

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant: ASUSTeK COMPUTER INC.
1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan

Product Name: ASUS Phone (Mobile Phone)

Brand Name: ASUS

Model No.: ASUS_I003D

Model Difference: N/A

Report Number: ER/2020/30085

FCC ID MSQI003D

IC: 3568A-I003D

FCC Rule Part: 2, 22H & 24E & 27 C

ISED Rule: RSS-130, 132, 133, 139, 199

Issue Date: Sep. 07, 2020

Date of Test: Jun. 01, 2020 ~ Jul. 23, 2020

Date of EUT Received: May 06, 2020

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Approved By:

Jazz Huang

Jazz Huang / Asst. Supervisor



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History

Report Number	Revision	Description	Issue Date	Remark
ER/2020/30085	Rev.00	Original.	Sep. 07, 2020	Revised By: Violetta Tang

Note:

1、Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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1 GENERAL PRODUCT INFORMATION

1.1 Product Description

General:

Product Name:	ASUS Phone (Mobile Phone)	
Brand Name:	ASUS	
Model No.:	ASUS_I003D	
Model Difference:	N/A	
Hardware Version:	R2.0B	
Software Version:	Android Q	
AJ Dongle:	Model No.: F370002, Supplier: MEILU	
Fan Dongle:	Model No.: I003, Supplier: ASUS	
USB Cable:	Model No.: LA9U2015-CS-R, Supplier: ASAP	
Power Supply:	3.85Vdc from Rechargeable Li-polymer Battery or 5V / 9V / 12V / 15V / 20V from AC/DC Adapter	
	Battery:	Model No.: C11P1903, Supplier: SCUD
	Adapter:	Model No.: A299-200150U-US, Supplier: AOHAI
IMEI:	355306110093970 / 355306110093988 (Conducted) 355306110094390 (Radiated)	

1.2 Operation Frequency Range

5G NR Band	BW (MHz)	Operation Frequency (MHz)	5G NR Band	BW (MHz)	Operation Frequency (MHz)
n2	5	1852.5 - 1907.5	n66	5	1712.5 - 1777.5
	10	1855.0 - 1905.0		10	1715 - 1775
	15	1857.5 - 1902.5		15	1717.5 - 1772.5
	20	1860.0 - 1900.0		20	1720 - 1770
n5	5	826.5 - 846.5	n71	5	665.5 - 695.5
	10	829.0 - 844.0		10	668 - 693
	15	831.5 - 841.5		15	670.5 - 690.5
	20	834 - 839		20	673 - 688
n41	20	2506 - 2680			
	40	2516 - 2670			
	50	2521 - 2665			
	60	2526 - 2660			
	80	2536 - 2650			
	90	2541 - 2645			
	100	2546 - 2640			

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1.3 Antenna Designation

Antenna Type	Antenna Model No.
PIFA	Ant0
	Ant1
	Ant9
	Ant11

Note: The EUT equipped with 7 WWAN antennas, however, transmission of 5G NR bands are available by Ant0, Ant1, Ant9 and Ant11.

Operating Frequency (MHz)		Ant 0 Peak Gain (dBi)	Ant 1 Peak Gain (dBi)	Ant 9 Peak Gain (dBi)	Ant 11 Peak Gain (dBi)
NR Band 2	1850 ~ 1910	N/A	-1.0	N/A	N/A
NR Band 5	824 ~ 849	-1.8	N/A	N/A	N/A
NR Band 41	2496 ~ 2690	N/A	N/A	-2.9	-3.8
NR Band 66	1710 ~ 1780	N/A	-1.1	N/A	N/A
NR Band 71	663 ~ 698	-4.0	N/A	N/A	N/A

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1.4 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22H, 24E, 27C.

