FCC RF Test Report

APPLICANT	: unitech electronics co., ltd.
EQUIPMENT	: Rugged Handheld Computer
BRAND NAME	: unitech
MODEL NAME	: EA660
FCC ID	: HLEEA660BWNW
STANDARD	: 47 CFR Part 2, Part 27 Subpart Q
CLASSIFICATION	: PCS Licensed Transmitter Held to Ear (PCE)
TEST DATE(S)	: Aug. 29, 2023 ~ Sep. 13, 2023

We, Sporton International Inc. (KunShan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (KunShan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG372407K	Rev. 01	Initial issue of report	Oct. 13, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	—	Report Only	-
3.5	§27.50 (k)(4)	Peak-to-Average Ratio	<13dB	PASS	
3.6	§27.50 (k)(3)	EIRP	EIRP < 1W (30dBm)	PASS	-
3.7	§2.1049	Occupied Bandwidth	—	Report Only	-
3.8	§2.1051 §27.53 (n)(2)	Conducted Band Edge Measurement	-13dBm/MHz	PASS	-
3.9	§2.1051 §27.53 (n)(2)	Conducted Spurious Emission	-13dBm/MHz	PASS	-
3.10	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Within the band	PASS	-
4.4	§2.1053 §27.53 (n)(2)	Radiated Spurious Emission	-13dBm/MHz	PASS	Under limit 32.03 dB at 13968.00 MHz

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

unitech electronics co., ltd.
5F., No. 136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei City, Taiwan

1.2 Manufacturer

unitech electronics co., ltd.
5F., No. 136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei City, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Rugged Handheld Computer
Brand Name	unitech
Model Name	EA660
FCC ID	HLEEA660BWNW
IMEI Code	Conducted : 004400152020000 Radiation : 357458980006695
HW Version	V4
SW Version	ST6729A_1280_Unitech_patchbuild_20230815181058934
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Product Feature	
Tx/Rx Frequency	5G NR n77: 3450 MHz ~ 3550 MHz 5G NR n78: 3450 MHz ~ 3550 MHz
SCS	30kHz
Bandwidth	n77: 20 / 30 / 40 / 60 / 80 / 100MHz n78: 20 / 30 / 40 / 50 / 60 / 70 / 80 / 90 / 100MHz
Antenna Gain	**<Ant. 5>** 5G NR n77: -2.2 dBi 5G NR n78: -2.2 dBi **<Ant. 6>** 5G NR n77: -1.2 dBi 5G NR n78: -1.2 dBi **<Ant. 8>** 5G NR n77: -1.2 dBi 5G NR n78: -1.2 dBi **<Ant. 9>** 5G NR n77: -2.2 dBi 5G NR n78: -2.2 dBi
Type of Modulation	CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM

Remark:

1. The maximum EIRP is calculated from max output power and max antenna gain, only the maximum EIRP of Ant.8 for 5G NR n77/n78 is shown in the report.
2. The device supports n77/n78 (1T4R) SRS resources on Antenna 5/6/8/9, only the test data of worst Ant.8 is shown in the report according to the maximum power.
3. 5G NR n77/n78 supports UL MIMO on Antenna 5+8 for CP-OFDM modulation, the conducted BE/Spurious are tested at single antenna port and add 10*log(N_{ANT}) according to KDB 662911 D01. The MIMO mode is completely uncorrelated, so the directional gain is selected the maximum gain from Antenna 5/8.
4. 5G NR n77/n78 support SA and NSA mode. The whole testing has assessed SA mode for n77 by referring to the higher conducted power for conducted test items.
5. The device supports HPUE mode for 5G NR n77/n78.
6. All the supported EN-DC combinations are verified conducted power, only the EN-DC combination with highest power are shown in the report.
7. The EN-DC mode combination could be referred to the product spec.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum EIRP Power and Emission Designator

5G NR n77		PI/2 BPSK / QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
20	3460.02 ~ 3540.00	0.3221	18M2G7D	0.2466	18M3W7D
30	3465.00 ~ 3534.99	0.3281	27M8G7D	0.2317	27M8W7D
40	3470.01 ~ 3529.98	0.3304	37M9G7D	0.2410	37M9W7D
60	3480.00 ~ 3519.99	0.3119	58M0G7D	0.2449	58M0W7D
80	3490.02 ~ 3510.00	0.3148	77M6G7D	0.2415	77M6W7D
100	3500.01	0.3350	97M4G7D	0.2415	97M4W7D

5G NR n78		PI/2 BPSK / QPSK		16QAM/64QAM/256QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
20	3460.02 ~ 3540.00	0.2812	18M2G7D	0.2070	18M3W7D
30	3465.00 ~ 3534.99	0.2799	27M8G7D	0.2099	27M8W7D
40	3470.01 ~ 3529.98	0.2825	37M9G7D	0.2099	37M9W7D
50	3475.02 ~ 3525.00	0.2716	47M4G7D	0.2168	47M6W7D
60	3480.00 ~ 3519.99	0.2692	58M0G7D	0.2198	58M0W7D
70	3485.01 ~ 3514.98	0.2704	67M4G7D	0.2168	67M7W7D
80	3490.02 ~ 3510.00	0.2761	77M6G7D	0.2198	77M6W7D
90	3495.00 ~ 3504.99	0.2661	87M3G7D	0.2118	87M5W7D
100	3500.01	0.2871	97M4G7D	0.2051	97M4W7D

Note:

1. 5G NR Band n77 overlaps the entire frequency range of Band n78, and n77 power > n78 power, therefore the conducted test results of n77 provided in this report cover n78 except the bandwidth of 50/70/90MHz.
2. All modulations have been tested, and only the worst test results of PSK & QAM are shown in the report.

1.7 Testing Site

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH03-KS TH01-KS	CN1257	314309

1.8 Test Software

Item	Site	Manufacture	Name	Version
1.	TH01-KS	Tonscend	JS1120-3 test system China_210602	3.3.10
2.	03CH03-KS	AUDIX	E3	210616

1.9 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, Part 27 Subpart Q
- ANSI C63.26-2015
- FCC KDB 971168 Power Meas License Digital Systems D01 v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

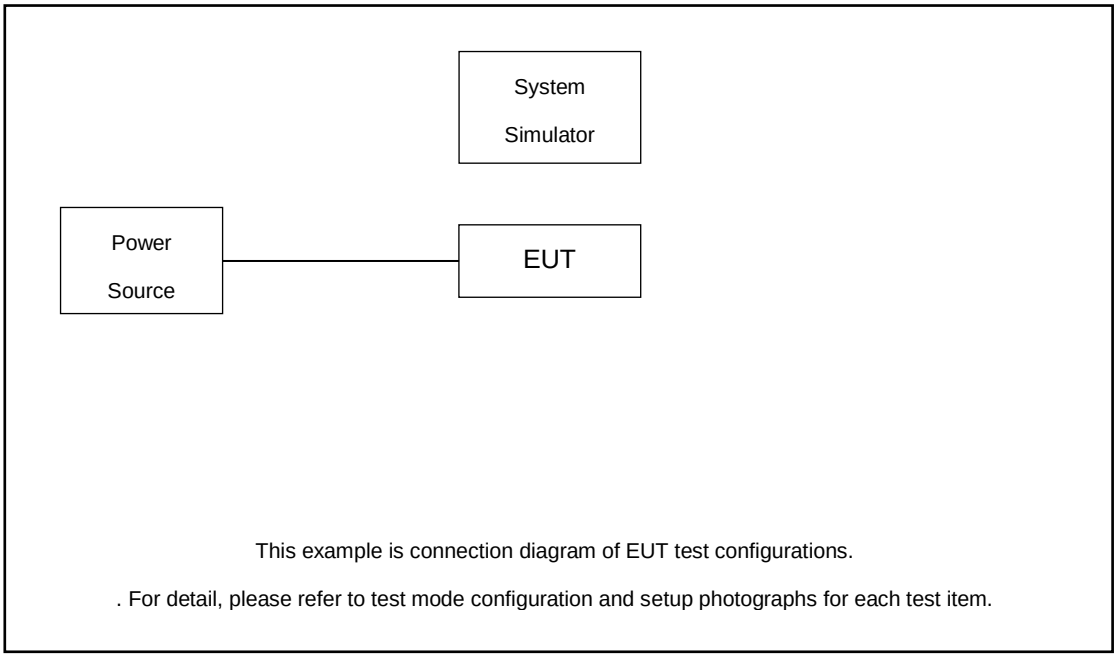
Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission. (Z Plane)

Test Cases	Band	Bandwidth (MHz)	Modulation	RB #	Test Channel
		eg. 5M, 10M, 15M, 20M	eg. PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	1RB, Partial RB, Full RB	L/M/H
Max. Output Power	5G n77	20M, 30M, 40M, , 60M, 80M, 100M	All Modulations	1RB, Full RB	L, M, H
	5G n78	20M, 30M, 40M, 50M, 60M, 70M, 80M, 90M ,100M	All Modulations	1RB, , Full RB	L, M, H
Peak-to-Average Ratio	5G n77	100M	PI/2 BPSK, QPSK	1RB, , Full RB	M
	5G n78	90M	PI/2 BPSK, QPSK	1RB, Full RB	M
E.I.R.P	5G n77	20M, 30M, 40M, , 60M, 80M, 100M	All Modulations	1RB, Full RB	L, M, H
	5G n78	20M, 30M, 40M, 50M, 60M, 70M, 80M, 90M ,100M	All Modulations	1RB, , Full RB	L, M, H
26dB and 99% Bandwidth	5G n77	20M, 30M, 40M, , 60M, 80M, 100M	QPSK, 16QAM, 64QAM, 256QAM	Full RB	M
	5G n78	50M, 70M, , 90M	QPSK, 16QAM, 64QAM, 256QAM	Full RB	M
Conducted Band Edge	5G n77	20M, , 60M,, 100M	PI/2 BPSK, QPSK	1RB, Full RB	L, H
	5G n78	50M, 70M, , 90M	PI/2 BPSK, QPSK	1RB, Full RB	L, H
Conducted Spurious Emission	5G n77	20M, , 60M, 100M	PI/2 BPSK, QPSK	1RB	L, M, H
	5G n78	50M, 70M, , 90M	PI/2 BPSK, QPSK	1RB	L, M, H
Frequency Stability	5G n77	100M	QPSK	Full RB	M
	5G n78	90M,	QPSK	Full RB	M
Radiated Spurious Emission	5G n77	Worst case from maximum power			M
	5G n78	Worst case from maximum power			M

Note:

1. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.
2. Frequency Stability: Normal Voltage = 3.87V ; Low Voltage =3.4V.; High Voltage =4.45V.

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Power Supply	GWINSTEK	PSS-2002	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	NR Base Station	Anritsu	MT8000A	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 16.70 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 16.70 + 10 = 26.70 (dB)

2.5 Frequency List of Low/Middle/High Channels

5G n77 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
100	Channel	-	633334	-
	Frequency	-	3500.01	-
80	Channel	632668	633334	634000
	Frequency	3490.02	3500.01	3510
60	Channel	632000	633334	634666
	Frequency	3480	3500.01	3519.99
40	Channel	631334	633334	635332
	Frequency	3470.01	3500.01	3529.98
30	Channel	631000	633334	635666
	Frequency	3465	3500.01	3534.99
20	Channel	630668	633334	636000
	Frequency	3460.02	3500.01	3540

5G n78 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
100	Channel	-	633334	-
	Frequency	-	3500.01	-
90	Channel	633000	633334	633666
	Frequency	3495	3500.01	3504.99
80	Channel	632668	633334	634000
	Frequency	3490.02	3500.01	3510
70	Channel	632334	633334	634332
	Frequency	3485.01	3500.01	3514.98
60	Channel	632000	633334	634666
	Frequency	3480	3500.01	3519.99
50	Channel	631668	633334	635000
	Frequency	3475.02	3500.01	3525
40	Channel	631334	633334	635332
	Frequency	3470.01	3500.01	3529.98
30	Channel	631000	633334	635666
	Frequency	3465	3500.01	3534.99
20	Channel	630668	633334	636000
	Frequency	3460.02	3500.01	3540

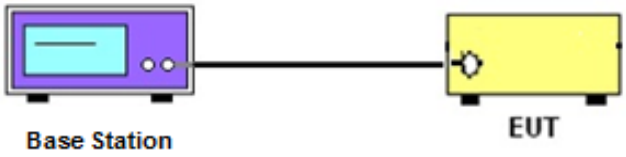
3 Conducted Test Items

3.1 Measuring Instruments

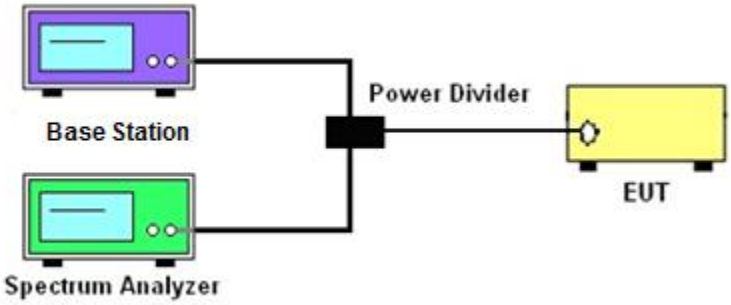
See list of measuring instruments of this test report.

