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FCC 5G mmWave REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
December 08, 2020

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2010-FC005-R3

FCC ID:	**A3LSMG991U**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**
Model:	SM-G991U
Additional Model:	SM-G991U1
EUT Type:	Mobile Phone
Frequency Range:	27.5 GHz ~ 28.35 GHz, 37 GHz ~ 40 GHz
Modulation type:	PI/2 BPSK(DFT-s Only), QPSK, 16QAM, 64QAM
FCC Classification:	Part 30 Mobile Transmitter (5GM)
FCC Rule Part(s):	Part 30
Test Procedure(s):	ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 842590 D01 v01r01

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

REVIEWED BY

Report prepared by : Kwon Jeong
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2010-FC005	October 29, 2020	- First Approval Report
HCT-RF-2010-FC005-R1	November 17, 2020	- Revised the page 84. (Sample Calculation for TRP was added.)
HCT-RF-2010-FC005-R2	December 01, 2020	- Revised the page 12. (Worst case of modulation was added.) - Revised the page 85 - 88. (Limits of band edge test were added.)
HCT-RF-2010-FC005-R3	December 08, 2020	- Revised the typo on page 3, 5. - Revised the 'Patch name' on section 5.4.

Table of Contents

1. EUT DESCRIPTION

Model	SM-G991U
Additional Model	SM-G991U1
EUT Type	Mobile Phone
Power Supply	DC 3.88 V
Date(s) of Tests	September 14, 2020 ~ October 16, 2020
Band	n261: 27,500 MHz ~ 28,350 MHz(TDD) n260: 37,000 MHz ~ 40,000 MHz(TDD)
Channel Bandwidths	50 MHz/100 MHz
Carrier Specification	1CC, 2CC
Multiple transmit	SISO, MIMO
Channel	Low, Mid, High
SCS	120 kHz
OFDM	CP-OFDM, DFT-s-OFDM
RB size	1 RB(Offset: low, mid, high), half RB, Full RB
Modulation	PI/2 BPSK(DFT-s Only), QPSK, 16QAM, 64QAM
Chip-set	SM8350
Antenna Specification	L patch : (right side module 0), K patch : (Left side, module 1) 2 patches antenna Size: 23.8 mm x 3.5 mm x 1.96 mm

1.1 CHANNEL SPECIFICATIONS

Band	CC	BW	Channel	Frequency[MHz]	Channel No.
n261	1	50 MHz	Low	27534.84	2071413
			Mid	27923.52	2077891
			High	28319.52	2084491
		100 MHz	Low	27559.32	2071821
			Mid	27923.52	2077891
			High	28292.16	2084035
n260	1	50 MHz	Low	37027.32	2229621
			Mid	38497.44	2254123
			High	39966.24	2278603
		100 MHz	Low	37051.8	2230029
			Mid	38497.44	2254123
			High	39949.92	2278331

Band	CC	BW	Channel	Frequency [MHz]	Channel No.	Frequency [MHz]	Channel No.
				PCC		SCC	
n261	2	50 MHz	Low	27534.84	2071413	27584.88	2072247
			Mid	27898.56	2077475	27948.6	2078309
			High	28269.48	2083657	28319.52	2084491
		100 MHz	Low	27559.32	2071821	27659.28	2073487
			Mid	27873.48	2077057	27973.44	2078723
			High	28192.2	2082369	28292.16	2084035
n260	2	50 MHz	Low	37027.32	2229621	37077.36	2230455
			Mid	38472.36	2253705	38522.4	2254539
			High	39916.2	2277769	39966.24	2278603
		100 MHz	Low	37051.8	2230029	37151.76	2231695
			Mid	38447.4	2253289	38547.36	2254955
			High	39849.96	2276665	39949.92	2278331

Note: "CC" refers to "Component Carriers".

1.2 MAXIMUM EIRP POWER

n261 Band								
Mode	Antenna	Bandwidth (MHz)	CCs Active	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
					(W)	(dBm)		
SISO	Ant0(L patch)	50	1	27500 - 28350	0.656	28.17	46M2G7D	BPSK
SISO	Ant0(L patch)	50	1	27500 - 28350	0.641	28.07	45M5G7D	QPSK
SISO	Ant0(L patch)	50	1	27500 - 28350	0.395	25.97	45M6W7D	16QAM
SISO	Ant0(L patch)	50	1	27500 - 28350	0.246	23.91	45M8W7D	64QAM
MIMO	Ant0(L patch)	50	1	27500 - 28350	1.452	31.62	45M4G7D	BPSK
MIMO	Ant0(L patch)	50	1	27500 - 28350	1.429	31.55	45M7G7D	QPSK
MIMO	Ant0(L patch)	50	1	27500 - 28350	0.881	29.45	45M6W7D	16QAM
MIMO	Ant0(L patch)	50	1	27500 - 28350	0.511	27.08	45M4W7D	64QAM
SISO	Ant0(L patch)	50	2	27500 - 28350	0.279	24.46	94M3G7D	BPSK
SISO	Ant0(L patch)	50	2	27500 - 28350	0.301	24.78	94M8G7D	QPSK
SISO	Ant0(L patch)	50	2	27500 - 28350	0.208	23.18	94M1W7D	16QAM
SISO	Ant0(L patch)	50	2	27500 - 28350	0.129	21.10	94M2W7D	64QAM
MIMO	Ant0(L patch)	50	2	27500 - 28350	0.438	26.41	95M5G7D	BPSK
MIMO	Ant0(L patch)	50	2	27500 - 28350	0.436	26.39	94M9G7D	QPSK
MIMO	Ant0(L patch)	50	2	27500 - 28350	0.296	24.71	94M4W7D	16QAM
MIMO	Ant0(L patch)	50	2	27500 - 28350	0.182	22.60	94M5W7D	64QAM
SISO	Ant0(L patch)	100	1	27500 - 28350	0.596	27.75	90M9G7D	BPSK
SISO	Ant0(L patch)	100	1	27500 - 28350	0.610	27.85	90M7G7D	QPSK
SISO	Ant0(L patch)	100	1	27500 - 28350	0.369	25.67	90M9W7D	16QAM
SISO	Ant0(L patch)	100	1	27500 - 28350	0.238	23.76	90M6W7D	64QAM
MIMO	Ant0(L patch)	100	1	27500 - 28350	1.528	31.84	91M0G7D	BPSK
MIMO	Ant0(L patch)	100	1	27500 - 28350	1.542	31.88	90M7G7D	QPSK
MIMO	Ant0(L patch)	100	1	27500 - 28350	0.906	29.57	91M0W7D	16QAM
MIMO	Ant0(L patch)	100	1	27500 - 28350	0.569	27.55	90M7W7D	64QAM
SISO	Ant0(L patch)	100	2	27500 - 28350	0.263	24.20	189MG7D	BPSK
SISO	Ant0(L patch)	100	2	27500 - 28350	0.287	24.58	189MG7D	QPSK
SISO	Ant0(L patch)	100	2	27500 - 28350	0.194	22.88	189MW7D	16QAM
SISO	Ant0(L patch)	100	2	27500 - 28350	0.117	20.67	189MW7D	64QAM
MIMO	Ant0(L patch)	100	2	27500 - 28350	0.698	28.44	189MG7D	BPSK
MIMO	Ant0(L patch)	100	2	27500 - 28350	0.701	28.46	189MG7D	QPSK
MIMO	Ant0(L patch)	100	2	27500 - 28350	0.479	26.80	190MW7D	16QAM
MIMO	Ant0(L patch)	100	2	27500 - 28350	0.302	24.80	189MW7D	64QAM
SISO	Ant1(K patch)	50	1	27500 - 28350	0.551	27.41	52M1G7D	BPSK
SISO	Ant1(K patch)	50	1	27500 - 28350	0.509	27.07	45M6G7D	QPSK
SISO	Ant1(K patch)	50	1	27500 - 28350	0.308	24.88	45M7W7D	16QAM
SISO	Ant1(K patch)	50	1	27500 - 28350	0.191	22.81	46M0W7D	64QAM
MIMO	Ant1(K patch)	50	1	27500 - 28350	1.005	30.02	45M3G7D	BPSK
MIMO	Ant1(K patch)	50	1	27500 - 28350	0.979	29.91	45M6G7D	QPSK
MIMO	Ant1(K patch)	50	1	27500 - 28350	0.593	27.73	45M3W7D	16QAM
MIMO	Ant1(K patch)	50	1	27500 - 28350	0.361	25.57	45M5W7D	64QAM

n261 Band								
Mode	Antenna	Bandwidth (MHz)	CCs Active	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
					(W)	(dBm)		
SISO	Ant1(K patch)	50	2	27500 - 28350	0.247	23.93	94M9G7D	BPSK
SISO	Ant1(K patch)	50	2	27500 - 28350	0.237	23.75	94M9G7D	QPSK
SISO	Ant1(K patch)	50	2	27500 - 28350	0.165	22.18	94M6W7D	16QAM
SISO	Ant1(K patch)	50	2	27500 - 28350	0.100	19.99	94M5W7D	64QAM
MIMO	Ant1(K patch)	50	2	27500 - 28350	0.431	26.34	94M7G7D	BPSK
MIMO	Ant1(K patch)	50	2	27500 - 28350	0.412	26.15	94M5G7D	QPSK
MIMO	Ant1(K patch)	50	2	27500 - 28350	0.294	24.69	94M7W7D	16QAM
MIMO	Ant1(K patch)	50	2	27500 - 28350	0.175	22.42	94M6W7D	64QAM
SISO	Ant1(K patch)	100	1	27500 - 28350	0.489	26.89	90M7G7D	BPSK
SISO	Ant1(K patch)	100	1	27500 - 28350	0.424	26.27	90M9G7D	QPSK
SISO	Ant1(K patch)	100	1	27500 - 28350	0.313	24.95	90M9W7D	16QAM
SISO	Ant1(K patch)	100	1	27500 - 28350	0.201	23.03	90M7W7D	64QAM
MIMO	Ant1(K patch)	100	1	27500 - 28350	1.016	30.07	91M0G7D	BPSK
MIMO	Ant1(K patch)	100	1	27500 - 28350	1.007	30.03	91M1G7D	QPSK
MIMO	Ant1(K patch)	100	1	27500 - 28350	0.611	27.86	91M1W7D	16QAM
MIMO	Ant1(K patch)	100	1	27500 - 28350	0.380	25.80	90M6W7D	64QAM
SISO	Ant1(K patch)	100	2	27500 - 28350	0.244	23.88	190MG7D	BPSK
SISO	Ant1(K patch)	100	2	27500 - 28350	0.240	23.81	190MG7D	QPSK
SISO	Ant1(K patch)	100	2	27500 - 28350	0.177	22.48	190MW7D	16QAM
SISO	Ant1(K patch)	100	2	27500 - 28350	0.103	20.13	189MW7D	64QAM
MIMO	Ant1(K patch)	100	2	27500 - 28350	0.479	26.80	190MG7D	BPSK
MIMO	Ant1(K patch)	100	2	27500 - 28350	0.480	26.81	190MG7D	QPSK
MIMO	Ant1(K patch)	100	2	27500 - 28350	0.326	25.13	190MW7D	16QAM
MIMO	Ant1(K patch)	100	2	27500 - 28350	0.200	23.02	190MW7D	64QAM

n260 Band								
Mode	Antenna	Bandwidth (MHz)	CCs Active	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
					(W)	(dBm)		
SISO	Ant0(L patch)	50	1	37000 - 40000	0.558	27.47	45M8G7D	BPSK
SISO	Ant0(L patch)	50	1	37000 - 40000	0.389	25.90	45M5G7D	QPSK
SISO	Ant0(L patch)	50	1	37000 - 40000	0.220	23.42	45M5W7D	16QAM
SISO	Ant0(L patch)	50	1	37000 - 40000	0.136	21.35	45M8W7D	64QAM
MIMO	Ant0(L patch)	50	1	37000 - 40000	1.081	30.34	45M7G7D	BPSK
MIMO	Ant0(L patch)	50	1	37000 - 40000	0.979	29.91	45M8G7D	QPSK
MIMO	Ant0(L patch)	50	1	37000 - 40000	0.634	28.02	45M5W7D	16QAM
MIMO	Ant0(L patch)	50	1	37000 - 40000	0.352	25.47	45M7W7D	64QAM
SISO	Ant0(L patch)	50	2	37000 - 40000	0.171	22.33	94M9G7D	BPSK
SISO	Ant0(L patch)	50	2	37000 - 40000	0.141	21.49	94M7G7D	QPSK
SISO	Ant0(L patch)	50	2	37000 - 40000	0.126	20.99	94M9W7D	16QAM
SISO	Ant0(L patch)	50	2	37000 - 40000	0.070	18.47	95M0W7D	64QAM
MIMO	Ant0(L patch)	50	2	37000 - 40000	0.288	24.59	95M3G7D	BPSK
MIMO	Ant0(L patch)	50	2	37000 - 40000	0.266	24.25	94M7G7D	QPSK
MIMO	Ant0(L patch)	50	2	37000 - 40000	0.187	22.73	94M5W7D	16QAM
MIMO	Ant0(L patch)	50	2	37000 - 40000	0.105	20.21	94M6W7D	64QAM
SISO	Ant0(L patch)	100	1	37000 - 40000	0.502	27.01	90M9G7D	BPSK
SISO	Ant0(L patch)	100	1	37000 - 40000	0.368	25.66	90M9G7D	QPSK
SISO	Ant0(L patch)	100	1	37000 - 40000	0.210	23.23	90M5W7D	16QAM
SISO	Ant0(L patch)	100	1	37000 - 40000	0.126	20.99	90M7W7D	64QAM
MIMO	Ant0(L patch)	100	1	37000 - 40000	0.925	29.66	90M6G7D	BPSK
MIMO	Ant0(L patch)	100	1	37000 - 40000	0.845	29.27	91M0G7D	QPSK
MIMO	Ant0(L patch)	100	1	37000 - 40000	0.541	27.33	90M7W7D	16QAM
MIMO	Ant0(L patch)	100	1	37000 - 40000	0.306	24.86	91M1W7D	64QAM
SISO	Ant0(L patch)	100	2	37000 - 40000	0.204	23.09	189MG7D	BPSK
SISO	Ant0(L patch)	100	2	37000 - 40000	0.140	21.47	189MG7D	QPSK
SISO	Ant0(L patch)	100	2	37000 - 40000	0.099	19.94	189MW7D	16QAM
SISO	Ant0(L patch)	100	2	37000 - 40000	0.072	18.55	190MW7D	64QAM
MIMO	Ant0(L patch)	100	2	37000 - 40000	0.365	25.62	189MG7D	BPSK
MIMO	Ant0(L patch)	100	2	37000 - 40000	0.314	24.97	190MG7D	QPSK
MIMO	Ant0(L patch)	100	2	37000 - 40000	0.238	23.76	189MW7D	16QAM
MIMO	Ant0(L patch)	100	2	37000 - 40000	0.131	21.18	189MW7D	64QAM
SISO	Ant1(K patch)	50	1	37000 - 40000	0.304	24.83	45M4G7D	BPSK
SISO	Ant1(K patch)	50	1	37000 - 40000	0.245	23.90	45M4G7D	QPSK
SISO	Ant1(K patch)	50	1	37000 - 40000	0.140	21.45	45M3W7D	16QAM
SISO	Ant1(K patch)	50	1	37000 - 40000	0.084	19.26	45M4W7D	64QAM
MIMO	Ant1(K patch)	50	1	37000 - 40000	0.678	28.31	45M6G7D	BPSK
MIMO	Ant1(K patch)	50	1	37000 - 40000	0.472	26.74	45M5G7D	QPSK
MIMO	Ant1(K patch)	50	1	37000 - 40000	0.259	24.14	45M9W7D	16QAM
MIMO	Ant1(K patch)	50	1	37000 - 40000	0.145	21.62	45M5W7D	64QAM
SISO	Ant1(K patch)	50	2	37000 - 40000	0.122	20.86	94M8G7D	BPSK

n260 Band								
Mode	Antenna	Bandwidth (MHz)	CCs Active	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
					(W)	(dBm)		
SISO	Ant1(K patch)	50	2	37000 - 40000	0.083	19.19	94M7G7D	QPSK
SISO	Ant1(K patch)	50	2	37000 - 40000	0.073	18.62	94M7W7D	16QAM
SISO	Ant1(K patch)	50	2	37000 - 40000	0.038	15.82	95M0W7D	64QAM
MIMO	Ant1(K patch)	50	2	37000 - 40000	0.229	23.60	95M3G7D	BPSK
MIMO	Ant1(K patch)	50	2	37000 - 40000	0.173	22.39	94M3G7D	QPSK
MIMO	Ant1(K patch)	50	2	37000 - 40000	0.125	20.96	94M7W7D	16QAM
MIMO	Ant1(K patch)	50	2	37000 - 40000	0.068	18.33	94M8W7D	64QAM
SISO	Ant1(K patch)	100	1	37000 - 40000	0.302	24.80	90M7G7D	BPSK
SISO	Ant1(K patch)	100	1	37000 - 40000	0.196	22.92	90M6G7D	QPSK
SISO	Ant1(K patch)	100	1	37000 - 40000	0.130	21.14	90M4W7D	16QAM
SISO	Ant1(K patch)	100	1	37000 - 40000	0.075	18.76	90M6W7D	64QAM
MIMO	Ant1(K patch)	100	1	37000 - 40000	0.618	27.91	90M8G7D	BPSK
MIMO	Ant1(K patch)	100	1	37000 - 40000	0.371	25.69	91M2G7D	QPSK
MIMO	Ant1(K patch)	100	1	37000 - 40000	0.234	23.69	91M1W7D	16QAM
MIMO	Ant1(K patch)	100	1	37000 - 40000	0.138	21.40	91M2W7D	64QAM
SISO	Ant1(K patch)	100	2	37000 - 40000	0.149	21.72	191MG7D	BPSK
SISO	Ant1(K patch)	100	2	37000 - 40000	0.101	20.03	190MG7D	QPSK
SISO	Ant1(K patch)	100	2	37000 - 40000	0.070	18.47	190MW7D	16QAM
SISO	Ant1(K patch)	100	2	37000 - 40000	0.042	16.20	192MW7D	64QAM
MIMO	Ant1(K patch)	100	2	37000 - 40000	0.251	24.00	189MG7D	BPSK
MIMO	Ant1(K patch)	100	2	37000 - 40000	0.170	22.31	190MG7D	QPSK
MIMO	Ant1(K patch)	100	2	37000 - 40000	0.117	20.68	189MW7D	16QAM
MIMO	Ant1(K patch)	100	2	37000 - 40000	0.070	18.43	189MW7D	64QAM

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 (Version: 2014) and CISPR Publication 22.

Seoicheon-ro
■ Semi Chamber 1
□ Semi Chamber 2
□ Semi Chamber 3
■ mmWave Chamber

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary for radiated emissions measurements in the spurious domain. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its fuction as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the table to bring the total table height to 1.5m for measurements above 1GHz.
Radiated spurious emission measurements from 30MHz - 18GHz were performed in a semi anechoic chamber (SAC) conforming to the site validation requirements.
Radiated power (EIRP) measurements were performed according to ANSI C63.26_2015 in a full anechoic chamber (FAC).

The test facility has been recognised by the FCC under registration number KR0032. The full scope of recognition can be viewed at https://apps.fcc.gov/oetcf/eas/reports/ViewTestFirmAccredScopes.cfm?calledFromFrame=N&RequestTimeout=500&regnum_specified=N&test_firm_id=5749.

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

3. TEST SPECIFICATIONS

FCC Rule Parts	47 CFR FCC Part2, Part 30
Measurement standards	ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 662911 D01 v02r01, KDB 662911 D02 v01, KDB 842590 D01 v01r01

Note:

The EUT was tested per the guidance of ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 842590 D01 v01r01.

EIRP Simulation data for all Beam IDs was used to determine the worst case Beam ID for SISO operation and Beam ID pair for MIMO operation. These Beam ID's was used for final measurements.

All testing was performed using FTM software at continuous Tx operation(100 % duty cycle).
In case of RSE for EN-DC mode, we used 5G NR call simulator.

Each of the patch antennas is comprised of two separate antenna feeds(H/V).
L patch antenna does not radiate when K patch antenna radiates.

All modulations, RB size, CP-OFDM, DFT-s-OFDM and SCS were investigated and the worst case configuration results are reported.

In cases of SISO, MIMO, Tx-Diversity mode, CP-OFDM is supported.
In cases of SISO, Tx-Diversity mode, is supported.
Both CP-OFDM and DFT-s-OFDM were invegtiged for the Occupied Bandwidth, EIRP, Band Edge, RSE and the DFT-s-OFDM was worst case of NR Modulations in all test cases.

Per 2.1057(a)(2), spurious emissions were investigated up to 200 GHz.(up to 100 GHz for n261 band)

The radiated RF output power, band edge and all out-of-band emissions in the spurious domain are evaluated to the EIRP limits.

In case of band edge, if the band edge results does not comply the EIRP limit, the band edge results are converted to an equivalent conductive power by subtracting the known antenna gain from the EIRP measured at each frequency of interest. These emissions are compared to the 30.203 spurious emission limits as conductive power levels.

Beam IDs were selected based on which Beam ID produces the highest EIRP during EIRP simulation.

3.1. STANDARDS & TEST SUMMARY

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 30

Description	Test Limit	Reference	Results
Occupied Bandwidth	N/A	§2.1049	Compliant
Equivalent Isotropic Radiated Power	43 dBm	§30.202 §30.202	Compliant
Out-of-Band Emissions at the Band Edge	-13 dBm/MHz for all out-of-band emissions, -5 dBm/MHz from the band edge up to 10 % of the channel BW	§2.1051, §30.203	Compliant
Radiated Spurious Emissions	-13 dBm/MHz for all out-of-band emissions	§2.1051, §30.203	Compliant
Frequency Stability	Fundamental emissions stay within authorized frequency block	§2.1055	Compliant

3.2. HIGHEST E.I.R.P POSITION

Ant 0(L patch) SISO

Band	CH	Beam ID	SISO – H	Beam ID	SISO - V
n261	Low	16	V / Azi : 62 Roll : 194	145	H / Azi : 62 Roll : 163
	Mid	16	H / Azi : 13 Roll : 271	145	H / Azi : 60 Roll : 166
	High	16	V / Azi : 34 Roll : 208	153	H / Azi : 62 Roll : 161
n260	Low	145	V / Azi : 30 Roll : 217	27	H / Azi : 63 Roll : 166
	Mid	145	V / Azi : 32 Roll : 195	29	H / Azi : 63 Roll : 134
	High	155	V / Azi : 11 Roll : 212	28	H / Azi : 72 Roll : 164

Ant 0(L patch) MIMO

Band	CH	Beam ID	MIMO - H	Beam ID	MIMO - V
n261	Low	24/152	H / Azi : 31 Roll : 303	24/152	V / Azi : 45 Roll : 219
	Mid	17/145	H / Azi : 32 Roll : 152	17/145	V / Azi : 63 Roll : 162
	High	17/145	H / Azi : 18 Roll : 123	17/145	V / Azi : 33 Roll : 185
n260	Low	18/146	H / Azi : 14 Roll : 75	18/146	V / Azi : 45 Roll : 163
	Mid	18/146	H / Azi : 13 Roll : 60	18/146	V / Azi : 42 Roll : 165
	High	17/145	H / Azi : 72 Roll : 195	17/145	V / Azi : 45 Roll : 211

Ant 1(K patch) SISO

Band	CH	Beam ID	SISO - H	Beam ID	SISO - V
n261	Low	20	H / Azi : 11 Roll : 75	156	H / Azi : 69 Roll : 11
	Mid	28	H / Azi : 15 Roll : 92	148	H / Azi : 73 Roll : 17
	High	28	H / Azi : 43 Roll : 12	156	H / Azi : 43 Roll : 2
n260	Low	151	V / Azi : 36 Roll : 342	32	H / Azi : 41 Roll : 337
	Mid	151	V / Azi : 33 Roll : 332	21	H / Azi : 75 Roll : 303
	High	160	V / Azi : 42 Roll : 6	31	H / Azi : 73 Roll : 15

Ant 1(K patch) MIMO

Band	CH	Beam ID	MIMO - H	Beam ID	MIMO - V
n261	Low	28/156	H / Azi : 60 Roll : 10	28/156	V / Azi : 42 Roll : 15
	Mid	28/156	H / Azi : 62 Roll : 12	28/156	V / Azi : 15 Roll : 139
	High	20/148	H / Azi : 75 Roll : 12	20/148	V / Azi : 41 Roll : 15
n260	Low	32/160	H / Azi : 15 Roll : 314	32/160	V / Azi : 43 Roll : 343
	Mid	32/160	H / Azi : 12 Roll : 285	32/160	V / Azi : 30 Roll : 343
	High	32/160	H / Azi : 45 Roll : 348	32/160	V / Azi : 42 Roll : 9

3.3. MAXIMUM MEASUREMENT UNCERTAINTY

The value of the measurement uncertainty for the measurement of each parameter.