ISED RSS-130 Issue 2 Feb. 2019

ISED RSS-132 Issue 3 Jan. 2013

ISED RSS-133 Issue 6, Amendment 1 Jan. 18, 2018

ISED RSS-139 Issue 3 July 16, 2015

ISED RSS-199 Issue 3 Dec. 2016

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

KDB412172 D01 Determining ERP and EIRP v01r01

1.5 Test Facility

SGS Taiwan Ltd. Central RF Lab (TAF code 0513)

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

FCC Designation number: TW0027

ISED CAB identifier: TW3702

1.6 Special Accessories

No special accessories were used during testing.

1.7 Equipment Modifications

There was no modifications incorporated into the EUT.

1.8 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*9m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Measurement at Antenna Port

The EUT is placed on a table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (ERP/EIRP)

The EUT is placed on a turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

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

Note:

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

Following shows an offset computation in physical test.

	RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
Low Band (Below 1GHz)	3.8	10	13.8
High Band (Above 1 GHz)	4.8	10	14.8

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2.5 Final Amplifier Voltage and Current Information:

5G NR Band	DC voltage (V)	DC current (mA)
n2	3.85	568
n5		589
n41		587
n66		571
n71		584

2.6 Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)

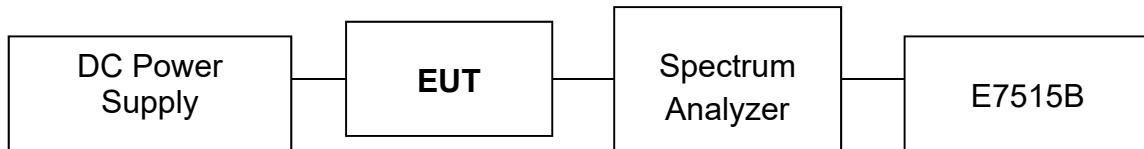


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)

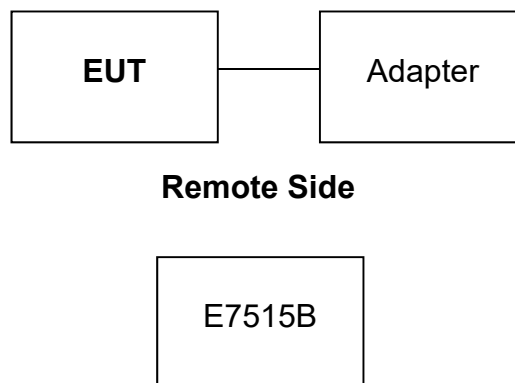


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	UXM 5G	KEYSIGHT	E7515B	MY59321561	shielded	Un-shielded

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3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	RSS-GEN §6.12	RF Power Output	Compliant
§22.913(a)(5) §24.232(c) §27.50(c)(10) §27.50(d)(4) §27.50(h)(2)	RSS-130 §4.6 RSS-132 §5.4 RSS-133 §6.4 RSS-139 §6.5 RSS-199 §4.4	ERP/ EIRP measurement	Compliant
§2.1049(h)	RSS-GEN §6.7	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)(4)	RSS-GEN §6.13 RSS-130 §4.7 RSS-132 §5.5 RSS-133 §6.5 RSS-139 §6.6 RSS-199 §4.5	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)(4)	RSS-GEN §6.13 RSS-130 §4.7 RSS-132 §5.5 RSS-133 §6.5 RSS-139 §6.6 RSS-199 §4.5	Field Strength of Spurious Radiation	Compliant
§24.232(d) §27.50(a)(1)(B)	RSS-130 §4.6.1 RSS-132 §5.4 RSS-133 §6.4 RSS-139 §6.4 RSS-199 §4.4	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235 §27.54	RSS-130 §4.5 RSS-132 §5.3 RSS-133 §6.3 RSS-139 §6.5 RSS-199 §4.3	Frequency Stability	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

- 1 The EUT has been tested under operating condition.
- 2 Transmissions of each frequency bands are available by 5 antennas below, only one antenna can be enabled at any given time by each band, the EUT dose not support MIMO mode.
- 3 Evaluation has been done on Upper and Lower antennas
 - a. For n2, n5, n66 and n71, the lower antennas result higher EIRP and Emissions.
 - b. For n41, Antenna 9 results higher EIRP and emissions.