3.2 Test Setup

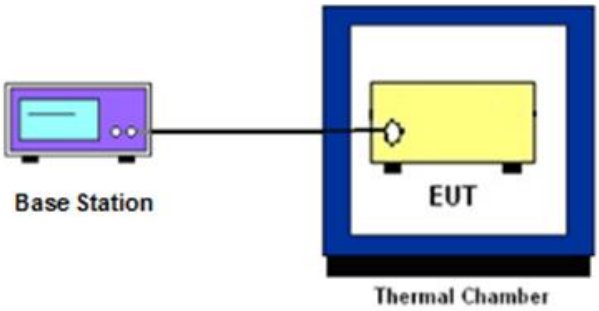
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied / 26dB Bandwidth, Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power Measurement

3.4.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 EIRP

3.6.1 Description of EIRP Limit

§ 27.50 (k)(3)

Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications

3.6.2 Test Procedures

1. According to KDB 412172 D01 Power Approach,
2. EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

   P_T = transmitter output power in dBm

   G_T = gain of the transmitting antenna in dBi

   L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.7 Occupied Bandwidth

3.7.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.8 Conducted Band Edge Measurement

3.8.1 Description of Conducted Band Edge Measurement

§ 27.53 (n)(2)

For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

Compliance with this paragraph is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW ≥ 1% EBW but limited to a maximum of 200 kHz in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz and 5 MHz removed from the band edge, set RBW ≥ 500KHz.
6. Beyond the 5 MHz removed from the band edge, set RBW = 1MHz.
7. Set spectrum analyzer with RMS detector.
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
9. Checked that all the results comply with the emission limit line.

3.9 Conducted Spurious Emission Measurement

3.9.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges shall not exceed −13 dBm/MHz.

It is measured by means of a calibrated spectrum analyzer and scanned from 9 kHz up to a frequency including its 10^{th} harmonic.

3.9.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. Checked that all the results comply with the emission limit line.

3.10 Frequency Stability Measurement

3.10.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block.

3.10.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.10.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5.
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

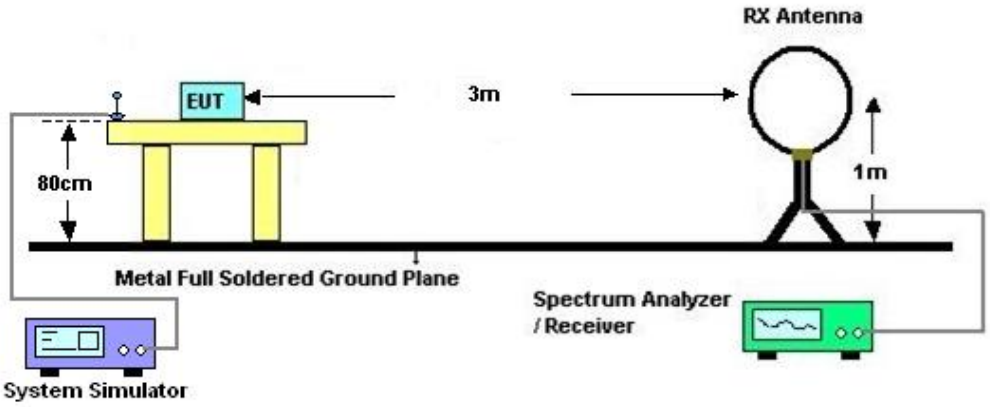
4 Radiated Test Items

4.1 Measuring Instruments

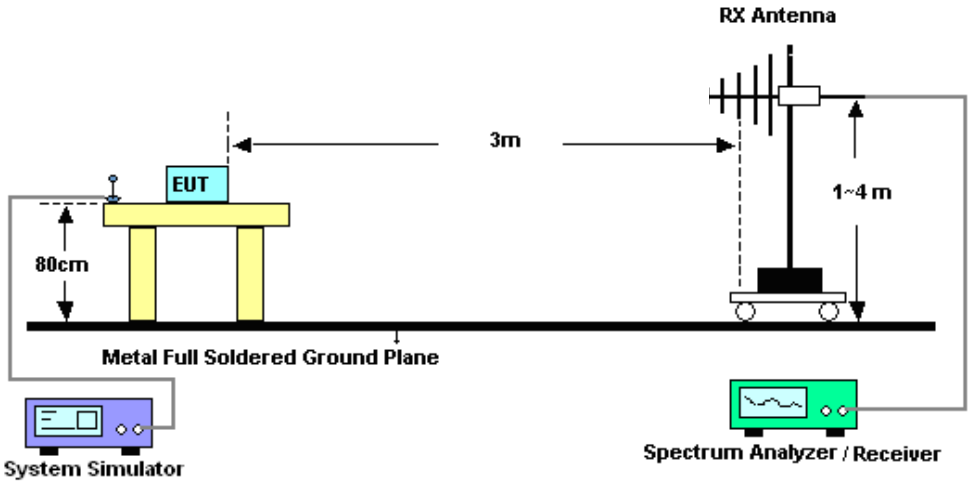
See list of measuring instruments of this test report.

4.2 Test Setup

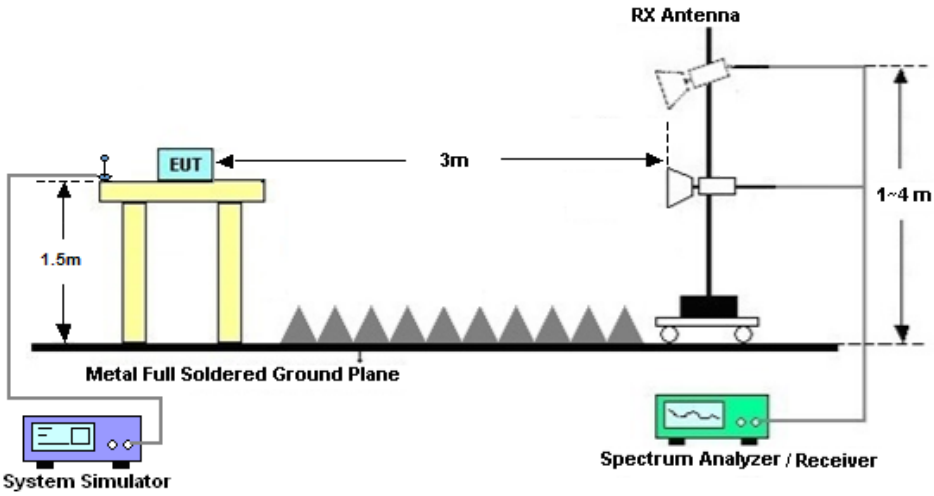
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix B.

4.4 Radiated Spurious Emission Measurement

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI/TIA-603-E.

The power of any emission outside of the authorized operating frequency ranges shall not exceed −13 dBm/MHz.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
   EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
   ERP (dBm) = EIRP - 2.15
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	Aug. 29, 2023~ Sep. 13, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	NCR	Aug. 29, 2023~ Sep. 13, 2023	NCR	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 06, 2023	Aug. 29, 2023~ Sep. 13, 2023	Jul. 05, 2024	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 13, 2022	Sep. 05, 2023	Oct. 12, 2023	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	May 15, 2023	Sep. 05, 2023	May 14, 2024	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 16, 2022	Sep. 05, 2023	Oct. 15, 2023	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-1GHz	Dec. 23, 2022	Sep. 05, 2023	Dec. 22, 2023	Radiation (03CH03-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 15, 2022	Sep. 05, 2023	Nov. 14, 2023	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101116	18GHz~40GHz	Oct. 17, 2022	Sep. 05, 2023	Oct. 16, 2023	Radiation (03CH03-KS)
Amplifier	SONOMA	310N	413740	30MHz ~1000MHz	Jan. 05, 2023	Sep. 05, 2023	Jan. 04, 2024	Radiation (03CH03-KS)
Amplifier	EM	EM18G40GA	060851	18~40GHz	Jan. 05, 2023	Sep. 05, 2023	Jan. 04, 2024	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2082394	1Ghz-18Ghz	Jan. 05, 2023	Sep. 05, 2023	Jan. 04, 2024	Radiation (03CH03-KS)
Amplifier	Keysight	83017A	MY53270319	1GHz~26.5GHz	Oct. 12, 2022	Sep. 05, 2023	Oct. 11, 2023	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Sep. 05, 2023	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Sep. 05, 2023	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Sep. 05, 2023	NCR	Radiation (03CH03-KS)

NCR: No Calibration Required

6 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.1 %

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.0dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

---------- THE END ----------

Appendix A. Test Results of Conducted Test

Test Engineer :	Jung Kuo	**Temperature :**	22~23℃
		Relative Humidity :	40~42%

Software Version: 23.06.1602

FR1 N77 SISO_ANT8

Transmitter Conducted Output Power and EIRP, (G_T - L_C)=-1.2 dB

NR Band	SCS	BandWidth	Arfcn	Freq (MHz)	Modulation	RB	Conducted Power(dBm)	EIRP(dBm)	EIRP(W)
77	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	135@67	26.25	25.05	0.3199
77	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	26.45	25.25	0.3350
77	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@271	26.1	24.9	0.3090
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	135@67	25.95	24.75	0.2985
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@1	26	24.8	0.3020
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@271	25.39	24.19	0.2624
77	30	100	633334	3500.01	DFT-s-OFDM 16 QAM	135@67	24.98	23.78	0.2388
77	30	100	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	25.03	23.83	0.2415
77	30	100	633334	3500.01	DFT-s-OFDM 16 QAM	1@271	24.31	23.11	0.2046
77	30	100	633334	3500.01	DFT-s-OFDM 64 QAM	135@67	23.54	22.34	0.1714
77	30	100	633334	3500.01	DFT-s-OFDM 64 QAM	1@1	23.39	22.19	0.1656
77	30	100	633334	3500.01	DFT-s-OFDM 64 QAM	1@271	22.76	21.56	0.1432
77	30	100	633334	3500.01	DFT-s-OFDM 256 QAM	135@67	21.76	20.56	0.1138
77	30	100	633334	3500.01	DFT-s-OFDM 256 QAM	1@1	21.76	20.56	0.1138
77	30	100	633334	3500.01	DFT-s-OFDM 256 QAM	1@271	21.37	20.17	0.1040
77	30	100	633334	3500.01	CP-OFDM QPSK	137@68	24.32	23.12	0.2051
77	30	100	633334	3500.01	CP-OFDM QPSK	1@1	24.5	23.3	0.2138
77	30	100	633334	3500.01	CP-OFDM QPSK	1@271	23.87	22.67	0.1849
77	30	20	630668	3460.02	DFT-s-OFDM PI/2 BPSK	1@1	26.28	25.08	0.3221
77	30	20	630668	3460.02	DFT-s-OFDM QPSK	1@1	25.91	24.71	0.2958
77	30	20	630668	3460.02	DFT-s-OFDM 16 QAM	1@1	24.96	23.76	0.2377
77	30	20	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	26.18	24.98	0.3148
77	30	20	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.81	24.61	0.2891
77	30	20	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.84	23.64	0.2312
77	30	20	636000	3540	DFT-s-OFDM PI/2 BPSK	1@1	26.14	24.94	0.3119
77	30	20	636000	3540	DFT-s-OFDM QPSK	1@1	26.16	24.96	0.3133
77	30	20	636000	3540	DFT-s-OFDM 16 QAM	1@1	25.12	23.92	0.2466
77	30	30	631000	3465	DFT-s-OFDM PI/2 BPSK	1@1	26.36	25.16	0.3281
77	30	30	631000	3465	DFT-s-OFDM QPSK	1@1	25.87	24.67	0.2931
77	30	30	631000	3465	DFT-s-OFDM 16 QAM	1@1	24.85	23.65	0.2317

77	30	30	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	26.26	25.06	0.3206
77	30	30	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.86	24.66	0.2924
77	30	30	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.83	23.63	0.2307
77	30	30	635666	3534.99	DFT-s-OFDM PI/2 BPSK	1@1	26.32	25.12	0.3251
77	30	30	635666	3534.99	DFT-s-OFDM QPSK	1@1	25.87	24.67	0.2931
77	30	30	635666	3534.99	DFT-s-OFDM 16 QAM	1@1	24.84	23.64	0.2312
77	30	40	631334	3470.01	DFT-s-OFDM PI/2 BPSK	1@1	26.39	25.19	0.3304
77	30	40	631334	3470.01	DFT-s-OFDM QPSK	1@1	25.97	24.77	0.2999
77	30	40	631334	3470.01	DFT-s-OFDM 16 QAM	1@1	24.95	23.75	0.2371
77	30	40	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	26.33	25.13	0.3258
77	30	40	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.95	24.75	0.2985
77	30	40	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.96	23.76	0.2377
77	30	40	635332	3529.98	DFT-s-OFDM PI/2 BPSK	1@1	26.33	25.13	0.3258
77	30	40	635332	3529.98	DFT-s-OFDM QPSK	1@1	26.04	24.84	0.3048
77	30	40	635332	3529.98	DFT-s-OFDM 16 QAM	1@1	25.02	23.82	0.2410
77	30	60	632000	3480	DFT-s-OFDM PI/2 BPSK	1@1	26.14	24.94	0.3119
77	30	60	632000	3480	DFT-s-OFDM QPSK	1@1	26.13	24.93	0.3112
77	30	60	632000	3480	DFT-s-OFDM 16 QAM	1@1	25.09	23.89	0.2449
77	30	60	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	26	24.8	0.3020
77	30	60	633334	3500.01	DFT-s-OFDM QPSK	1@1	26.02	24.82	0.3034
77	30	60	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.99	23.79	0.2393
77	30	60	634666	3519.99	DFT-s-OFDM PI/2 BPSK	1@1	26.14	24.94	0.3119
77	30	60	634666	3519.99	DFT-s-OFDM QPSK	1@1	26.08	24.88	0.3076
77	30	60	634666	3519.99	DFT-s-OFDM 16 QAM	1@1	25.09	23.89	0.2449
77	30	80	632668	3490.02	DFT-s-OFDM PI/2 BPSK	1@1	26.18	24.98	0.3148
77	30	80	632668	3490.02	DFT-s-OFDM QPSK	1@1	26.05	24.85	0.3055
77	30	80	632668	3490.02	DFT-s-OFDM 16 QAM	1@1	25.03	23.83	0.2415
77	30	80	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	26.14	24.94	0.3119
77	30	80	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.85	24.65	0.2917
77	30	80	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.84	23.64	0.2312
77	30	80	634000	3510	DFT-s-OFDM PI/2 BPSK	1@1	26.08	24.88	0.3076
77	30	80	634000	3510	DFT-s-OFDM QPSK	1@1	25.91	24.71	0.2958
77	30	80	634000	3510	DFT-s-OFDM 16 QAM	1@1	24.91	23.71	0.2350

