



No. I21Z61172-WMD01



TEST REPORT

No. I21Z61172-WMD01

for

Ericsson AB Radio Remote Radio Unit

Radio 4418 B41 KRC 161 789/5

FCC ID: TA8AKRC161789-5

In accordance with FCC CFR 47 Part 27

Issued Date: 2021-07-07

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z61172-WMD01	Rev.0	1 st edition	2021-07-07

Note: the latest revision of the test report supersedes all previous version.

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0 and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

1.3. Project date

Testing Start Date: 2021-06-21

Testing End Date: 2021-06-29

1.4. Signature



Dong Yuan
(Prepared this test report)



Zhou Yu
(Reviewed this test report)



Zhao Hui Lin
(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: Ericsson (China) Communications Company Ltd.
Address /Post: Ericsson Tower, No.5 Lize East Street, Chaoyang District, Beijing
100102, P.R.China
Contact: Shuang Qi
Email: Shuang.qi@ericsson.com
Telephone: +86 13911788711

2.2. Manufacturer Information

Company Name: Ericsson AB
Address /Post: Torshamnsgatan 23 Stockholm, 164 80
Sweden
Contact: /
Email: /
Telephone: /

3. Equipment Under Test (EUT)

3.1. About EUT

Description	Remote Radio Unit
Product Name	Radio 4418 B41
Product Number	KRC 161 789/5
FCC ID	TA8AKRC161789-5
Maximum Output Power per Port	Maximum 43.0 dBm(20W) per port
Power source	-48V DC
Serial Number	E559307140
Hardware Version	R1A
Software Version	UP: CXP9024418/15_R32A121, PIS: CXP9013268%15_R87BF
Frequency range	TX/RX: 2496MHz-2690MHz
TX/RX configuration	4 TX / RX
Maximum RF bandwidth (IBW)	100 MHz
Total number of supported carriers per port	SR NR: up to 3 carriers SR LTE: up to 6 carriers Mixed mode: up to 6 carriers
Supported modulations	QPSK, 16QAM, 64QAM, 256QAM
Date of receipt	2021-06-21

3.2. General Description

The Equipment Under Test (EUT) is an Ericsson Remote Radio Unit working in the wireless communications services 2496-2690MHz band which provides communication connections to network in LTE, 5G NR and mix mode. The Radio 4418 B41 KRC 161 789/5 operates from a -48V DC power supply.

The EUT includes 4 TX/RX ports and it can be configured to transmit in MIMO mode for LTE and NR carriers, and MIMO mode was used for measurements as the worst configuration. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test

3.3. Configuration Description

The following settings were used to representative for all traffic scenarios when settings with different modulations, channel bandwidths, number for carriers and RF configurations have been tested to find the worst case setting. The settings below were used for all measurements unless otherwise noted:

NR

Configuration	Carrier	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
NR-MIMO-1C	1NR	70MHz	2531.01	2593.02	2655.00
		90MHz	2541.00	2593.02	2645.01

LTE+NR

Configuration	Carrier	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
LTE+NR-MIMO-MC-1	1L+1NR	10MHz+90MHz	(NR)2541+(L)2591	(NR)2588.01+(L)2638	(NR)2635.02+(L)2685
LTE+NR-MIMO-MC-2	3L+1NR	10MHz+70MHz	(NR)2531.01+(L)2571+2581+2591	(NR)2578.02+(L)2618+2628+2638	(NR)2625+(L)2665+2675+2685
LTE+NR-MIMO-MC-1-BE	1L+1NR	10MHz+90MHz	(L)2501+(NR)2551.02	N/A	(NR)2635.02+(L)2685
LTE+NR-MIMO-MC-2-BE	3L+1NR	10MHz+70MHz	(L)2501+2511+2521+(NR)2561.01	N/A	(NR)2625+(L)2665+2675+2685

N/A – Not Applicable

4. Reference Documents

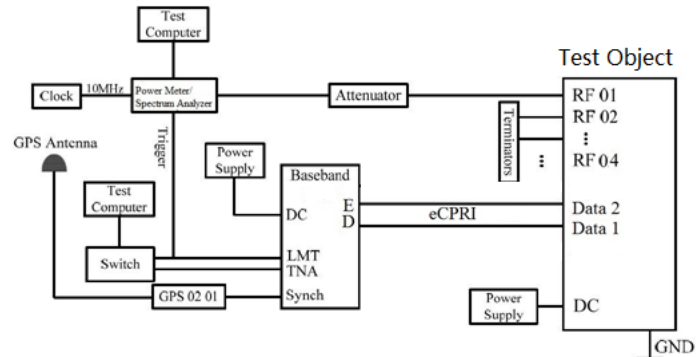
4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-20 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-20 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI 63.26	IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01
KDB 662911 D01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band	v02r01

5. TEST SETUP

Test Setup, Conducted Measurement:



No.	Auxilliary Equipment	Model Type	Version
1	Computer	Dell Optiplex 3050	-
2	Baseband 6630	KDU 137 848/1	R2H
3	Power supply unit	-	-
4	Terminator	SHX 6G	-
5	40dB Attenuator	Aeroflex / Weinschel	-

6. LABORATORY ENVIRONMENT

Control room / conducted chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 M Ω
Ground system resistance	< 0.5 Ω

Semi-anechoic chamber (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	>2 M Ω
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< \pm 3.5 dB, 3 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

7. SUMMARY OF TEST RESULTS

Items	Test Name	Clause in FCC rules	Verdict
1	Maximum Output Power and Peak to Average Power Ratio - EIRP calculation	27.50(h), 2.1046	Pass
2	Occupied Bandwidth	27.53(m), 2.1049	Pass
3	Spurious Emissions at Band Edge	27.53(m), 2.1051	Pass
4	Conducted Spurious Emission	27.53(m), 2.1051	Pass
5	Radiated Spurious Emission	27.53(m), 2.1053	NT
6	Frequency Stability	27.54, 2.1055	Pass

NT - Not tested in this configuration. Passed in an equivalently tested configuration shown in Document: 201101130SHA-001.

8. Test Equipments Utilized

NO.	Description	TYPE	series number	MANUFACTURE	CAL DUE DATE
1	Power Supply	PCR2000M	PJ000583	Kikusui	2022-05-12
2	40dB Attenuator	66-40-33	CD4019	Aeroflex / Weinschel	-
3	40dB Attenuator	TSG150R-4-40N11	1511040001	Nanjing Jiexi Technologies	-
4	Spectrum Analyzer	N9030	MY54490239	Keysight	2021-08-04
5	Spectrum Analyzer	FSW	104038-dC	Rohde-schwarz	2022-06-24
6	Climate Chamber	GPS-4	0010-003512	Espec	2021-08-02

9. MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Discipline	Measurement Uncertainty
Conducted Maximum Peak Output Power	0.5dB
Occupied Bandwidth	1.1Hz
Conducted Spurious Emissions	2.3dB
Band Edge	2.3dB
Frequency Stability	$<\pm 1 \times 10^{-7}$

ANNEX A: MEASUREMENT RESULTS

A.1 Maximum Output Power and Peak-to-Average Power Ratio

A.1.1 Reference

FCC CFR 47 Part 2, Clause 2.1046

FCC CFR 47 Part 27, Clause 27.50(h)

A.1.2 Method of Measurements

During the process of testing, the EUT was configured to transmit on maximum power and proper modulation. The transmitter power shall be measured in terms of a root-mean-square (RMS) average value. In case of the EUT was configured to MIMO mode, since the EUT transmits on all antennas simultaneously in the same frequency range, using the Measure-and-Sum approach, the output power at all antennas were tested, and the total output power were then summed mathematically in linear power units according to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier for single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

A.1.3 Limit

Output Power:

$$\text{EIRP} \leq 33 \text{ dBW} + 10\log(X/Y) \text{ dBW}$$

X is the actual channel width

Y is 5.5 or 6 MHz

Peak to Average Ratio: ≤ 13 dB

A.1.4 Measurement result

Configuration NR-MIMO-1C 70M

Maximum Output Power 43.0dBm per port

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	QPSK/70	42.41	25.02	7.67	42.77	25.31	6.48	42.61	25.34	7.71
B		42.43	25.01	7.68	42.66	25.27	6.47	42.53	25.22	7.73
C		42.56	25.06	7.75	42.74	25.38	6.48	42.66	25.38	7.67
D		42.59	25.46	7.75	42.61	25.27	6.47	42.52	25.42	7.77
Total		48.52	31.16	-	48.72	31.33	-	48.60	31.36	-

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	16QAM/70	42.54	26.96	7.79	42.75	27.17	7.03	42.68	27.06	7.75
B		42.48	27.08	7.78	42.68	27.12	7.04	42.55	27.13	7.78
C		42.63	26.99	7.82	42.68	27.08	7.03	42.74	27.35	7.75
D		42.66	26.99	7.81	42.68	27.03	7.04	42.59	27.11	7.76
Total		48.60	33.03	-	48.72	33.12	-	48.66	33.18	-