Coverage factor k = 2, Confidence levels of 95 %

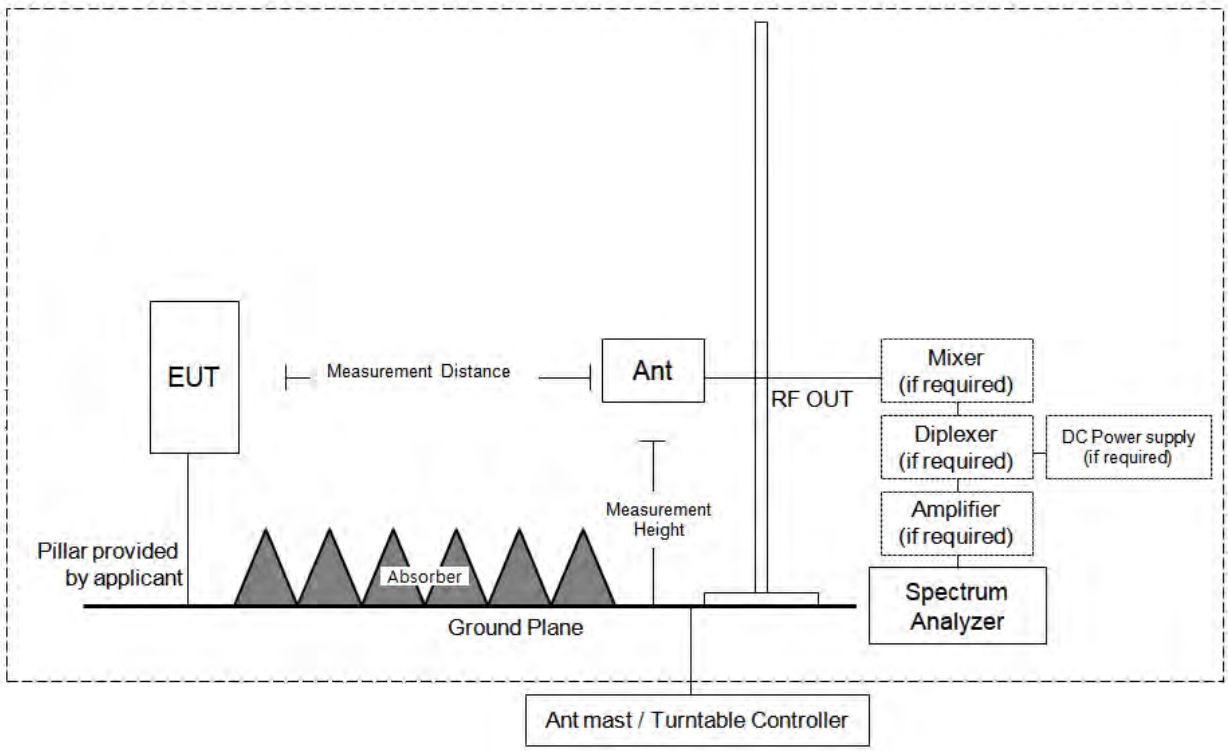
Description	Condition	Uncertainty
Occupied Bandwidth	-	± 0.31 MHz
Equivalent Isotropic Radiated Power	27.48 GHz ~ 28.37 GHz, 36.98 GHz ~ 40.02 GHz	± 5.05 dB
Band Edge		
Radiated Spurious Emissions	9 kHz ~ 30 MHz	± 3.40 dB
	30 MHz ~ 1 GHz	± 4.80 dB
	1 GHz ~ 18 GHz	± 5.70 dB
	18 GHz ~ 40 GHz	± 5.05 dB
	40 GHz ~ 200 GHz	± 4.59 dB
Frequency Stability	-	69.61 kHz

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

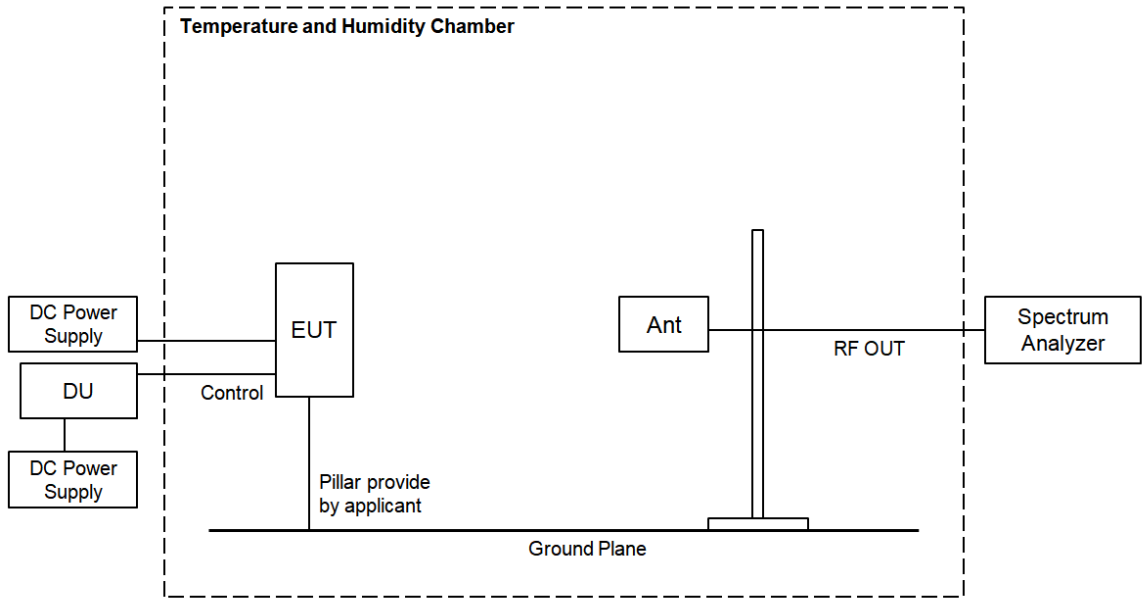
Temperature :	+15 ℃ to +35 ℃
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

3.5. TEST DIAGRAMS

Occupied Bandwidth / EIRP / Band Edge / RSE



Frequency stability



3.6. ADDITIONAL DESCRIPTIONS ABOUT TEST

- All tests is performed by radiated measurement and applied below conditions.

: Used measurement distance with far field of test such as EIRP, OBW and Band edge are as follow.

Wavelength = Speed of light / Measurement frequency = 30 / 4 000 = 0.0075

(2 X (Max measured antenna dimension) ^{2}) / Wavelength = (2 X (0.09604686)^2)/ 0.0075= ***2.46 m***

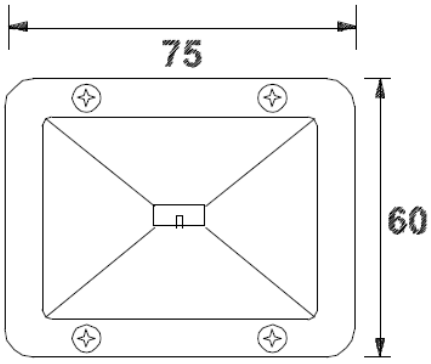
: Spurious emissions measurement distance is shown in table below(Reference : Measurement Antenna Dimension).

Frequency Rage (GHz)	Wavelength (cm)	Far Field Distance (m)	Measurement Distance(m)
18 ~ 40	0.75	2.46	3.00
40 ~ 60	0.50	1.354	3.75
60 ~90	0.33	0.856	1
90 ~ 140	0.214	0.572	1
140 ~ 200	0.15	0.332	0.5

- Unwanted radiated emissions test was performed on state of all EUT antenna path is operated with a maximum output power level.

- In case of far-field distance for fundamental, we applied the measured antenna dimension because the measured antenna is bigger than the antenna of EUT.

- Dimension of measured(BBHA 9170) antenna: 0.09604686 m,



- Dimension of EUT antenna : 0.024136 m

- Below 18 GHz, measurement distance is 3.75 m.

4. TEST EQUIPMENTS

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N9030B / PXA Signal Analyzer	03/27/2020	Annual	MY55480167
Schwarzbeck	BBHA 9170 / Horn Antenna	11/29/2019	Biennial	BBHA9170541
KIKUSUI	PWR800L / DC Power Supply	07/14/2020	Annual	RE002047
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Rohde&Schwarz	FSW / Spectrum Analyzer	09/09/2020	Annual	101256
Rohde&Schwarz	FSP / Spectrum Analyzer	09/14/2020	Annual	836650/016
Schwarzbeck	Loop Antenna	05/18/2020	Biennial	1513-175
Emco	2090 / Controller	N/A	N/A	060520
Ets	Turn Table	N/A	N/A	N/A
Schwarzbeck	VULB 9168 / Hybrid Antenna	09/04/2020	Biennial	9168-0895
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	9120D-1300
OML INC.	WR-19 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M19RH-160419-2
OML INC.	WR-19 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M19RH-160419-1
OML INC.	WR-12 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M12RH-160419-1
OML INC.	WR-12 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M12RH-160419-2
OML INC.	WR-08 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M08RH-160419-2
OML INC.	WR-08 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M08RH-160419-1
OML INC.	WR-05 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M05RH-160419-1
OML INC.	WR-05 Horn Antenna / Horn Antenna	04/23/2020	Biennial	M05RH-160419-2
OML INC.	OML WR19 / Harmonic Mixer	09/09/2020	Annual	M19HWD
OML INC.	OML WR12 / Harmonic Mixer	09/09/2020	Annual	M12HWD
OML INC.	OML WR08 / Harmonic Mixer	09/09/2020	Annual	M08HWD
OML INC.	OML WR05 / Harmonic Mixer	09/09/2020	Annual	M05HWD
OML INC.	WR-19 / Source Module	09/09/2020	Annual	S19MS-A-160516-1
OML INC.	WR-12 / Source Module	09/09/2020	Annual	S12MS-A-160419-1
OML INC.	WR-08 / Source Module	09/09/2020	Annual	S08MS-A-160419-1
OML INC.	WR-05 / Source Module	09/09/2020	Annual	S05MS-A-160419-1
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	12/16/2019	Annual	NY-200912201A
Rohde & Schwarz	SMV100A / Signal Generator	07/13/2020	Annual	177633
Keysight	E7515B / UXM 5G Wireless Test Platform	01/07/2020	Annual	MY58300756

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

5. TEST RESULT

5.1. OCCUPIED BANDWIDTH

FCC Rules

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedures:

The measurement is performed in accordance with Section 5.4.3 and 5.4.4 of ANSI C63.26.

5.4.3 Occupied bandwidth—Relative measurement procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “−X dB” requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:

1) 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).

2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the “−X dB amplitude” as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) 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 amplitude” determined in step f). If a marker is below this “−X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the “−X dB amplitude” at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “−X dB amplitude.”

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

5.4.4 Occupied bandwidth—Power bandwidth (99%) measurement procedure

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 (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Test Results:

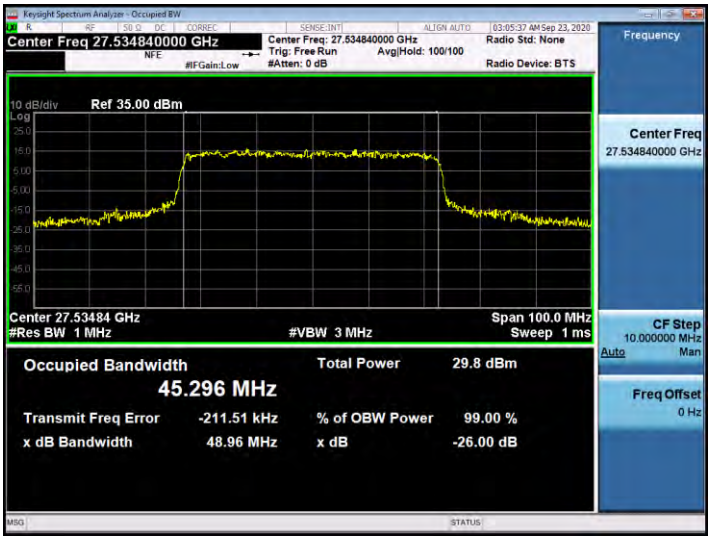
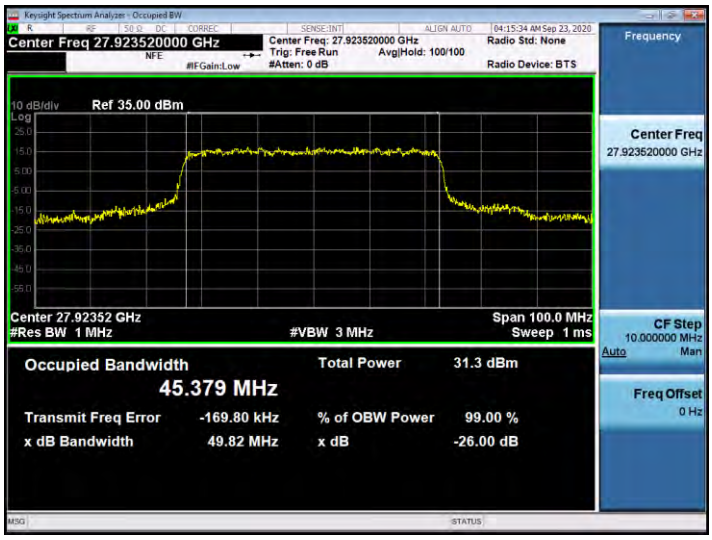
Tabular Data of Occupied Bandwidth

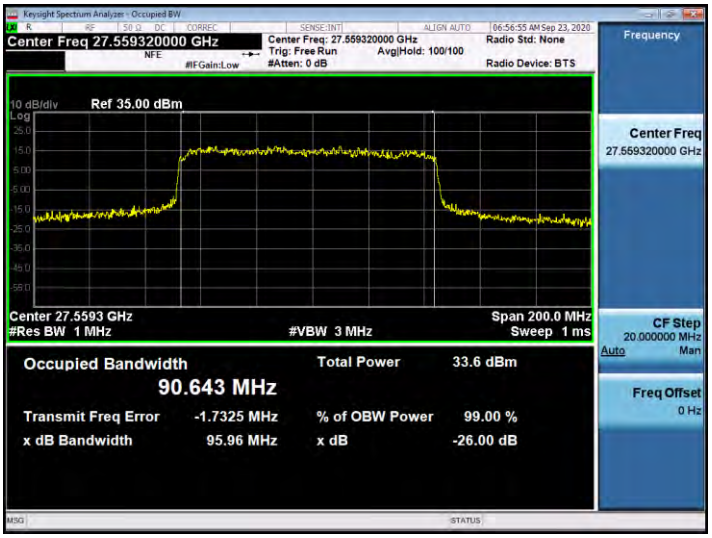
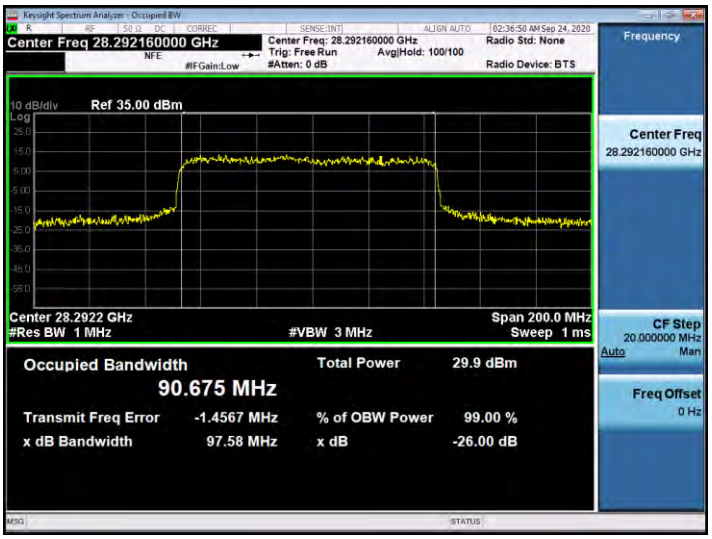
Band	Antenna	CCs Active	Bandwidth	Modulation	Channel	Frequency [MHz]	OBW [MHz]
n261	0(L patch)	1	50 MHz	BPSK	Low	27534.84	45.296
					Mid	27923.52	45.379
					High	28319.52	45.357
			100 MHz	QPSK	Low	27559.32	90.643
					Mid	27923.52	90.474
					High	28292.16	90.675
		2	50 MHz	BPSK	Low	27559.84	94.342
					Mid	27923.52	95.053
					High	28294.52	95.462
			100 MHz	QPSK	Low	27609.32	189.47
					Mid	27923.52	188.75
					High	28242.16	188.75
	1(K patch)	1	50 MHz	BPSK	Low	27534.84	45.234
					Mid	27923.52	45.262
					High	28319.52	45.286
			100 MHz	QPSK	Low	27559.32	90.979
					Mid	27923.52	91.144
					High	28292.16	90.997
		2	50 MHz	BPSK	Low	27559.84	94.702
					Mid	27923.52	94.726
					High	28294.52	94.550
			100 MHz	QPSK	Low	27609.32	189.53
					Mid	27923.52	189.34
					High	28242.16	189.66

Band	Antenna	CCs Active	Bandwidth	Modulation	Channel	Frequency [MHz]	OBW [MHz]
n260	0(L patch)	1	50 MHz	BPSK	Low	37027.32	45.688
					Mid	38497.44	45.656
					High	39966.24	45.743
			100 MHz		Low	37051.80	90.621
					Mid	38497.44	90.380
					High	39949.92	90.441
		2	50 MHz		Low	37052.32	94.729
					Mid	38497.44	94.614
					High	39941.24	95.295
			100 MHz		Low	37101.80	188.56
					Mid	38497.44	188.99
					High	39899.92	189.11
	1(K patch)	1	50 MHz	BPSK	Low	37027.32	45.542
					Mid	38497.44	45.644
					High	39966.24	45.591
			100 MHz		Low	37051.80	90.820
					Mid	38497.44	90.787
					High	39949.92	90.698
		2	50 MHz		Low	37052.32	94.834
					Mid	38497.44	94.987
					High	39941.24	95.306
			100 MHz		Low	37101.80	189.03
					Mid	38497.44	189.01
					High	39899.92	188.53

Plot Data of RF Occupied Bandwidth

1. Antenna 0(L patch), n261

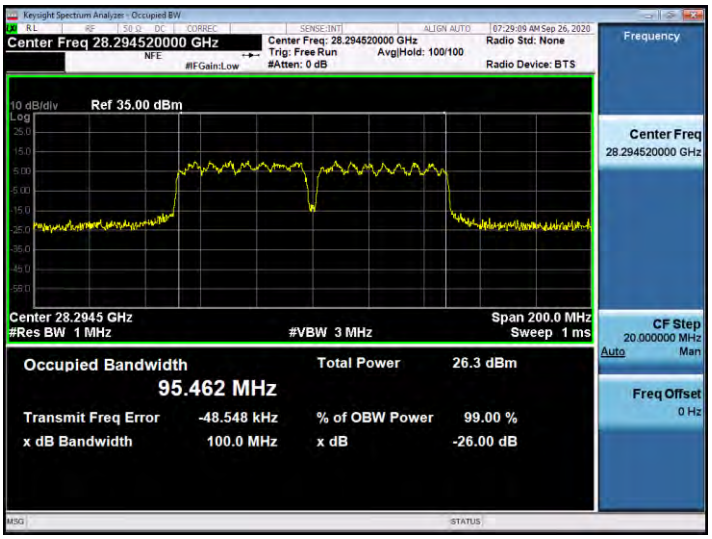
50 MHz, 1CC	
	
	

100 MHz, 1CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.559320000 GHz
Center Freq: 27.559320000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 27.5593 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.643 MHz
Total Power 33.6 dBm
Transmit Freq Error -1.7325 MHz
% of OBW Power 99.00 %
x dB Bandwidth 95.96 MHz
x dB -26.00 dB
Frequency
Center Freq
27.559320000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.923520000 GHz
Center Freq: 27.923520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 27.9235 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.474 MHz
Total Power 30.5 dBm
Transmit Freq Error -1.4762 MHz
% of OBW Power 99.00 %
x dB Bandwidth 96.94 MHz
x dB -26.00 dB
Frequency
Center Freq
27.923520000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

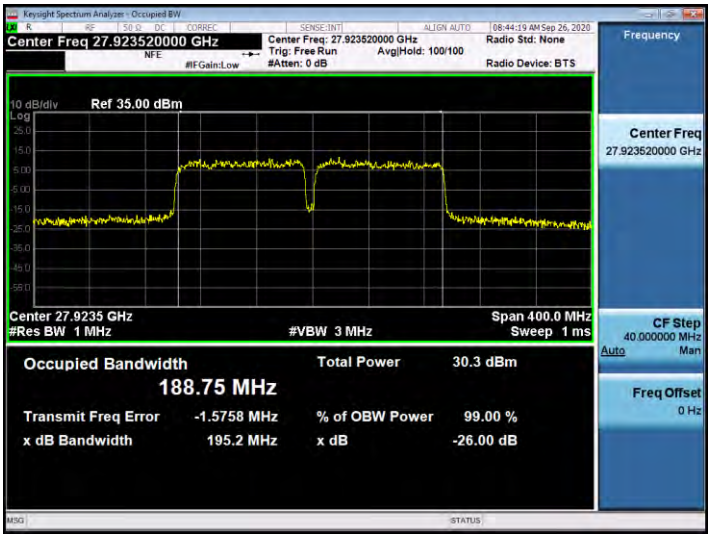
Keysight Spectrum Analyzer - Occupied BW
Center Freq 28.292160000 GHz
Center Freq: 28.292160000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 28.2922 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.675 MHz
Total Power 29.9 dBm
Transmit Freq Error -1.4567 MHz
% of OBW Power 99.00 %
x dB Bandwidth 97.58 MHz
x dB -26.00 dB
Frequency
Center Freq
28.292160000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

50 MHz, 2CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.559840000 GHz
Center Freq: 27.559840000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
27.559840000 GHz
Center 27.5598 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
94.342 MHz
Total Power
27.8 dBm
Transmit Freq Error
-81.655 kHz
% of OBW Power
99.00 %
x dB Bandwidth
98.47 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.923520000 GHz
Center Freq: 27.923520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
27.923520000 GHz
Center 27.9235 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
95.053 MHz
Total Power
26.2 dBm
Transmit Freq Error
-55.629 kHz
% of OBW Power
99.00 %
x dB Bandwidth
98.40 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

Keysight Spectrum Analyzer - Occupied BW
Center Freq 28.294520000 GHz
Center Freq: 28.294520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
28.294520000 GHz
Center 28.2945 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
95.462 MHz
Total Power
26.3 dBm
Transmit Freq Error
-48.548 kHz
% of OBW Power
99.00 %
x dB Bandwidth
100.0 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

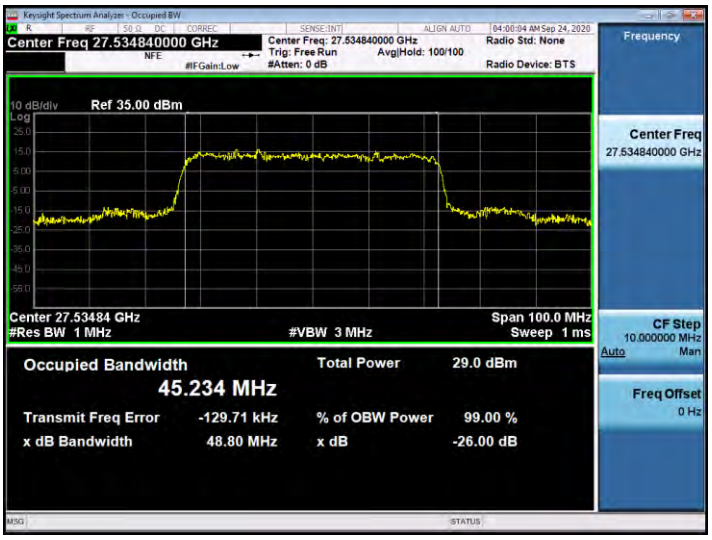
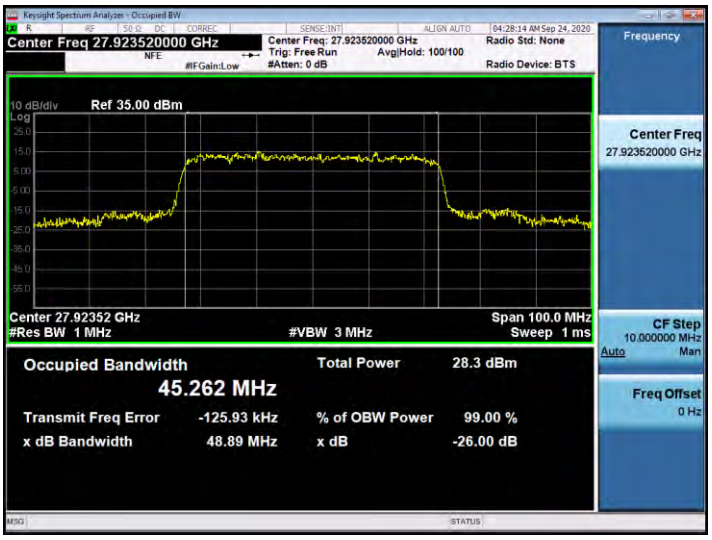
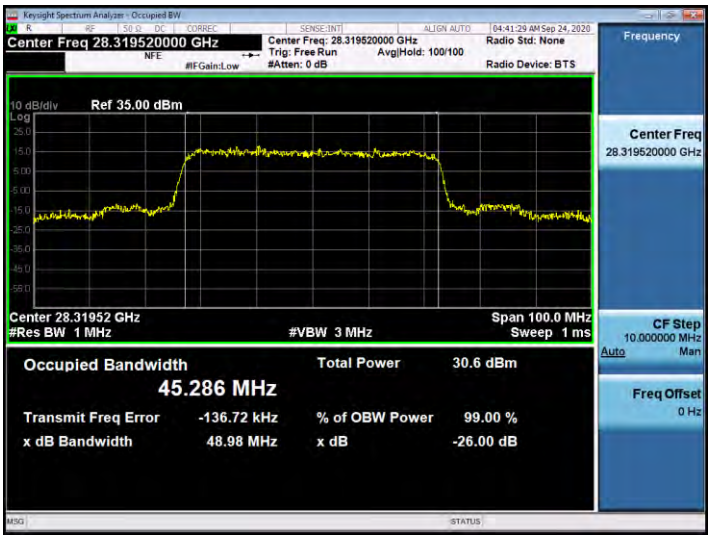
100 MHz, 2CC	
	
	

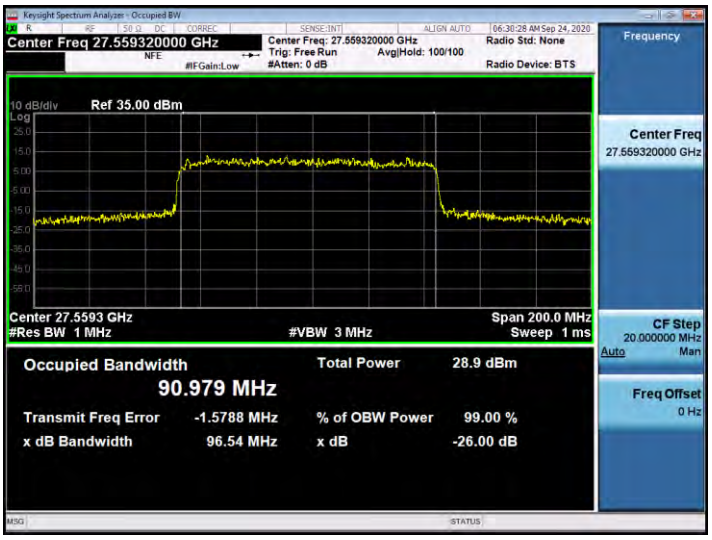
Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.609320000 GHz
Center Freq: 27.609320000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 27.6093 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.47 MHz
Total Power 29.0 dBm
Transmit Freq Error -2.3177 MHz
% of OBW Power 99.00 %
x dB Bandwidth 195.0 MHz
x dB -26.00 dB
Frequency
Center Freq
27.609320000 GHz
CF Step
40.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.923520000 GHz
Center Freq: 27.923520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 27.9235 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
188.75 MHz
Total Power 30.3 dBm
Transmit Freq Error -1.5758 MHz
% of OBW Power 99.00 %
x dB Bandwidth 195.2 MHz
x dB -26.00 dB
Frequency
Center Freq
27.923520000 GHz
CF Step
40.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 28.242160000 GHz
Center Freq: 28.242160000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 28.2422 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
188.75 MHz
Total Power 27.9 dBm
Transmit Freq Error -1.7637 MHz
% of OBW Power 99.00 %
x dB Bandwidth 196.0 MHz
x dB -26.00 dB
Frequency
Center Freq
28.242160000 GHz
CF Step
40.000000 MHz
Auto Man
Freq Offset
0 Hz

2. Antenna 1(K patch), n261

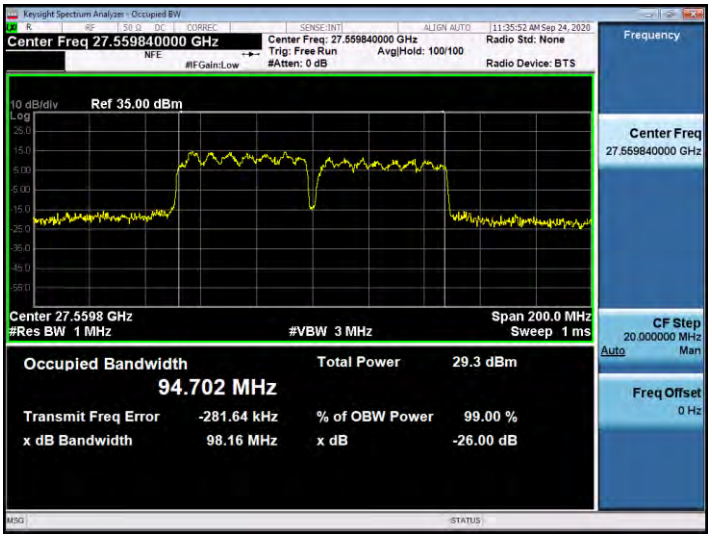
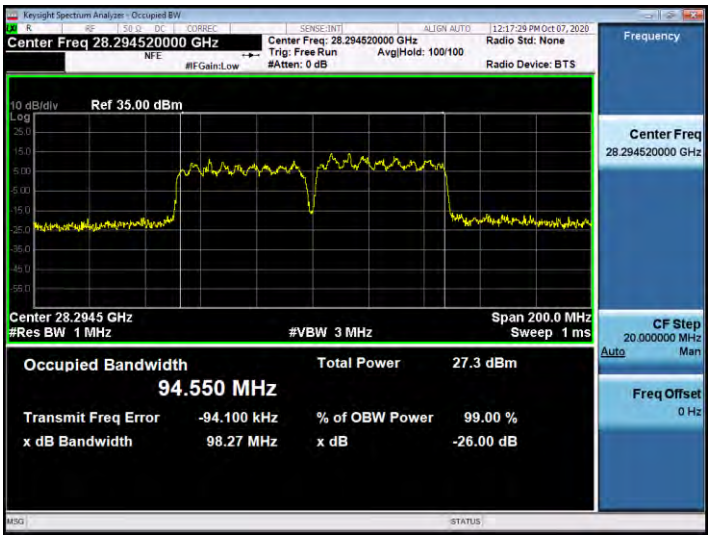
50 MHz, 1CC	
	