Therefore, only measurement results of the Lower antennas and Antenna 9 are demonstrated in this test report.

Mode	Bands	Upper Antenna	Lower Antenna
5G NR	n2	N/A	1
	n5	N/A	0
	n41	11	9
	n66	N/A	1
	n71	N/A	0

- 4 The EUT only supports with below SCS and Bandwidth in each 5G NR Band.

5G NR BAND	SCS (kHz)	Bandwidth (MHz)
n2	15	5, 10, 15, 20
n5	15	5, 10, 15, 20
n41	30	20, 40, 50, 60, 80, 90, 100
n66	15	5, 10, 15, 20
n71	15	5, 10, 15, 20

- 5 Due to each single LTE Band transmission generates higher power than the LTE transmission in ENDC mode, the test results of each single LTE band transmission are demonstrated in the test report ER/2020/30083 as the worst case senarios.
- 6 Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X(E1)Y(E2)Z(H) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

5G NR BAND	H PLAN	E1 PLAN	E2 PLAN
n2		√	
n5		√	
n41		√	
n66		√	
n71		√	

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- 7 The worst case scenarios are determined by the ENDC combinations that generate the highest output power. The occupied bandwidth, peak to average ratio and unwanted emission test results are only be presented with the ENDC combinations of the worst case.

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4.2 Measurement Configuration

Test Items	Band	Test Channel			Bandwidth (MHz)										Modulation DFT-OFDM					Modulation CP-OFDM				RB #			
		L	M	H	5	10	15	20	40	50	60	80	90	100	BPSK	QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	1	Half	Full	
Max. Output Power	2	v	v	v	v	v	v	v	-	-	-	-	-	-	v	v	v	v	v	v	v	v	v	v	-	v	
	5	v	v	v	v	v	v	v	-	-	-	-	-	-	v	v	v	v	v	v	v	v	v	v	-	v	
	41	v	v	v	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	-	v	
	66	v	v	v	v	v	v	v	-	-	-	-	-	-	v	v	v	v	v	v	v	v	v	v	-	v	
	71	v	v	v	v	v	v	v	-	-	-	-	-	-	v	v	v	v	v	v	v	v	v	v	-	v	
Frequency Stability	2	-	v	-	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
	5	-	v	-	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
	41	-	v	-	-	-	-	-	-	-	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	v	
	66	-	v	-	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
	71	-	v	-	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
26dB and 99% Bandwidth	2	v	v	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	v	v	v	-	-	v	
	5	v	v	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	v	v	v	-	-	v	
	41	v	v	v	-	-	-	v	v	v	v	v	v	v	-	-	-	-	-	v	v	v	v	-	-	v	
	66	v	v	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	v	v	v	-	-	v	
	71	v	v	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	v	v	v	-	-	v	
Peak-to-Average Ratio	2	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
	5	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
	41	v	v	v	-	-	-	-	-	-	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	v	
	66	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
	71	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	v	
Band Edge	2	v	-	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	-	-	-	-	v	v	v
	5	v	-	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	-	-	-	-	v	v	v
	41	v	-	v	-	-	-	v	v	v	v	v	v	v	v	-	-	-	-	v	-	-	-	-	v	v	v
	66	v	-	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	-	-	-	-	v	v	v
	71	v	-	v	v	v	v	v	-	-	-	-	-	-	v	-	-	-	-	v	-	-	-	-	v	v	v
Conducted Emission	2	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	5	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	41	v	v	v	-	-	-	-	-	-	-	-	-	v	v	-	-	-	-	-	-	-	-	-	-	-	
	66	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	71	v	v	v	-	-	-	v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Radiated Emission