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	64QAM/70	42.63	25.65	7.68	42.73	26.76	6.62	42.61	25.59	7.59
B		42.47	25.51	7.67	42.56	25.55	6.63	42.55	25.52	7.60
C		42.57	25.26	7.75	42.64	25.64	6.53	42.64	25.65	7.55
D		42.61	25.55	7.71	42.63	25.44	6.64	42.57	25.82	7.62
Total		48.59	31.52	-	48.66	31.90	-	48.61	31.67	-

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	256QAM/70	42.62	25.59	7.67	42.68	25.82	6.79	42.69	25.54	7.75
B		42.46	25.35	7.76	42.59	25.42	6.78	42.48	25.39	7.63
C		42.58	25.58	7.78	42.65	25.39	6.64	42.62	25.56	7.62
D		42.51	25.35	7.71	42.67	25.49	6.71	42.56	25.52	7.69
Total		48.56	31.49	-	48.67	31.55	-	48.61	31.52	-

Configuration NR-MIMO-1C 90M

Maximum Output Power 43.0dBm per port

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	QPSK/90	42.57	25.59	7.69	42.55	24.38	6.58	42.57	24.83	7.87
B		42.39	24.31	7.87	42.52	24.58	6.59	42.46	24.48	7.89
C		42.47	25.39	7.79	42.51	24.42	6.57	42.53	25.69	7.79
D		42.49	24.36	7.82	42.42	24.51	6.59	42.51	24.49	7.85
Total		48.50	30.97	-	48.52	30.49	-	48.54	30.92	-

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	16QAM/90	42.57	25.59	7.83	42.58	26.77	7.05	42.67	26.62	7.81
B		42.35	25.65	7.81	42.41	26.73	7.01	42.42	26.73	7.74
C		42.65	25.39	7.83	42.52	26.78	7.02	42.61	26.68	7.82
D		42.59	25.52	7.78	42.49	26.67	7.05	42.52	26.79	7.76
Total		48.56	31.56	-	48.52	32.76	-	48.58	32.73	-

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	64QAM/90	42.48	24.82	7.87	42.57	24.99	6.84	42.63	24.96	7.74
B		42.27	24.96	7.86	42.45	24.94	6.81	42.42	24.56	7.77
C		42.44	24.83	7.87	42.58	24.91	6.78	42.59	24.86	7.71
D		42.57	24.75	7.82	42.51	24.89	6.82	42.47	24.66	7.69
Total		48.46	30.86	-	48.55	30.95	-	48.55	30.78	-

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	256QAM/90	42.47	24.72	7.92	42.65	24.63	6.75	42.52	24.87	7.74
B		42.28	24.46	7.82	42.56	24.69	6.76	42.42	24.62	7.68
C		42.39	24.71	7.91	42.63	24.73	6.75	42.48	24.77	7.64
D		42.45	24.52	7.89	42.64	24.65	6.77	42.51	24.92	7.78
Total		48.42	30.62	-	48.64	30.70	-	48.50	30.82	-

Configuration LTE+NR-MIMO-MC-1 (1LTE 10M+1NR 90M)

Maximum Output Power 43.0dBm per port

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	LTE QPSK/ 10	41.96	27.12	-	42.06	27.10	-	42.04	26.90	-
B		41.92	26.91	-	42.00	27.00	-	41.97	26.63	-
C	NR QPSK/ 90	41.92	26.78	-	41.97	26.64	-	42.05	26.49	-
D		41.86	26.86	-	42.05	27.19	-	42.10	26.63	-
Total		47.94	32.94	-	48.04	33.01	-	48.06	32.69	-

Configuration LTE+NR-MIMO-MC-2 (3LTE 10M+1NR 70M)

Maximum Output Power 43.0dBm per port

Antenna	Modulation/ Carrier Bandwidth (MHz)	Output Power / Peak to Average Ratio (PAR)								
		Channel position B			Channel position M			Channel position T		
		POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)	POWER (dBm)	POWER (dBm/MHz)	PAR (db)
A	LTE QPSK/ 10	42.11	27.51	-	42.08	27.36	-	41.97	27.31	-
B		41.99	27.48	-	42.02	27.50	-	41.97	27.38	-
C	NR QPSK/ 70	41.87	27.31	-	41.88	27.20	-	41.78	27.14	-
D		41.83	27.20	-	41.84	27.17	-	41.81	27.18	-
Total		47.97	33.40	-	47.98	33.33	-	47.90	33.27	-

A.2 Occupied Bandwidth

A.2.1 Reference

FCC CFR 47 Part 2, Clause 2.1049

FCC CFR 47 Part 27, Clause 27.53 (m)

A.2.2 Method of Measurements

The EUT was set to transmit at maximum power and testing was carried out on bottom, middle and top channels. Using the Occupied Bandwidth measurement function in the spectrum analyser, the 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 Clause 4.2.

The measurement method is from KDB 971168 4.2:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB 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.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least $10\log(\text{OBW} / \text{RBW})$ below the reference level.

A.2.3 Measurement result

Configuration NR-MIMO-1C

-26dBc Occupied Bandwidth

Modulation/ Bandwidth	Occupied Bandwidth (MHz)		
	Channel position B	Channel position M	Channel position T
QPSK/ 70MHz	69.67	69.70	69.67
QPSK/ 90MHz	90.32	90.33	90.33

-26dBc Occupied Bandwidth

Bandwidth	Occupied Bandwidth (MHz)		
	Modulation 16QAM / Channel position M	Modulation 64QAM/ Channel position M	Modulation 256QAM/ Channel position M
70MHz	69.65	69.67	69.65
90MHz	90.29	90.33	90.33

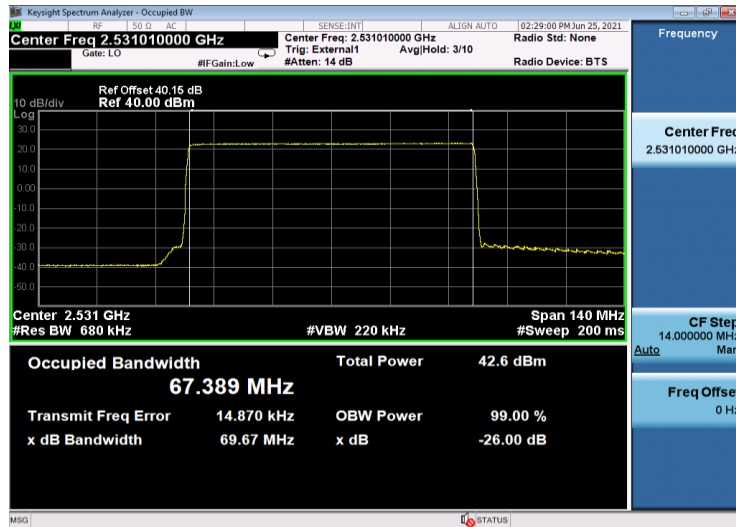
99% Occupied Bandwidth

Modulation/ Bandwidth	Occupied Bandwidth (MHz)		
	Channel position B	Channel position M	Channel position T
QPSK/ 70MHz	67.389	67.410	67.400
QPSK/ 90MHz	87.342	87.485	87.348

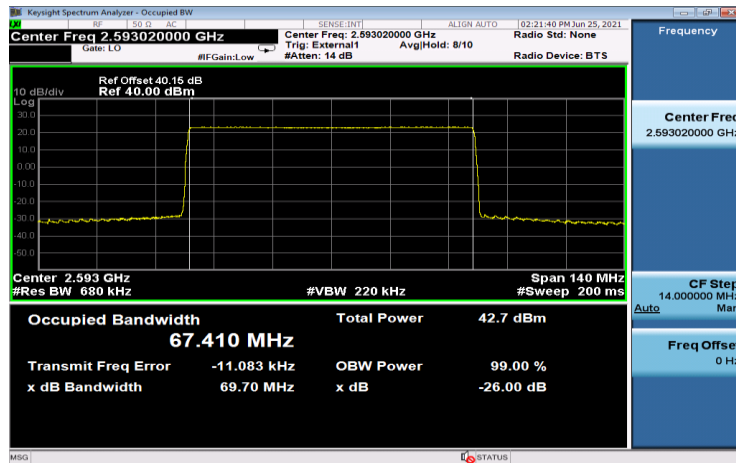
99% Occupied Bandwidth

Bandwidth	Occupied Bandwidth (MHz)		
	Modulation 16QAM / Channel position M	Modulation 64QAM/ Channel position M	Modulation 256QAM/ Channel position M
70MHz	67.563	67.403	67.395
90MHz	87.583	87.359	87.365

