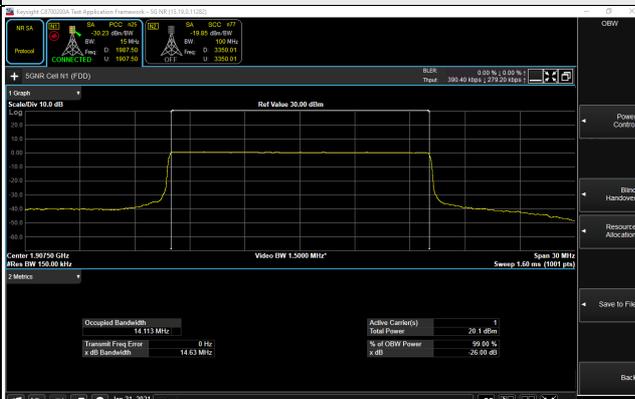
### 5MHz / $\pi/2$ BPSK



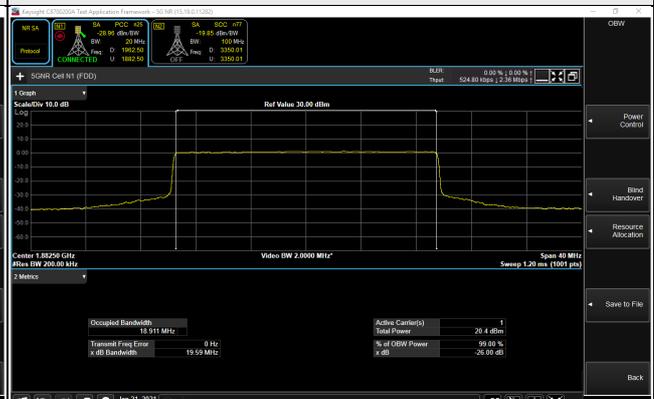
### 10MHz / 256QAM



### 15MHz / QPSK



### 20MHz / 16QAM



### 25MHz / 16QAM



### 30MHz / $\pi/2$ BPSK



### 40MHz / $\pi/2$ BPSK



26dB Bandwidth

n2, Channel Bandwidth: 5MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.77	4.76	4.77	4.78	4.78
376000	1880.0	4.74	4.80	4.69	4.74	4.75
381500	1907.5	4.73	4.82	4.72	4.72	4.71
n2, Channel Bandwidth: 10MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	9.29	9.31	9.30	9.33	9.29
376000	1880.0	9.29	9.33	9.33	9.35	9.30
381000	1905.0	9.26	9.31	9.31	9.29	9.28
n2, Channel Bandwidth: 15MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	13.91	14.52	14.61	14.52	14.60
376000	1880.0	13.89	14.60	14.63	14.61	14.62
380500	1902.5	13.88	14.62	14.63	14.59	14.61
n2, Channel Bandwidth: 20MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	18.48	18.51	18.49	19.55	19.57
376000	1880.0	18.50	18.51	18.50	18.49	18.48
380000	1900.0	18.48	18.50	18.49	18.48	18.48

## Spectrum Plot of Worst Value

### 5MHz / QPSK



### 10MHz / 64QAM



### 15MHz / 16QAM



### 20MHz / 256QAM



n25, Channel Bandwidth: 5MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
370500	1852.5	4.75	4.74	4.75	4.75	4.71
376500	1882.5	4.75	4.78	4.74	4.76	4.77
382500	1912.5	4.76	4.76	4.75	4.77	4.73
n25, Channel Bandwidth: 10MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371000	1855.0	9.29	9.71	9.65	9.67	9.64
376500	1882.5	9.27	9.65	9.66	9.65	9.68
382000	1910.0	9.31	9.66	9.68	9.67	9.64
n25, Channel Bandwidth: 15MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
371500	1857.5	13.91	14.62	14.61	14.61	14.61
376500	1882.5	13.92	14.62	14.63	14.62	14.60
381500	1907.5	13.92	14.63	14.61	14.62	14.59
n25, Channel Bandwidth: 20MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372000	1860.0	18.47	19.58	19.58	19.55	19.54
376500	1882.5	18.50	19.58	19.59	19.57	19.57
381000	1905.0	18.48	19.58	19.57	19.57	19.55
n25, Channel Bandwidth: 25MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
372500	1862.5	36.84	24.61	24.60	24.61	24.58
376500	1882.5	23.68	24.62	24.61	24.60	24.60
380500	1902.5	30.73	24.60	24.59	24.60	24.59