Frequency Stability

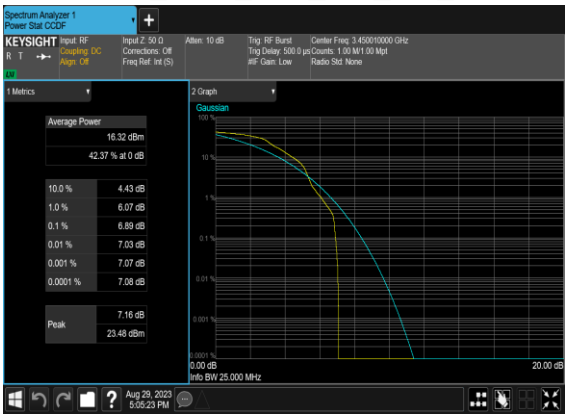
NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Deviation (ppm)	Verdict	Environment
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0016	**PASS**	NV
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0014	**PASS**	LV
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0028	**PASS**	HV
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0013	**PASS**	-30℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0011	**PASS**	-20℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0016	**PASS**	-10℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0015	**PASS**	0℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	-0.0008	**PASS**	10℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0013	**PASS**	20℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0029	**PASS**	30℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0017	**PASS**	40℃
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	0.0007	**PASS**	50℃

Peak to Average Ratio

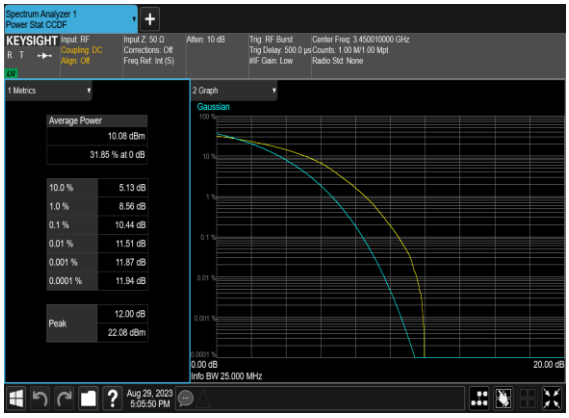
NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result (dB)	Limit (dB)	Verdict
77	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	270@0	10.2	13	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@0	6.89	13	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	10.44	13	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@0	8.81	13	**PASS**

N77(100M)_DFT-s-OFDM_PI_2-BPSK_Outer_Full_Mid_CH

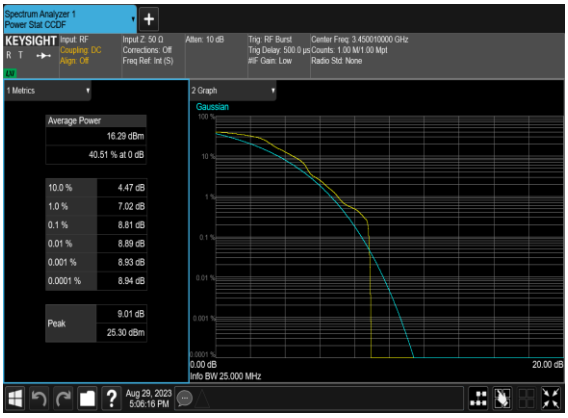
N77(100M)_DFT-s-OFDM_PI_2-BPSK_Edge_1RB_Left_Mid_CH



N77(100M)_DFT-s-OFDM_QPSK_Outer_Full_Mid_CH



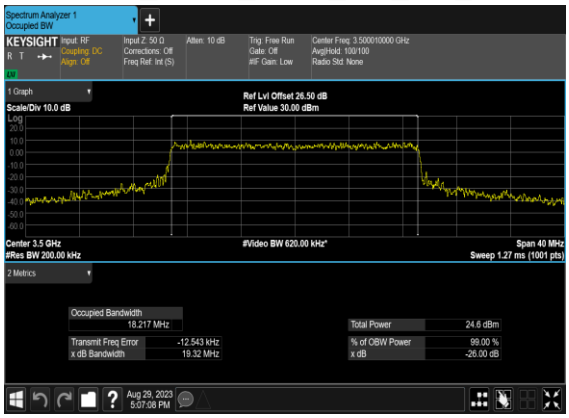
N77(100M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



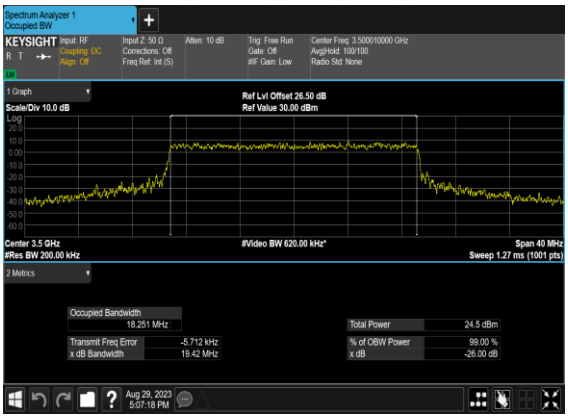
Occupied Bandwidth

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	OBW (MHz)	26dB BW (MHz)
77	30	20	633334	3500.01	CP-OFDM QPSK	51@0	18.217	19.32
77	30	20	633334	3500.01	CP-OFDM 16 QAM	51@0	18.251	19.42
77	30	20	633334	3500.01	CP-OFDM 64 QAM	51@0	18.135	19.67
77	30	20	633334	3500.01	CP-OFDM 256 QAM	51@0	18.257	19.98
77	30	30	633334	3500.01	CP-OFDM QPSK	78@0	27.84	29.81
77	30	30	633334	3500.01	CP-OFDM 16 QAM	78@0	27.835	29.72
77	30	30	633334	3500.01	CP-OFDM 64 QAM	78@0	27.842	29.22
77	30	30	633334	3500.01	CP-OFDM 256 QAM	78@0	27.804	30.91
77	30	40	633334	3500.01	CP-OFDM QPSK	106@0	37.932	39.6
77	30	40	633334	3500.01	CP-OFDM 16 QAM	106@0	37.869	39.37
77	30	40	633334	3500.01	CP-OFDM 64 QAM	106@0	37.927	39.55
77	30	40	633334	3500.01	CP-OFDM 256 QAM	106@0	37.942	39.64
77	30	60	633334	3500.01	CP-OFDM QPSK	162@0	57.969	59.88
77	30	60	633334	3500.01	CP-OFDM 16 QAM	162@0	57.783	59.6
77	30	60	633334	3500.01	CP-OFDM 64 QAM	162@0	57.888	59.73
77	30	60	633334	3500.01	CP-OFDM 256 QAM	162@0	57.973	60.03
77	30	80	633334	3500.01	CP-OFDM QPSK	217@0	77.634	79.91
77	30	80	633334	3500.01	CP-OFDM 16 QAM	217@0	77.383	80.27
77	30	80	633334	3500.01	CP-OFDM 64 QAM	217@0	77.552	79.91
77	30	80	633334	3500.01	CP-OFDM 256 QAM	217@0	77.515	80.92
77	30	100	633334	3500.01	CP-OFDM QPSK	273@0	97.388	100.5
77	30	100	633334	3500.01	CP-OFDM 16 QAM	273@0	97.409	100.5
77	30	100	633334	3500.01	CP-OFDM 64 QAM	273@0	97.344	100.7
77	30	100	633334	3500.01	CP-OFDM 256 QAM	273@0	97.136	100.6

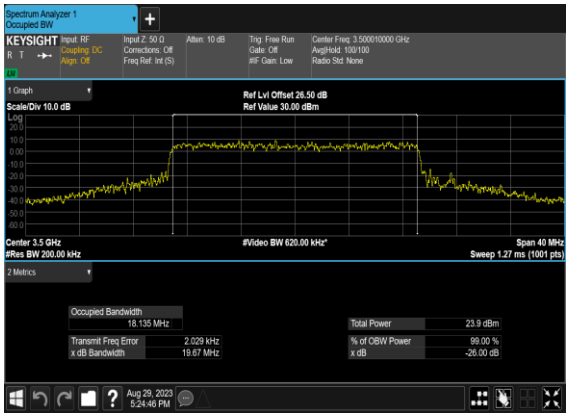
N77(20M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



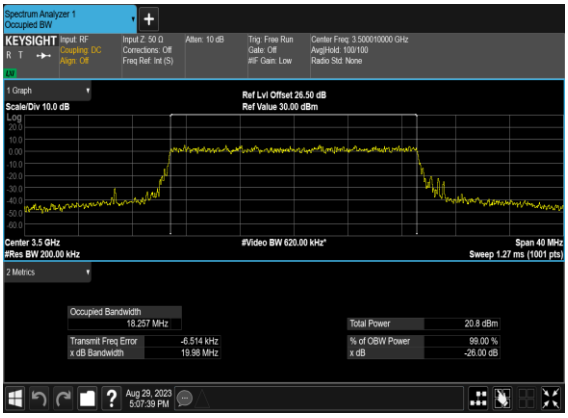
N77(20M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



N77(20M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



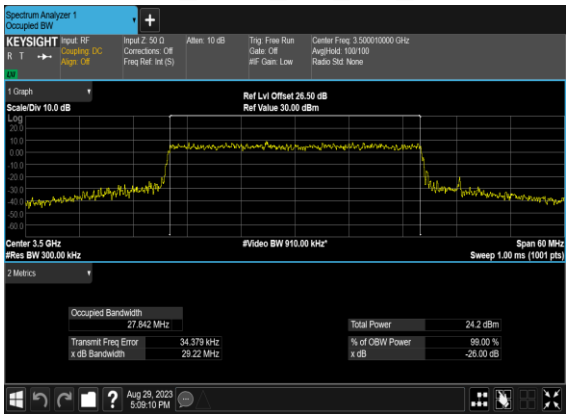
N77(20M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



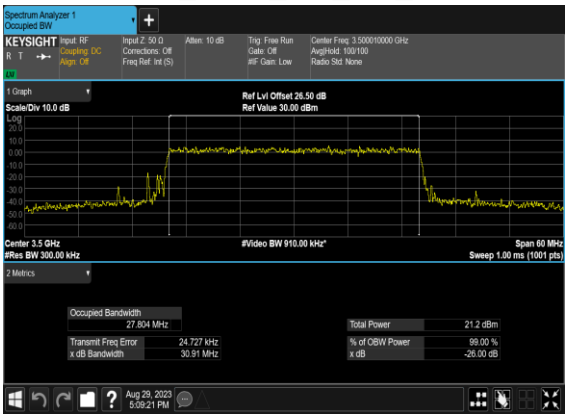
N77(30M)_CP-OFDM_QPSK_Outer_Full_Mid_CH

N77(30M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH

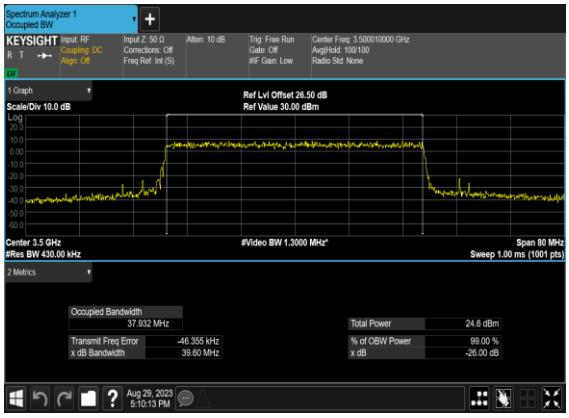
N77(30M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



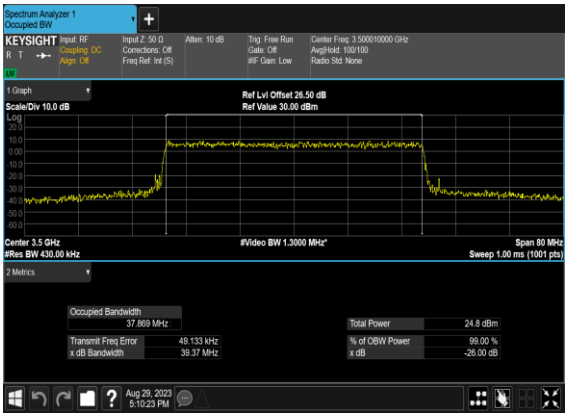
N77(30M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