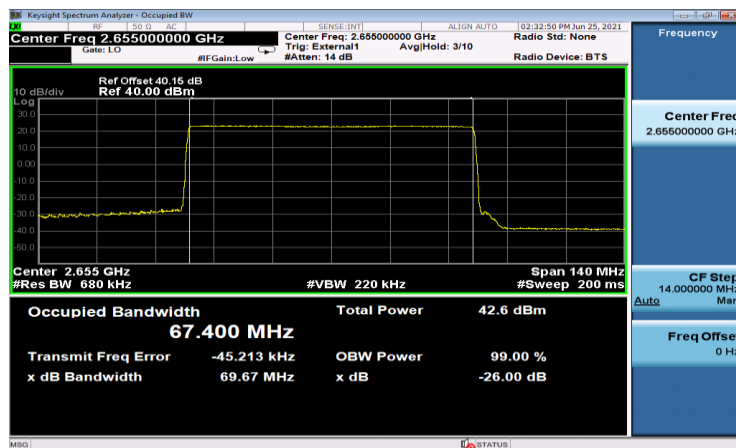
Port A, QPSK/70MHz, Channel Position B



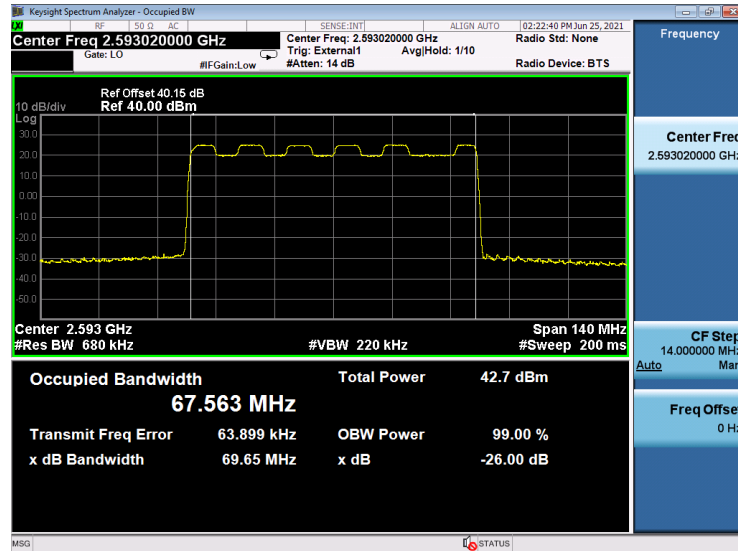
Port A, QPSK/70MHz, Channel Position M



Port A, QPSK/70MHz, Channel Position T



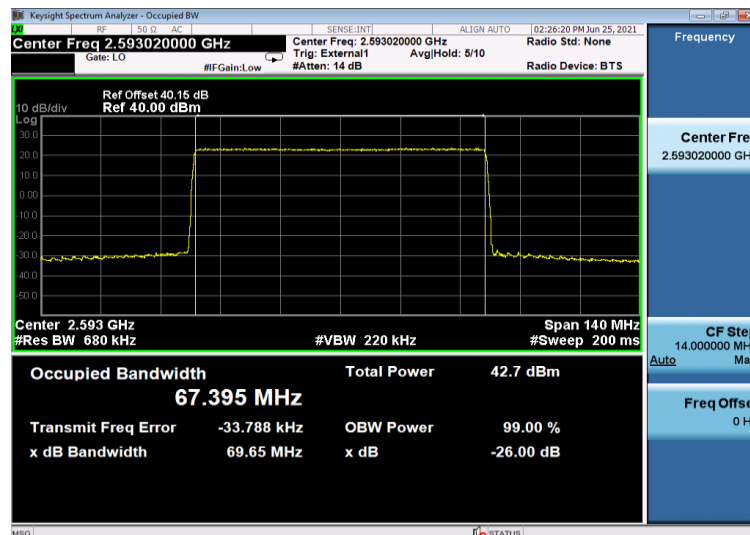
Port A, 16QAM/70MHz, Channel Position M



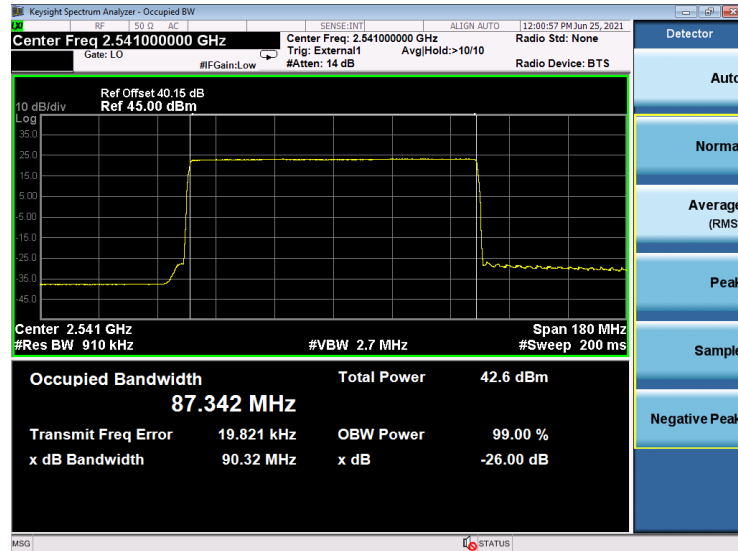
Port A, 64QAM/70MHz, Channel Position M



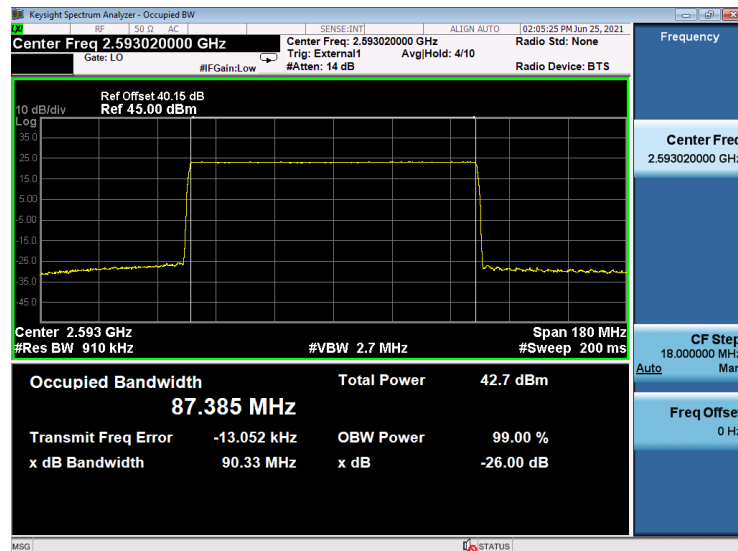
Port A, 256QAM/70MHz, Channel Position M