	

100 MHz, 1CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.559320000 GHz
Center Freq: 27.559320000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
27.559320000 GHz
Center 27.5593 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
90.979 MHz
Total Power 28.9 dBm
Transmit Freq Error -1.5788 MHz
% of OBW Power 99.00 %
x dB Bandwidth 96.54 MHz
x dB -26.00 dB
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.923520000 GHz
Center Freq: 27.923520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
27.923520000 GHz
Center 27.9235 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
91.144 MHz
Total Power 28.2 dBm
Transmit Freq Error -1.6283 MHz
% of OBW Power 99.00 %
x dB Bandwidth 95.89 MHz
x dB -26.00 dB
Freq Offset
0 Hz

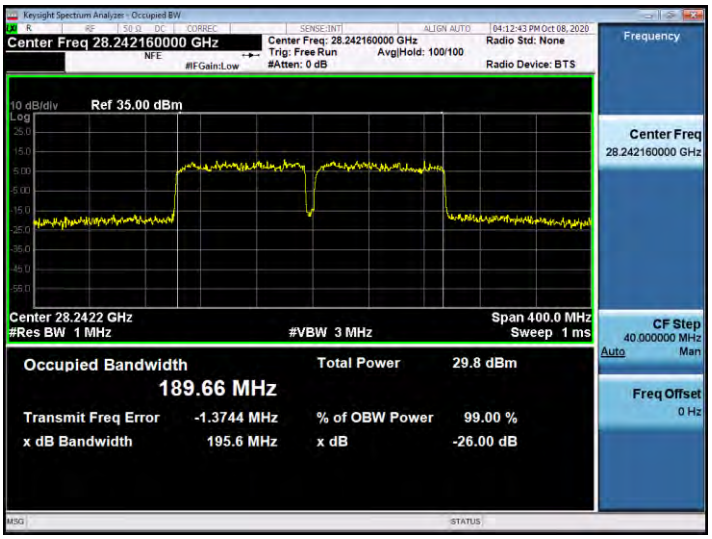
Keysight Spectrum Analyzer - Occupied BW
Center Freq 28.292160000 GHz
Center Freq: 28.292160000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
28.292160000 GHz
Center 28.2922 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
90.997 MHz
Total Power 28.6 dBm
Transmit Freq Error -1.6267 MHz
% of OBW Power 99.00 %
x dB Bandwidth 95.35 MHz
x dB -26.00 dB
Freq Offset
0 Hz

50 MHz, 2CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.559840000 GHz
Center Freq: 27.559840000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
27.559840000 GHz
Center 27.5598 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
94.702 MHz
Total Power
29.3 dBm
Transmit Freq Error
-281.64 kHz
% of OBW Power
99.00 %
x dB Bandwidth
98.16 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.923520000 GHz
Center Freq: 27.923520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
27.923520000 GHz
Center 27.9235 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
94.726 MHz
Total Power
26.9 dBm
Transmit Freq Error
-404.86 kHz
% of OBW Power
99.00 %
x dB Bandwidth
97.97 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

Keysight Spectrum Analyzer - Occupied BW
Center Freq 28.294520000 GHz
Center Freq: 28.294520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
28.294520000 GHz
Center 28.2945 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
CF Step
20.000000 MHz
Auto
Man
Occupied Bandwidth
94.550 MHz
Total Power
27.3 dBm
Transmit Freq Error
-94.100 kHz
% of OBW Power
99.00 %
x dB Bandwidth
98.27 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

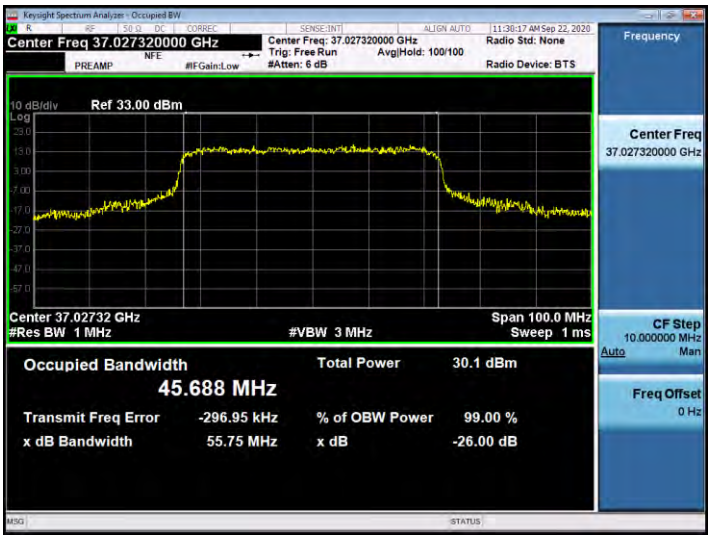
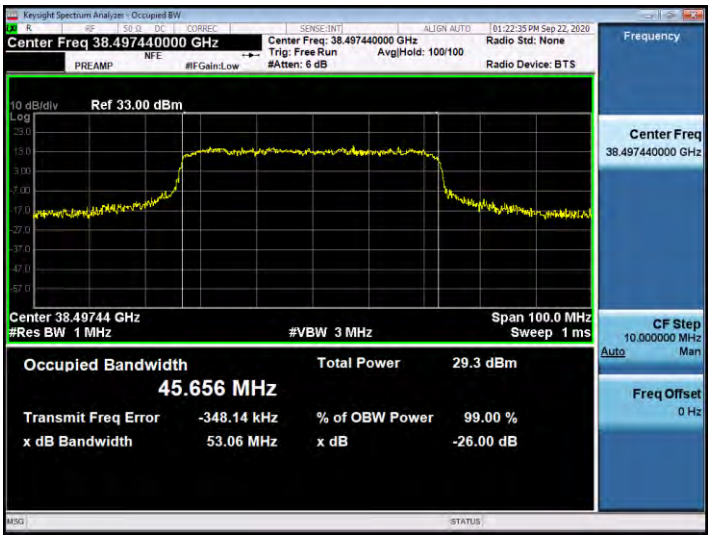
100 MHz, 2CC	
	
	

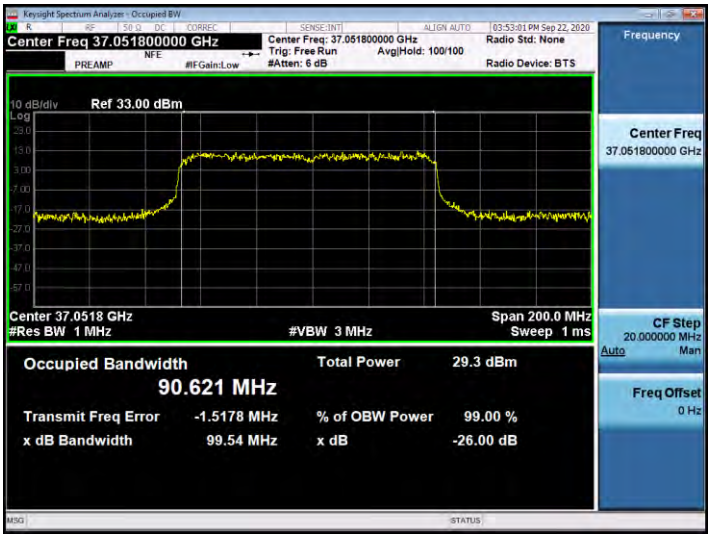
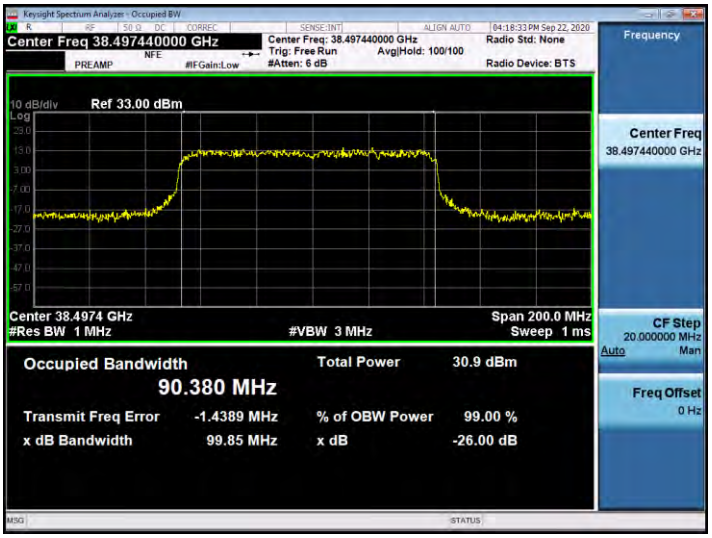
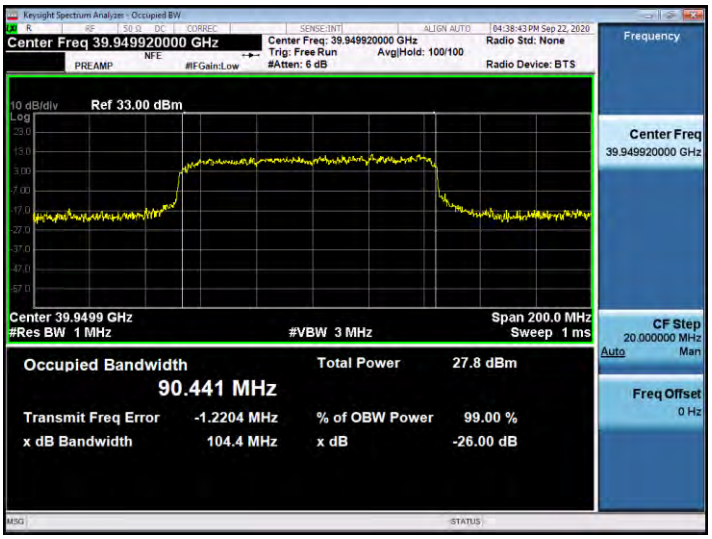
Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.609320000 GHz
Center Freq: 27.609320000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 27.6093 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.53 MHz
Total Power 27.1 dBm
Transmit Freq Error -1.5287 MHz
% of OBW Power 99.00 %
x dB Bandwidth 233.8 MHz
x dB -26.00 dB
Frequency
Center Freq
27.609320000 GHz
CF Step
40.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 27.923520000 GHz
Center Freq: 27.923520000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 27.9235 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.34 MHz
Total Power 27.1 dBm
Transmit Freq Error -1.8391 MHz
% of OBW Power 99.00 %
x dB Bandwidth 194.3 MHz
x dB -26.00 dB
Frequency
Center Freq
27.923520000 GHz
CF Step
40.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 28.242160000 GHz
Center Freq: 28.242160000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 35.00 dBm
Center 28.2422 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.66 MHz
Total Power 29.8 dBm
Transmit Freq Error -1.3744 MHz
% of OBW Power 99.00 %
x dB Bandwidth 195.6 MHz
x dB -26.00 dB
Frequency
Center Freq
28.242160000 GHz
CF Step
40.000000 MHz
Auto Man
Freq Offset
0 Hz

3. Antenna 0(L patch), n260

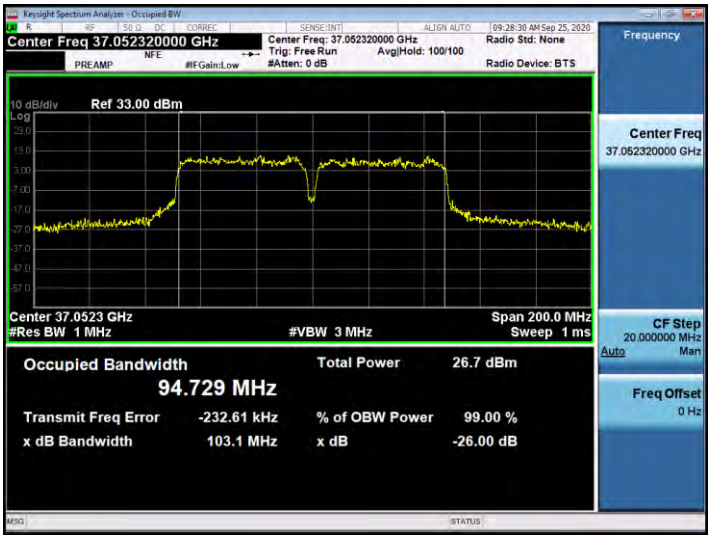
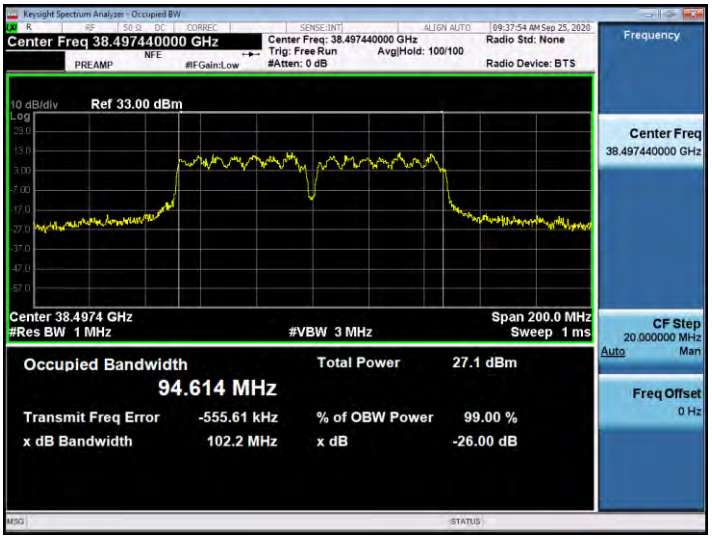
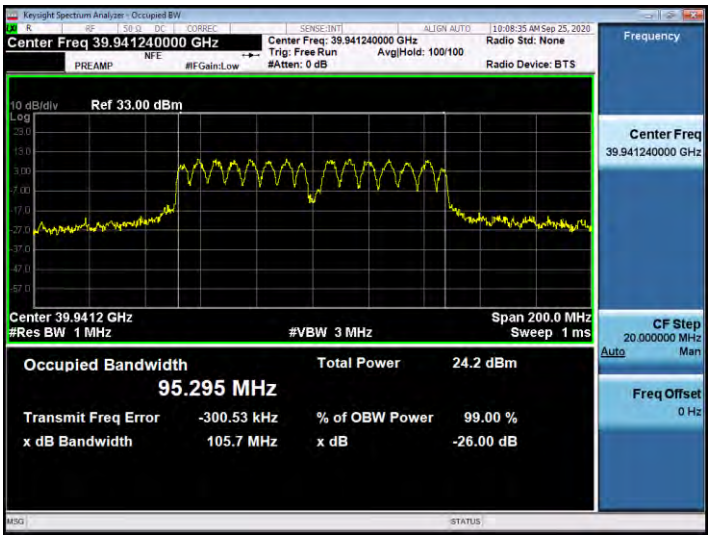
50 MHz, 1CC	
	
	

100 MHz, 1CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 37.051800000 GHz
Center Freq: 37.051800000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 6 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 37.0518 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.621 MHz
Total Power 29.3 dBm
Transmit Freq Error -1.5178 MHz
% of OBW Power 99.00 %
x dB Bandwidth 99.54 MHz
x dB -26.00 dB
Frequency
Center Freq
37.051800000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 38.497440000 GHz
Center Freq: 38.497440000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 6 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 38.4974 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.380 MHz
Total Power 30.9 dBm
Transmit Freq Error -1.4389 MHz
% of OBW Power 99.00 %
x dB Bandwidth 99.85 MHz
x dB -26.00 dB
Frequency
Center Freq
38.497440000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

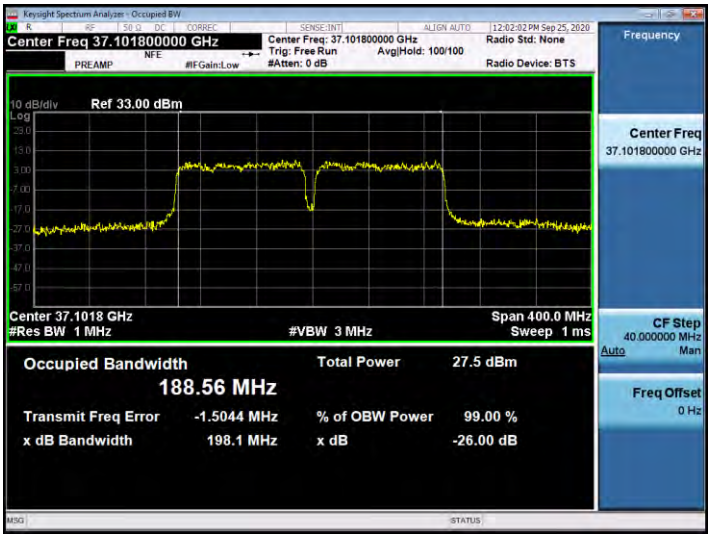
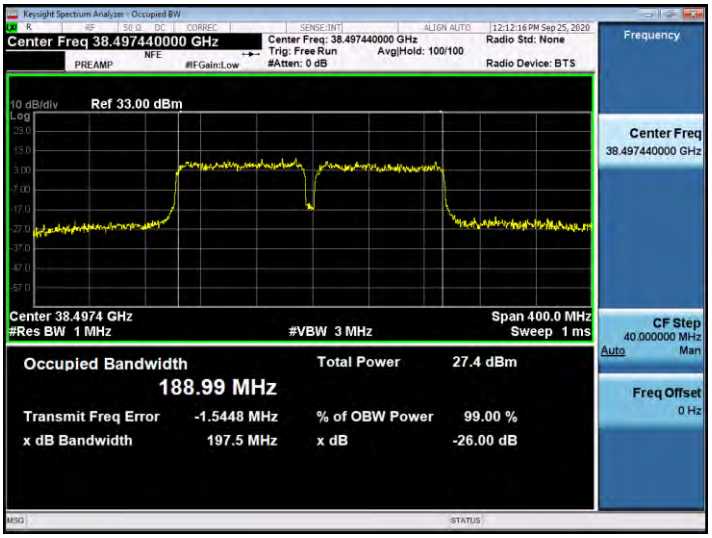
Keysight Spectrum Analyzer - Occupied BW
Center Freq 39.949920000 GHz
Center Freq: 39.949920000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 6 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 39.9499 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.441 MHz
Total Power 27.8 dBm
Transmit Freq Error -1.2204 MHz
% of OBW Power 99.00 %
x dB Bandwidth 104.4 MHz
x dB -26.00 dB
Frequency
Center Freq
39.949920000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

50 MHz, 2CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 37.052320000 GHz
Center Freq: 37.052320000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
09:28:30 AM Sep 25, 2020
Frequency
10 dB/div
Log
Ref 33.00 dBm
Center 37.0523 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
94.729 MHz
Total Power 26.7 dBm
Transmit Freq Error -232.61 kHz
% of OBW Power 99.00 %
x dB Bandwidth 103.1 MHz
x dB -26.00 dB
Center Freq
37.052320000 GHz
CF Step
20.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

Keysight Spectrum Analyzer - Occupied BW
Center Freq 38.497440000 GHz
Center Freq: 38.497440000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
09:37:54 AM Sep 25, 2020
Frequency
10 dB/div
Log
Ref 33.00 dBm
Center 38.4974 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
94.614 MHz
Total Power 27.1 dBm
Transmit Freq Error -555.61 kHz
% of OBW Power 99.00 %
x dB Bandwidth 102.2 MHz
x dB -26.00 dB
Center Freq
38.497440000 GHz
CF Step
20.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

Keysight Spectrum Analyzer - Occupied BW
Center Freq 39.941240000 GHz
Center Freq: 39.941240000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10:08:35 AM Sep 25, 2020
Frequency
10 dB/div
Log
Ref 33.00 dBm
Center 39.9412 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
95.295 MHz
Total Power 24.2 dBm
Transmit Freq Error -300.53 kHz
% of OBW Power 99.00 %
x dB Bandwidth 105.7 MHz
x dB -26.00 dB
Center Freq
39.941240000 GHz
CF Step
20.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

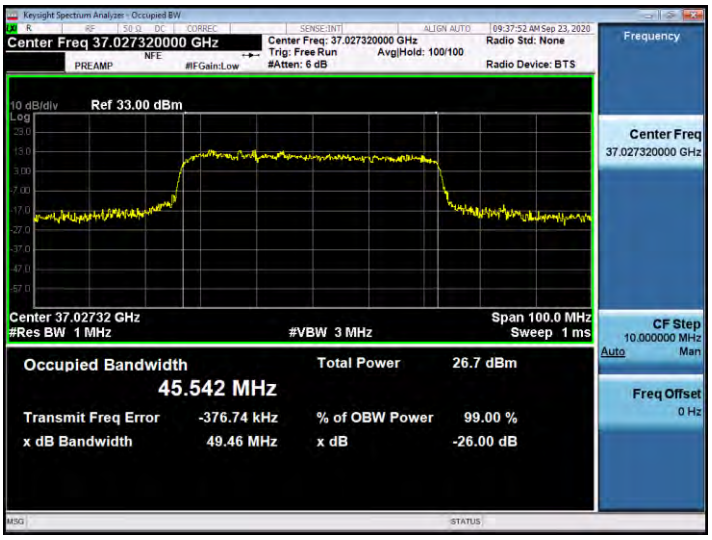
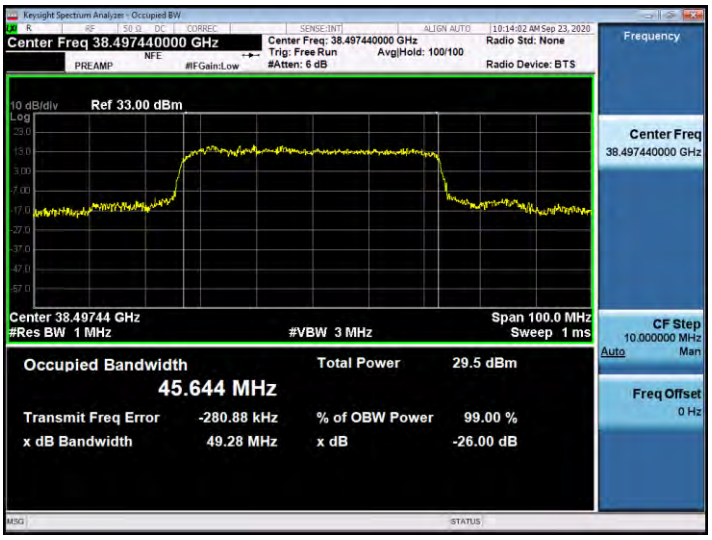
100 MHz, 2CC	
	
	

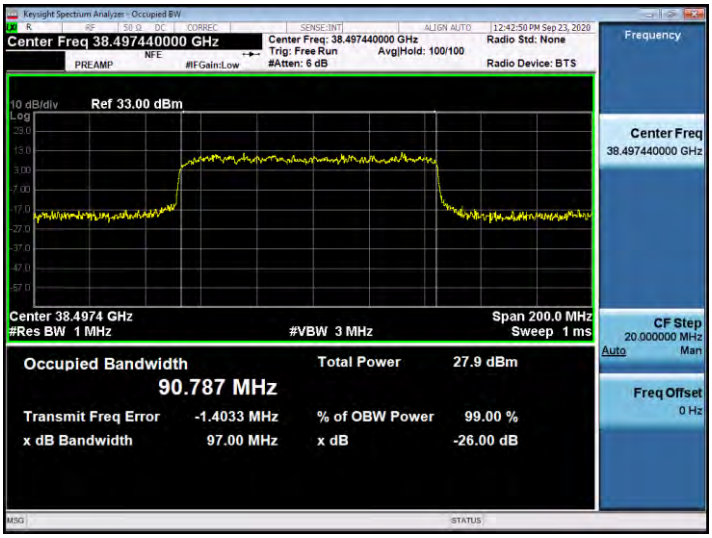
Keysight Spectrum Analyzer - Occupied BW
Center Freq 37.101800000 GHz
Center Freq: 37.101800000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
12:02:02 PM Sep 25, 2020
10 dB/div
Ref 33.00 dBm
Center 37.1018 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
188.56 MHz
Total Power 27.5 dBm
Transmit Freq Error -1.5044 MHz
% of OBW Power 99.00 %
x dB Bandwidth 198.1 MHz
x dB -26.00 dB
Frequency
Center Freq
37.101800000 GHz
CF Step
40.000000 MHz
Auto
Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 38.497440000 GHz
Center Freq: 38.497440000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
12:12:16 PM Sep 25, 2020
10 dB/div
Ref 33.00 dBm
Center 38.4974 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
188.99 MHz
Total Power 27.4 dBm
Transmit Freq Error -1.5448 MHz
% of OBW Power 99.00 %
x dB Bandwidth 197.5 MHz
x dB -26.00 dB
Frequency
Center Freq
38.497440000 GHz
CF Step
40.000000 MHz
Auto
Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 39.899920000 GHz
Center Freq: 39.899920000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
12:19:48 PM Sep 25, 2020
10 dB/div
Ref 33.00 dBm
Center 39.8999 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.11 MHz
Total Power 25.9 dBm
Transmit Freq Error -742.82 kHz
% of OBW Power 99.00 %
x dB Bandwidth 203.2 MHz
x dB -26.00 dB
Frequency
Center Freq
39.899920000 GHz
CF Step
40.000000 MHz
Auto
Man
Freq Offset
0 Hz