E-UTRA Band	SCS	Test Channel	Channel Bandwidth (MHz)	Modulation	Resource Block Allocation	
					RBs allocated	RB Start
n41	30K	500202	40	DFT-S-OFDM Pi/2 BPSK	1RB Left	
n41	30K	518598	40	DFT-S-OFDM Pi/2 BPSK	1RB Left	
n41	30K	537000	40	DFT-S-OFDM Pi/2 BPSK	1RB Left	

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ENDC

E-UTRA Band	SCS	Test Channel	Channel Bandwidth (MHz)	Modulation	Resource Block Allocation	
					RBs allocated	RB Start
2A_n5A	15K	18900+165800	20+10	DFT-S-OFDM Pi/2 BPSK	FULL	
2A_n5A	15K	18900+167300	20+10	DFT-S-OFDM Pi/2 BPSK	FULL	
2A_n5A	15K	18900+168800	20+10	DFT-S-OFDM Pi/2 BPSK	FULL	
2A_n71A	15K	18900+133600	20+20	CP-OFDM 64QAM	1RB Left	
2A_n71A	15K	18900+136100	20+20	CP-OFDM 64QAM	1RB Left	
2A_n71A	15K	18900+138600	20+20	CP-OFDM 64QAM	1RB Left	
5A_n2A	15K	20525+371000	10+20	DFT-S-OFDM Pi/2 BPSK	FULL	
5A_n2A	15K	20525+376000	10+20	DFT-S-OFDM Pi/2 BPSK	FULL	
5A_n2A	15K	20525+381000	10+20	DFT-S-OFDM Pi/2 BPSK	FULL	
5A_n66A	15K	20525+343000	10+10	DFT-S-OFDM 64QAM	FULL	
5A_n66A	15K	20525+351000	10+10	DFT-S-OFDM 64QAM	FULL	
5A_n66A	15K	20525+359000	10+10	DFT-S-OFDM 64QAM	FULL	

Note: List of frequency bands mentioned in the measurement configuration, for comparison with 3GPP, please refer to the following table.

Band	3GPP inter-EN-DC configuration in FR1
2A_n5A	DC_2A_n5A
2A_n71A	DC_2A_n71A
5A_n2A	DC_5A_n2A
5A_n66A	DC_5A_n66A

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
ERP/ EIRP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.70 dB
Peak to Average Ratio	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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6 MAXMUM OUTPUT POWER

6.1 Standard Applicable

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

6.1.1 ERP/EIRP LIMIT

According to FCC §2.1046

FCC 22.913(a)

(5) mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

FCC 24.232(c)

Mobile and portable stations are limited to 2 W EIRP.

FCC 27.50(c)

(10) Portable stations (hand-held devices) are limited to 3 watts ERP.

FCC 27.50(d)

(4) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz, 1695-1710 MHz and 1755-1780 MHz bands are limited to 1W EIRP.

FCC 27.50(h)

(2) Mobile and other user stations transmitting in the BRS and EBS bands are limited to 2 W EIRP.

RSS-130 §4.6

The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment operating in the Band 617-652 and 663-698MHz.

RSS-132 §5.4

The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment in operating in the Bands 824-849 and 869-894MHz shall not exceed 11.5 watts.

RSS-133 §6.4

The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510.

According to section 5.1.2 of SRSP-510, Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

RSS-139 §6.5

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters in the Bands 1710-1780MHz shall not exceed one watt.