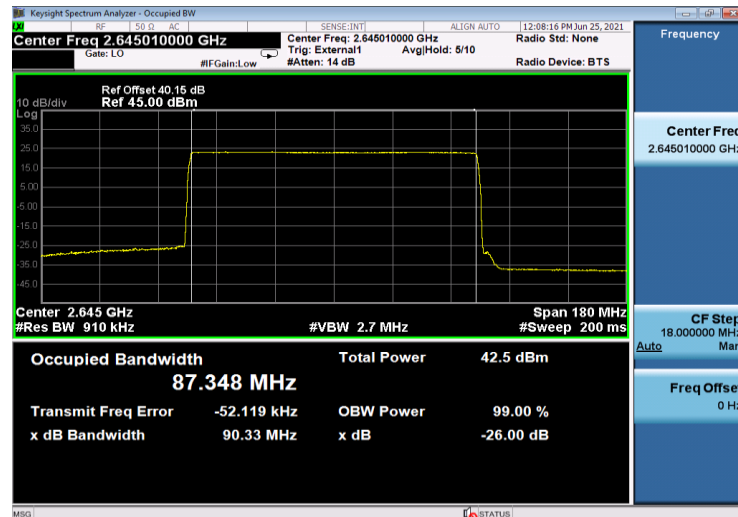
Port A, QPSK/90MHz, Channel Position B



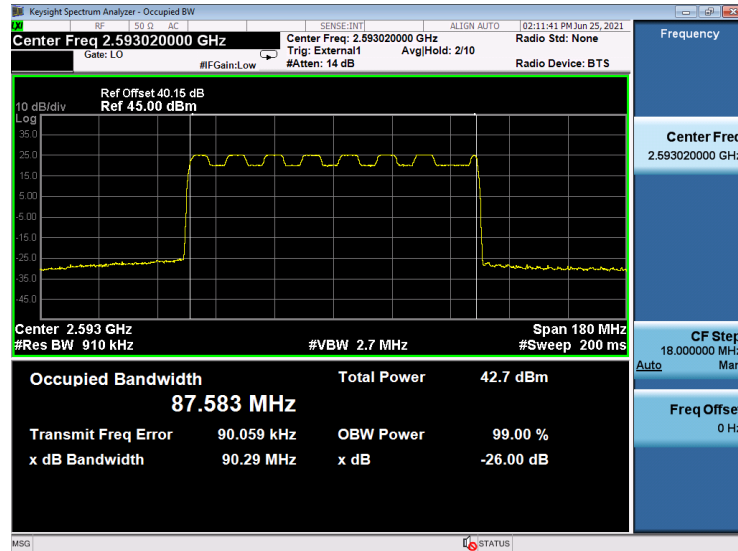
Port A, QPSK/90MHz, Channel Position M



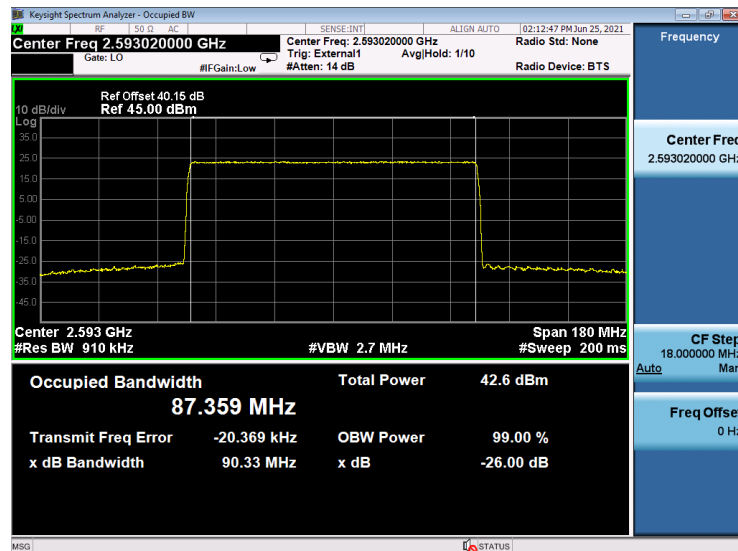
Port A, QPSK/90MHz, Channel Position T



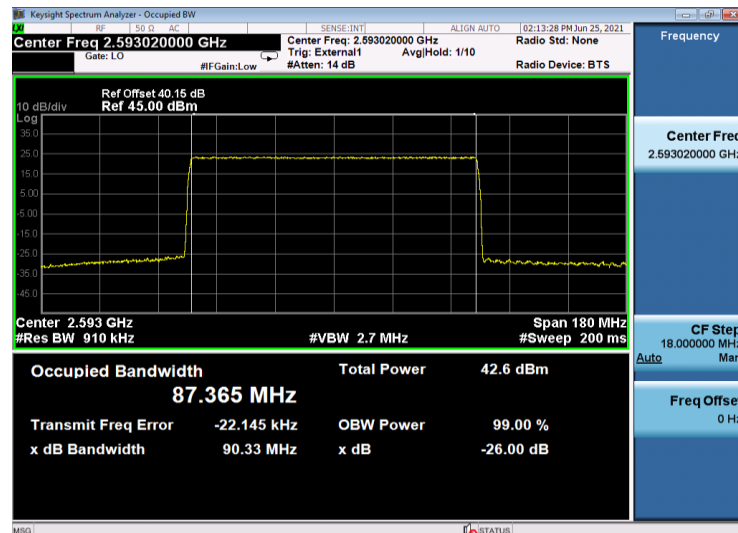
Port A, 16QAM/90MHz, Channel Position M



Port A, 64QAM/90MHz, Channel Position M



Port A, 256QAM/90MHz, Channel Position M



A.3 Spurious Emissions at Band Edge

A.3.1 Reference

FCC CFR 47 Part 2, Clause 2.1051

FCC CFR 47 Part 27, Clause 27.53(m)

A.3.2 Method of measurement

The 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.

For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log4] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports RF A,B,C and D.

According to FCC rules, 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 and a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges. The limit was adjusted with -13.01dB [10Log(50/1000)] to compensate for the reduce measurement bandwidth 50KHz for emission more than 1MHz away from the band edges. For MIMO mode, the limit of -32.03dBm was used for emission more than 1MHz away from the band edges. Spectrum analyser detector was set as RMS.

A.3.3 Measurement limit

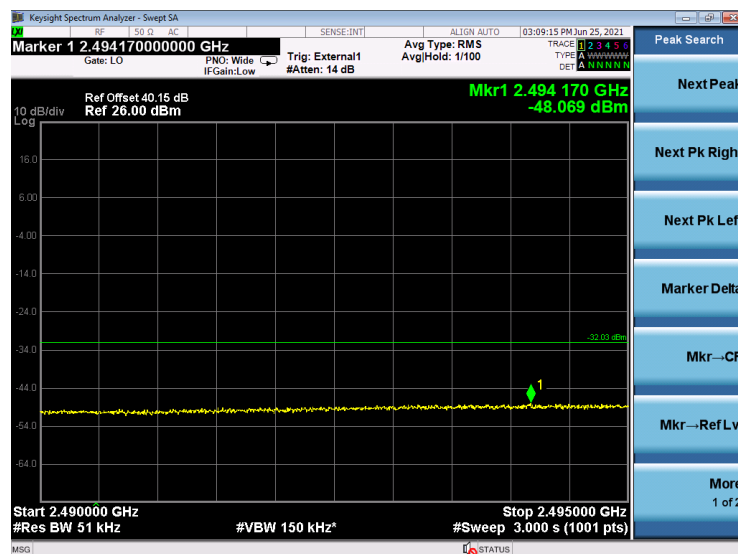
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

A.3.4 Measurement result

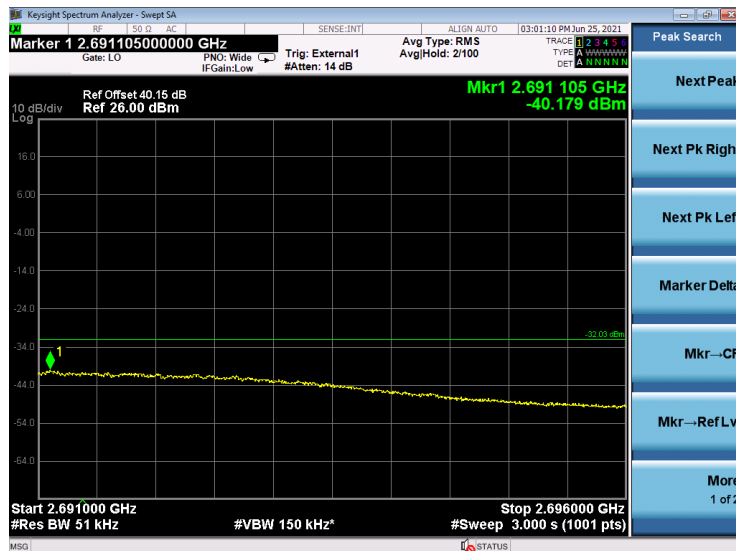
Configuration NR-MIMO-1C, QPSK

Band Edge Frequency	Channel Bandwidth	RBW(KHz)	Limit(dBm)
Channel Position B 2496MHz	70 MHz	50/50	-30.48/-32.03
	90 MHz	50/50	-31.57/-32.03
Channel Position T 2690MHz	70 MHz	50/50	-30.48/-32.03
	90 MHz	50/50	-31.57/-32.03