4. Antenna 1(K patch), n260

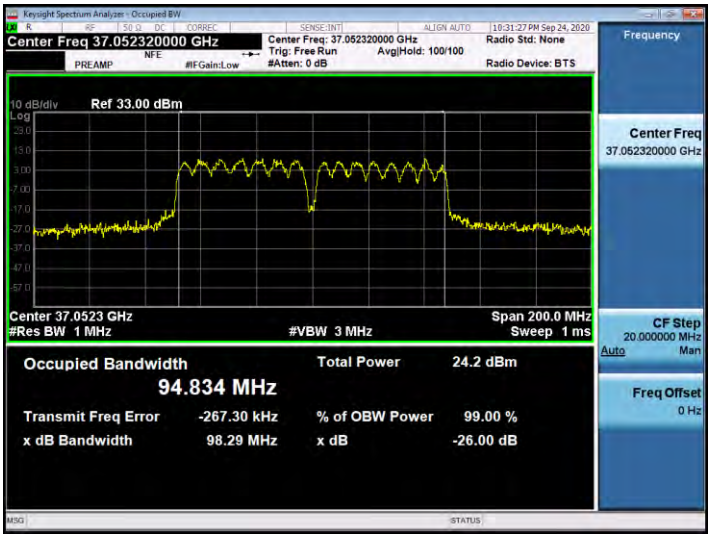
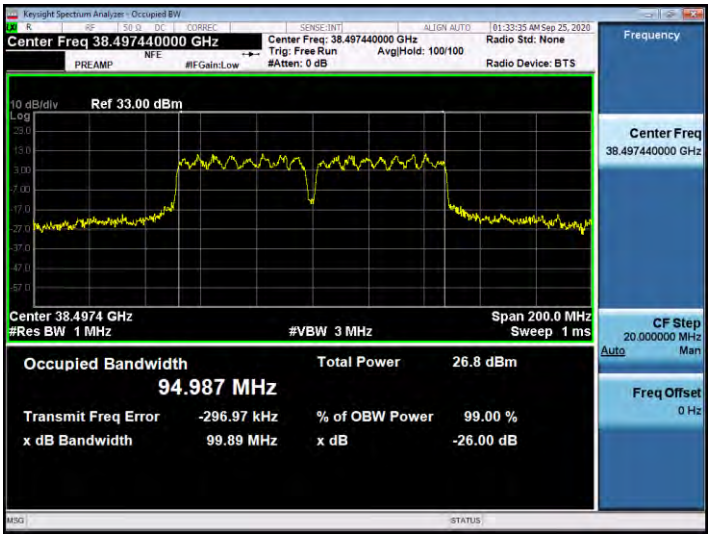
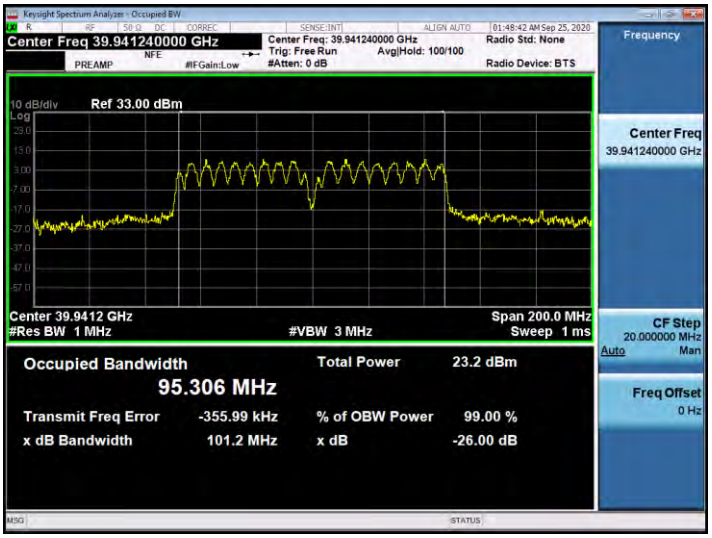
50 MHz, 1CC	
	
	

100 MHz, 1CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 37.051800000 GHz
Center Freq: 37.051800000 GHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 6 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div Ref 33.00 dBm
Center 37.0518 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.820 MHz
Total Power 25.6 dBm
Transmit Freq Error -1.7511 MHz
% of OBW Power 99.00 %
x dB Bandwidth 97.66 MHz
x dB -26.00 dB
Frequency
Center Freq
37.051800000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 38.497440000 GHz
Center Freq: 38.497440000 GHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 6 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div Ref 33.00 dBm
Center 38.4974 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.787 MHz
Total Power 27.9 dBm
Transmit Freq Error -1.4033 MHz
% of OBW Power 99.00 %
x dB Bandwidth 97.00 MHz
x dB -26.00 dB
Frequency
Center Freq
38.497440000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

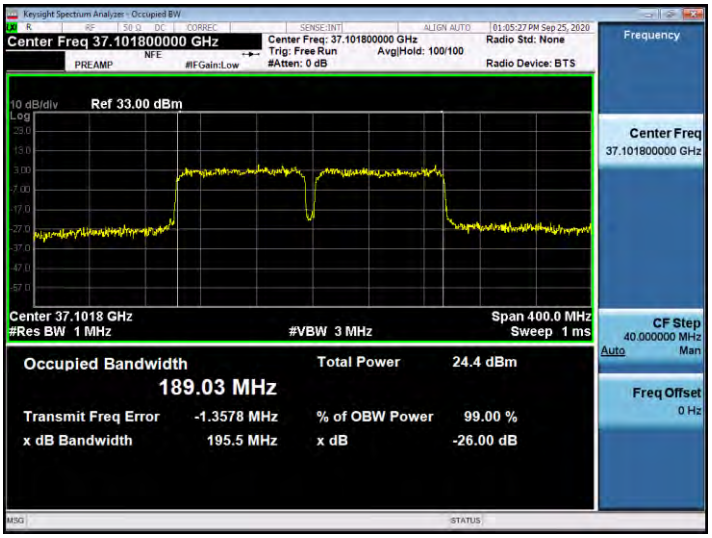
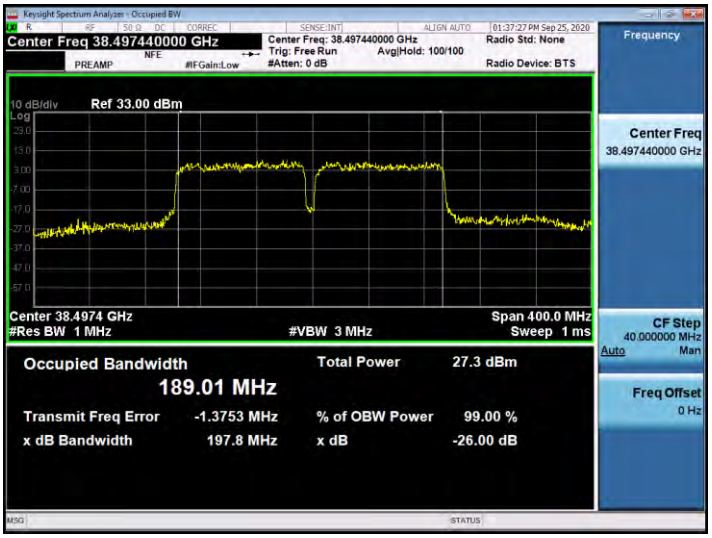
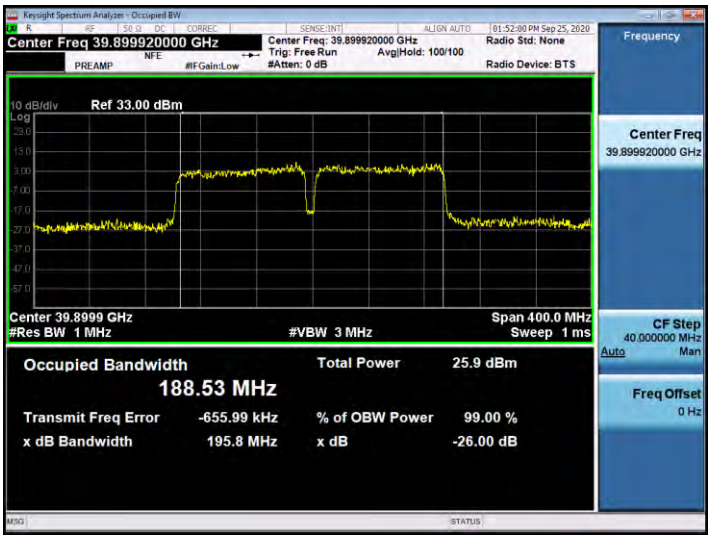
Keysight Spectrum Analyzer - Occupied BW
Center Freq 39.949920000 GHz
Center Freq: 39.949920000 GHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 6 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div Ref 33.00 dBm
Center 39.9499 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
90.698 MHz
Total Power 26.0 dBm
Transmit Freq Error -1.3578 MHz
% of OBW Power 99.00 %
x dB Bandwidth 100.7 MHz
x dB -26.00 dB
Frequency
Center Freq
39.949920000 GHz
CF Step
20.000000 MHz
Auto Man
Freq Offset
0 Hz

50 MHz, 2CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 37.052320000 GHz
Center Freq: 37.052320000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 37.0523 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
94.834 MHz
Total Power 24.2 dBm
Transmit Freq Error -267.30 kHz
% of OBW Power 99.00 %
x dB Bandwidth 98.29 MHz
x dB -26.00 dB
Frequency
Center Freq
37.052320000 GHz
CF Step
20.000000 MHz
Auto
Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 38.497440000 GHz
Center Freq: 38.497440000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 38.4974 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
94.987 MHz
Total Power 26.8 dBm
Transmit Freq Error -296.97 kHz
% of OBW Power 99.00 %
x dB Bandwidth 99.89 MHz
x dB -26.00 dB
Frequency
Center Freq
38.497440000 GHz
CF Step
20.000000 MHz
Auto
Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 39.941240000 GHz
Center Freq: 39.941240000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 39.9412 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 200.0 MHz
Sweep 1 ms
Occupied Bandwidth
95.306 MHz
Total Power 23.2 dBm
Transmit Freq Error -355.99 kHz
% of OBW Power 99.00 %
x dB Bandwidth 101.2 MHz
x dB -26.00 dB
Frequency
Center Freq
39.941240000 GHz
CF Step
20.000000 MHz
Auto
Man
Freq Offset
0 Hz

100 MHz, 2CC	
	
	

Keysight Spectrum Analyzer - Occupied BW
Center Freq 37.101800000 GHz
Center Freq: 37.101800000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 37.1018 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.03 MHz
Total Power
24.4 dBm
Transmit Freq Error
-1.3578 MHz
% of OBW Power
99.00 %
x dB Bandwidth
195.5 MHz
x dB
-26.00 dB
Frequency
Center Freq
37.101800000 GHz
CF Step
40.000000 MHz
Auto
Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 38.497440000 GHz
Center Freq: 38.497440000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 38.4974 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
189.01 MHz
Total Power
27.3 dBm
Transmit Freq Error
-1.3753 MHz
% of OBW Power
99.00 %
x dB Bandwidth
197.8 MHz
x dB
-26.00 dB
Frequency
Center Freq
38.497440000 GHz
CF Step
40.000000 MHz
Auto
Man
Freq Offset
0 Hz

Keysight Spectrum Analyzer - Occupied BW
Center Freq 39.899920000 GHz
Center Freq: 39.899920000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 0 dB
Radio Std: None
Radio Device: BTS
PREAMP
#IFGain:Low
10 dB/div
Ref 33.00 dBm
Center 39.8999 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 400.0 MHz
Sweep 1 ms
Occupied Bandwidth
188.53 MHz
Total Power
25.9 dBm
Transmit Freq Error
-655.99 kHz
% of OBW Power
99.00 %
x dB Bandwidth
195.8 MHz
x dB
-26.00 dB
Frequency
Center Freq
39.899920000 GHz
CF Step
40.000000 MHz
Auto
Man
Freq Offset
0 Hz

5.2. EQUIVALENT ISOTROPIC RADIATED POWER

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

The average power of the sum of all antenna elements is limited to a maximum EIRP of +43 dBm.

FCC Rules

Test Requirements:

§ 30.202 Power limits.

(b) For mobile stations, the average power of the sum of all antenna elements is limited to a maximum EIRP of +43 dBm.

Test Procedures:

The measurement is performed in accordance with Section 5.2.4.4.2 of ANSI C63.26.

a) Set span to 2 × to 3 × the OBW.

b) Set RBW = 1% to 5% of the OBW.

c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time:

1) Set = auto-couple, or

2) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.

f) Detector = power averaging (rms).

g) Set sweep trigger to “free run.”

h) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

j) Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

Note:

1. The EUT was tested under rotating conditions and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
2. Elements within the same antenna array are correlated to produce beamforming array gain. Antenna arrays cannot be correlated with another antenna array. During testing, only one antenna array was active.
3. Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst case polarization/positioning. It was determined that H=0 degree and V=90 degree are the worst case positions when the EUT was transmitting horizontally and vertically polarized beams, respectively.

Test Results:

Antenna 0(L patch), n261

SISO

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]
1	50 MHz	27534.84	Low	H	QPSK	V	10/11	28.07
		27534.84	Low	V	BPSK	H	10/11	26.61
		27923.52	Mid	H	QPSK	V	10/11	27.01
		27923.52	Mid	V	QPSK	H	10/11	27.07
		28319.52	High	H	QPSK	V	10/11	26.23
		28319.52	High	V	QPSK	H	1/21	25.90
	100 MHz	27559.32	Low	H	QPSK	V	20/22	27.85
		27559.32	Low	V	BPSK	H	20/22	26.84
		27923.52	Mid	H	QPSK	H	20/22	26.68
		27923.52	Mid	V	QPSK	H	20/22	27.29
		28292.16	High	H	QPSK	V	20/22	26.20
		28292.16	High	V	QPSK	H	20/22	27.20
2	50 MHz	27559.84	Low	H	QPSK	V	32/0	24.78
		27559.84	Low	V	BPSK	H	32/0	23.30
		27923.52	Mid	H	QPSK	V	32/0	24.06
		27923.52	Mid	V	QPSK	H	32/0	24.03
		28294.52	High	H	QPSK	V	32/0	22.87
		28294.52	High	V	QPSK	H	32/0	22.53
	100 MHz	27609.32	Low	H	QPSK	V	64/0	24.58
		27609.32	Low	V	BPSK	H	64/0	23.58
		27923.52	Mid	H	QPSK	V	64/0	23.92
		27923.52	Mid	V	QPSK	H	64/0	23.26
		28242.16	High	H	QPSK	V	64/0	23.37
		28242.16	High	V	QPSK	H	64/0	23.03

MIMO

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]	SUM [dBm]
1	50 MHz	27534.84	Low	MIMO	BPSK	H	10/11	26.14	31.62
		27534.84	Low	MIMO	BPSK	V		30.17	
		27923.52	Mid	MIMO	BPSK	H	10/11	27.96	30.96
		27923.52	Mid	MIMO	BPSK	V		27.93	
		28319.52	High	MIMO	BPSK	H	1/21	26.84	29.23
		28319.52	High	MIMO	BPSK	V		25.50	
	100 MHz	27559.32	Low	MIMO	QPSK	H	20/22	26.56	31.88
		27559.32	Low	MIMO	QPSK	V		30.37	
		27923.52	Mid	MIMO	QPSK	H	20/22	27.33	30.42
		27923.52	Mid	MIMO	QPSK	V		27.48	
		28292.16	High	MIMO	QPSK	H	20/22	26.72	29.12
		28292.16	High	MIMO	QPSK	V		25.40	
2	50 MHz	27559.84	Low	MIMO	BPSK	H	32/0	22.25	26.41
		27559.84	Low	MIMO	BPSK	V		24.30	
		27923.52	Mid	MIMO	BPSK	H	32/0	22.36	24.71
		27923.52	Mid	MIMO	BPSK	V		20.91	
		28294.52	High	MIMO	BPSK	H	32/0	21.64	24.43
		28294.52	High	MIMO	BPSK	V		21.18	
	100 MHz	27609.32	Low	MIMO	QPSK	H	64/0	23.51	28.46
		27609.32	Low	MIMO	QPSK	V		26.79	
		27923.52	Mid	MIMO	QPSK	H	64/0	24.31	27.45
		27923.52	Mid	MIMO	QPSK	V		24.57	
		28242.16	High	MIMO	QPSK	H	64/0	23.82	26.06
		28242.16	High	MIMO	QPSK	V		22.11	

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SISO

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]
1	50 MHz	27534.84	Low	H	BPSK	H	10/11	27.41
		27534.84	Low	V	BPSK	H	1/11	24.89
		27923.52	Mid	H	BPSK	H	10/11	25.50
		27923.52	Mid	V	BPSK	H	10/11	25.04
		28319.52	High	H	BPSK	H	1/21	19.30
		28319.52	High	V	BPSK	H	10/11	23.87
	100 MHz	27559.32	Low	H	BPSK	H	1/22	26.89
		27559.32	Low	V	BPSK	H	20/22	24.46
		27923.52	Mid	H	BPSK	H	1/22	26.02
		27923.52	Mid	V	BPSK	H	20/22	25.15
		28292.16	High	H	BPSK	H	20/22	19.82
		28292.16	High	V	BPSK	H	20/22	23.91
2	50 MHz	27559.84	Low	H	BPSK	H	32/0	23.93
		27559.84	Low	V	BPSK	H	32/0	21.45
		27923.52	Mid	H	BPSK	H	32/0	22.54
		27923.52	Mid	V	BPSK	H	32/0	21.87
		28294.52	High	H	BPSK	H	32/0	16.52
		28294.52	High	V	BPSK	H	32/0	20.75
	100 MHz	27609.32	Low	H	BPSK	H	64/0	23.88
		27609.32	Low	V	BPSK	H	64/0	21.76
		27923.52	Mid	H	BPSK	H	64/0	22.60
		27923.52	Mid	V	BPSK	H	64/0	21.79
		28242.16	High	H	BPSK	H	64/0	16.63
		28242.16	High	V	BPSK	H	64/0	20.41

MIMO

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]	SUM [dBm]
1	50 MHz	27534.84	Low	MIMO	BPSK	H	10/11	28.20	30.02
		27534.84	Low	MIMO	BPSK	V		25.36	
		27923.52	Mid	MIMO	BPSK	H	10/11	27.84	30.40
		27923.52	Mid	MIMO	BPSK	V		24.85	
		28319.52	High	MIMO	BPSK	H	1/21	26.89	29.42
		28319.52	High	MIMO	BPSK	V		26.35	
	100 MHz	27559.32	Low	MIMO	BPSK	H	20/22	28.30	30.07
		27559.32	Low	MIMO	BPSK	V		25.33	
		27923.52	Mid	MIMO	BPSK	H	20/22	27.74	29.45
		27923.52	Mid	MIMO	BPSK	V		24.56	
		28292.16	High	MIMO	BPSK	H	1/43	27.02	29.30
		28292.16	High	MIMO	BPSK	V		25.41	
2	50 MHz	27559.84	Low	MIMO	BPSK	H	32/0	22.52	26.34
		27559.84	Low	MIMO	BPSK	V		24.02	
		27923.52	Mid	MIMO	BPSK	H	32/0	21.58	23.98
		27923.52	Mid	MIMO	BPSK	V		20.25	
		28294.52	High	MIMO	BPSK	H	32/0	22.06	25.42
		28294.52	High	MIMO	BPSK	V		22.74	
	100 MHz	27609.32	Low	MIMO	QPSK	H	64/0	25.18	26.81
		27609.32	Low	MIMO	QPSK	V		21.75	
		27923.52	Mid	MIMO	QPSK	H	64/0	24.42	26.29
		27923.52	Mid	MIMO	QPSK	V		21.72	
		28242.16	High	MIMO	QPSK	H	64/0	24.09	26.13
		28242.16	High	MIMO	QPSK	V		21.87	

Antenna 0(L patch), n260

SISO

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]
1	50 MHz	37027.32	Low	H (145)	BPSK	V	1/11	26.32
		37027.32	Low	V (27)	BPSK	H	1/11	22.50
		38497.44	Mid	H (145)	BPSK	V	1/11	27.47
		38497.44	Mid	V (29)	BPSK	H	10/11	23.75
		39966.24	High	H (155)	BPSK	V	10/11	23.63
		39966.24	High	V (28)	BPSK	H	10/11	20.05
	100 MHz	37051.80	Low	H (145)	BPSK	V	20/22	25.74
		37051.80	Low	V (27)	BPSK	H	20/22	22.53
		38497.44	Mid	H (145)	BPSK	V	1/22	27.01
		38497.44	Mid	V (29)	BPSK	H	1/22	22.61
		39949.92	High	H (155)	BPSK	V	20/22	23.23
		39949.92	High	V (28)	BPSK	H	20/22	19.87
2	50 MHz	37052.32	Low	H (145)	BPSK	V	32/0	22.33
		37052.32	Low	V (27)	BPSK	H	32/0	18.77
		38497.44	Mid	H (145)	BPSK	V	32/0	22.08
		38497.44	Mid	V (29)	BPSK	H	32/0	19.96
		39941.24	High	H (155)	BPSK	V	32/0	20.55
		39941.24	High	V (28)	BPSK	H	32/0	16.74
	100 MHz	37101.80	Low	H (145)	BPSK	V	64/0	22.02
		37101.80	Low	V (27)	BPSK	H	64/0	18.61
		38497.44	Mid	H (145)	BPSK	V	64/0	23.09
		38497.44	Mid	V (29)	BPSK	H	64/0	19.35
		39899.92	High	H (155)	BPSK	V	64/0	20.42
		39899.92	High	V (28)	BPSK	H	64/0	15.68

MIMO

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]	SUM [dBm]
1	50 MHz	37027.32	Low	MIMO	BPSK	H	1/0	27.69	30.34
		37027.32	Low	MIMO	BPSK	V		26.94	
		38497.44	Mid	MIMO	BPSK	H	10/11	27.77	30.21
		38497.44	Mid	MIMO	BPSK	V		26.54	
		39966.24	High	MIMO	BPSK	H	1/11	26.05	28.24
		39966.24	High	MIMO	BPSK	V		24.23	
	100 MHz	37051.80	Low	MIMO	BPSK	H	1/22	26.59	29.36
		37051.80	Low	MIMO	BPSK	V		26.10	
		38497.44	Mid	MIMO	BPSK	H	1/22	27.29	29.66
		38497.44	Mid	MIMO	BPSK	V		25.89	
		39949.92	High	MIMO	BPSK	H	1/22	25.64	27.99
		39949.92	High	MIMO	BPSK	V		24.21	
2	50 MHz	37052.32	Low	MIMO	BPSK	H	32/0	21.39	24.37
		37052.32	Low	MIMO	BPSK	V		21.33	
		38497.44	Mid	MIMO	BPSK	H	32/0	21.63	24.59
		38497.44	Mid	MIMO	BPSK	V		21.52	
		39941.24	High	MIMO	BPSK	H	32/0	18.70	23.07
		39941.24	High	MIMO	BPSK	V		21.09	
	100 MHz	37101.80	Low	MIMO	BPSK	H	64/0	22.26	25.15
		37101.80	Low	MIMO	BPSK	V		22.01	
		38497.44	Mid	MIMO	BPSK	H	64/0	23.32	25.62
		38497.44	Mid	MIMO	BPSK	V		21.76	
		39899.92	High	MIMO	BPSK	H	64/0	21.26	23.90
		39899.92	High	MIMO	BPSK	V		20.49	

Antenna 1(K patch), n260

SISO

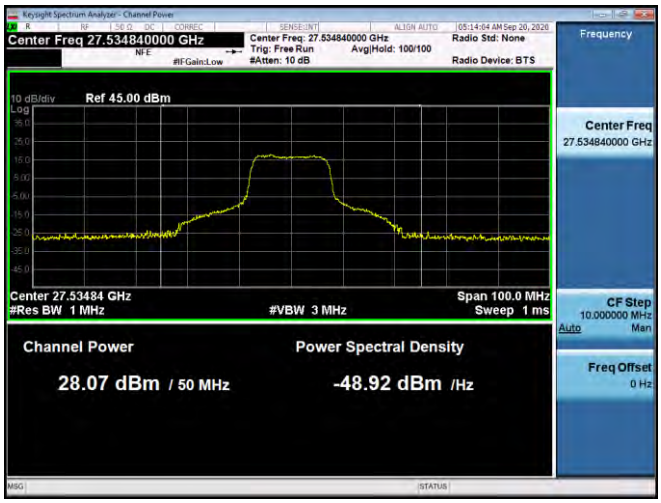
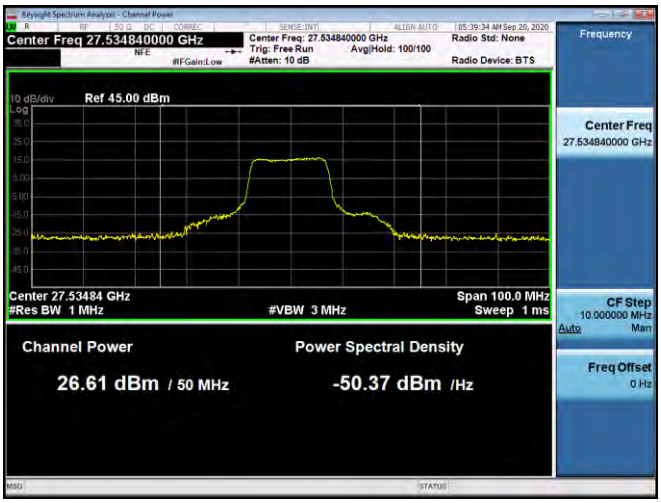
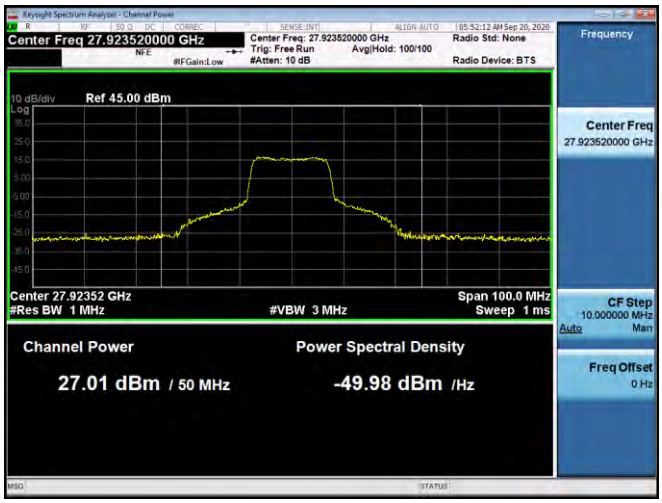
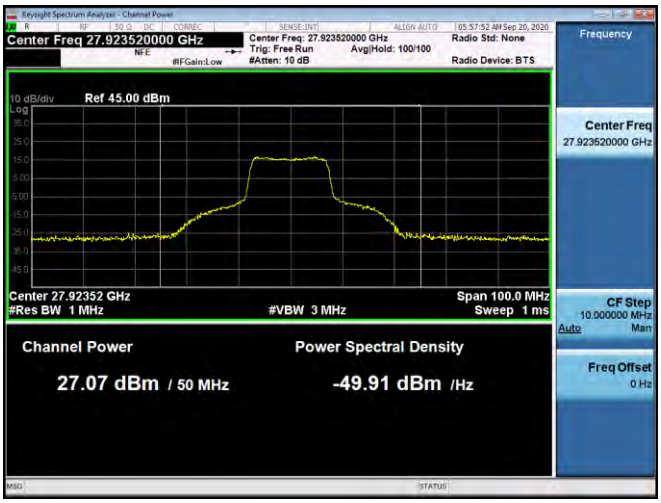
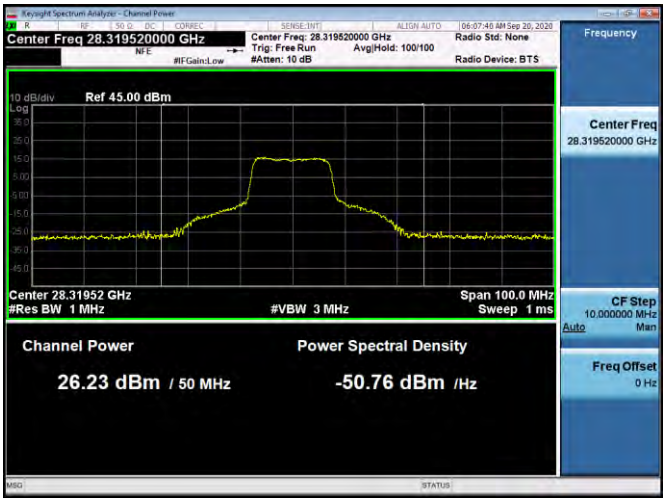
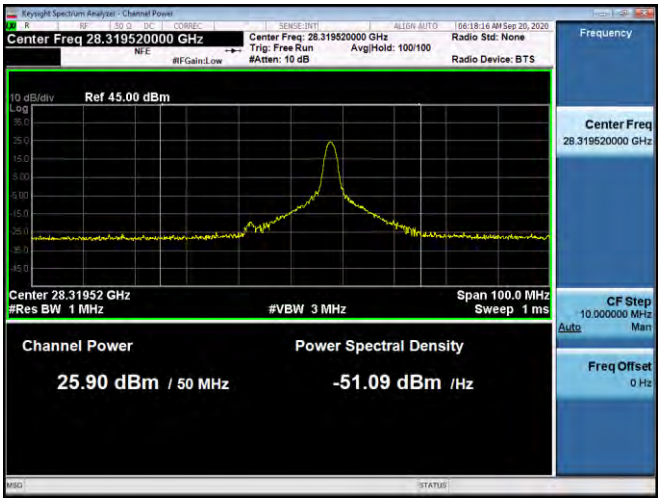
CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]
1	50 MHz	37027.32	Low	H (151)	BPSK	V	1/21	23.99
		37027.32	Low	V (32)	BPSK	H	1/11	20.14
		38497.44	Mid	H (151)	BPSK	V	1/21	24.83
		38497.44	Mid	V (21)	BPSK	H	10/11	18.94
		39966.24	High	H (160)	BPSK	V	10/11	21.34
		39966.24	High	V (31)	BPSK	H	1/21	21.63
	100 MHz	37051.80	Low	H (151)	BPSK	V	20/22	23.12
		37051.80	Low	V (32)	BPSK	H	20/22	19.85
		38497.44	Mid	H (151)	BPSK	V	1/43	24.80
		38497.44	Mid	V (21)	BPSK	H	1/43	18.81
		39949.92	High	H (160)	BPSK	V	20/22	21.20
		39949.92	High	V (31)	BPSK	H	1/43	21.37
2	50 MHz	37052.32	Low	H (151)	BPSK	V	32/0	19.63
		37052.32	Low	V (32)	BPSK	H	32/0	15.43
		38497.44	Mid	H (151)	BPSK	V	32/0	20.86
		38497.44	Mid	V (21)	BPSK	H	32/0	15.05
		39941.24	High	H (160)	BPSK	V	32/0	17.57
		39941.24	High	V (31)	BPSK	H	32/0	18.32
	100 MHz	37101.80	Low	H (151)	BPSK	V	64/0	20.09
		37101.80	Low	V (32)	BPSK	H	64/0	16.08
		38497.44	Mid	H (151)	BPSK	V	64/0	21.72
		38497.44	Mid	V (21)	BPSK	H	64/0	16.03
		39899.92	High	H (160)	BPSK	V	64/0	17.45
		39899.92	High	V (31)	BPSK	H	64/0	18.03