N77(40M)_CP-OFDM_QPSK_Outer_Full_Mid_CH

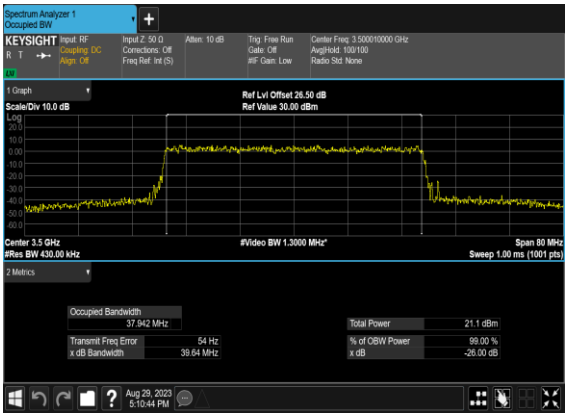


N77(40M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH

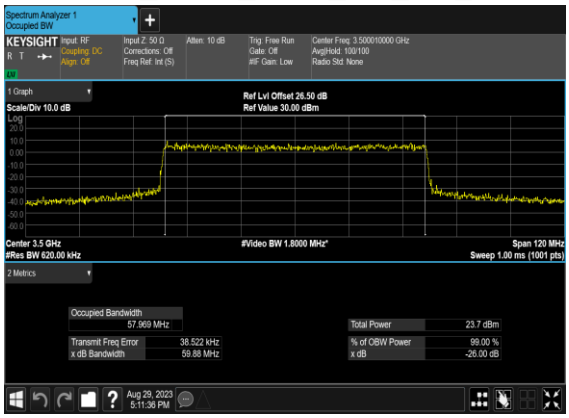


N77(40M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH

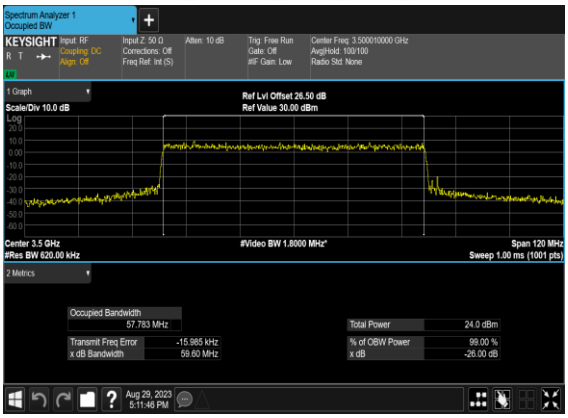
N77(40M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



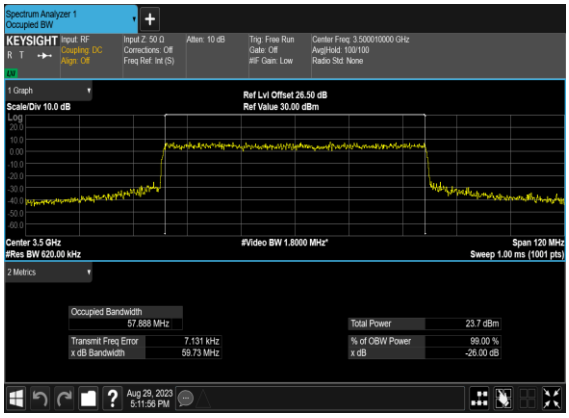
N77(60M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



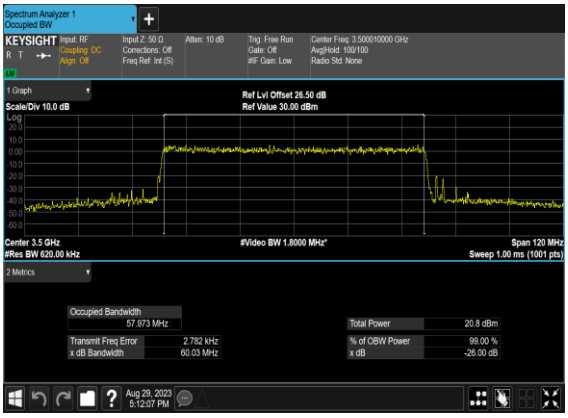
N77(60M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



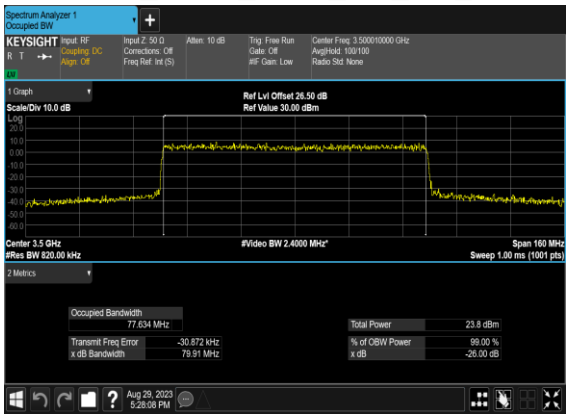
N77(60M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



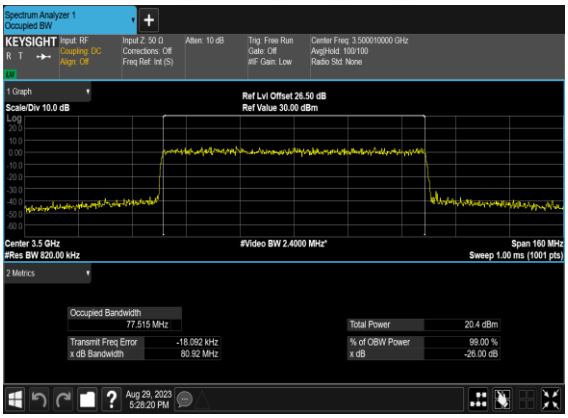
N77(60M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



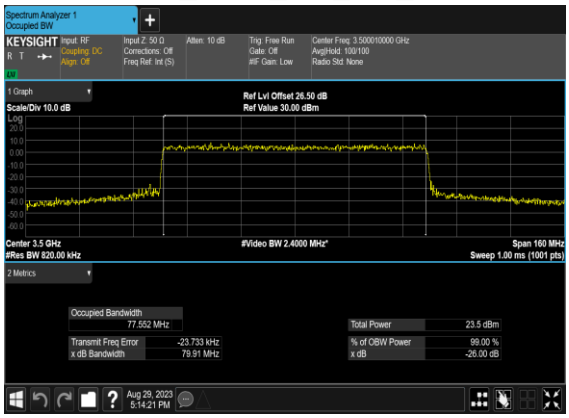
N77(80M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



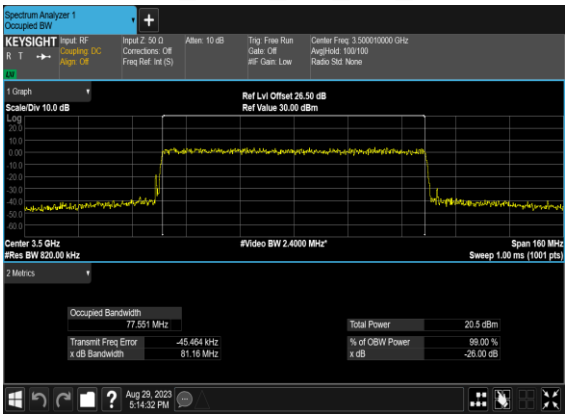
N77(80M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



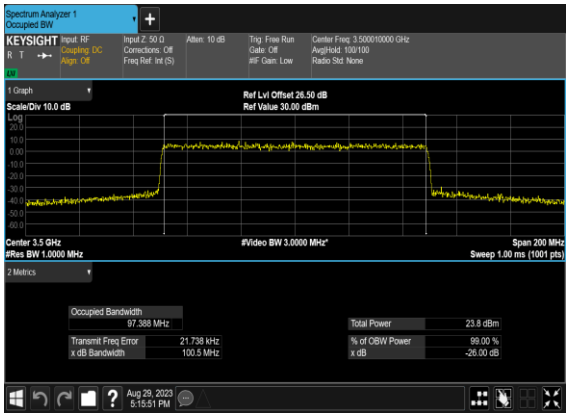
N77(80M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



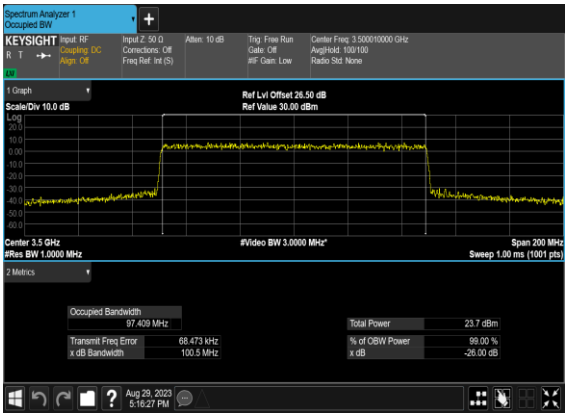
N77(80M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



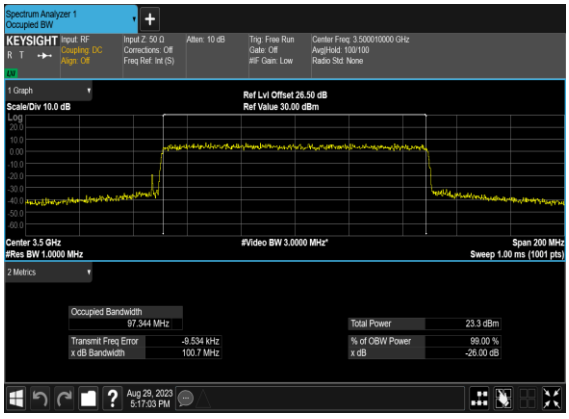
N77(100M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



N77(100M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



N77(100M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



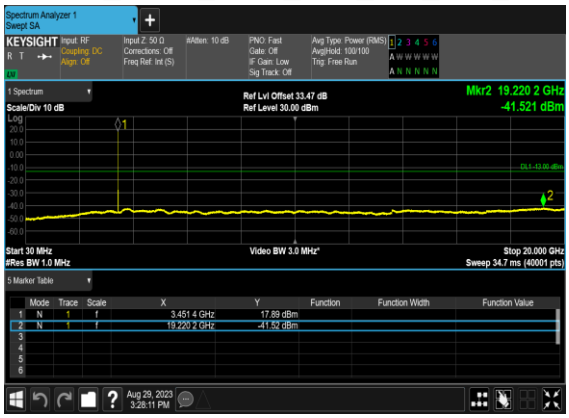
N77(100M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH

Conducted Spurious Emissions

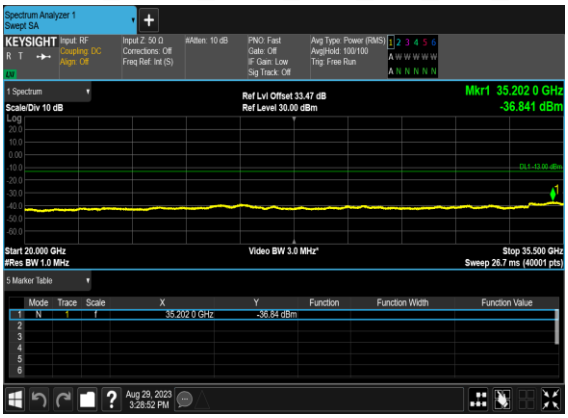
NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result	Verdict
77	30	20	630668	3460.02	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	20	630668	3460.02	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	630668	3460.02	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	630668	3460.02	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	20	630668	3460.02	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	20	630668	3460.02	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	20	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	20	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	20	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	20	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	20	636000	3540.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	20	636000	3540.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	60	632000	3480.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	60	632000	3480.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**

77	30	60	632000	3480.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	60	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	60	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	60	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	60	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	60	634666	3519.99	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	60	634666	3519.99	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**---**
77	30	100	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**---**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**

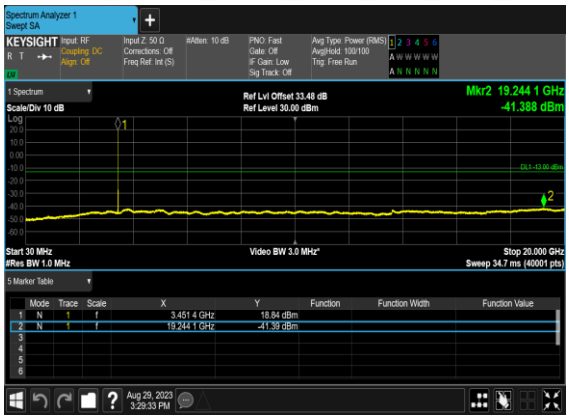
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



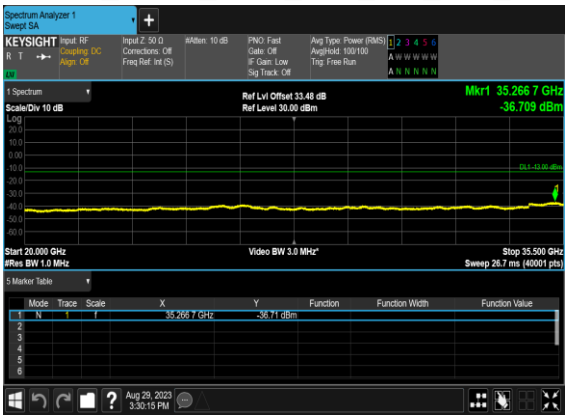
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



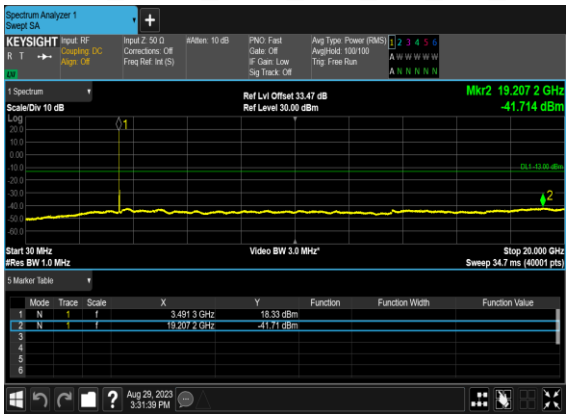
N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