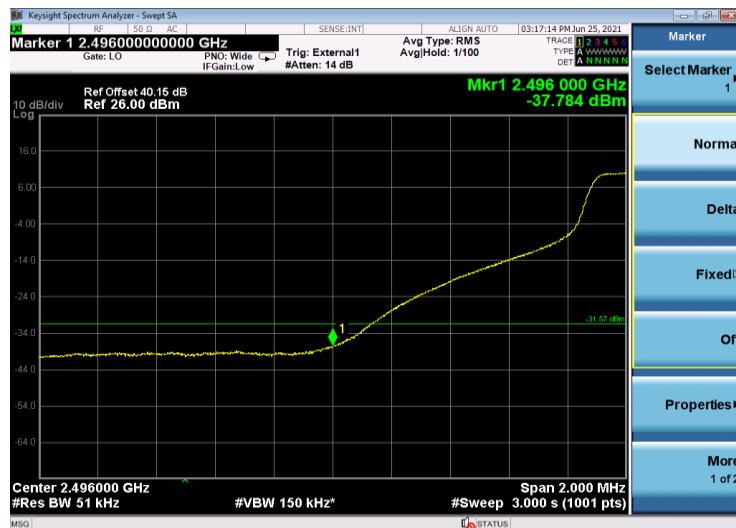
Port A, Channel Position B, 70MHz



Port A, Channel Position T, 70MHz

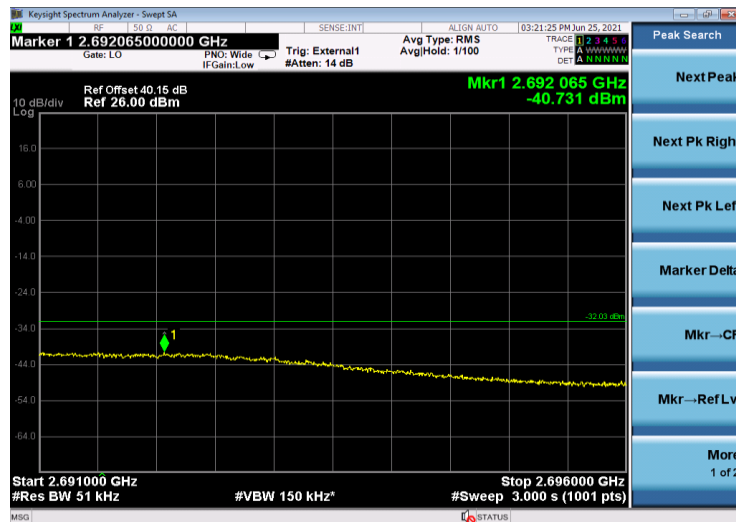


Port A, Channel Position B, 90MHz





Port A, Channel Position T, 90MHz



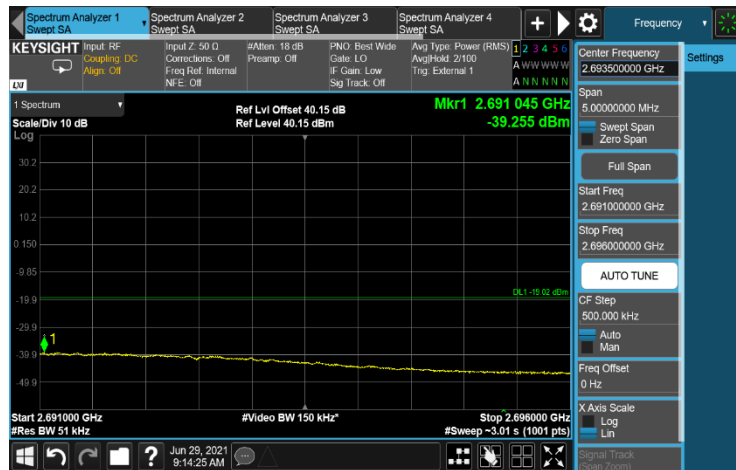
Configuration LTE+NR-MIMO-MC-1-BE (1LTE 10M QPSK +1NR 90M QPSK)

Band Edge Frequency	Channel Bandwidth	RBW(KHz)	Limit(dBm)
Channel Position B 2496MHz	(L) 10MHz, (NR) 90MHz	100/51	-19.02/-19.02
Channel Position T 2690MHz	(L) 10MHz, (NR) 90MHz	100/51	-19.02/-19.02

Port A, Channel Position B,



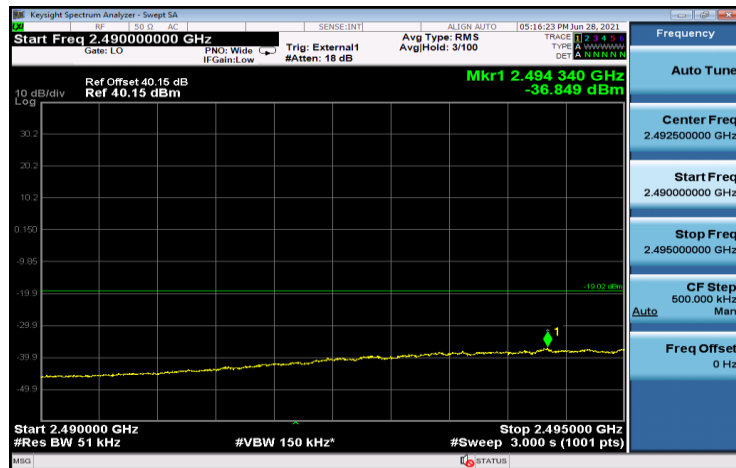
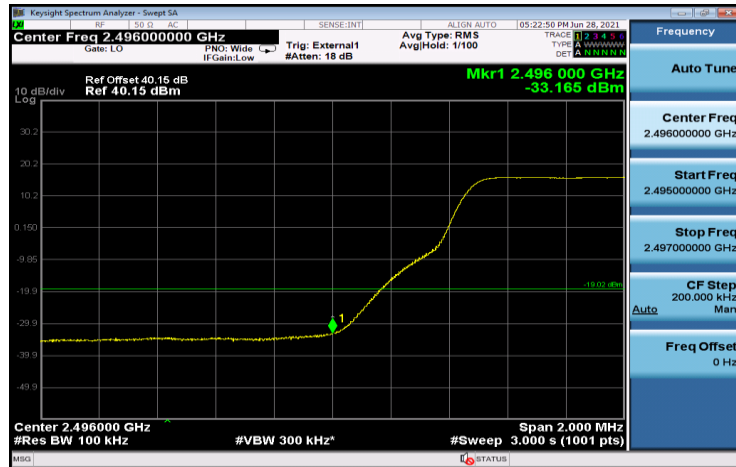
Port A, Channel Position T,



Configuration LTE+NR-MIMO-MC-2-BE (3LTE 10M QPSK+1NR 70M QPSK)

Band Edge Frequency	Channel Bandwidth	RBW(KHz)	Limit(dBm)
Channel Position B 2496MHz	(L) 10MHz, (NR) 70MHz	100/51	-19.02/-19.02
Channel Position T 2690MHz	(L) 10MHz, (NR) 70MHz	100/51	-19.02/-19.02

Port A, Channel Position B,



Port A, Channel Position T,





A.4 Conducted Spurious Emission

A.4.1 Reference

FCC CFR 47 Part 2, Clause 2.1051

FCC CFR 47 Part 27, Clause 27.53(m)

A.4.2 Method of measurement

In accordance with FCC rules, the 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.

The spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 3KHz to 20GHz. The resolution bandwidth of 1MHz was employed for frequency band 3KHz to 20GHz. The spectrum analyzer detector was set to RMS.

For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log4] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports RF A,B,C and D. Then the limit was adjust to -19.02dBm.

A.4.3 Measurement limit

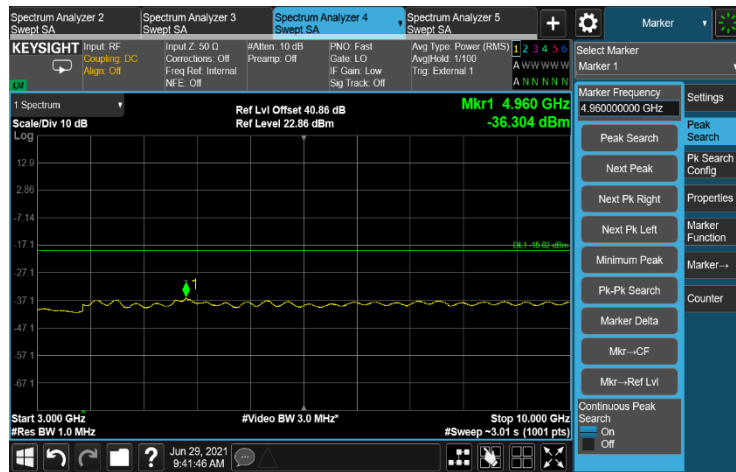
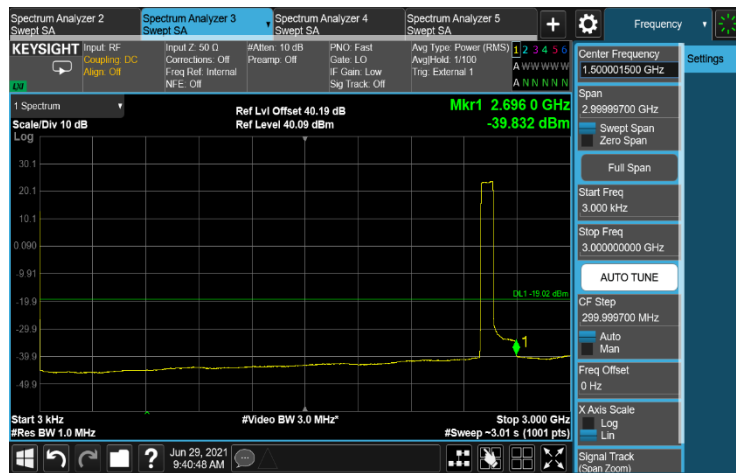
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