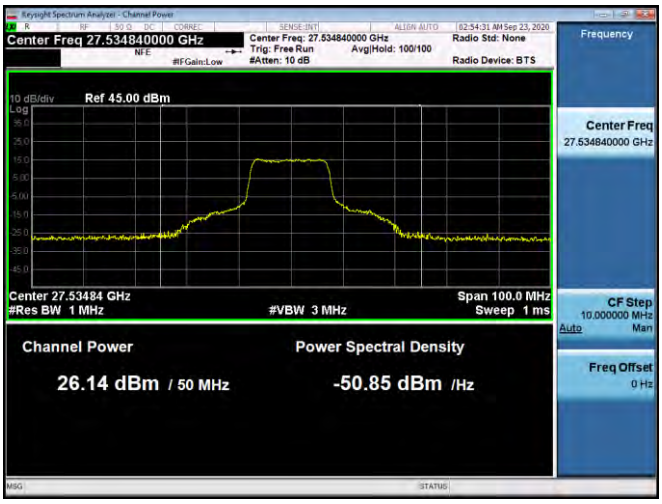
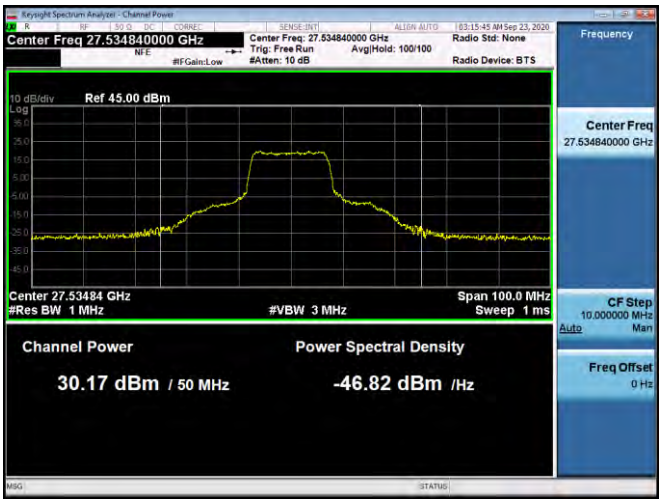
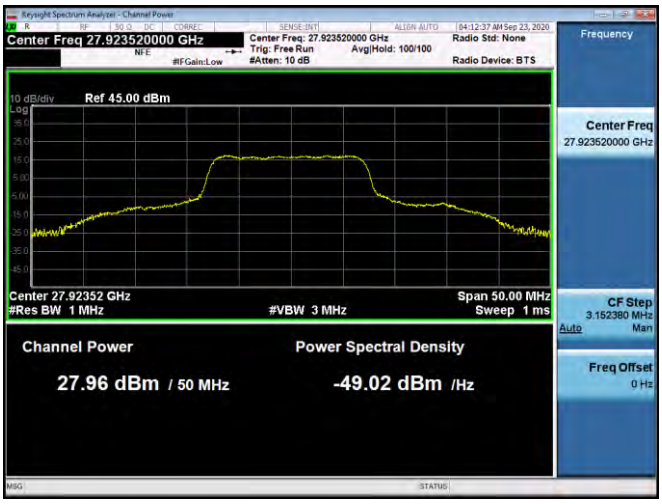
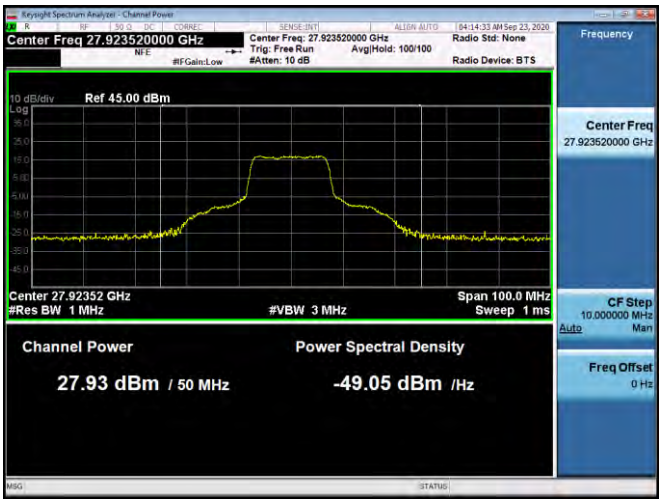
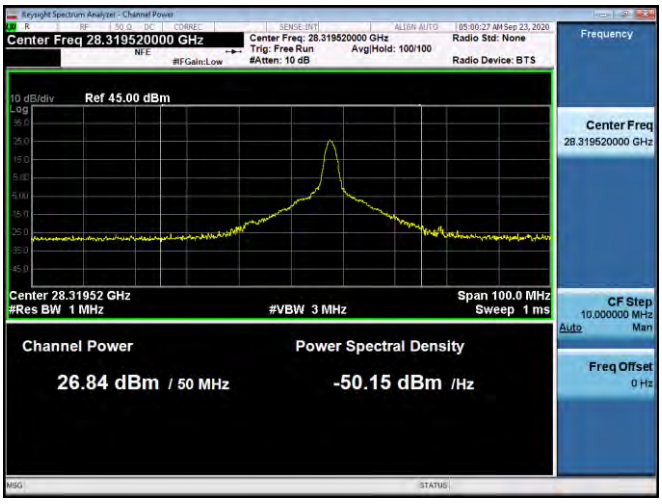
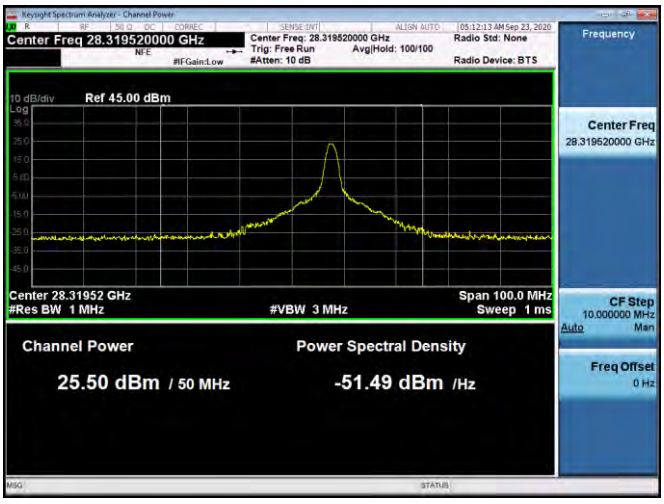
MIMO

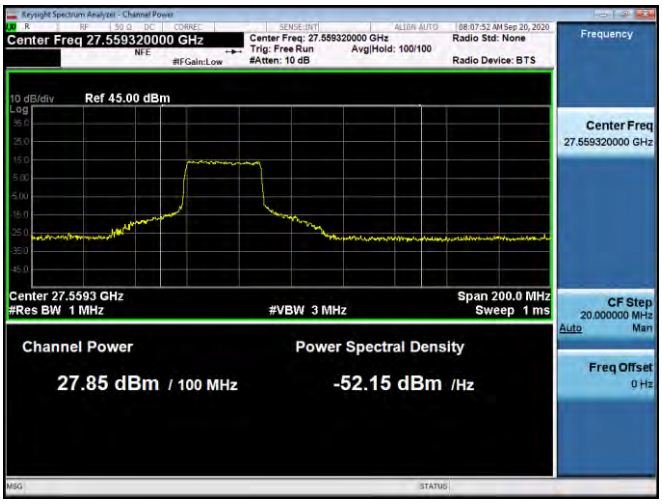
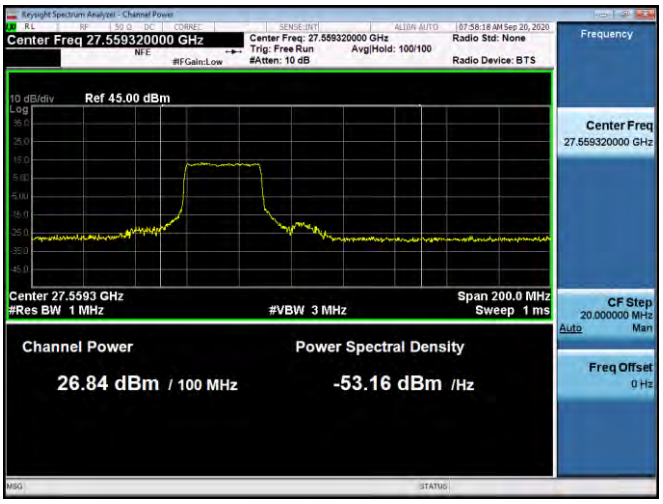
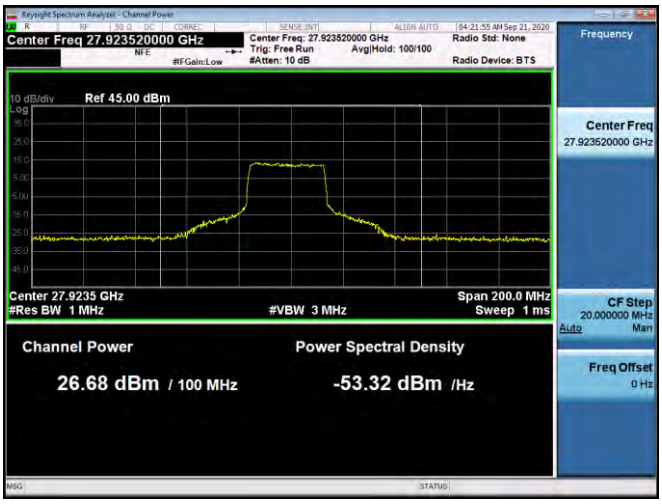
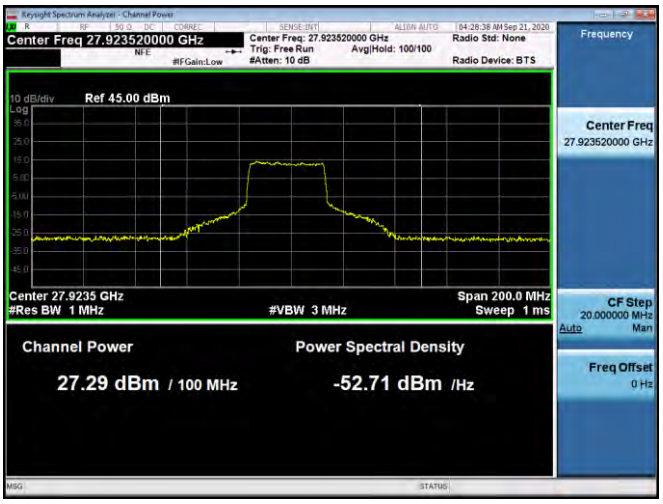
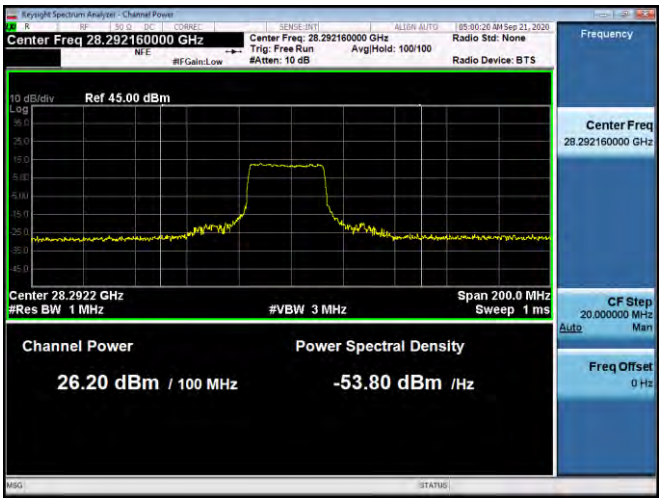
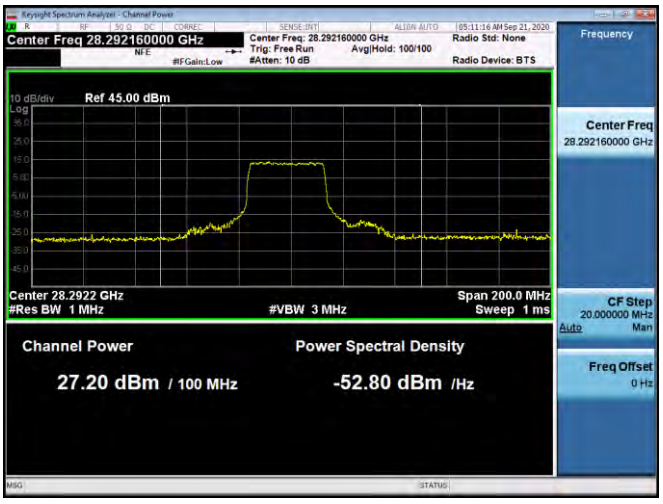
CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	EIRP [dBm]	SUM [dBm]
1	50 MHz	37027.32	Low	MIMO	BPSK	H	1/21	23.23	26.80
		37027.32	Low	MIMO	BPSK	V		24.29	
		38497.44	Mid	MIMO	BPSK	H	10/11	26.31	28.31
		38497.44	Mid	MIMO	BPSK	V		23.98	
		39966.24	High	MIMO	BPSK	H	1/21	22.62	26.36
		39966.24	High	MIMO	BPSK	V		23.98	
	100 MHz	37051.80	Low	MIMO	BPSK	H	20/22	22.30	25.85
		37051.80	Low	MIMO	BPSK	V		23.32	
		38497.44	Mid	MIMO	BPSK	H	20/22	25.32	27.91
		38497.44	Mid	MIMO	BPSK	V		24.43	
		39949.92	High	MIMO	BPSK	H	20/22	22.16	26.35
		39949.92	High	MIMO	BPSK	V		24.26	
2	50 MHz	37052.32	Low	MIMO	BPSK	H	32/0	19.70	22.93
		37052.32	Low	MIMO	BPSK	V		20.13	
		38497.44	Mid	MIMO	BPSK	H	32/0	21.32	23.60
		38497.44	Mid	MIMO	BPSK	V		19.71	
		39941.24	High	MIMO	BPSK	H	32/0	17.78	21.18
		39941.24	High	MIMO	BPSK	V		18.53	
	100 MHz	37101.80	Low	MIMO	BPSK	H	64/0	18.95	22.53
		37101.80	Low	MIMO	BPSK	V		20.02	
		38497.44	Mid	MIMO	BPSK	H	64/0	21.77	24.00
		38497.44	Mid	MIMO	BPSK	V		20.04	
		39899.92	High	MIMO	BPSK	H	64/0	19.73	23.10
		39899.92	High	MIMO	BPSK	V		20.42	

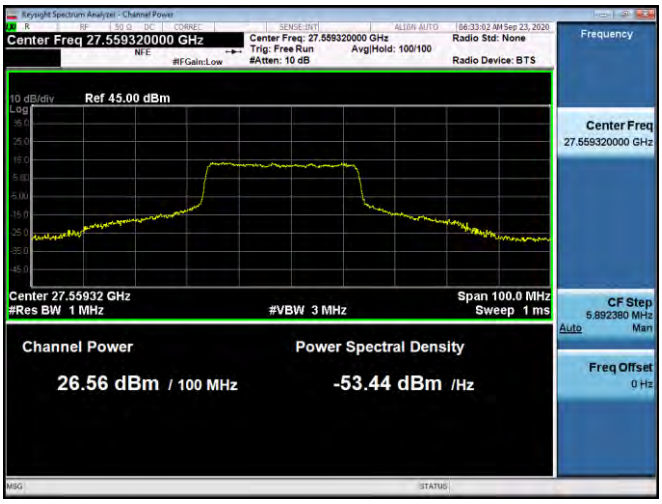
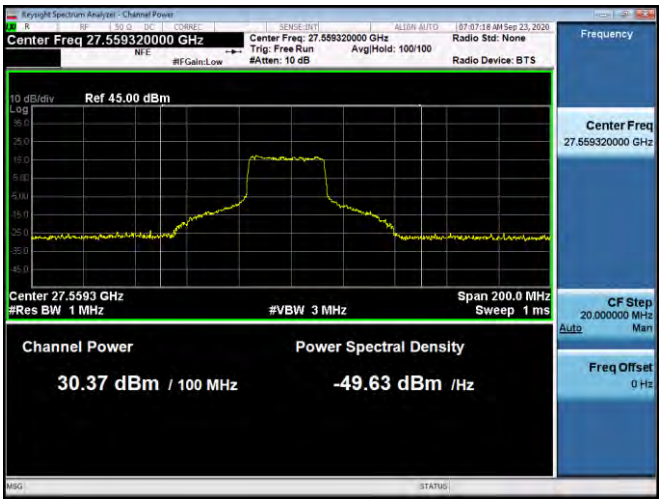
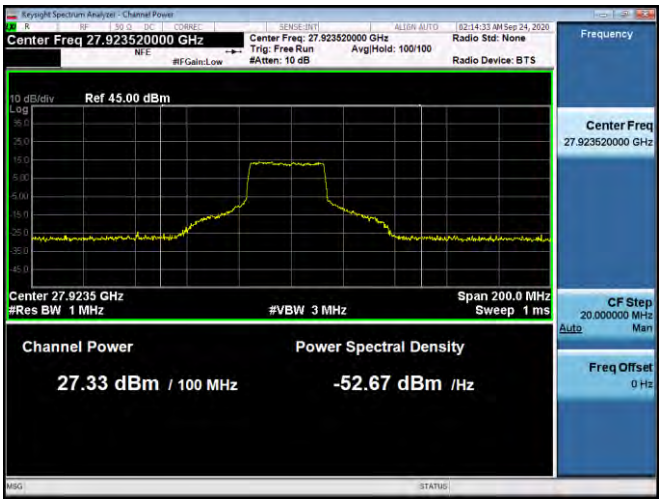
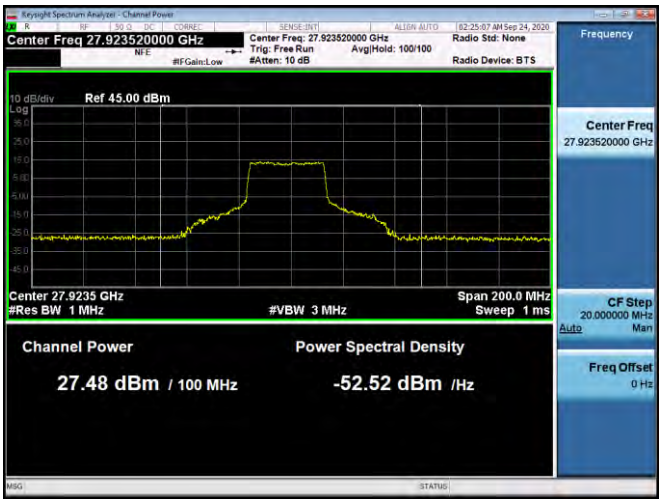
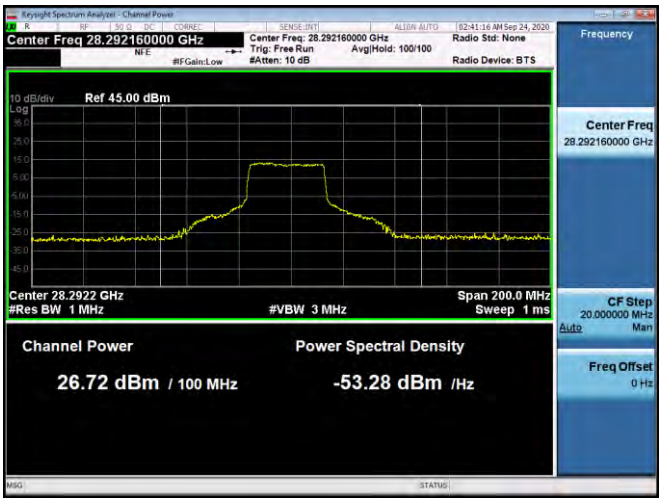
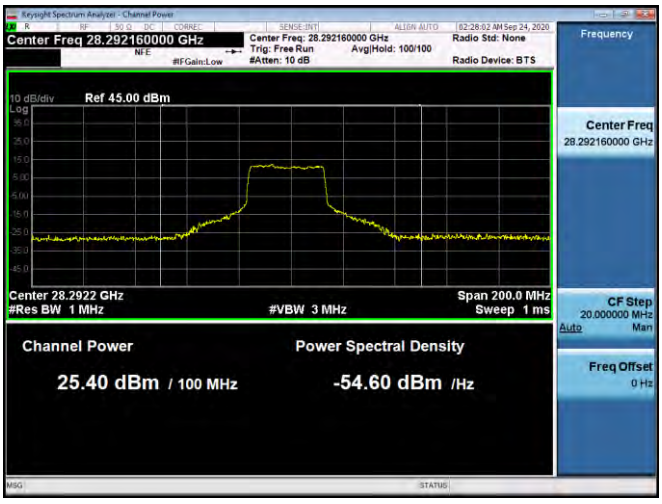
Plot Data of EIRP

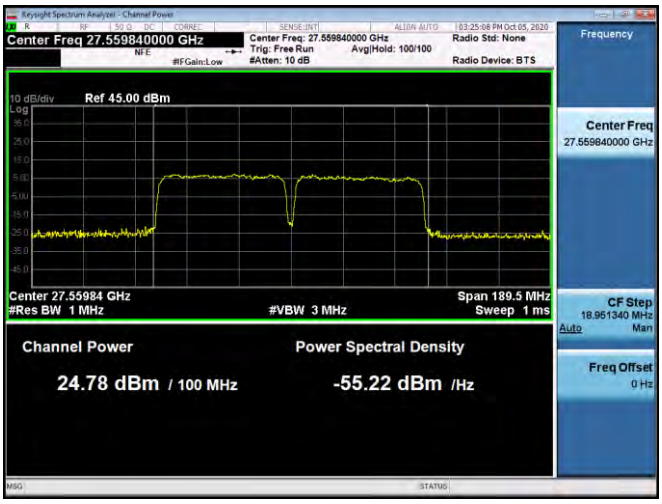
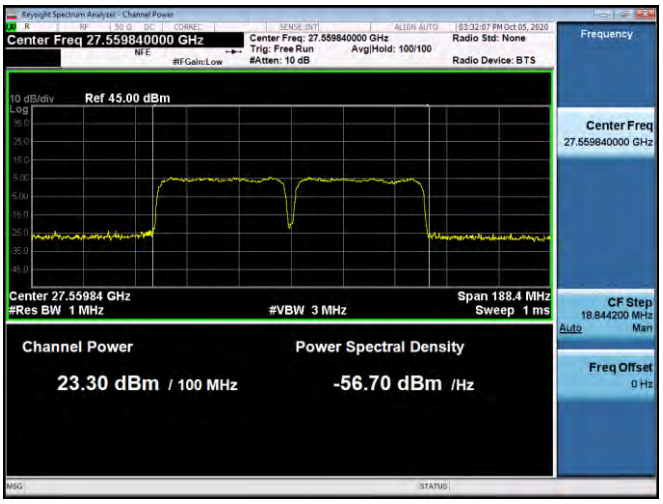
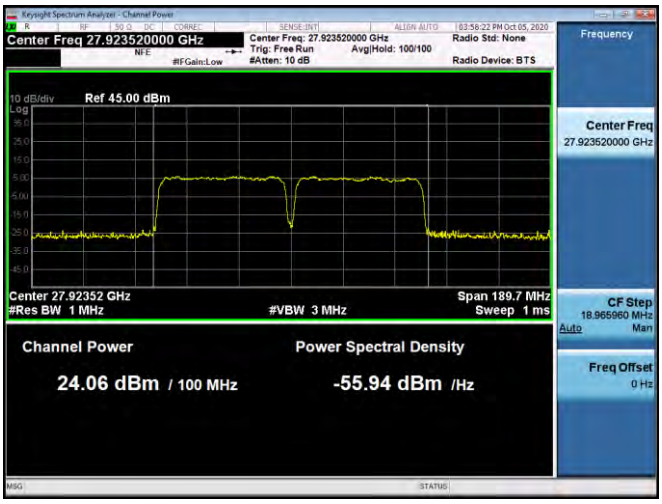
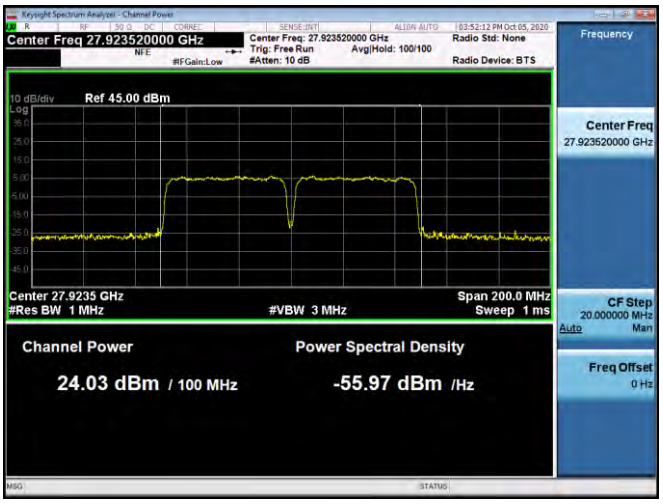
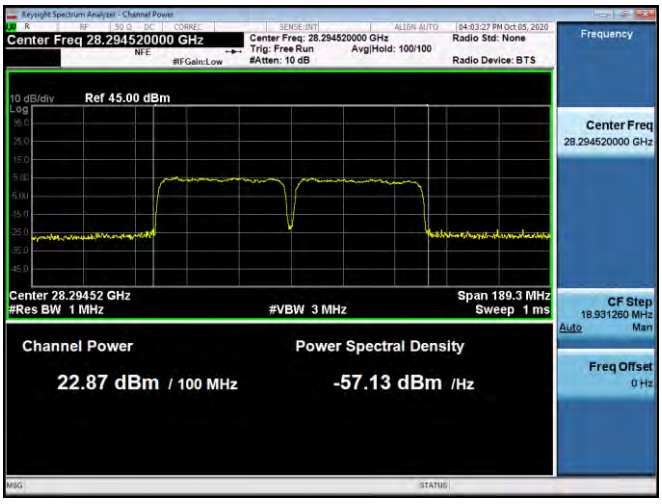
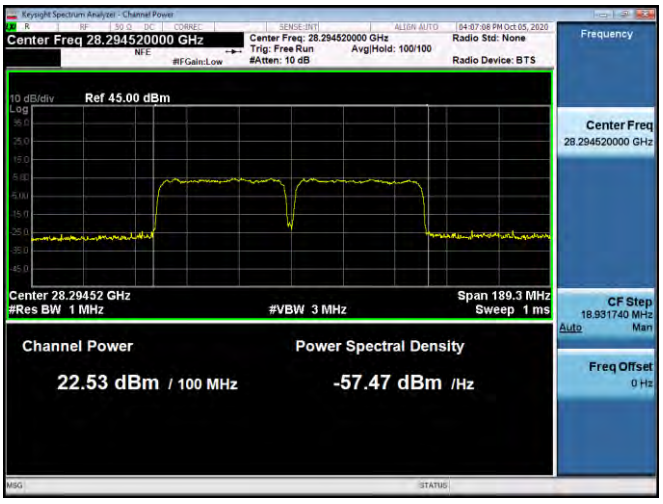
1. Antenna 0(L patch), n261