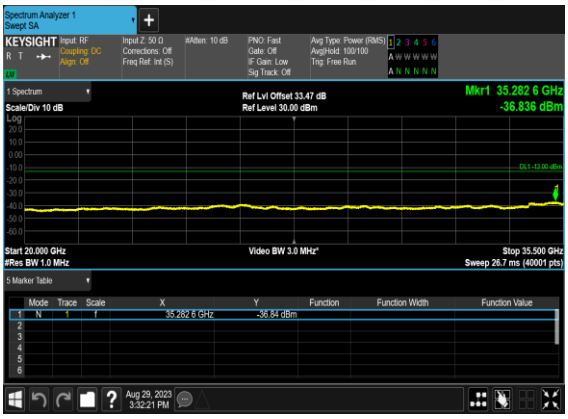
N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



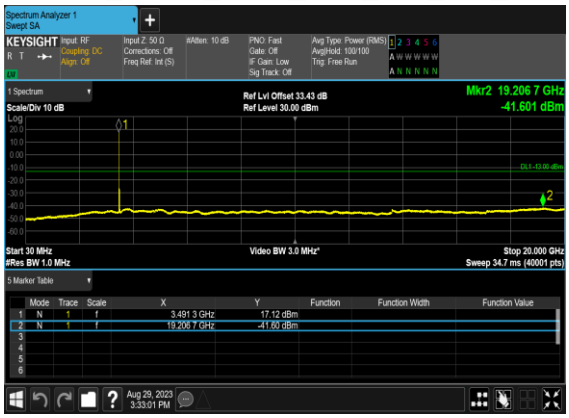
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH



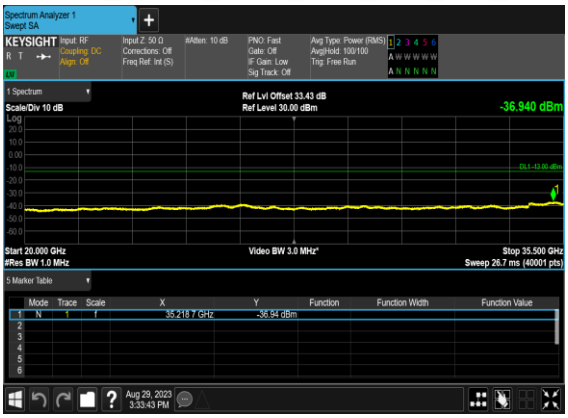
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH



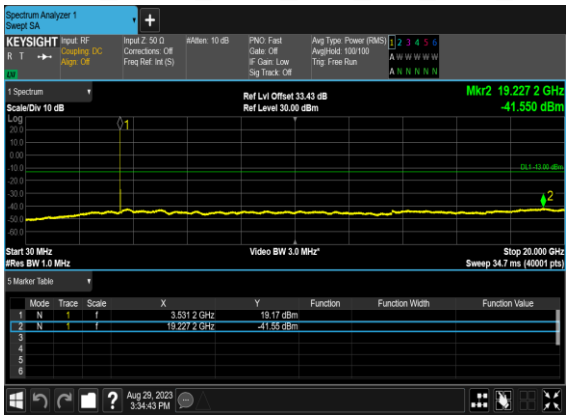
N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



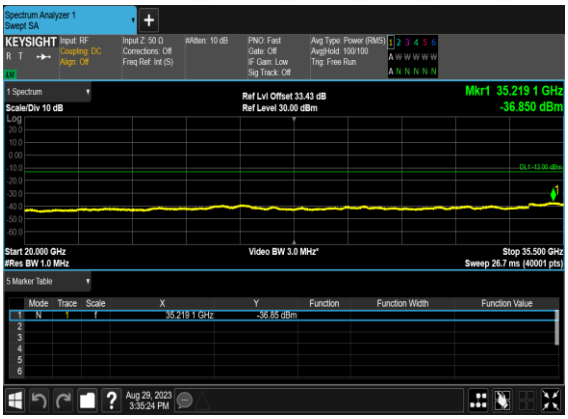
N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



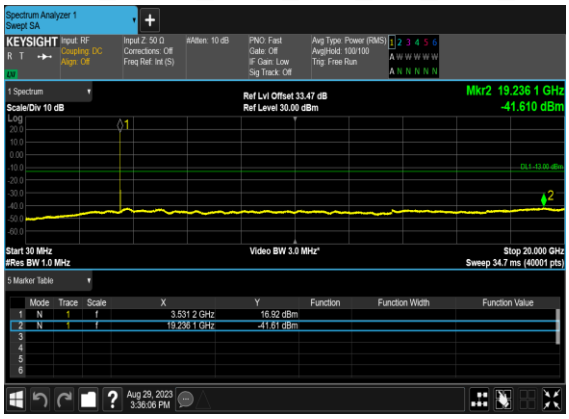
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



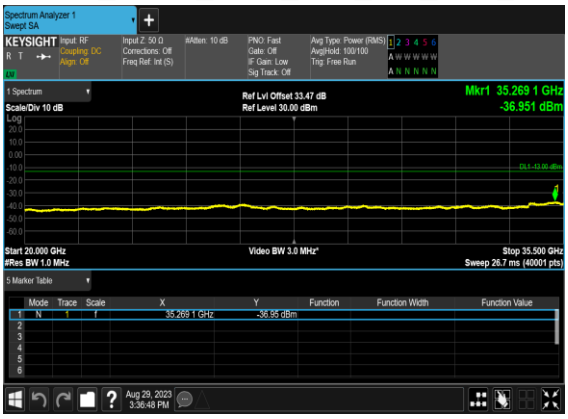
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



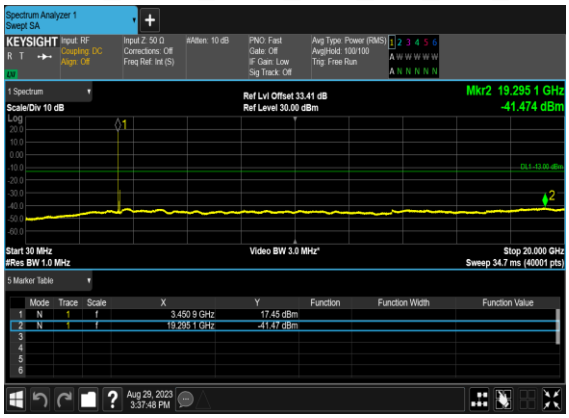
N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH



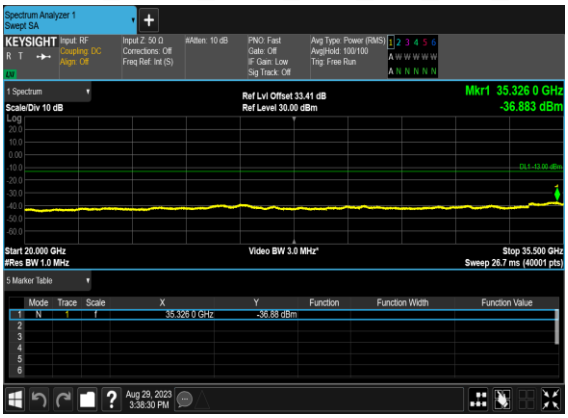
N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH



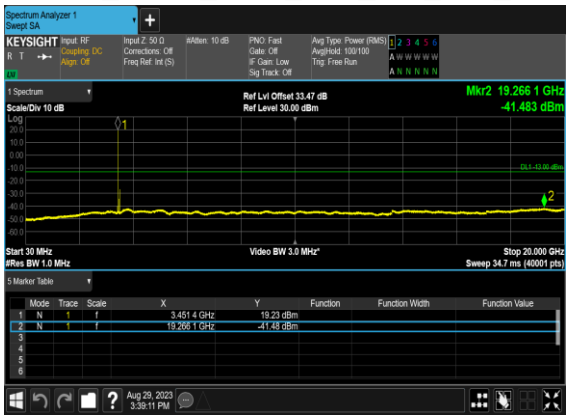
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



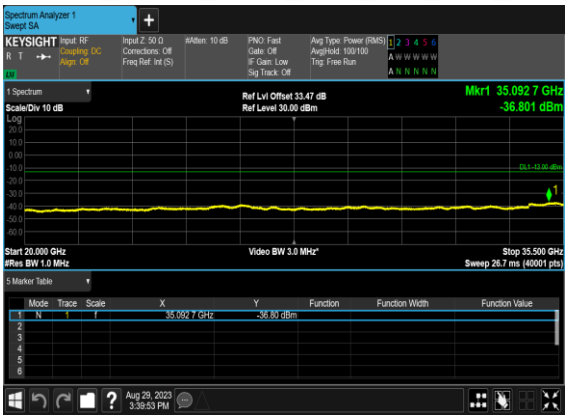
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



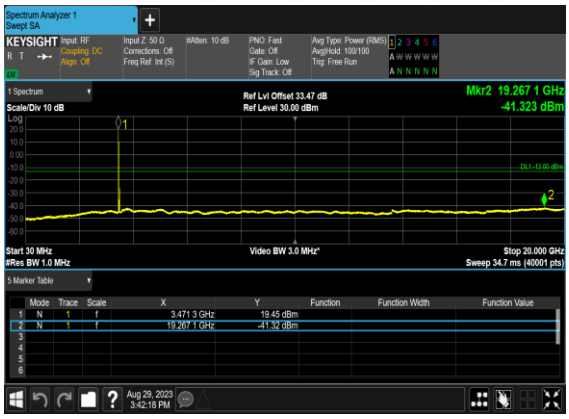
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



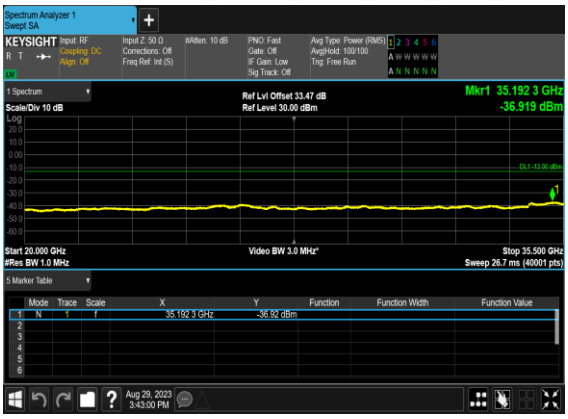
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



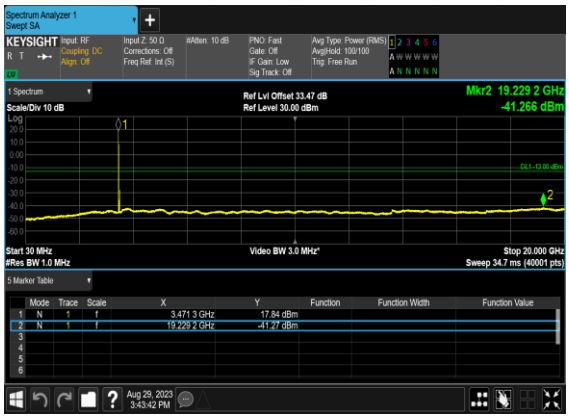
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH



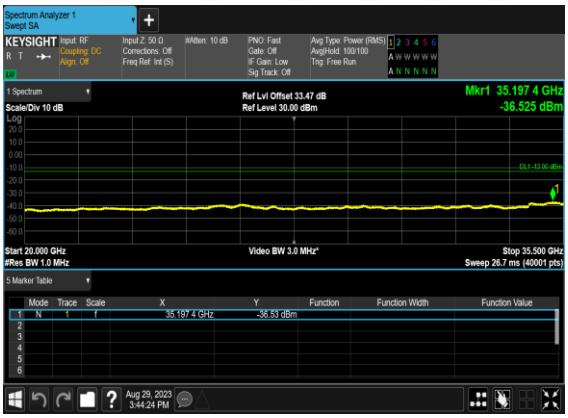
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH



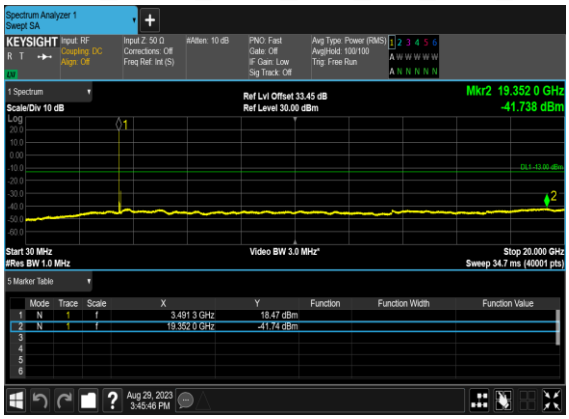
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



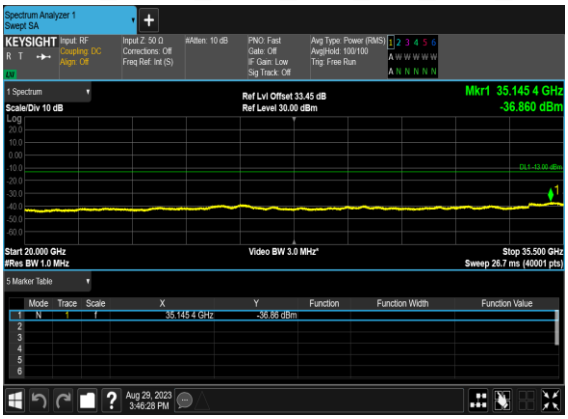
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