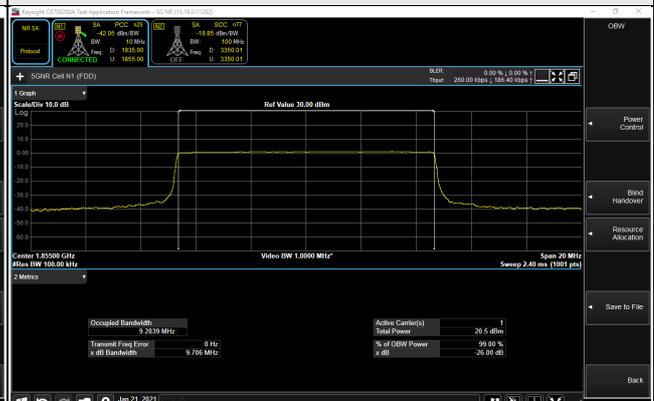
n25, Channel Bandwidth: 30MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
373000	1865.0	44.95	29.53	29.53	29.51	29.51
376500	1882.5	32.37	29.53	29.51	29.52	29.51
380000	1900.0	34.01	29.51	29.50	29.50	29.50
n25, Channel Bandwidth: 40MHz						
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
374000	1870.0	59.93	39.87	39.85	39.88	39.86
376500	1882.5	50.10	39.88	39.87	39.86	39.86
379000	1895.0	43.95	39.85	39.84	39.84	39.84