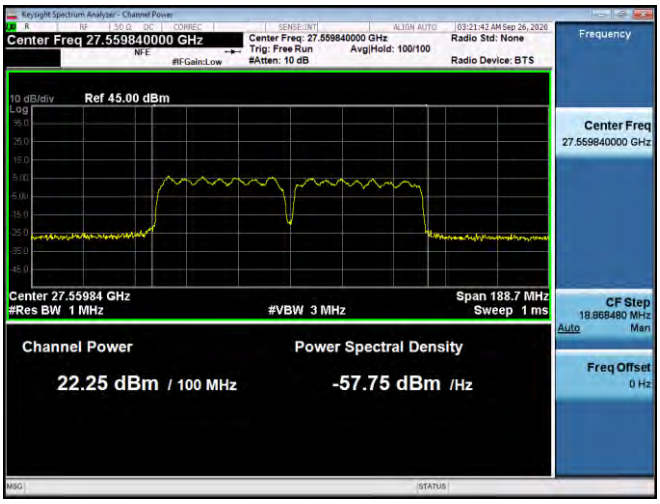
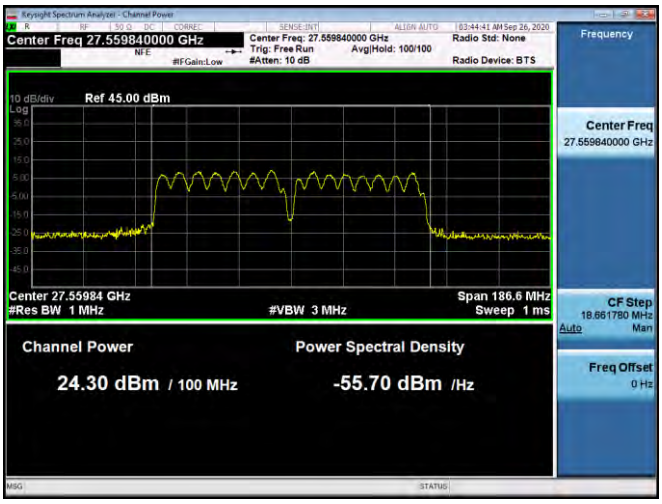
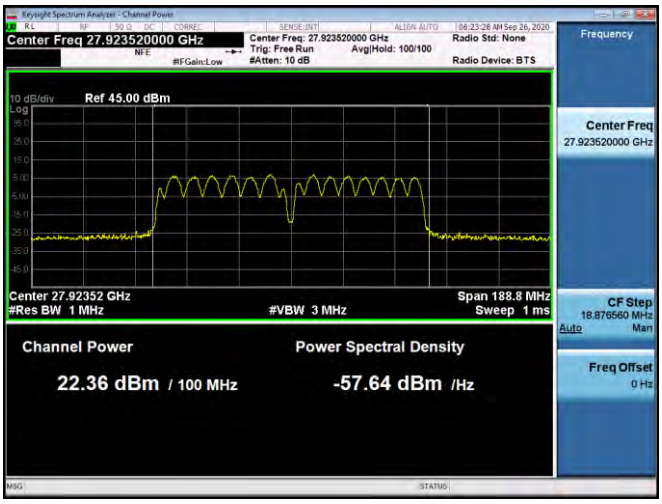
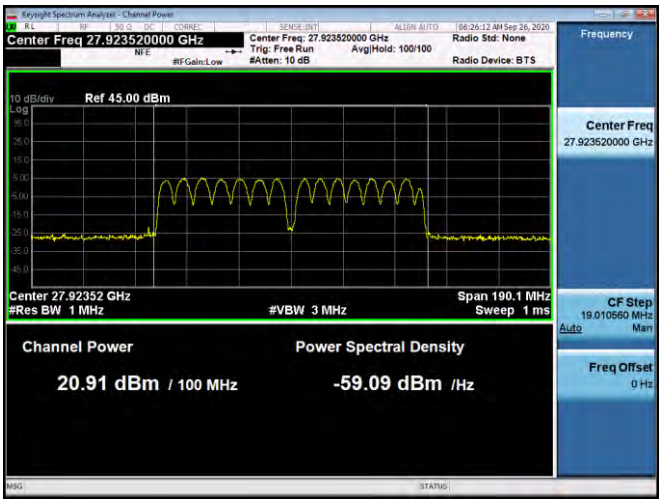
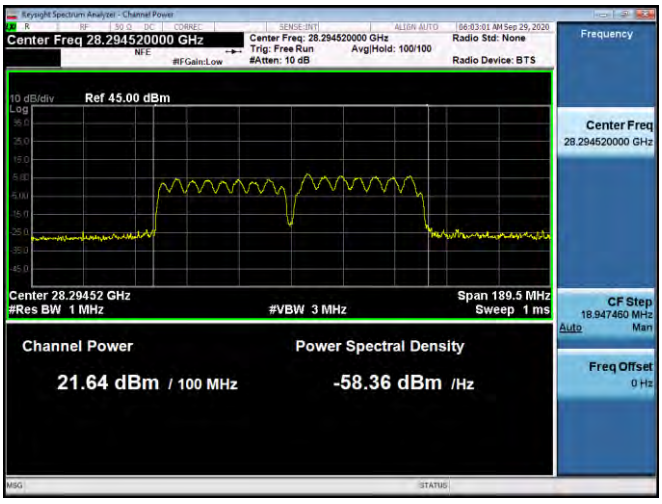
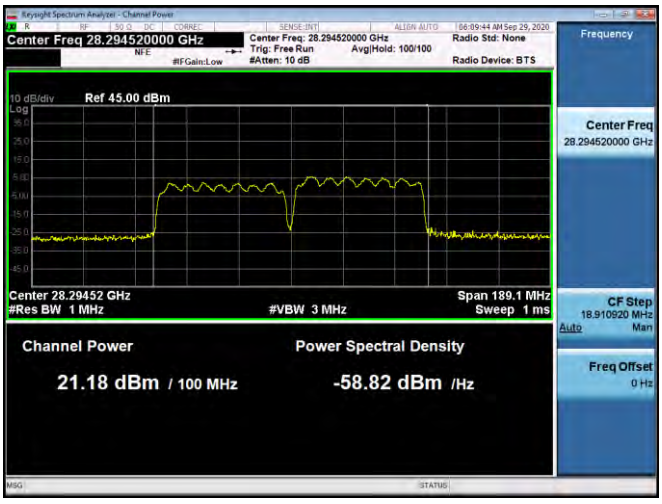
50 MHz, 1CC SISO	
	
	
	

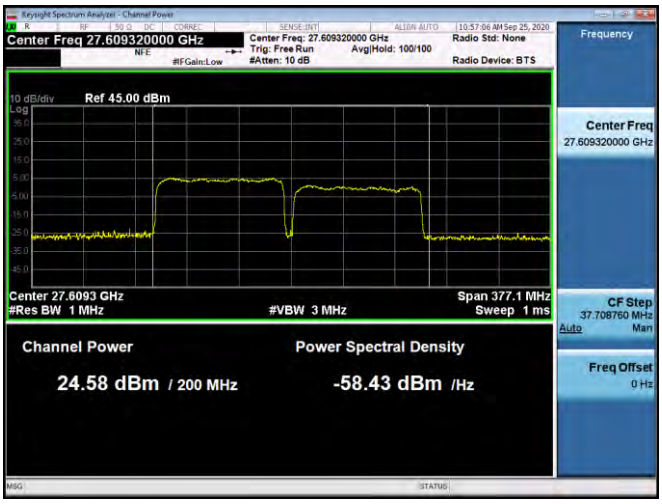
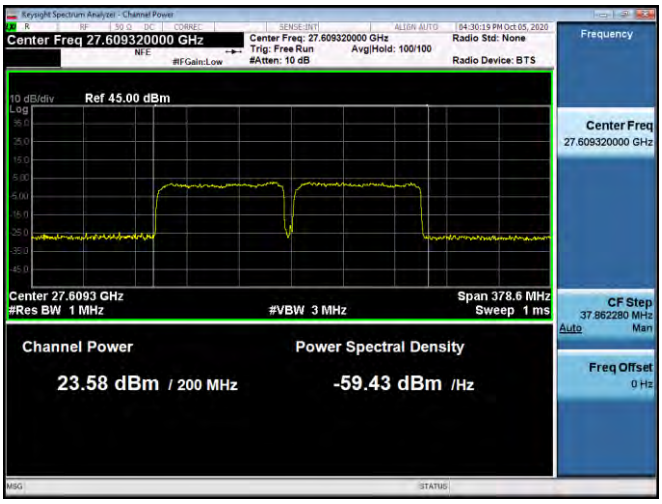
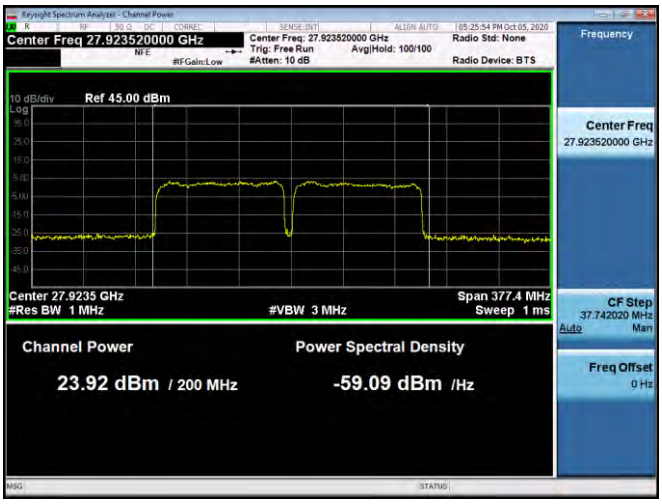
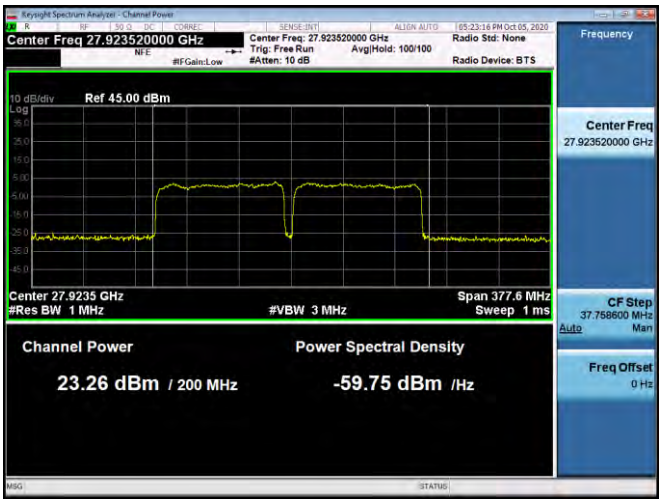
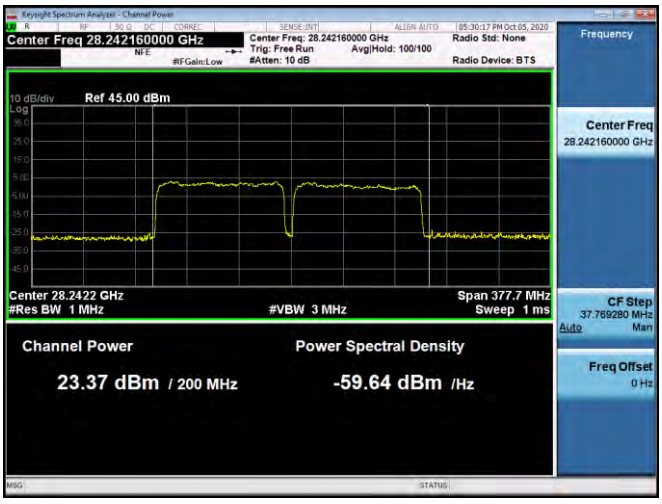
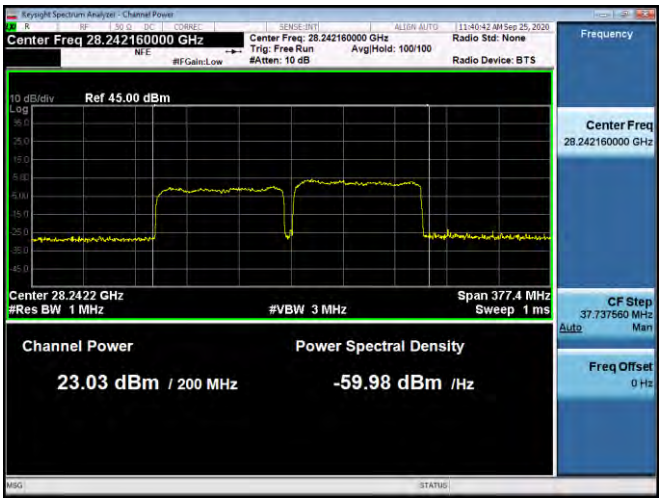
50 MHz, 1CC MIMO	
	
	
	

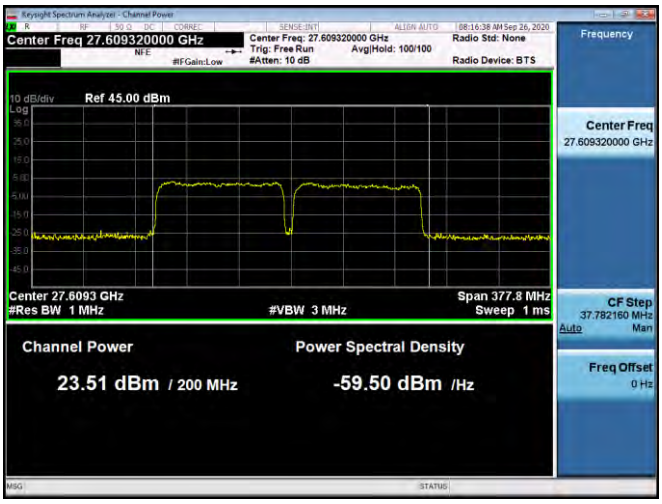
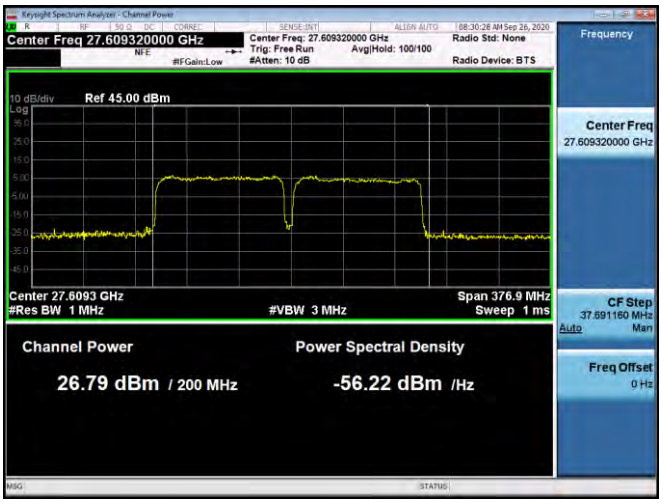
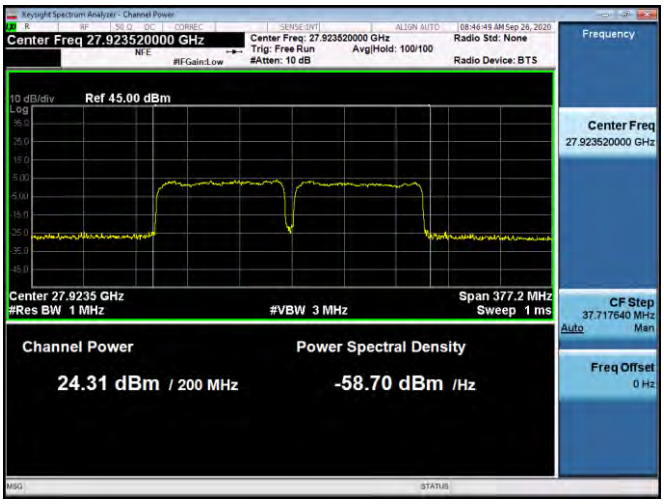
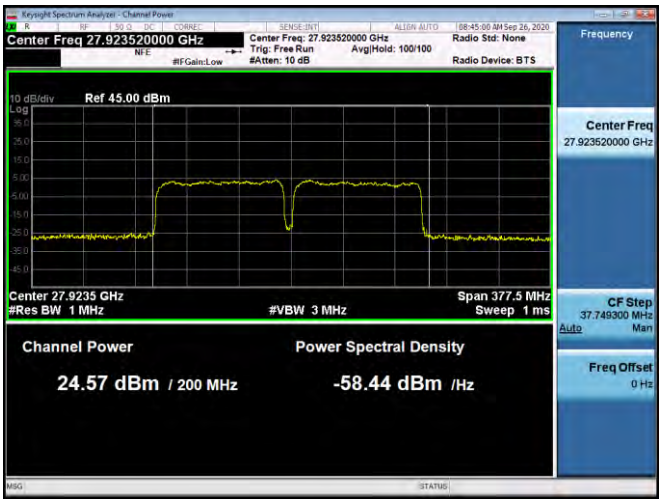
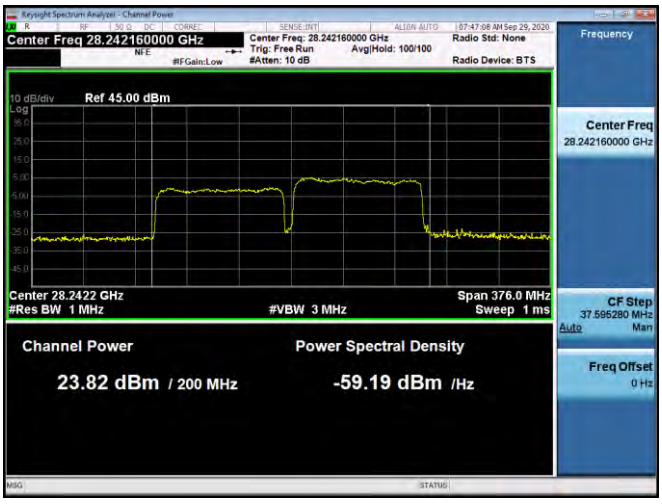
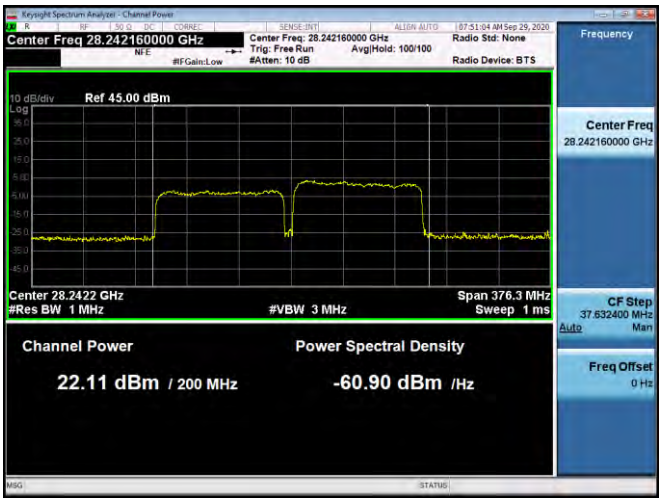
100 MHz, 1CC SISO	
	
	
	

100 MHz, 1CC MIMO	
	
	
	

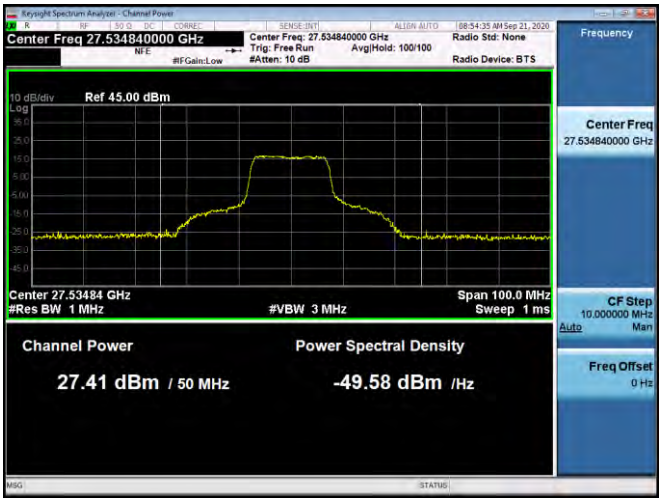
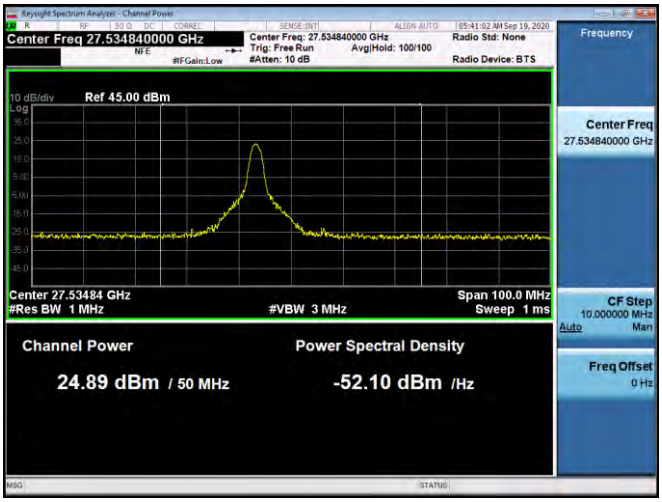
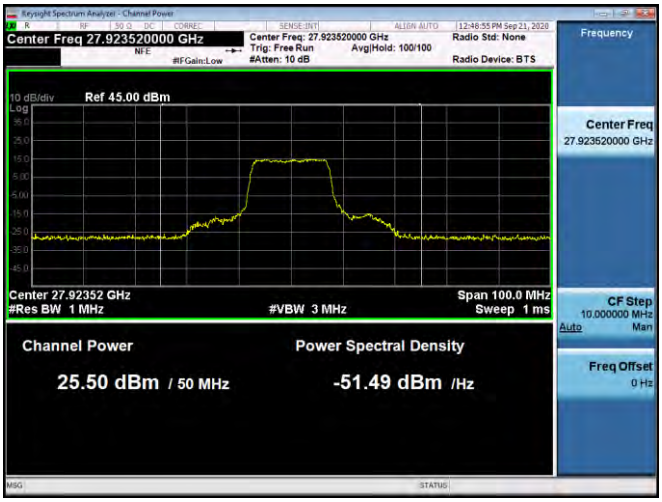
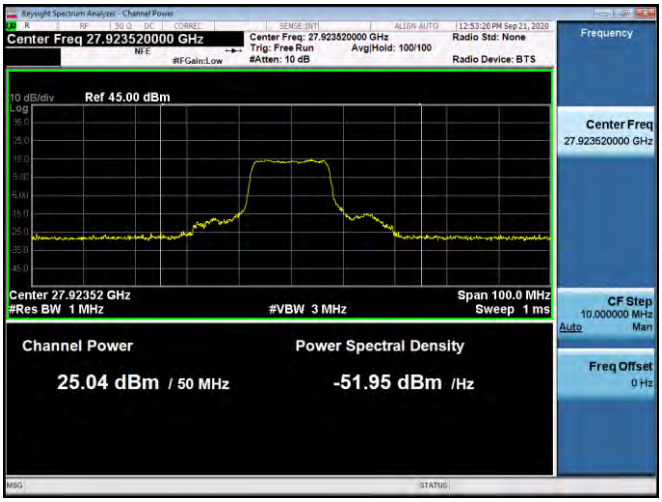
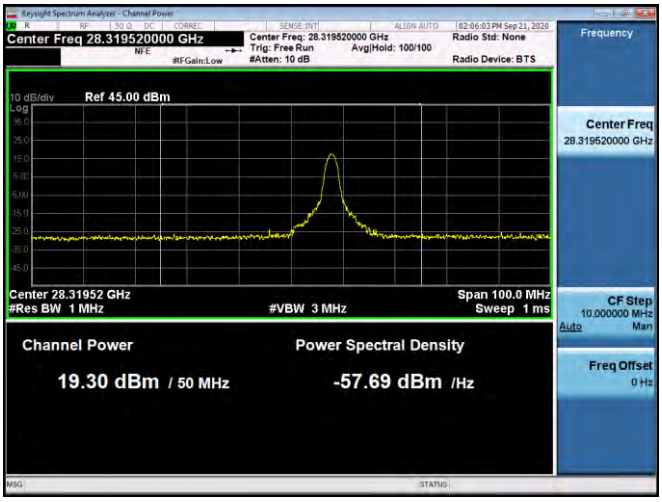
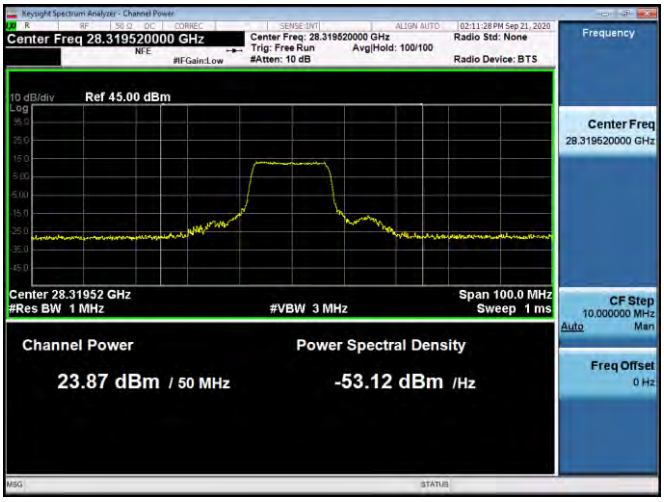
50 MHz, 2CC SISO	
	
	
	