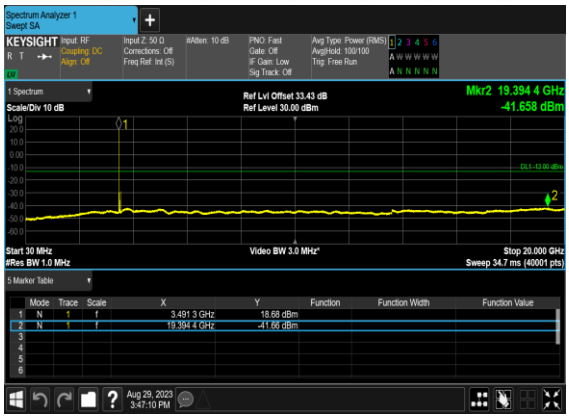
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



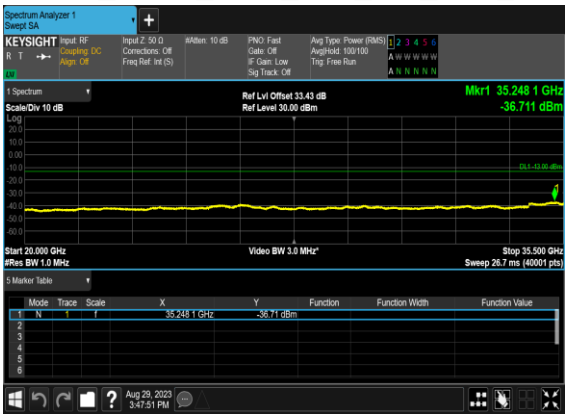
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_High_CH



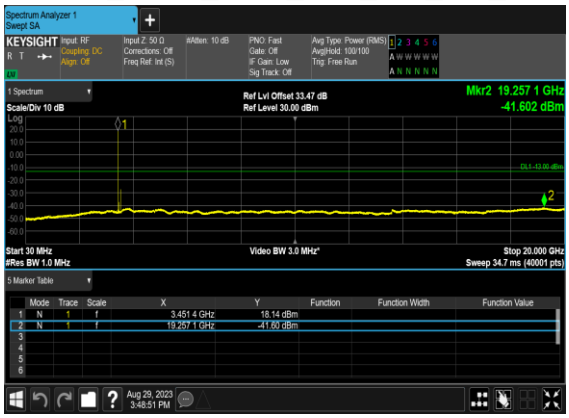
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH



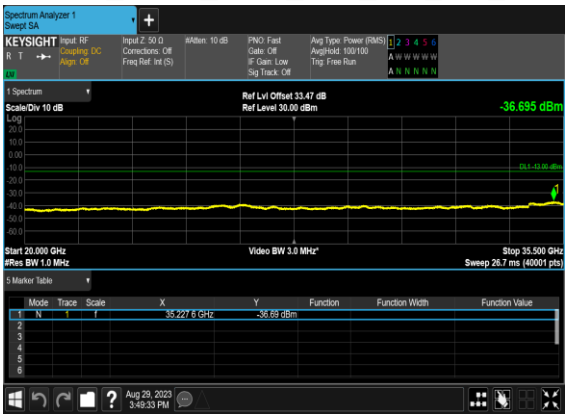
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_High_CH



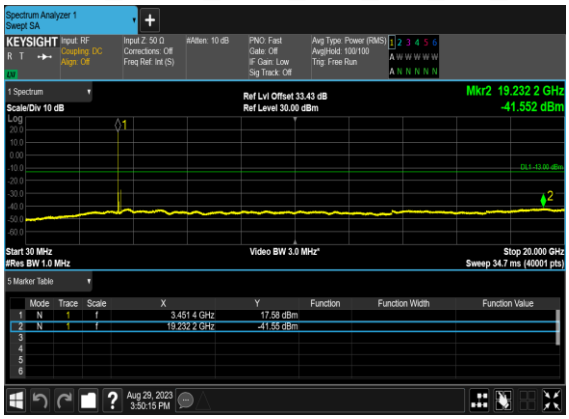
N77(100M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH



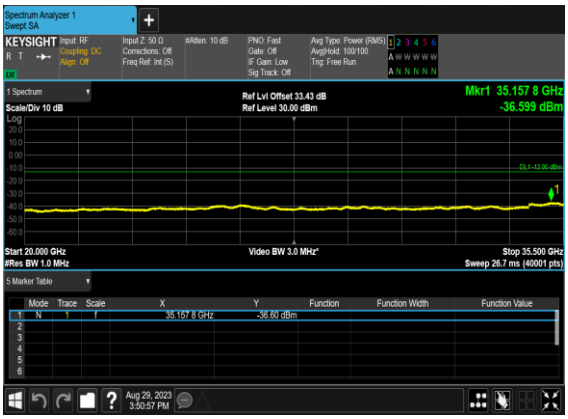
N77(100M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH



N77(100M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



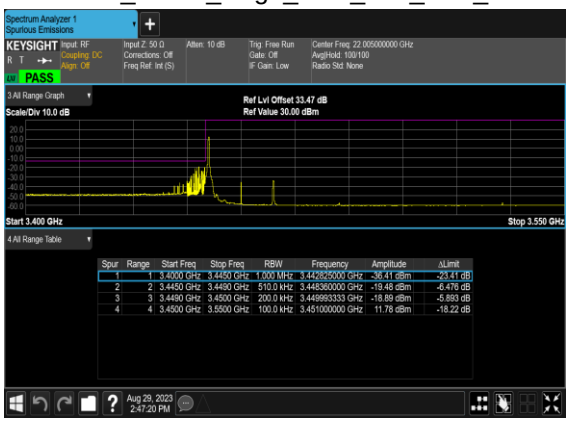
N77(100M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



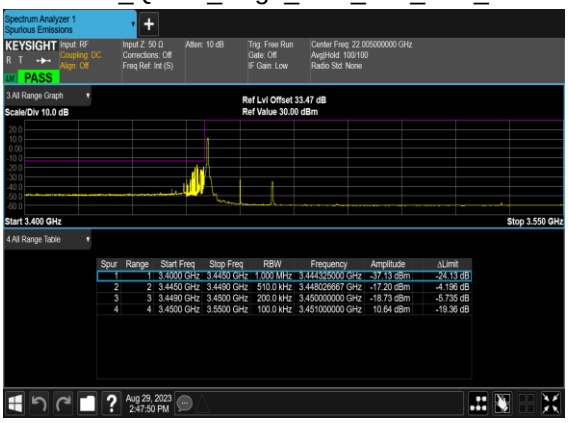
Conducted Band Edge

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result	Verdict
77	30	20	630668	3460.02	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	20	630668	3460.02	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	20	630668	3460.02	DFT-s-OFDM BPSK	50@0	see graph	**PASS**
77	30	20	630668	3460.02	DFT-s-OFDM QPSK	50@0	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM BPSK	1@50	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM QPSK	1@50	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM BPSK	50@0	see graph	**PASS**
77	30	20	636000	3540.0	DFT-s-OFDM QPSK	50@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM BPSK	162@0	see graph	**PASS**
77	30	60	632000	3480.0	DFT-s-OFDM QPSK	162@0	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM BPSK	1@161	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM QPSK	1@161	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM BPSK	162@0	see graph	**PASS**
77	30	60	634666	3519.99	DFT-s-OFDM QPSK	162@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM BPSK	1@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM BPSK	1@272	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@272	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM BPSK	270@0	see graph	**PASS**
77	30	100	633334	3500.01	DFT-s-OFDM QPSK	270@0	see graph	**PASS**

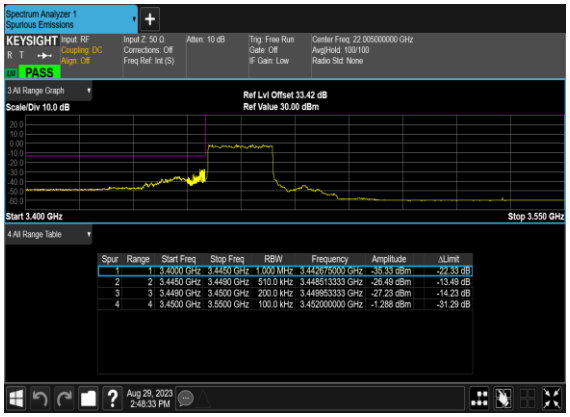
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH

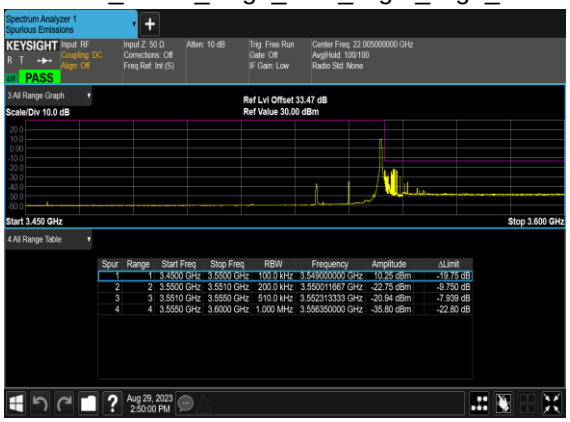


N77(20M)_DFT-s-OFDM_BPSK_Outer_Full_Low_CH

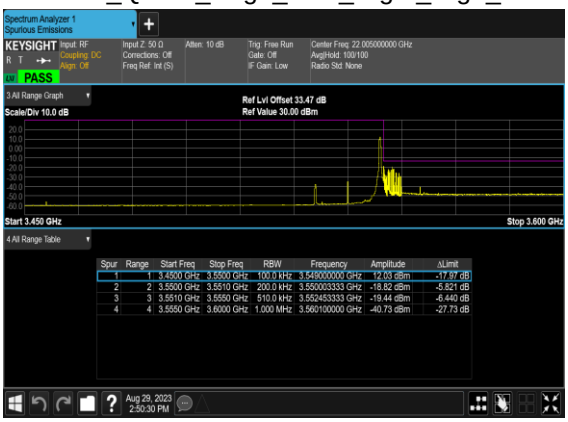


N77(20M)_DFT-s-OFDM_QPSK_Outer_Full_Low_CH

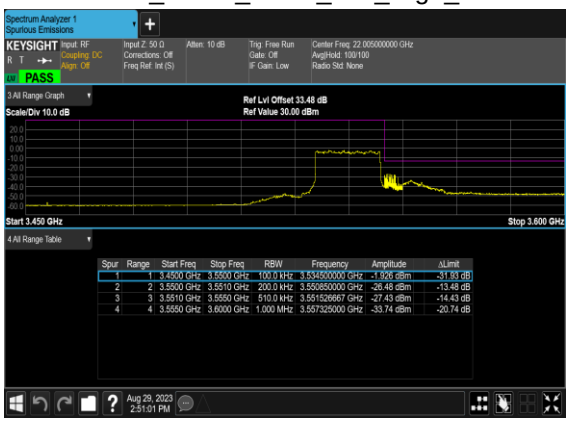
N77(20M)_DFT-s-OFDM_BPSK_Edge_1RB_Right_High_CH



N77(20M)_DFT-s-OFDM_QPSK_Edge_1RB_Right_High_CH

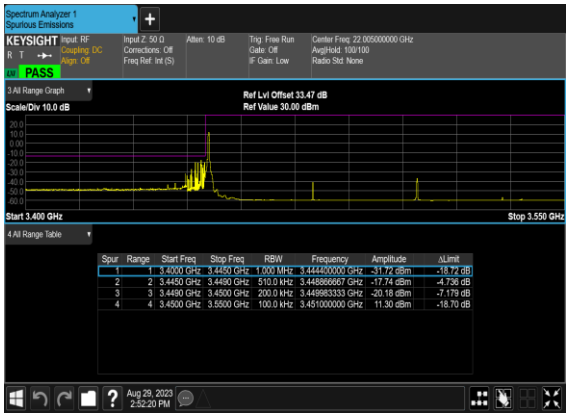


N77(20M)_DFT-s-OFDM_BPSK_Outer_Full_High_CH

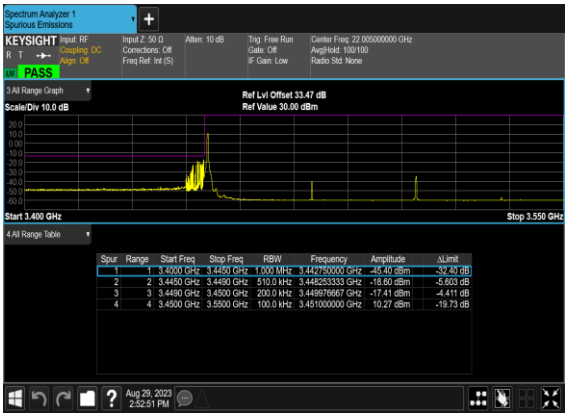


N77(20M)_DFT-s-OFDM_QPSK_Outer_Full_High_CH

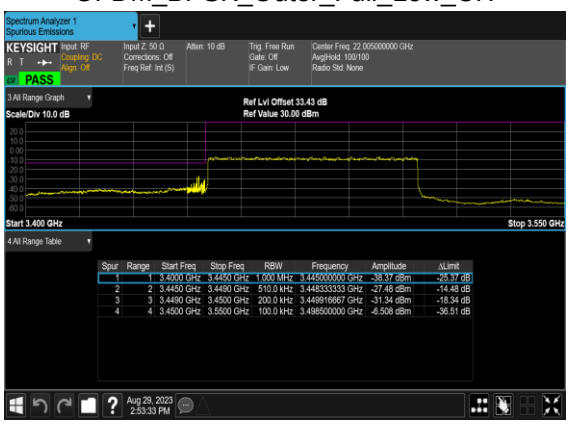
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Low_CH