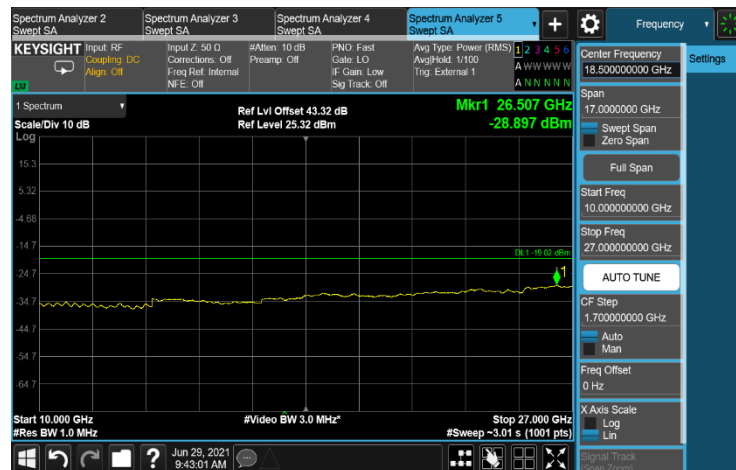
A.4.4 Measurement results

Configuration NR-MIMO-1C QPSK

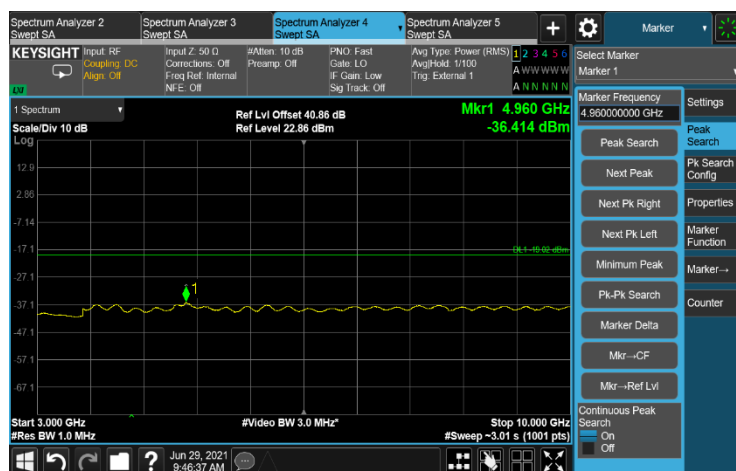
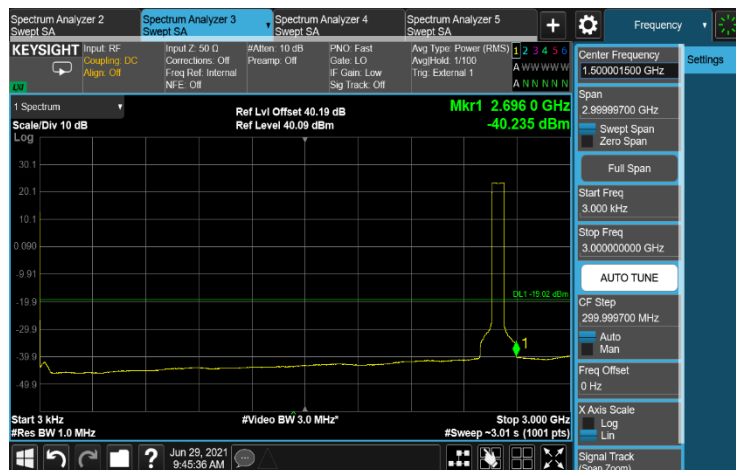
Channel Bandwidth	RBW (MHz)	Limit (dBm)
70 MHz	1.0	-19.02
90 MHz	1.0	-19.02

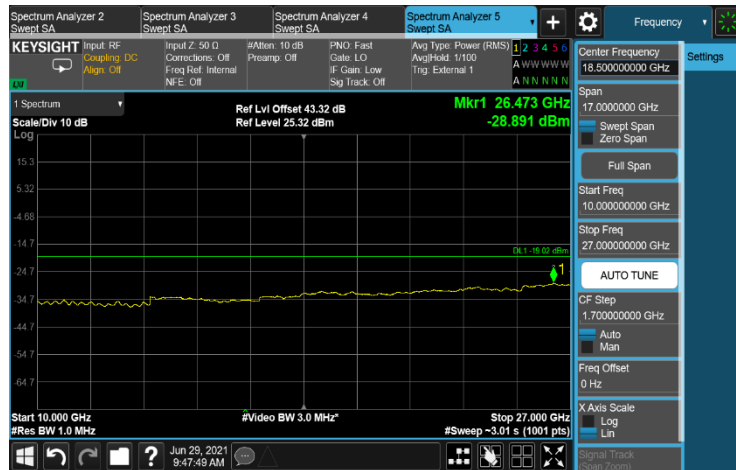
Port A, Channel Position B 70 MHz



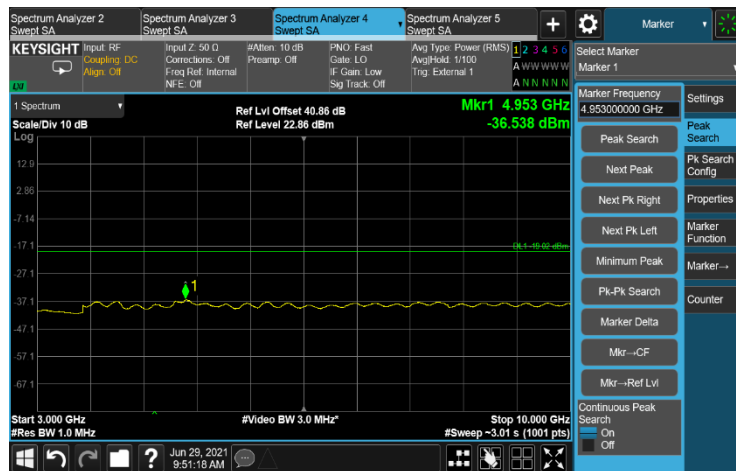
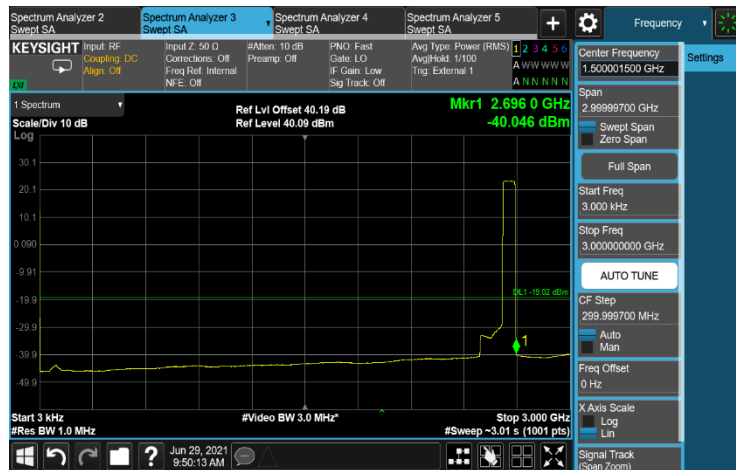


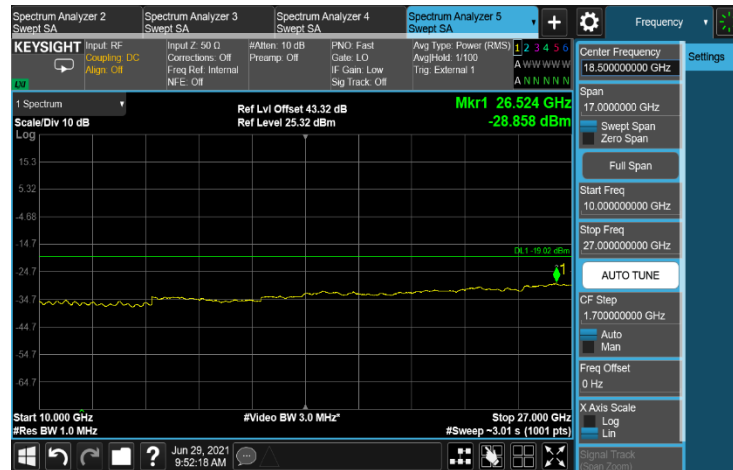
Port A, Channel Position M 70 MHz



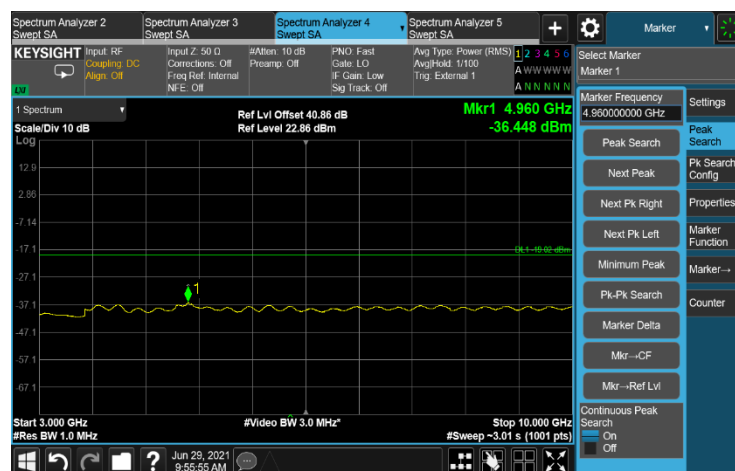
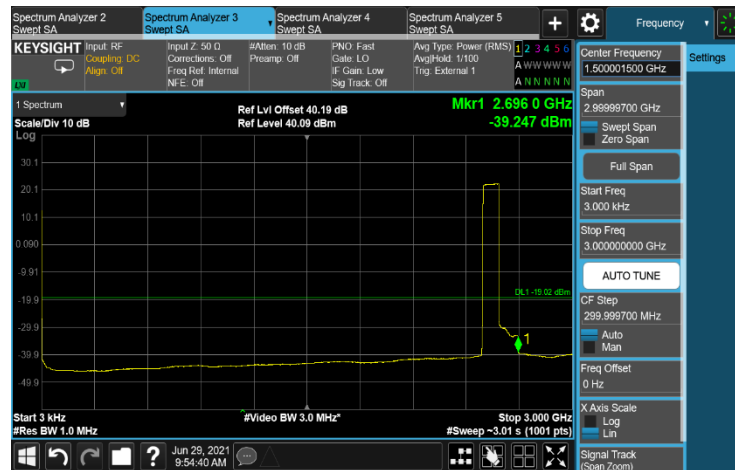