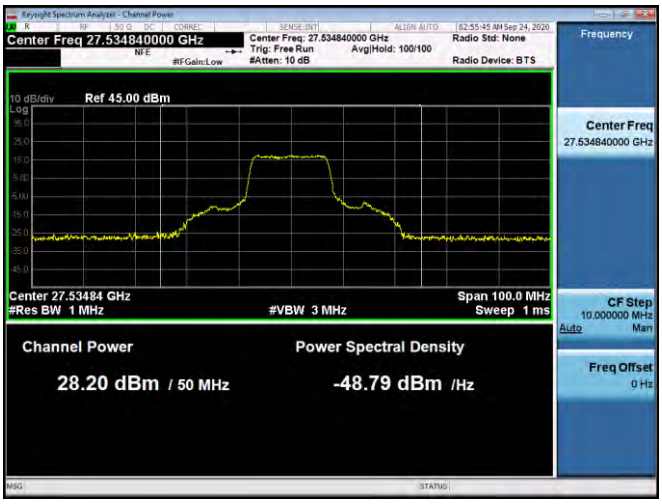
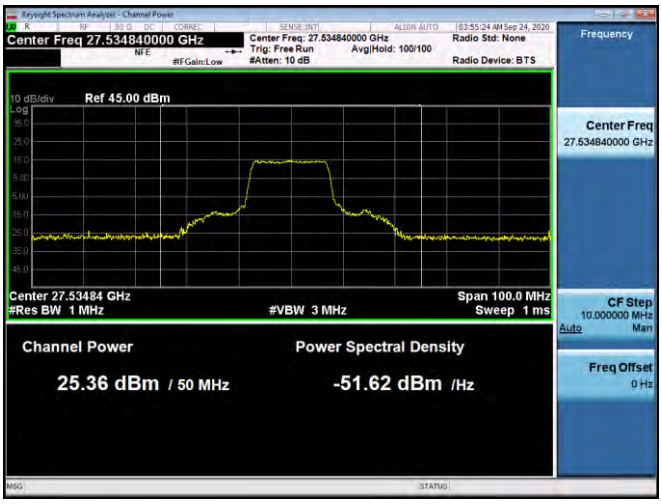
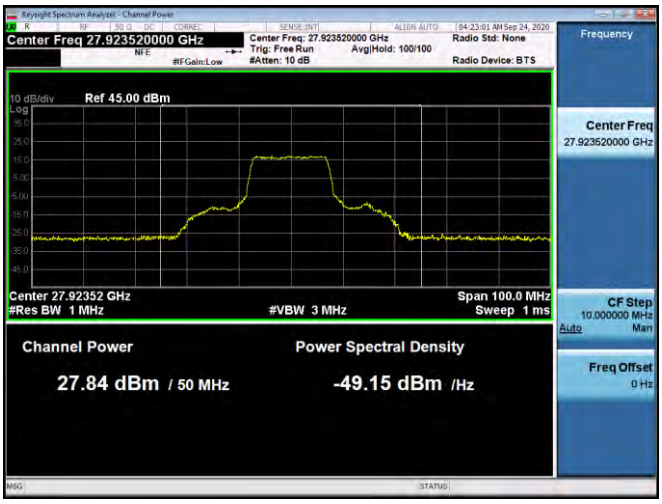
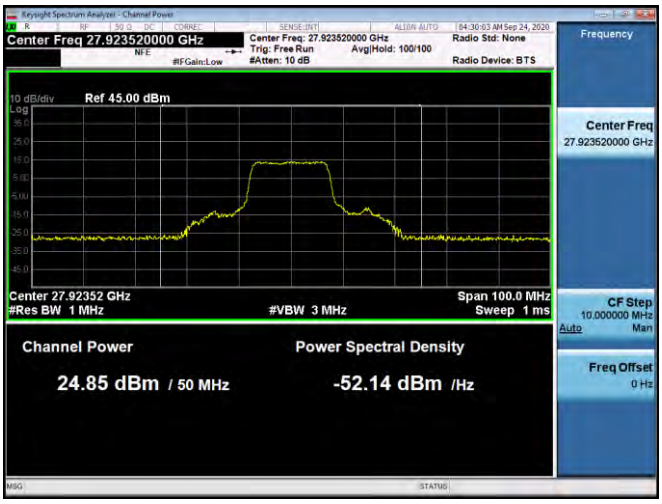
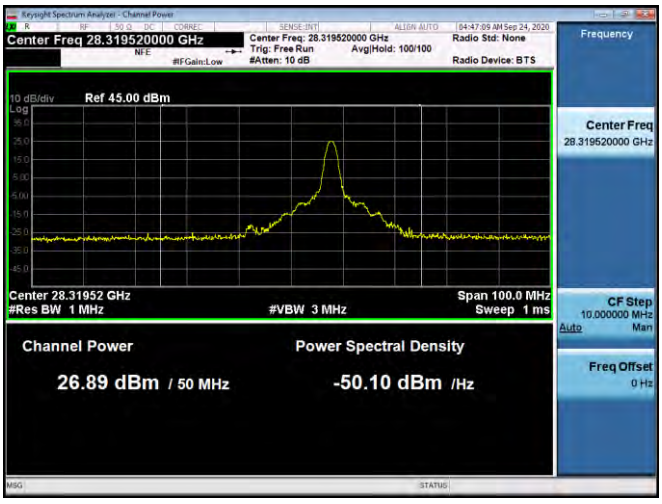
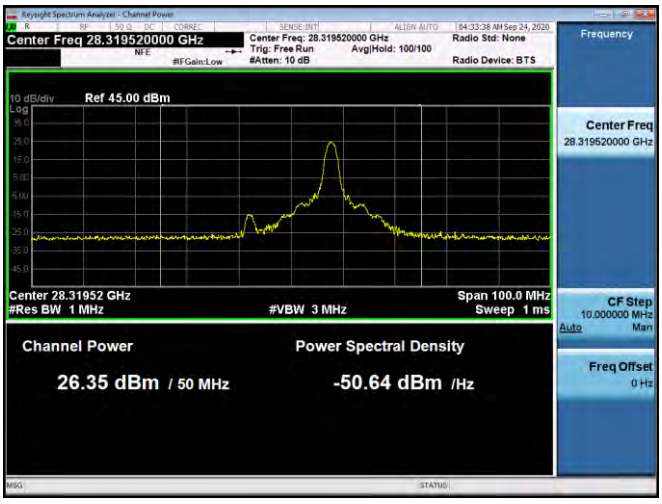
50 MHz, 2CC MIMO	
	
	
	

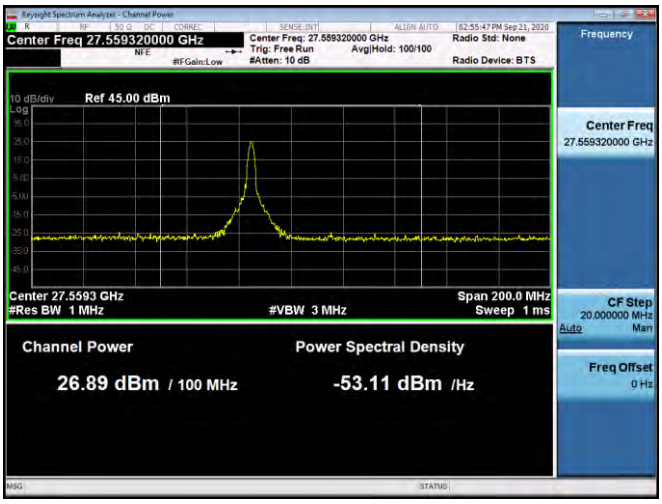
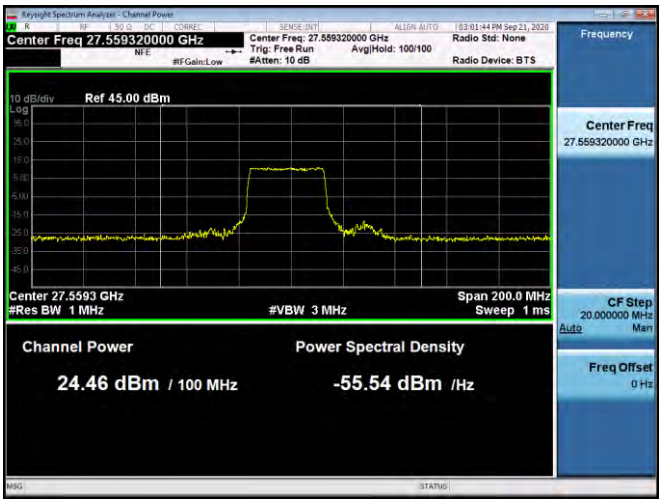
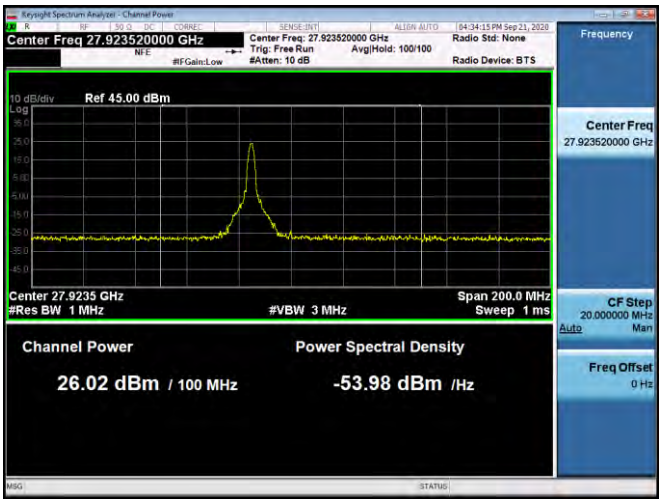
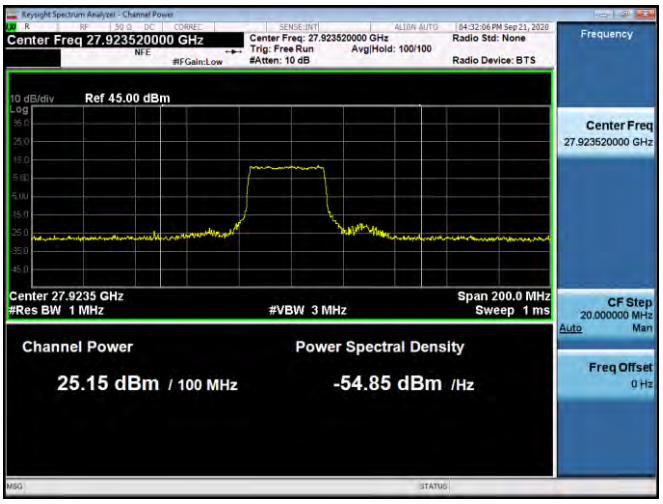
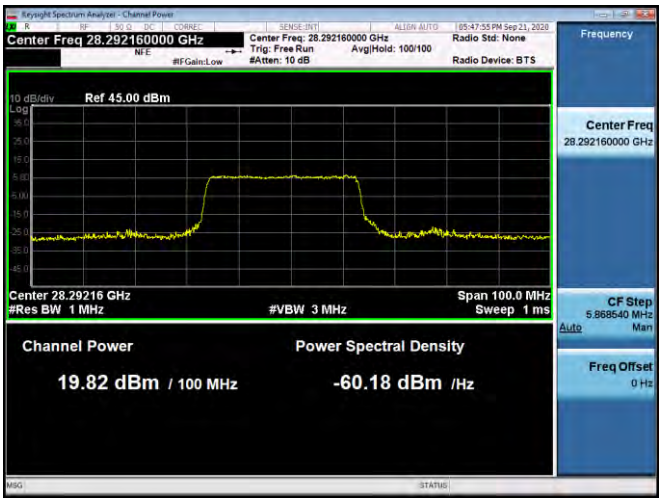
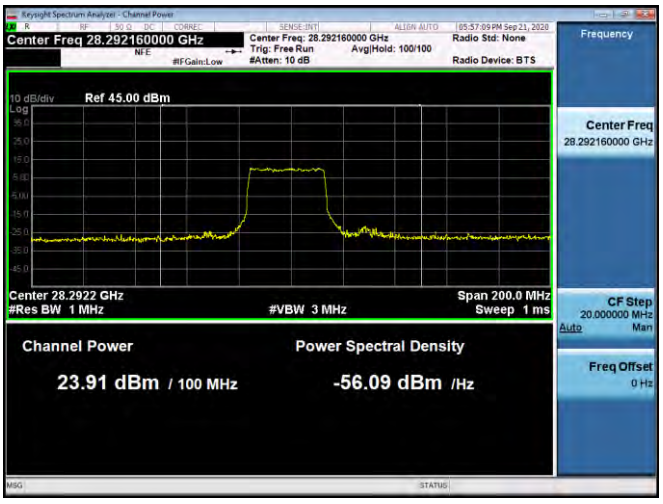
100 MHz, 2CC SISO	
	
	
	

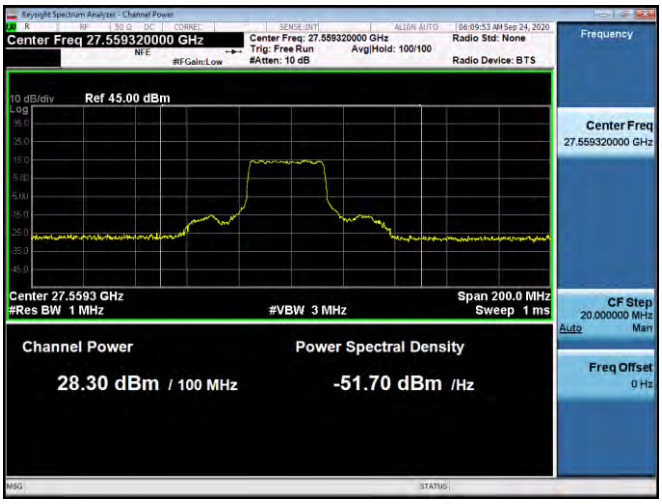
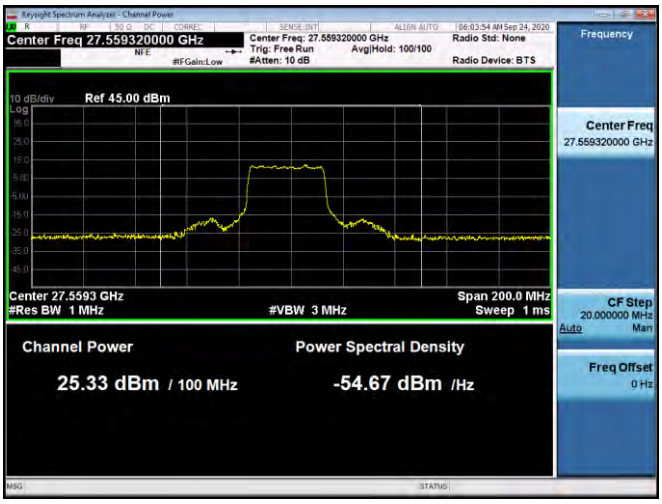
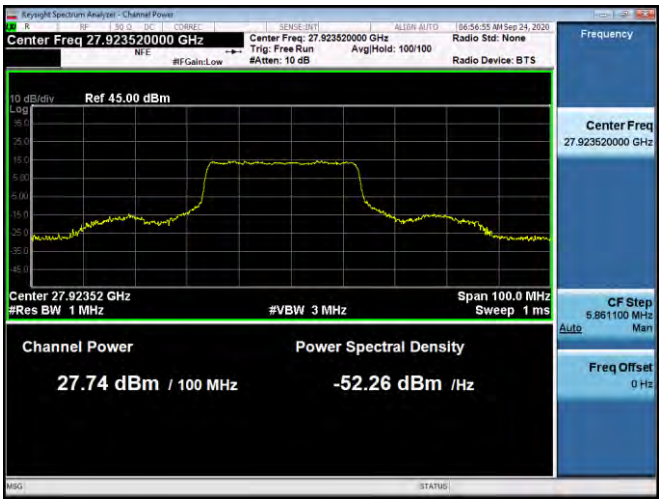
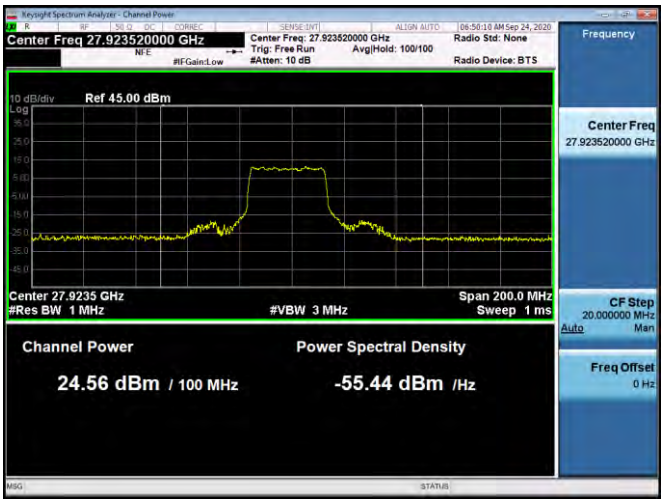
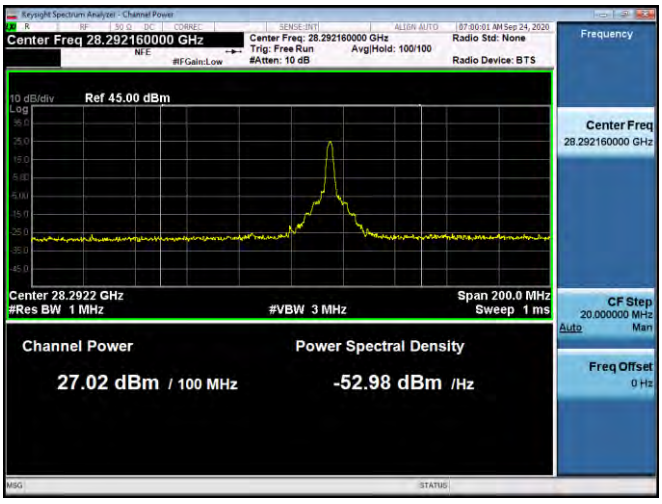
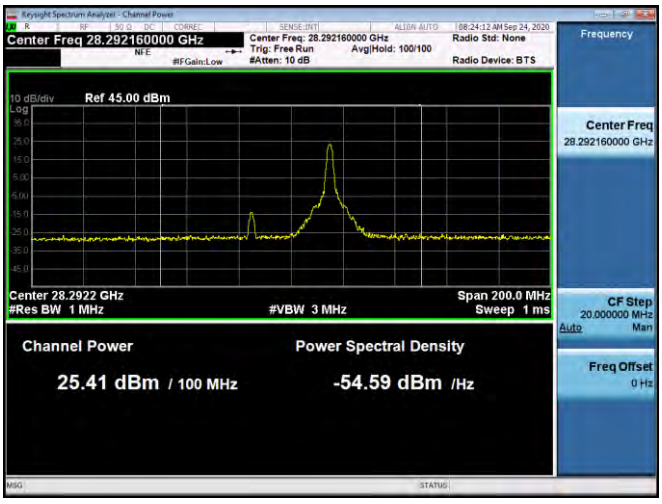
100 MHz, 2CC MIMO	
	
	
	

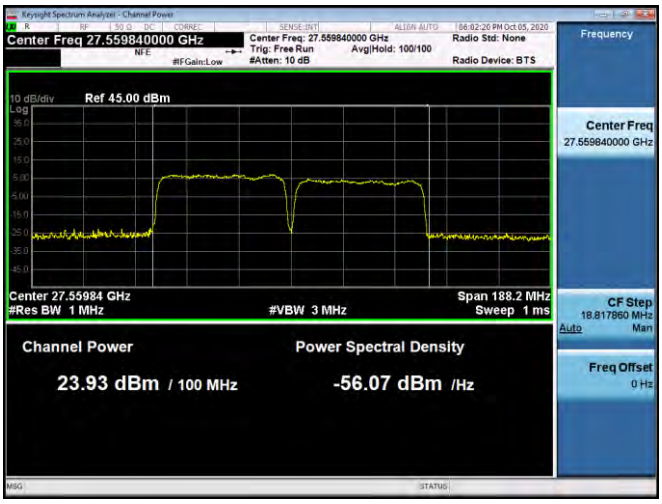
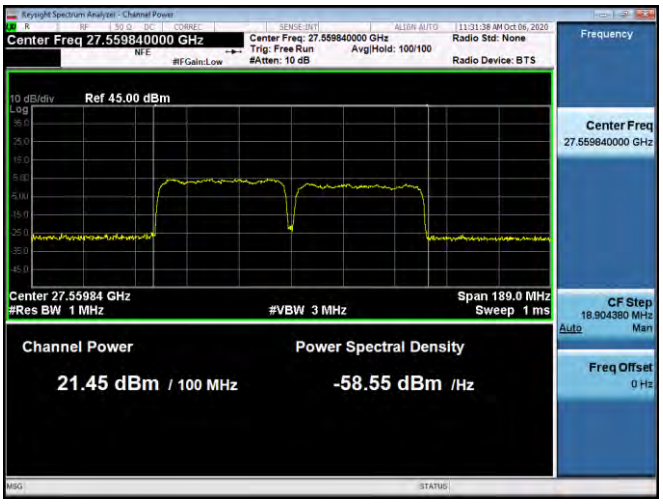
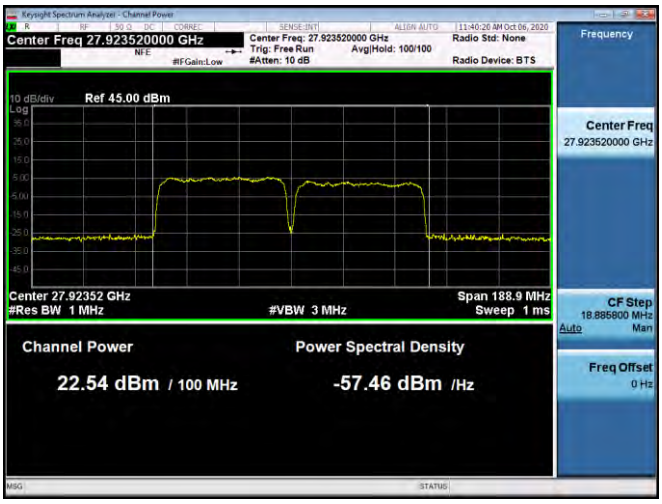
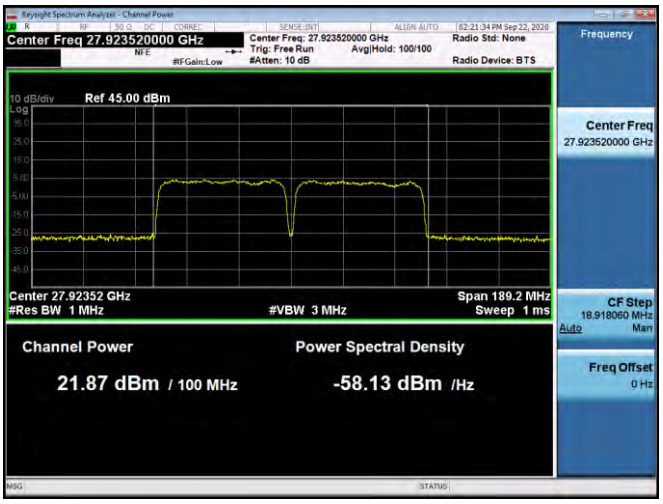
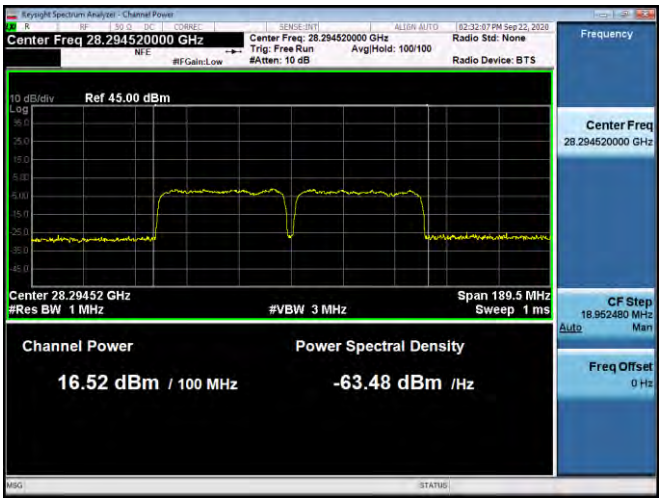
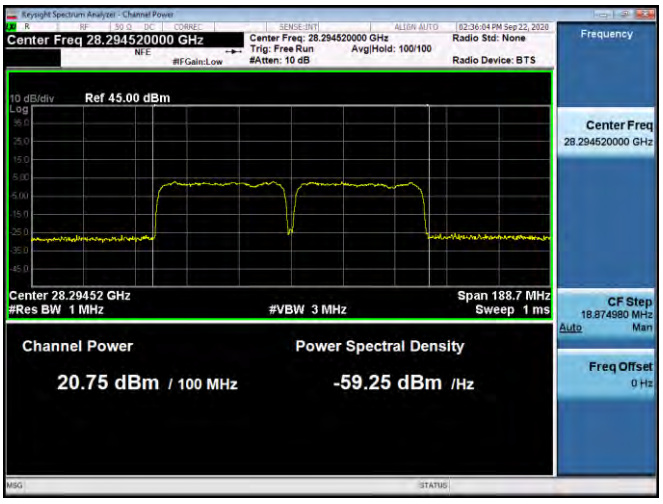
2. Antenna 1(K patch), n261

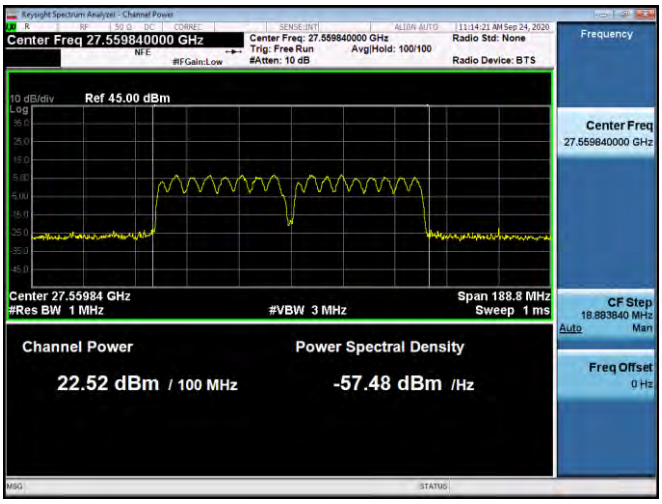
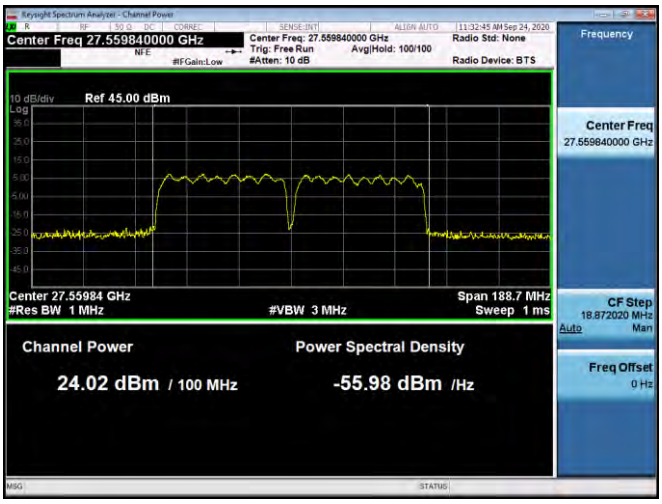
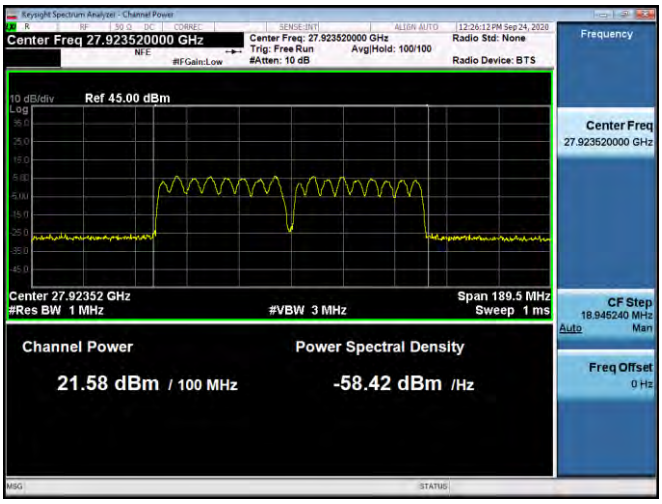
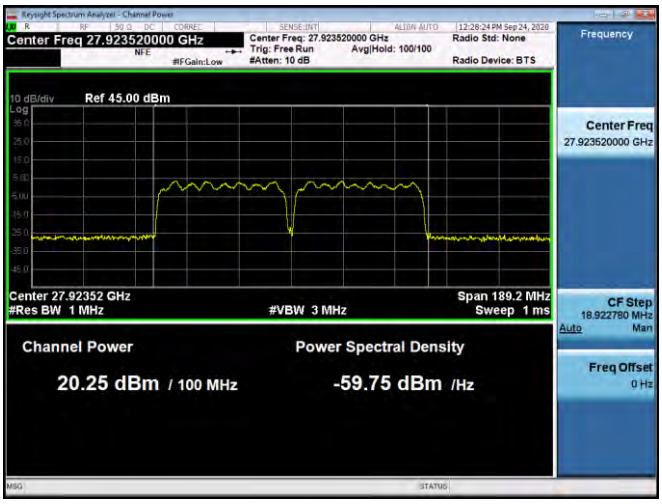
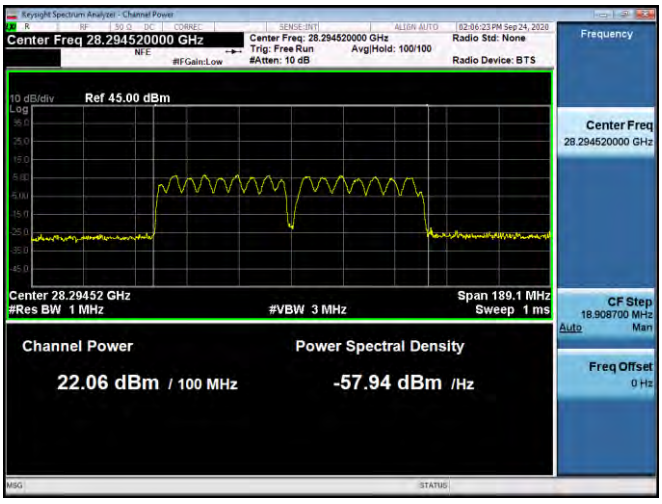
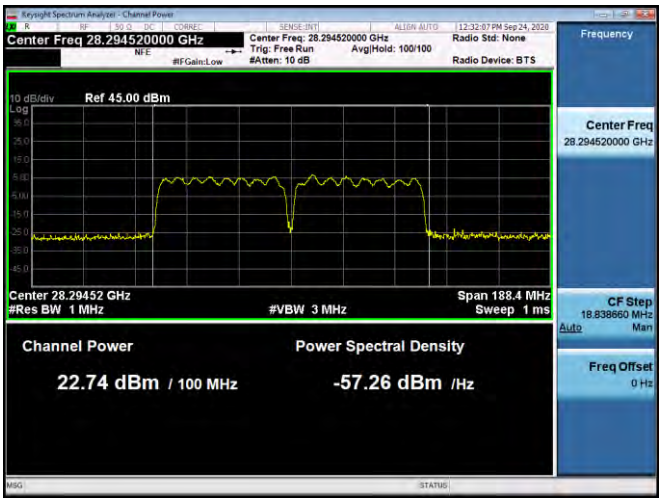
50 MHz, 1CC SISO	
	