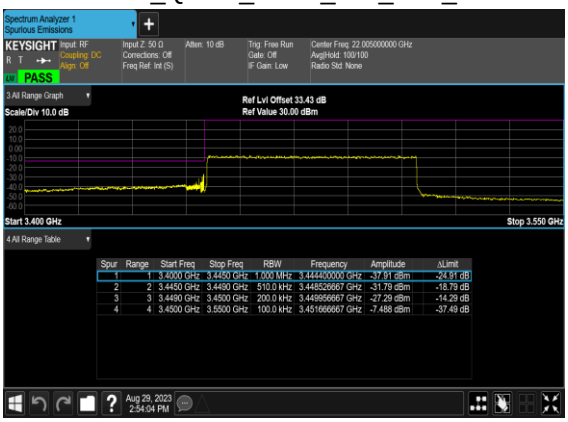
N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Low_CH



N77(60M)_DFT-s-OFDM_BPSK_Outer_Full_Low_CH



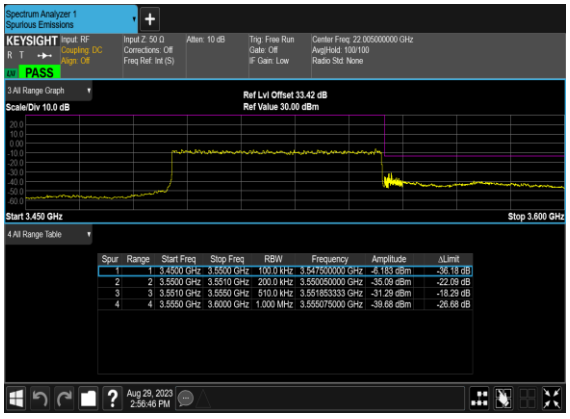
N77(60M)_DFT-s-OFDM_QPSK_Outer_Full_Low_CH



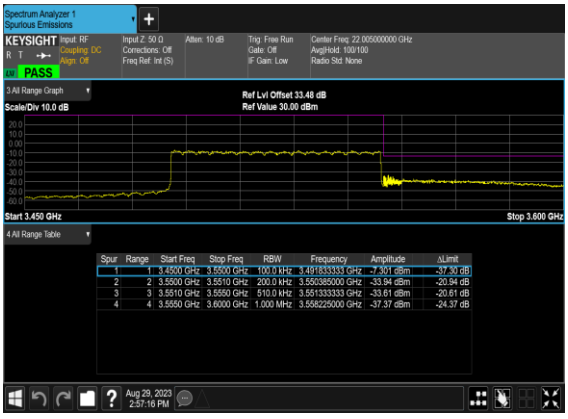
N77(60M)_DFT-s-OFDM_BPSK_Edge_1RB_Right_High_CH

N77(60M)_DFT-s-OFDM_QPSK_Edge_1RB_Right_High_CH

N77(60M)_DFT-s-OFDM_BPSK_Outer_Full_High_CH

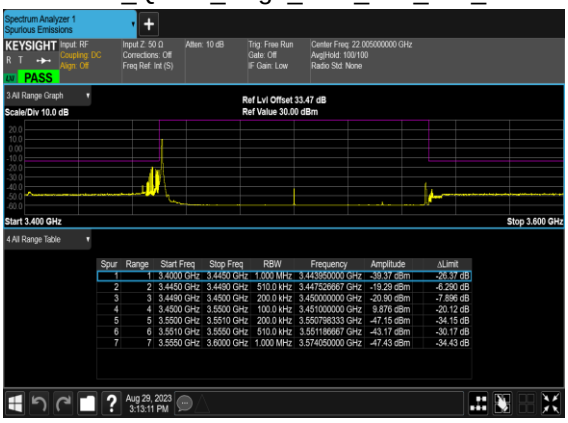


N77(60M)_DFT-s-OFDM_QPSK_Outer_Full_High_CH

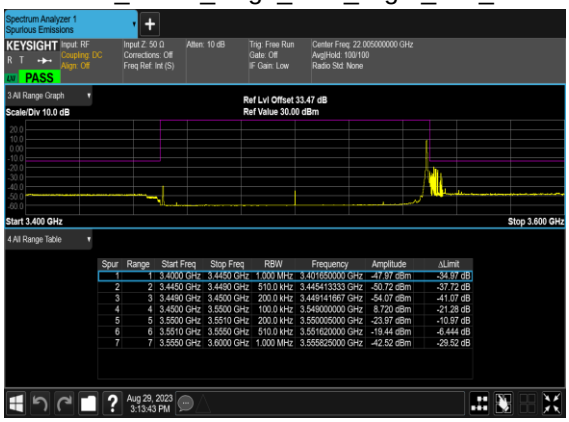


N77(100M)_DFT-s-OFDM_BPSK_Edge_1RB_Left_Mid_CH

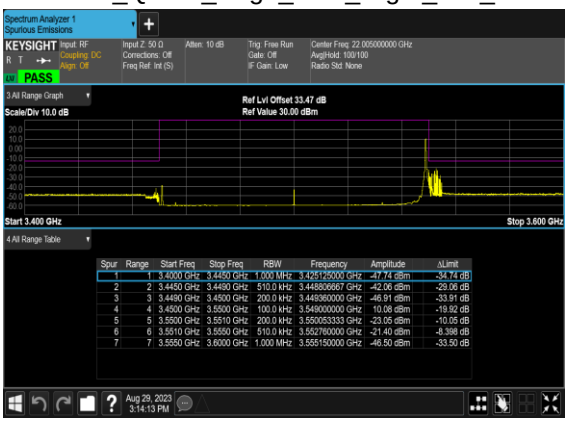
N77(100M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



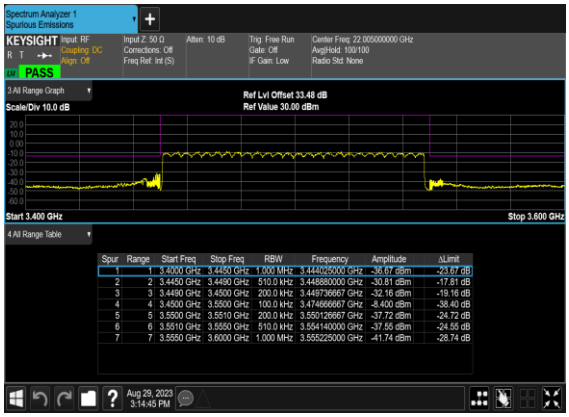
N77(100M)_DFT-s-OFDM_BPSK_Edge_1RB_Right_Mid_CH



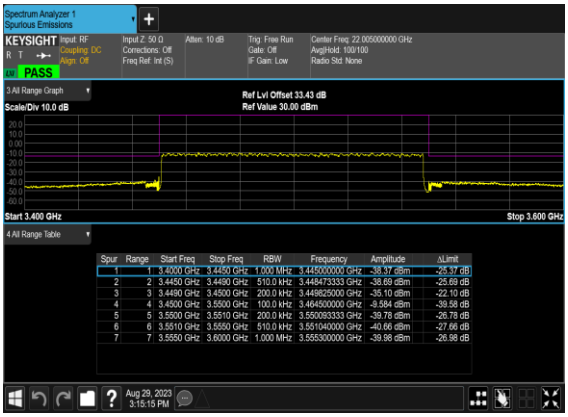
N77(100M)_DFT-s-OFDM_QPSK_Edge_1RB_Right_Mid_CH



N77(100M)_DFT-s-OFDM_BPSK_Outer_Full_Mid_CH



N77(100M)_DFT-s-OFDM_QPSK_Outer_Full_Mid_CH



Software Version: 23.06.1602

FR1 N78 SISO_ANT8

Transmitter Conducted Output Power and EIRP, (G_T - L_C)=-1.2dB

NR Band	SCS	Band Width	Arfcn	Freq(MHz)	Modulation	RB	Conducted Power(dBm)	EIRP(dBm)	EIRP(W)
78	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	135@67	25.18	23.98	0.2500
78	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.78	24.58	0.2871
78	30	100	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@271	24.97	23.77	0.2382
78	30	100	633334	3500.01	DFT-s-OFDM QPSK	135@67	25.06	23.86	0.2432
78	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.41	24.21	0.2636
78	30	100	633334	3500.01	DFT-s-OFDM QPSK	1@271	24.97	23.77	0.2382
78	30	100	633334	3500.01	DFT-s-OFDM 16 QAM	135@67	24.19	22.99	0.1991
78	30	100	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.32	23.12	0.2051
78	30	100	633334	3500.01	DFT-s-OFDM 16 QAM	1@271	23.87	22.67	0.1849
78	30	100	633334	3500.01	DFT-s-OFDM 64 QAM	135@67	22.66	21.46	0.1400
78	30	100	633334	3500.01	DFT-s-OFDM 64 QAM	1@1	22.66	21.46	0.1400
78	30	100	633334	3500.01	DFT-s-OFDM 64 QAM	1@271	22.18	20.98	0.1253
78	30	100	633334	3500.01	DFT-s-OFDM 256 QAM	135@67	20.66	19.46	0.0883
78	30	100	633334	3500.01	DFT-s-OFDM 256 QAM	1@1	20.81	19.61	0.0914
78	30	100	633334	3500.01	DFT-s-OFDM 256 QAM	1@271	20.38	19.18	0.0828
78	30	100	633334	3500.01	CP-OFDM QPSK	137@68	23.58	22.38	0.1730
78	30	100	633334	3500.01	CP-OFDM QPSK	1@1	23.84	22.64	0.1837
78	30	100	633334	3500.01	CP-OFDM QPSK	1@271	23.44	22.24	0.1675
78	30	20	630668	3460.02	DFT-s-OFDM PI/2 BPSK	1@1	25.69	24.49	0.2812
78	30	20	630668	3460.02	DFT-s-OFDM QPSK	1@1	25.63	24.43	0.2773
78	30	20	630668	3460.02	DFT-s-OFDM 16 QAM	1@1	24.36	23.16	0.2070
78	30	20	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.24	24.04	0.2535
78	30	20	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.25	24.05	0.2541
78	30	20	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.19	22.99	0.1991
78	30	20	636000	3540	DFT-s-OFDM PI/2 BPSK	1@1	25.38	24.18	0.2618
78	30	20	636000	3540	DFT-s-OFDM QPSK	1@1	25.52	24.32	0.2704
78	30	20	636000	3540	DFT-s-OFDM 16 QAM	1@1	24.32	23.12	0.2051
78	30	30	631000	3465	DFT-s-OFDM PI/2 BPSK	1@1	25.62	24.42	0.2767
78	30	30	631000	3465	DFT-s-OFDM QPSK	1@1	25.67	24.47	0.2799
78	30	30	631000	3465	DFT-s-OFDM 16 QAM	1@1	24.42	23.22	0.2099
78	30	30	633334	3500.01	DFT-s-OFDM	1@1	25.2	24	0.2512

					PI/2 BPSK				
78	30	30	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.44	24.24	0.2655
78	30	30	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.3	23.1	0.2042
78	30	30	635666	3534.99	DFT-s-OFDM PI/2 BPSK	1@1	25.47	24.27	0.2673
78	30	30	635666	3534.99	DFT-s-OFDM QPSK	1@1	25.61	24.41	0.2761
78	30	30	635666	3534.99	DFT-s-OFDM 16 QAM	1@1	24.34	23.14	0.2061
78	30	40	631334	3470.01	DFT-s-OFDM PI/2 BPSK	1@1	25.62	24.42	0.2767
78	30	40	631334	3470.01	DFT-s-OFDM QPSK	1@1	25.71	24.51	0.2825
78	30	40	631334	3470.01	DFT-s-OFDM 16 QAM	1@1	24.28	23.08	0.2032
78	30	40	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.26	24.06	0.2547
78	30	40	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.58	24.38	0.2742
78	30	40	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.42	23.22	0.2099
78	30	40	635332	3529.98	DFT-s-OFDM PI/2 BPSK	1@1	25.39	24.19	0.2624
78	30	40	635332	3529.98	DFT-s-OFDM QPSK	1@1	25.49	24.29	0.2685
78	30	40	635332	3529.98	DFT-s-OFDM 16 QAM	1@1	24.32	23.12	0.2051
78	30	50	631668	3475.02	DFT-s-OFDM PI/2 BPSK	1@1	25.54	24.34	0.2716
78	30	50	631668	3475.02	DFT-s-OFDM QPSK	1@1	25.45	24.25	0.2661
78	30	50	631668	3475.02	DFT-s-OFDM 16 QAM	1@1	24.37	23.17	0.2075
78	30	50	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.4	24.2	0.2630
78	30	50	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.37	24.17	0.2612
78	30	50	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.36	23.16	0.2070
78	30	50	635000	3525	DFT-s-OFDM PI/2 BPSK	1@1	25.47	24.27	0.2673
78	30	50	635000	3525	DFT-s-OFDM QPSK	1@1	25.07	23.87	0.2438
78	30	50	635000	3525	DFT-s-OFDM 16 QAM	1@1	24.56	23.36	0.2168
78	30	60	632000	3480	DFT-s-OFDM PI/2 BPSK	1@1	25.24	24.04	0.2535
78	30	60	632000	3480	DFT-s-OFDM QPSK	1@1	25.5	24.3	0.2692
78	30	60	632000	3480	DFT-s-OFDM 16 QAM	1@1	24.46	23.26	0.2118
78	30	60	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.07	23.87	0.2438
78	30	60	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.36	24.16	0.2606
78	30	60	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.56	23.36	0.2168
78	30	60	634666	3519.99	DFT-s-OFDM PI/2 BPSK	1@1	25.27	24.07	0.2553
78	30	60	634666	3519.99	DFT-s-OFDM QPSK	1@1	25.21	24.01	0.2518
78	30	60	634666	3519.99	DFT-s-OFDM 16 QAM	1@1	24.62	23.42	0.2198
78	30	70	632334	3485.01	DFT-s-OFDM PI/2 BPSK	1@1	25.25	24.05	0.2541
78	30	70	632334	3485.01	DFT-s-OFDM QPSK	1@1	25.51	24.31	0.2698
78	30	70	632334	3485.01	DFT-s-OFDM 16 QAM	1@1	24.16	22.96	0.1977