Port A, Channel Position T 70 MHz



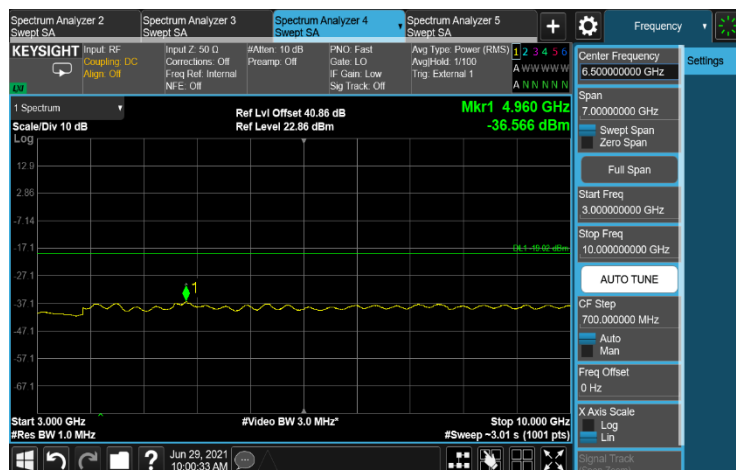
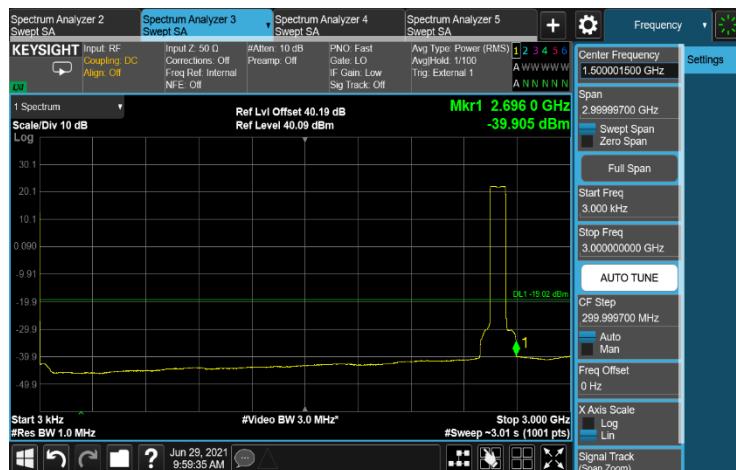


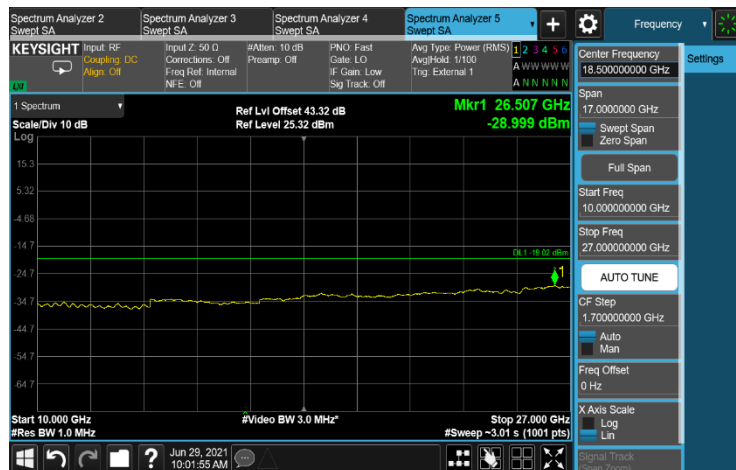
Port A, Channel Position B 90 MHz



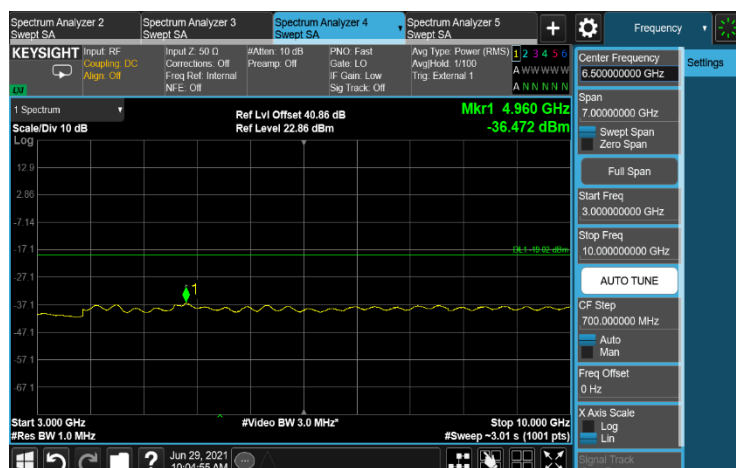
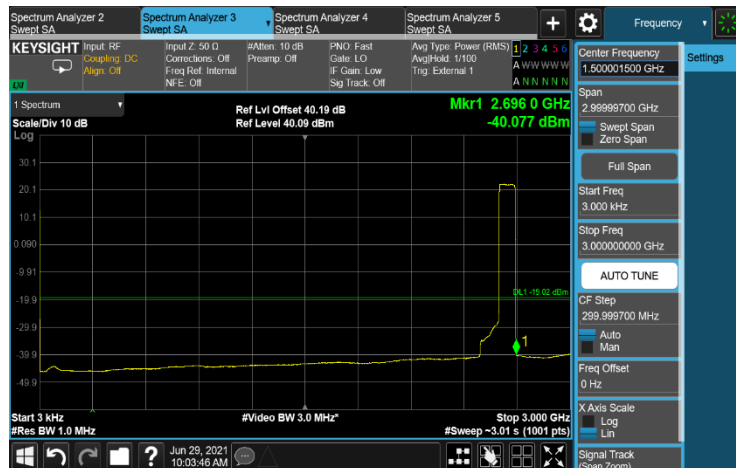


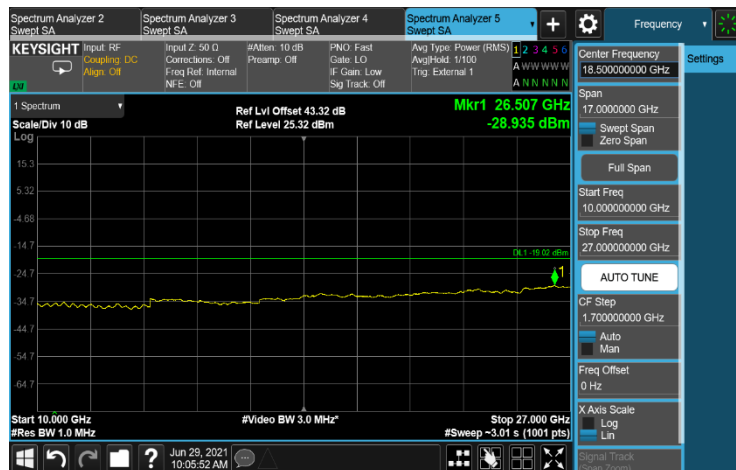
Port A, Channel Position M 90 MHz





Port A, Channel Position T 90 MHz

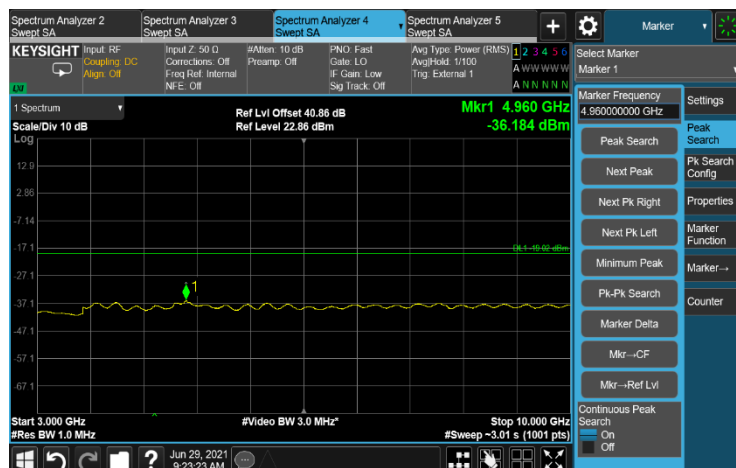
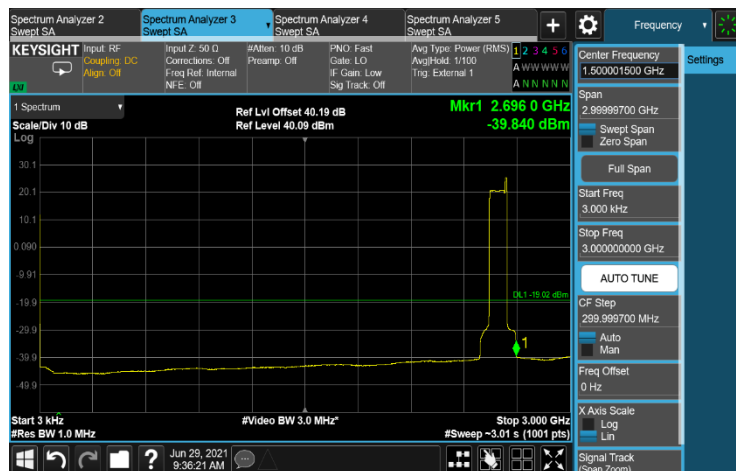