	
	

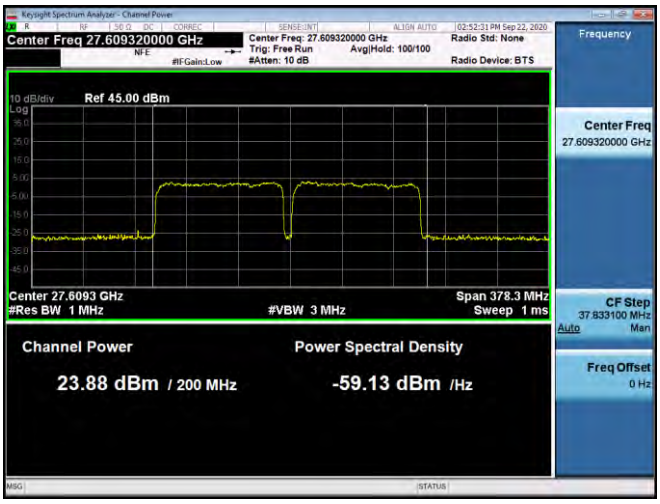
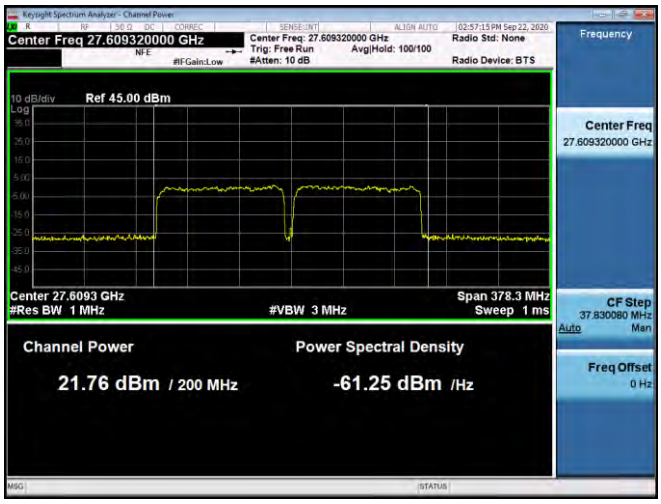
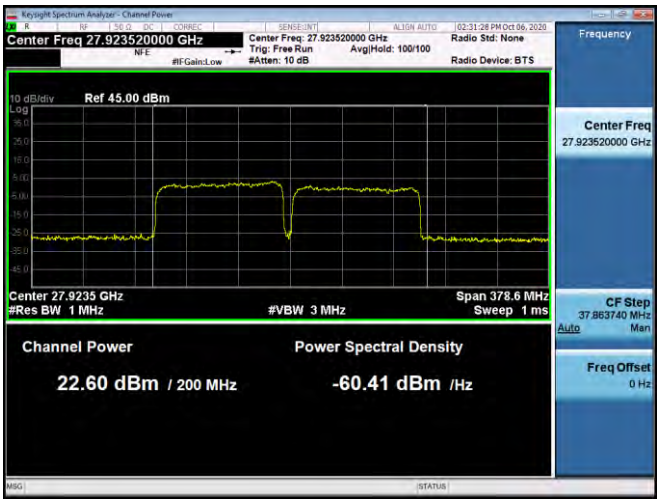
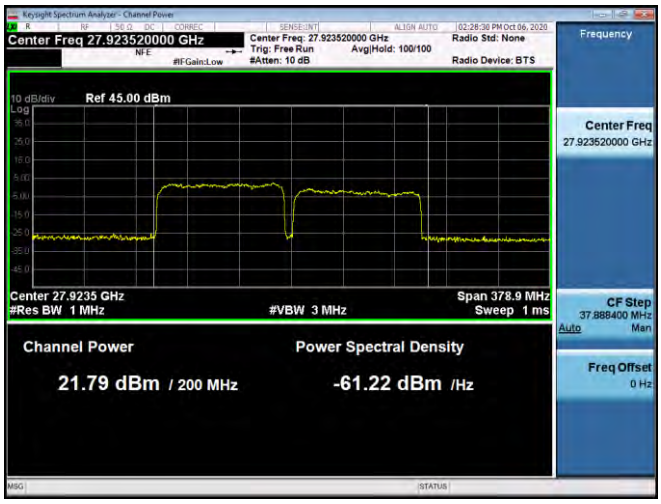
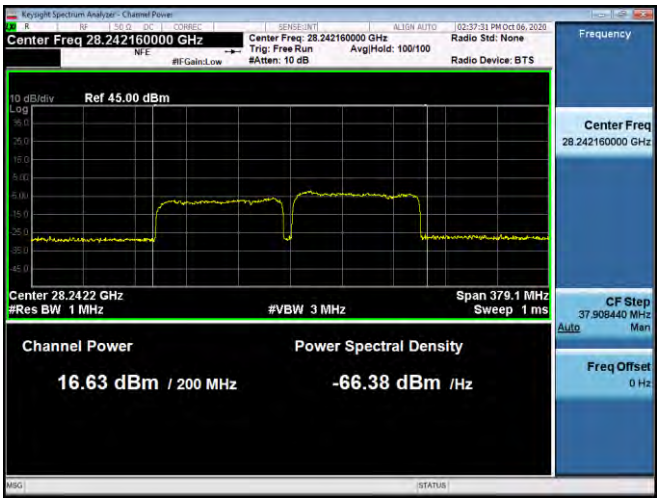
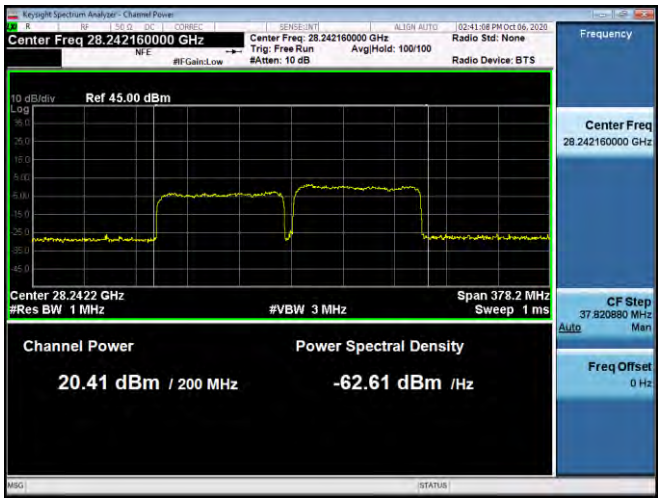
50 MHz, 1CC MIMO	
	
	
	

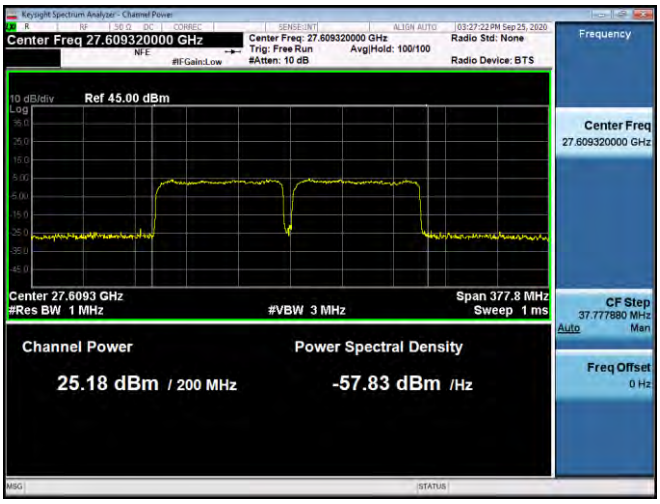
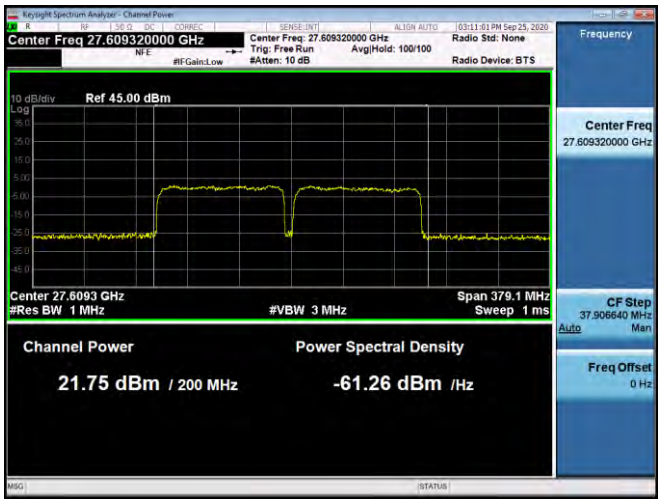
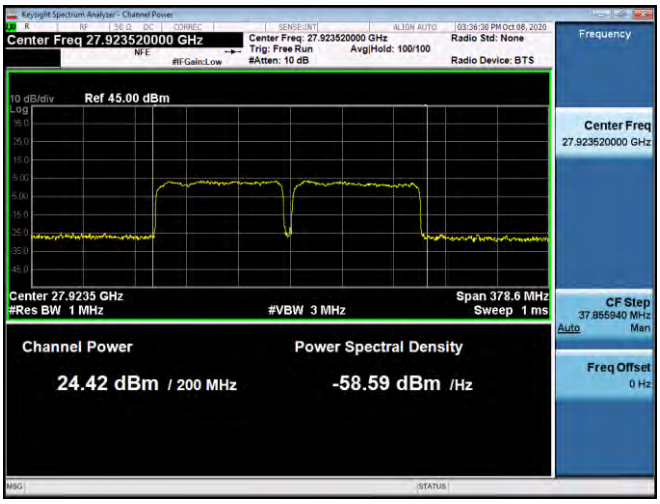
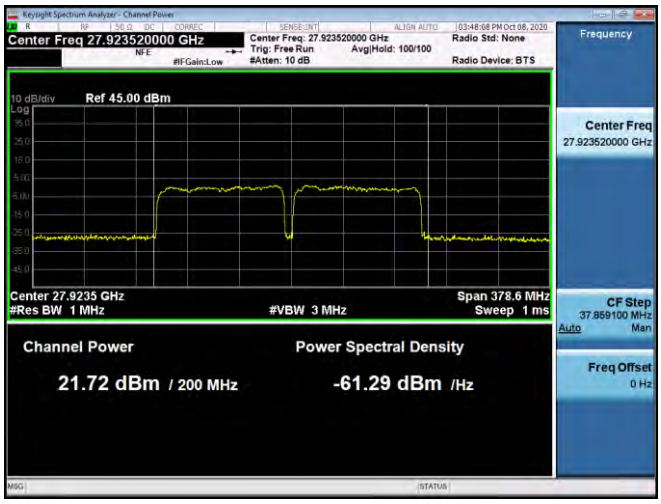
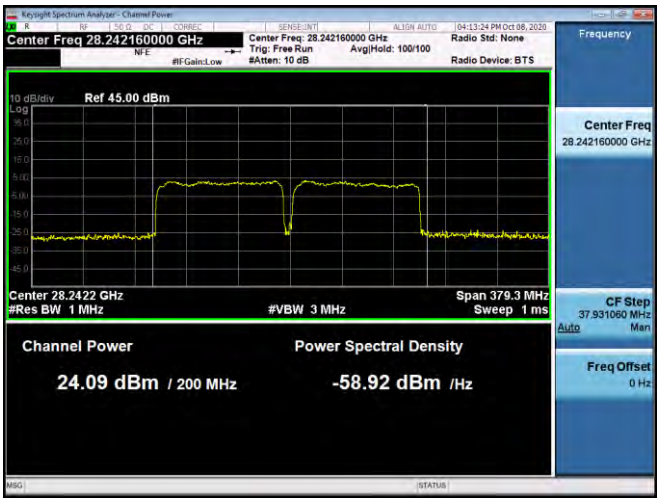
100 MHz, 1CC SISO	
	
	
	

100 MHz, 1CC MIMO	
	
	
	

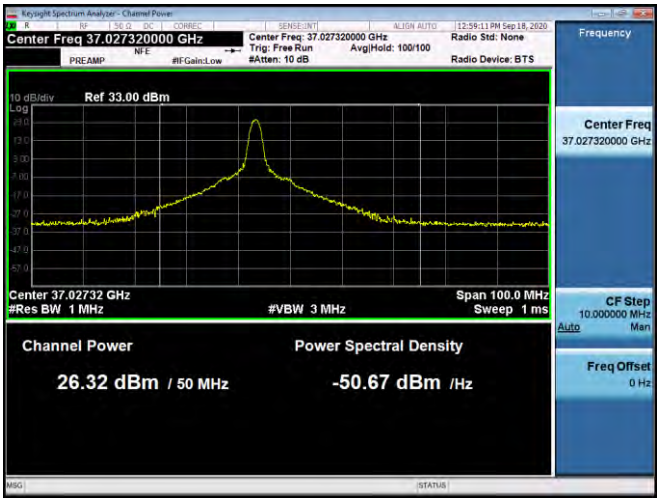
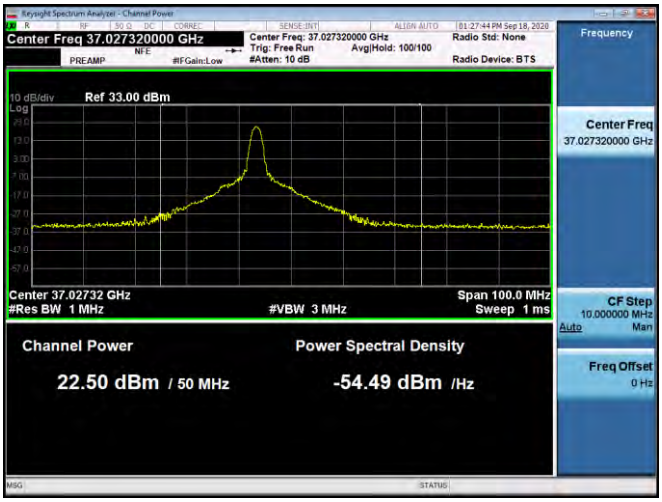
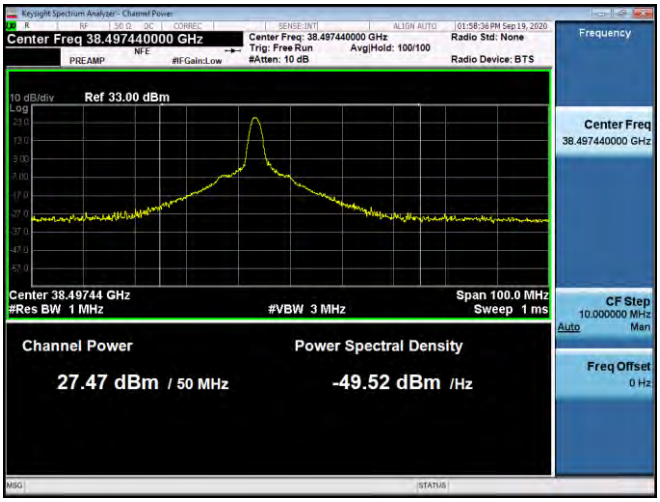
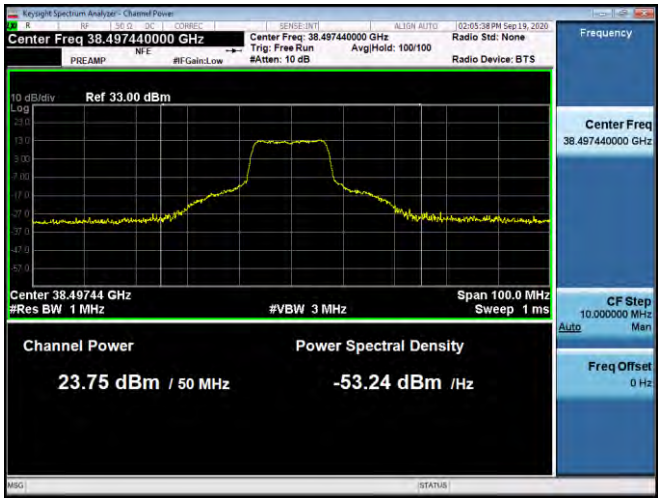
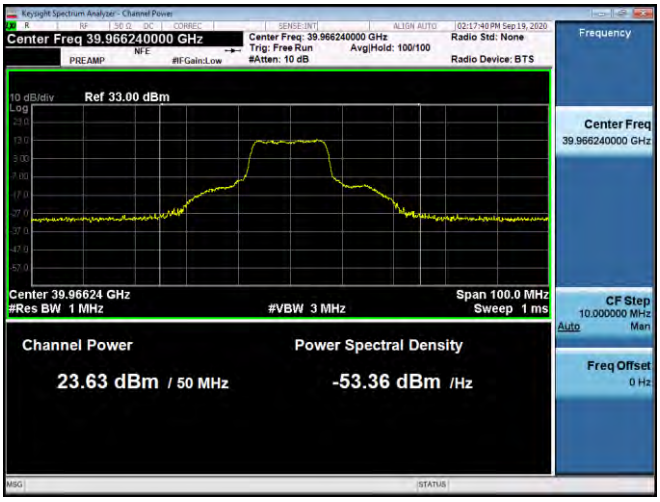
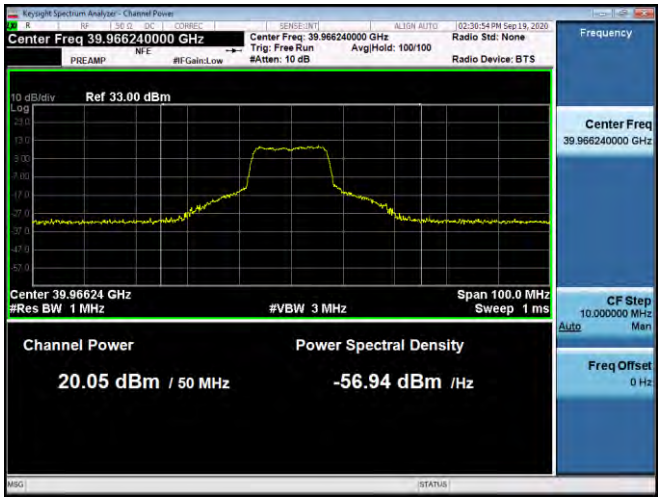
50 MHz, 2CC SISO	
	
	
	

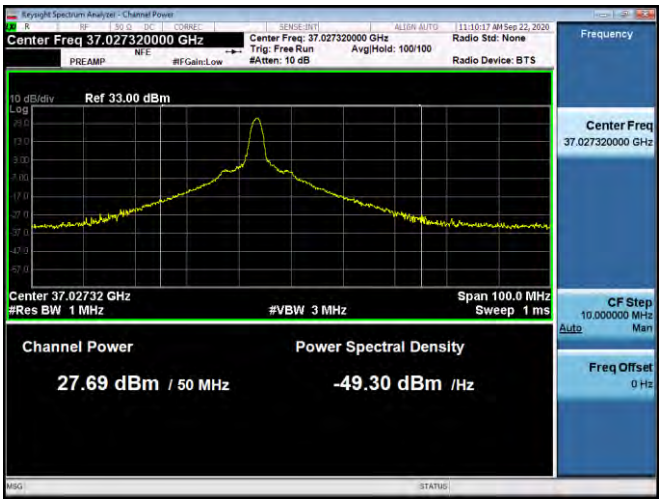
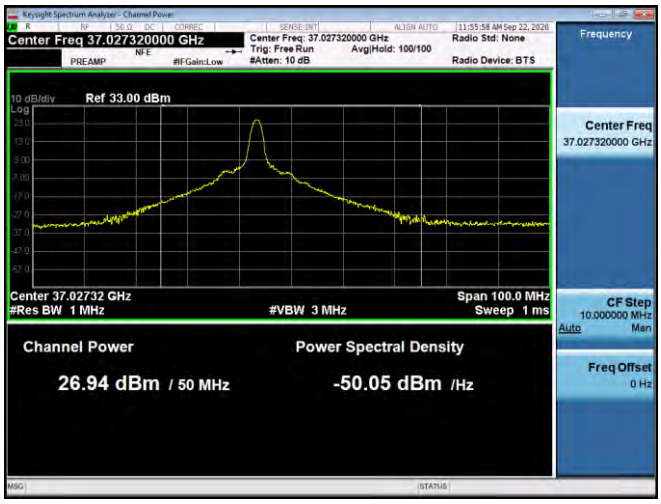
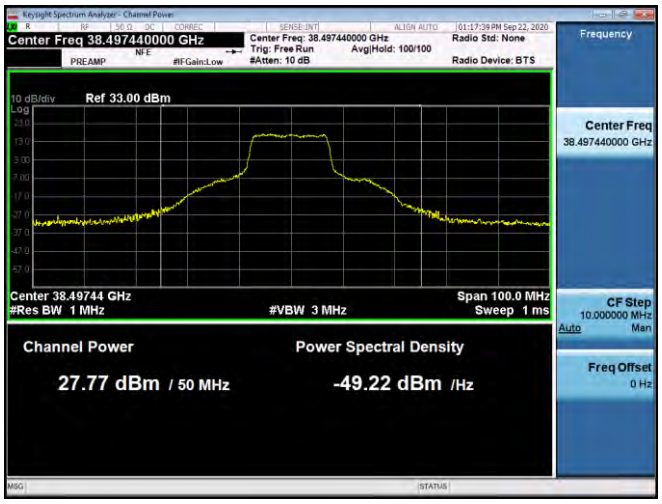
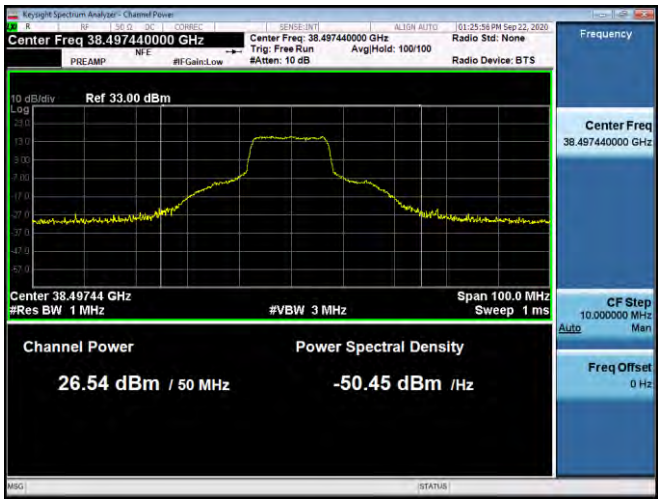
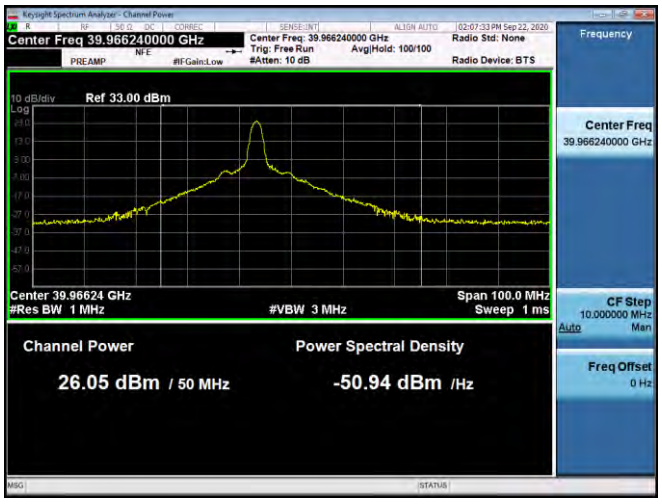
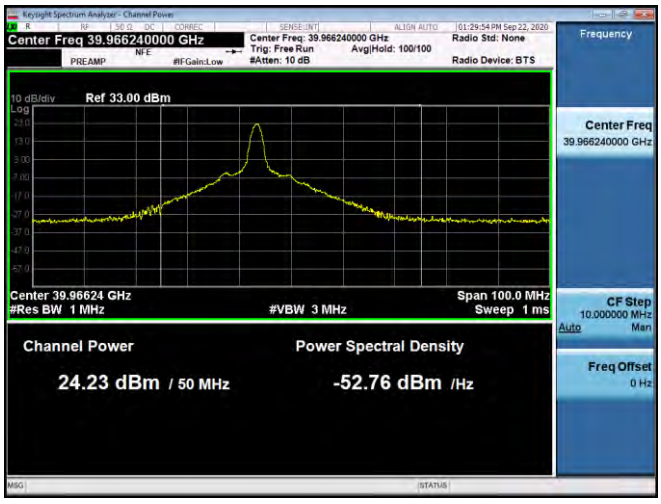
50 MHz, 2CC MIMO	
	
	
	

100 MHz, 2CC SISO	
	
	
	

100 MHz, 2CC MIMO	
	
	
	

3. Antenna 0(L patch), n260

50 MHz, 1CC SISO	
	
	
	

50 MHz, 1CC MIMO	
	
	
	

100 MHz, 1CC SISO