78	30	70	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.07	23.87	0.2438
78	30	70	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.52	24.32	0.2704
78	30	70	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.37	23.17	0.2075
78	30	70	634332	3514.98	DFT-s-OFDM PI/2 BPSK	1@1	25.45	24.25	0.2661
78	30	70	634332	3514.98	DFT-s-OFDM QPSK	1@1	25.14	23.94	0.2477
78	30	70	634332	3514.98	DFT-s-OFDM 16 QAM	1@1	24.56	23.36	0.2168
78	30	80	632668	3490.02	DFT-s-OFDM PI/2 BPSK	1@1	25.61	24.41	0.2761
78	30	80	632668	3490.02	DFT-s-OFDM QPSK	1@1	25.2	24	0.2512
78	30	80	632668	3490.02	DFT-s-OFDM 16 QAM	1@1	24.51	23.31	0.2143
78	30	80	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.11	23.91	0.2460
78	30	80	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.01	23.81	0.2404
78	30	80	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.53	23.33	0.2153
78	30	80	634000	3510	DFT-s-OFDM PI/2 BPSK	1@1	25.51	24.31	0.2698
78	30	80	634000	3510	DFT-s-OFDM QPSK	1@1	25	23.8	0.2399
78	30	80	634000	3510	DFT-s-OFDM 16 QAM	1@1	24.62	23.42	0.2198
78	30	90	633000	3495	DFT-s-OFDM PI/2 BPSK	1@1	25.41	24.21	0.2636
78	30	90	633000	3495	DFT-s-OFDM QPSK	1@1	25.14	23.94	0.2477
78	30	90	633000	3495	DFT-s-OFDM 16 QAM	1@1	24.46	23.26	0.2118
78	30	90	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@1	25.4	24.2	0.2630
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	1@1	25.09	23.89	0.2449
78	30	90	633334	3500.01	DFT-s-OFDM 16 QAM	1@1	24.36	23.16	0.2070
78	30	90	633666	3504.99	DFT-s-OFDM PI/2 BPSK	1@1	25.45	24.25	0.2661
78	30	90	633666	3504.99	DFT-s-OFDM QPSK	1@1	25.13	23.93	0.2472
78	30	90	633666	3504.99	DFT-s-OFDM 16 QAM	1@1	24.36	23.16	0.2070

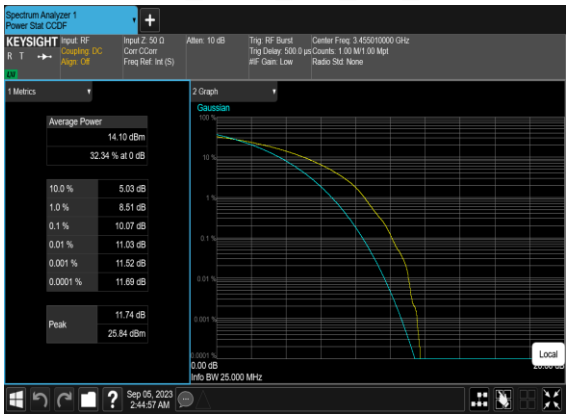
Frequency Stability

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Deviation (ppm)	Verdict	Environment
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0021	**PASS**	NV
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0009	**PASS**	LV
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0013	**PASS**	HV
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0024	**PASS**	-30℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0026	**PASS**	-20℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	-0.0011	**PASS**	-10℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0017	**PASS**	0℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0018	**PASS**	10℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0016	**PASS**	20℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0028	**PASS**	30℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	-0.0008	**PASS**	40℃
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	0.0022	**PASS**	50℃

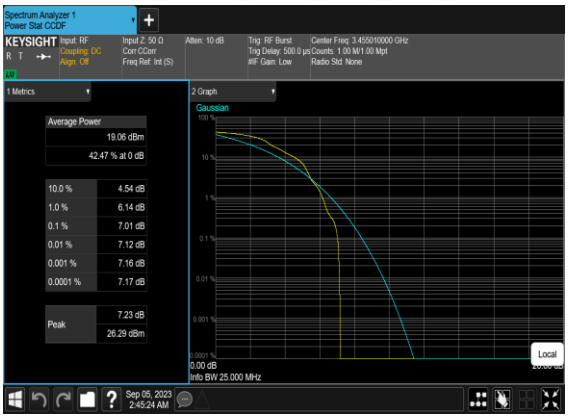
Peak to Average Ratio

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	Result (dB)	Limit (dB)	Verdict
78	30	90	633334	3500.01	DFT-s-OFDM PI/2 BPSK	240@0	10.07	13	**PASS**
78	30	90	633334	3500.01	DFT-s-OFDM PI/2 BPSK	1@0	7.01	13	**PASS**
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	240@0	10.45	13	**PASS**
78	30	90	633334	3500.01	DFT-s-OFDM QPSK	1@0	8.92	13	**PASS**

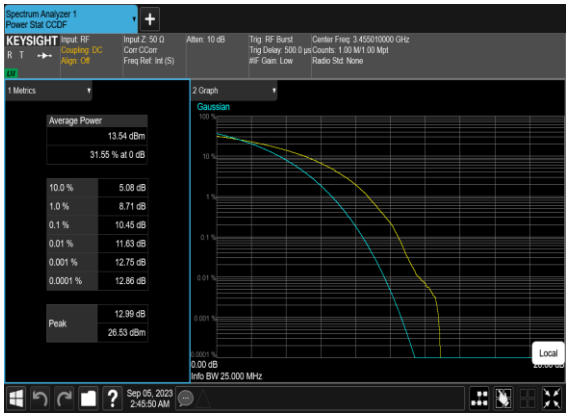
N78(90M)_DFT-s-OFDM_PI_2-BPSK_Outer_Full_Mid_CH



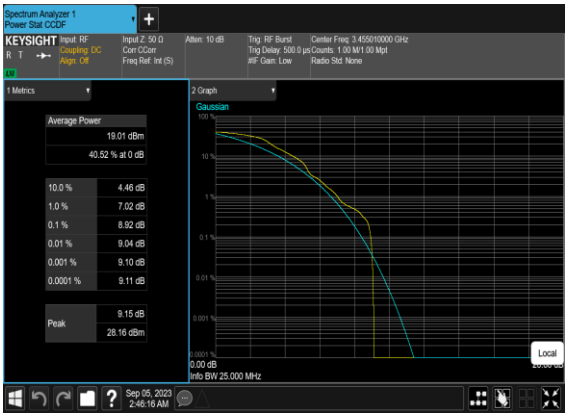
N78(90M)_DFT-s-OFDM_PI_2-BPSK_Edge_1RB_Left_Mid_CH



N78(90M)_DFT-s-OFDM_QPSK_Outer_Full_Mid_CH



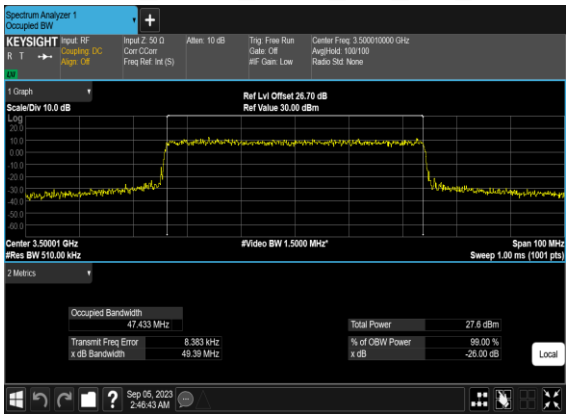
N78(90M)_DFT-s-OFDM_QPSK_Edge_1RB_Left_Mid_CH



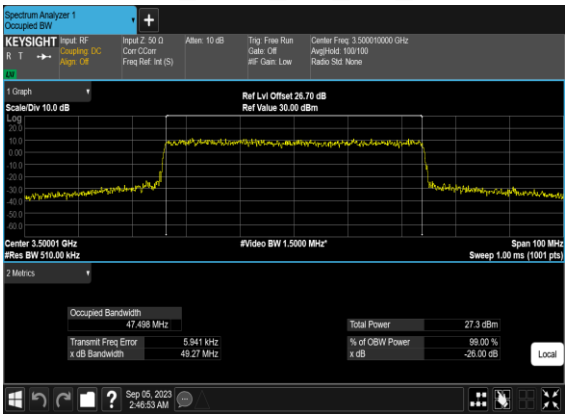
Occupied Bandwidth

NR Band	SCS (kHz)	Bandwidth (MHz)	Arfcn	Freq (MHz)	Modulation	RB	OBW (MHz)	26dB BW (MHz)
78	30	50	633334	3500.01	CP-OFDM QPSK	133@0	47.433	49.39
78	30	50	633334	3500.01	CP-OFDM 16 QAM	133@0	47.498	49.27
78	30	50	633334	3500.01	CP-OFDM 64 QAM	133@0	47.609	49.0
78	30	50	633334	3500.01	CP-OFDM 256 QAM	133@0	47.467	49.18
78	30	70	633334	3500.01	CP-OFDM QPSK	189@0	67.386	69.65
78	30	70	633334	3500.01	CP-OFDM 16 QAM	189@0	67.398	69.98
78	30	70	633334	3500.01	CP-OFDM 64 QAM	189@0	67.652	71.4
78	30	70	633334	3500.01	CP-OFDM 256 QAM	189@0	67.325	69.53
78	30	90	633334	3500.01	CP-OFDM QPSK	245@0	87.342	90.25
78	30	90	633334	3500.01	CP-OFDM 16 QAM	245@0	87.505	90.21
78	30	90	633334	3500.01	CP-OFDM 64 QAM	245@0	87.465	90.22
78	30	90	633334	3500.01	CP-OFDM 256 QAM	245@0	87.351	90.17

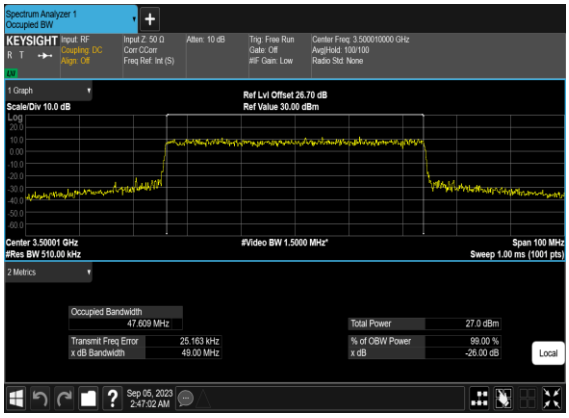
N78(50M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



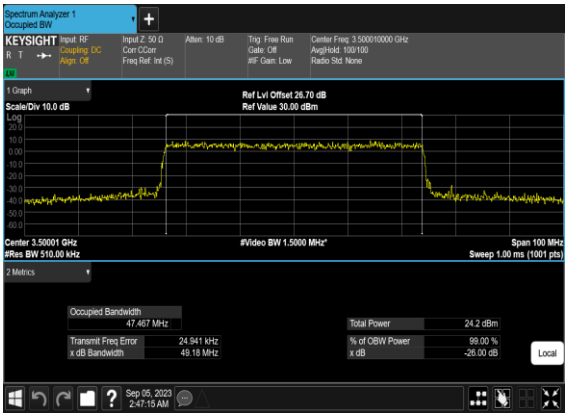
N78(50M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH



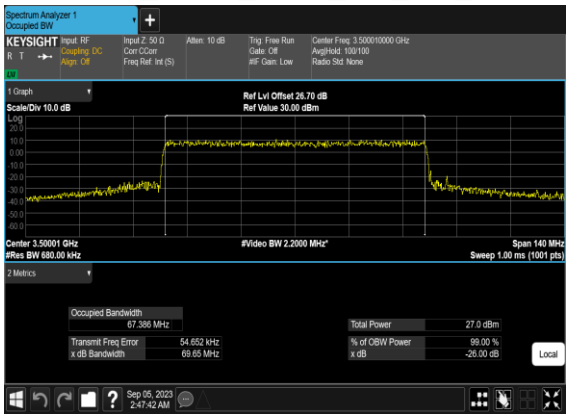
N78(50M)_CP-OFDM_64 QAM_Outer_Full_Mid_CH



N78(50M)_CP-OFDM_256 QAM_Outer_Full_Mid_CH



N78(70M)_CP-OFDM_QPSK_Outer_Full_Mid_CH



N78(70M)_CP-OFDM_16 QAM_Outer_Full_Mid_CH