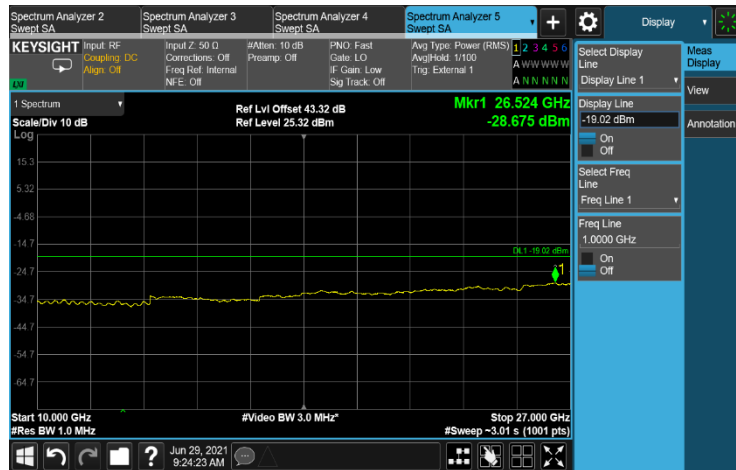


Configuration LTE+NR-MIMO-MC-1 (1LTE 10M QPSK+1NR 90M QPSK)

Channel Bandwidth	RBW (MHz)	Limit (dBm)
(L) 10MHz, (NR) 90MHz	1.0	-19.02

Port A, Channel Position M

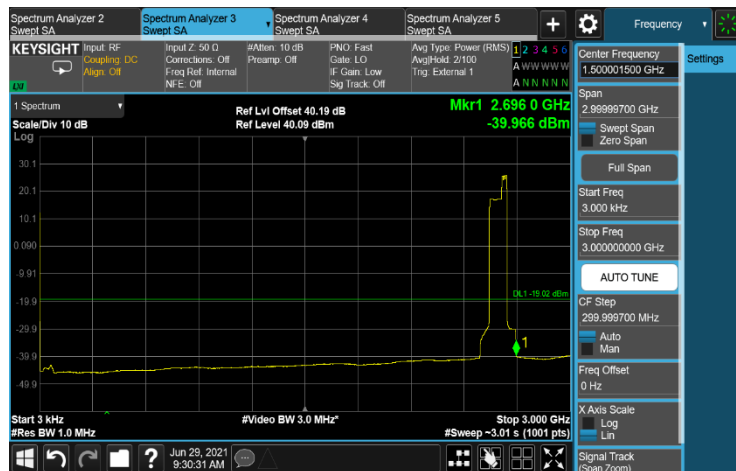


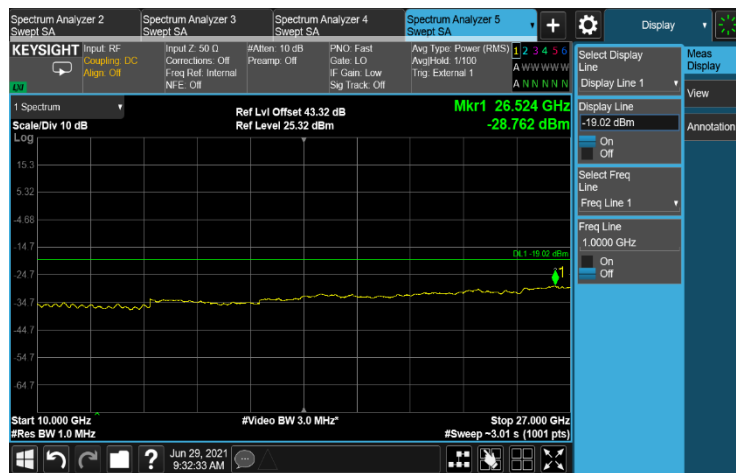
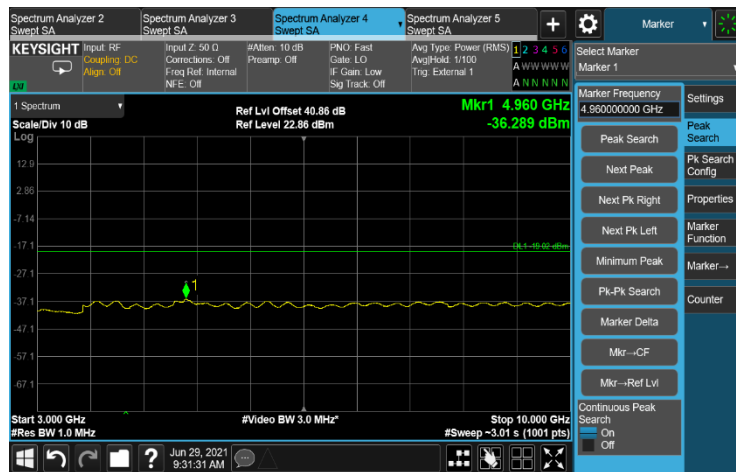


Configuration LTE+NR-MIMO-MC-2 (3LTE 10M QPSK+1NR 70M QPSK)

Channel Bandwidth	RBW (MHz)	Limit (dBm)
(L) 10MHz, (NR) 70MHz	1.0	-19.02

Port A, Channel Position M





A.6 Frequency Stability

A.6.1 Reference

FCC CFR 47 Part 27, Clause 27.54

A.6.2 Method of measurement

Temperature Variation

The EUT was tested over the temperature range -30°C to +50°C in 10°C steps with -48V DC Power Supply. At each temperature step, the Base Station was configured to transmit an [RAT]* at maximum power on the bottom, middle and top channel of the operating band. After achieving thermal balance, the averages of 200 transmission bursts were measured and the result recorded.

Voltage Variation

The EUT was tested at the supplied voltages varied from 85 to 115 percent of the nominal values of -48V DC. At +20°C, the Base Station was configured to transmit an [RAT]* at maximum power on the bottom, middle and top channel of the operating band. The average of 200 transmission bursts was measured and the result recorded.

[RAT]*:

NR - Single Carrier with QPSK modulation

A.6.3 Measurement limit

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

A.6.4 Measurement results

Frequency Error – Temperature Variation

Configuration NR-MIMO-1C, QPSK, Port A, Channel Bandwidth 70MHz

Maximum Output Power 43.0dBm per port

Supply Voltage DC(V)	Temperature	Frequency Stability (Hz)		
		Channel position B	Channel position M	Channel position T
-48	-30	7.99	4.04	6.18
	-20	9.71	4.96	9.93
	-10	9.54	3.97	8.54
	0	7.28	6.58	4.29
	10	2.88	2.59	7.22
	20	2.47	3.35	8.26
	30	5.61	9.71	7.75
	40	2.62	7.11	4.86
	50	7.65	2.87	6.12

Configuration NR-MIMO-1C, QPSK, Port A, Channel Bandwidth 90MHz

Maximum Output Power 43.0dBm per port

Supply Voltage DC(V)	Temperature	Frequency Stability (Hz)		
		Channel position B	Channel position M	Channel position T
-48	-30	8.55	8.62	6.75
	-20	6.25	6.85	6.59
	-10	8.76	2.22	4.25
	0	2.99	7.92	8.46
	10	5.04	7.12	3.34
	20	7.23	6.19	8.11
	30	9.41	7.21	3.43
	40	4.58	8.72	6.99
	50	4.61	5.17	7.40

Frequency Error – Voltage Variation

Configuration NR-MIMO-1C, QPSK, Port A, Channel Bandwidth 70MHz

Maximum Output Power 43.0dBm per port

Supply Voltage DC(V)	Temperature(°C)	Frequency Stability (Hz)		
		Channel position B	Channel position M	Channel position T
-40.8	20	6.54	6.75	3.42
-55.2	20	8.46	4.47	5.71

Configuration NR-MIMO-1C, QPSK, Port A, Channel Bandwidth 90MHz

Maximum Output Power 43.0dBm per port

Supply Voltage DC(V)	Temperature(°C)	Frequency Stability (Hz)		
		Channel position B	Channel position M	Channel position T
-40.8	20	2.11	8.61	8.55
-55.2	20	8.42	9.05	5.15

ANNEX B: Accreditation Certificate

**United States Department of Commerce
National Institute of Standards and Technology**

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2020-09-29 through 2021-09-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program

*****END OF REPORT*****