## Spectrum Plot of Worst Value

### 5MHz / QPSK



### 10MHz / QPSK



### 15MHz / QPSK



### 20MHz / 16QAM



### 25MHz / $\pi/2$ BPSK



### 30MHz / $\pi/2$ BPSK



### 40MHz / $\pi/2$ BPSK

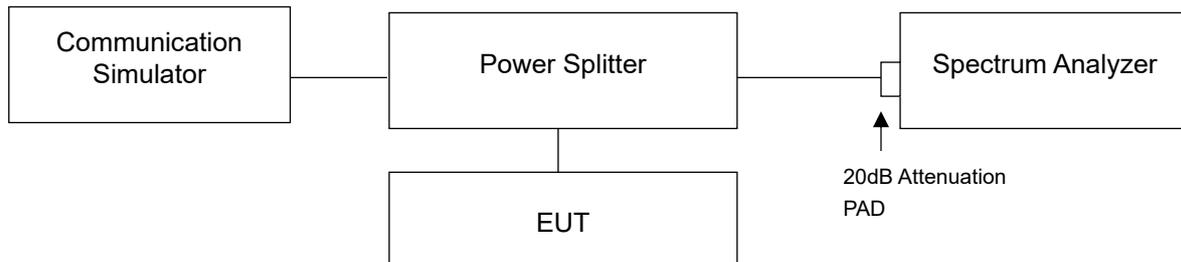


## 4.5 Band Edge Measurement

### 4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

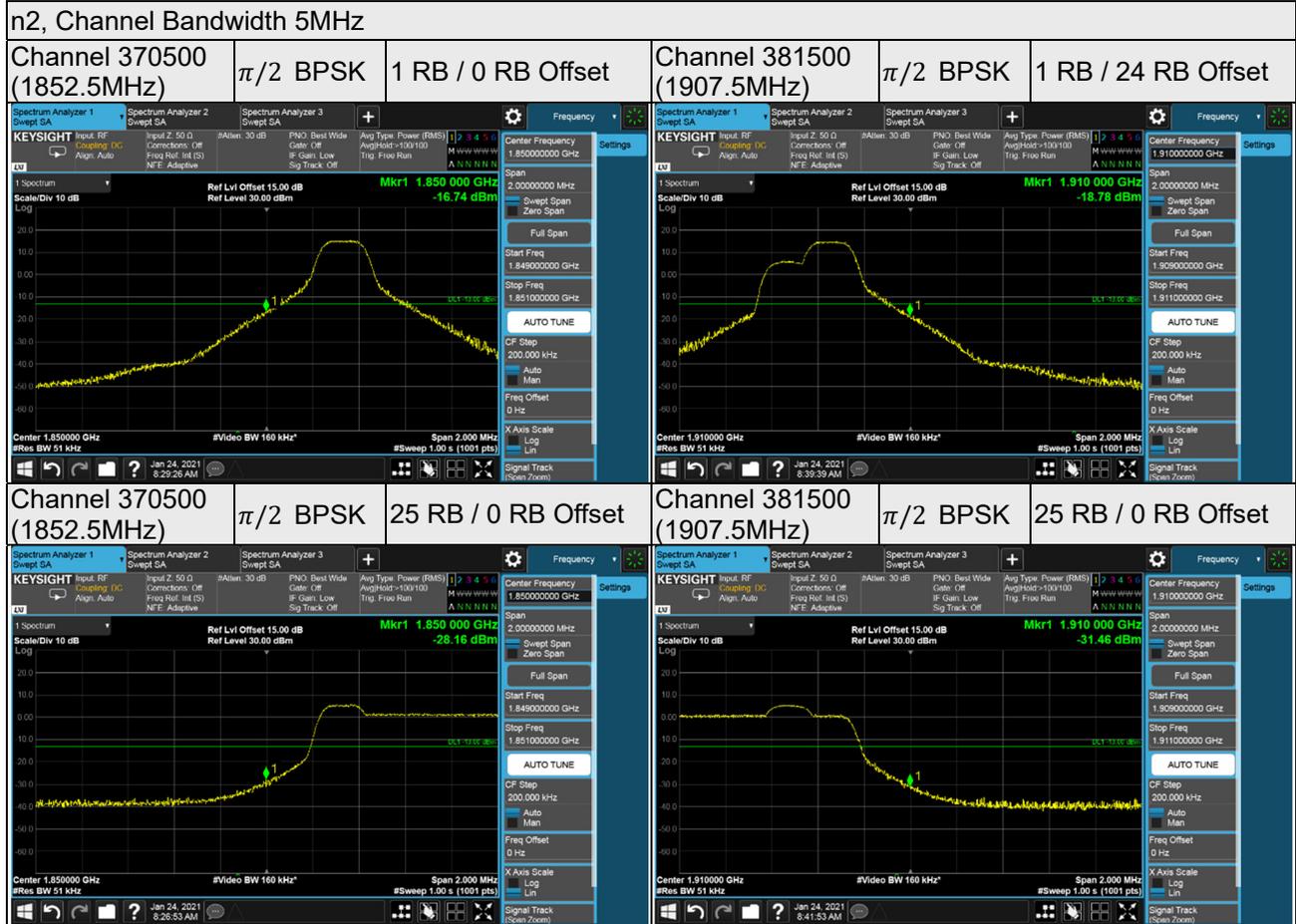
### 4.5.2 Test Setup



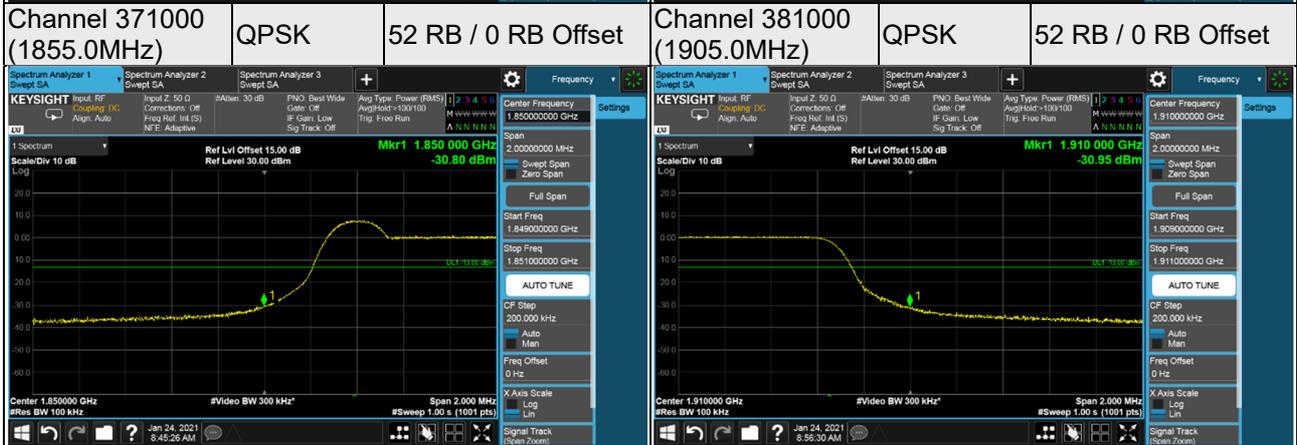
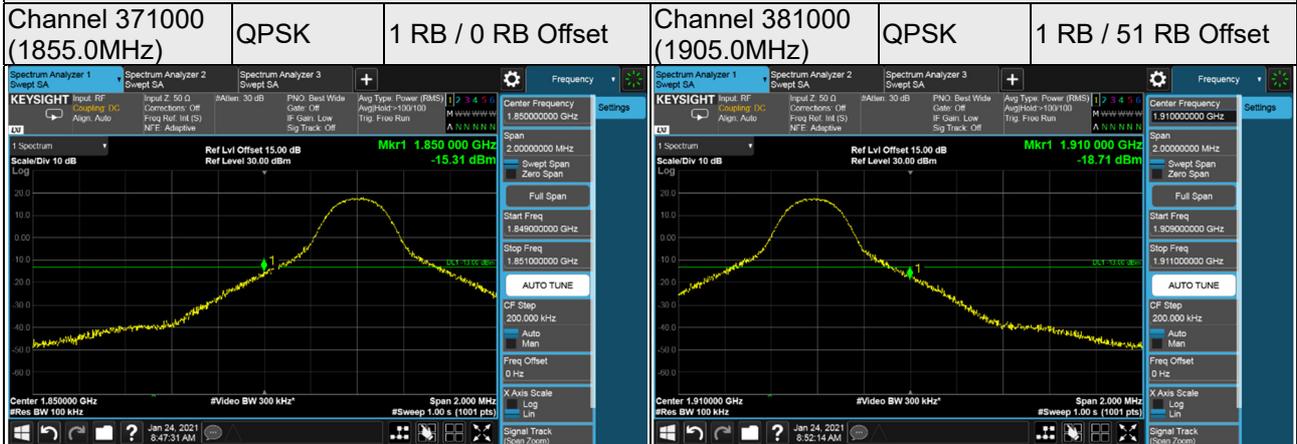
### 4.5.3 Test Procedures

- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (Channel Bandwidth 5MHz).
- c. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (Channel Bandwidth 10MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (Channel Bandwidth 15MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 200kHz and VB of the spectrum is 620kHz (Channel Bandwidth 20MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 270kHz and VB of the spectrum is 1MHz (Channel Bandwidth 25MHz).
- g. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 300kHz and VB of the spectrum is 1MHz (Channel Bandwidth 30MHz, 40MHz).
- h. Record the max trace plot into the test report.

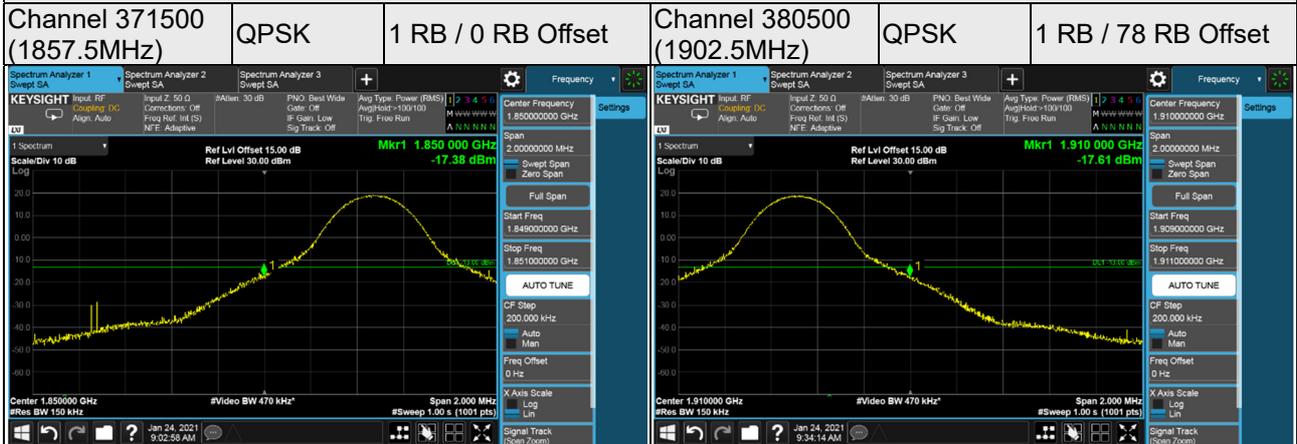
### 4.5.4 Test Results



n2, Channel Bandwidth 10MHz



n2, Channel Bandwidth 15MHz



n2, Channel Bandwidth 20MHz

Channel 372000  
(1860.0MHz)

QPSK

1 RB / 0 RB Offset

Channel 380000  
(1900.0MHz)

QPSK

1 RB / 105 RB Offset



Channel 372000  
(1860.0MHz)

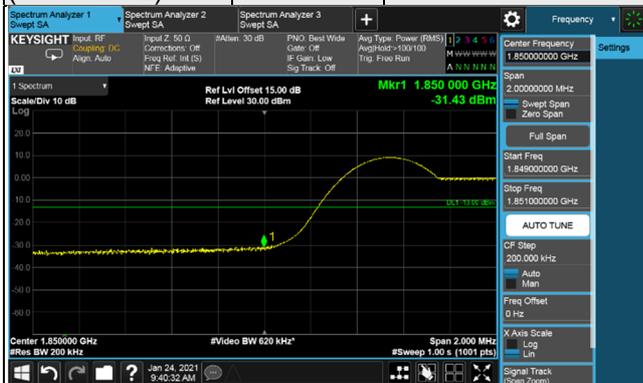
QPSK

106 RB / 0 RB Offset

Channel 380000  
(1900.0MHz)

QPSK

106 RB / 0 RB Offset



n25, Channel Bandwidth 5MHz