RSS-199 §4.4

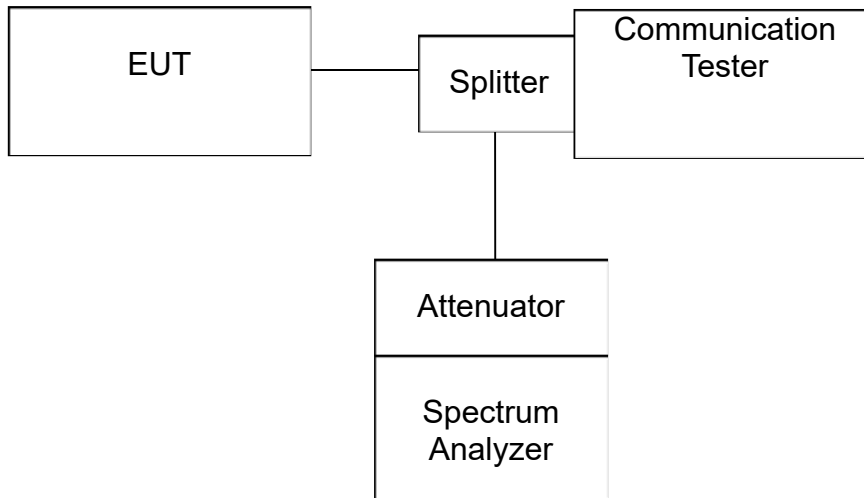
For mobile subscriber equipment operating in the Band 2500-2690MHz, the e.i.r.p. shall not exceed 2 W.

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6.2 Test Set-up



Note: Measurement setup for testing on Antenna connector

6.3 Output Power Measurement Applicable Guidance

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCDMA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.

All LTE bands conducted average power is obtained from the simulator telecommunication test set.

6.4 Determining ERP and/or EIRP from conducted RF output power measurements

According to KDB 412172 D01 Power Approach,

$$EIRP = P_T + G_T - L_C,$$

$$ERP = EIRP - 2.15,$$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power (expressed in the same units as P_T , typically dBW, dBm, or power spectral density (PSD)²), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);

P_T = transmitter output power, expressed in dBW, dBm, or PSD;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

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

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6.5 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	02/20/2020	02/19/2021
UXM 5G	KEYSIGHT	E7515B	MY59321561	12/16/2019	12/15/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

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6.6 Measurement Results:

6.6.1 ENDC Mode

Antenna gain (dBi)		-1							
5A_n2									
Modulation	BW	SCS	RB	5A CH	n2CH	Total Power (dBm)	Total EIRP (dBm)	EIRP limit (dBm)	Margin (dB)
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	FULL	Mid	Mid	21.89	20.89	33	-12.11
DFT-S-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	Mid	21.39	20.39	33	-12.61
DFT-S-OFDM 16QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	19.98	18.98	33	-14.02
DFT-S-OFDM 64QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	19.48	18.48	33	-14.52
DFT-S-OFDM 256QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	17.49	16.49	33	-16.51
CP-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	Mid	19.40	18.40	33	-14.6
CP-OFDM 16QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	18.66	17.66	33	-15.34
CP-OFDM 64QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	18.43	17.43	33	-15.57
CP-OFDM 256QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	15.56	14.56	33	-18.44
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 15	15K	FULL	Mid	Mid	21.33	20.33	33	-12.67
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 10	15K	FULL	Mid	Mid	21.41	20.41	33	-12.59
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 5	15K	FULL	Mid	Mid	21.29	20.29	33	-12.71
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Left	Mid	Mid	20.70	19.70	33	-13.3
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Righth	Mid	Mid	20.11	19.11	33	-13.89
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	FULL	Mid	Low	21.99	20.99	33	-12.01
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	FULL	Mid	high	21.84	20.84	33	-12.16
CP-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	Low	19.31	18.31	33	-14.69
CP-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	high	18.65	17.65	33	-15.35

Antenna gain (dBi)		-1							
2A_n5									
Modulation	BW	SCS	RB	2A CH	n5CH	Total Power (dBm)	Total ERP (dBm)	Total EIRP (dBm)	EIRP limit (dBm)
DFT-S-OFDM Pi/2 BPSK	LTE 20 + NR 20	15K	FULL	Mid	Mid	20.59	17.44	19.59	33
DFT-S-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	Mid	20.53	17.38	19.53	33
DFT-S-OFDM 16QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	19.51	16.36	18.51	33
DFT-S-OFDM 64QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	18.25	15.10	17.25	33
DFT-S-OFDM 256QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	16.40	13.25	15.40	33
CP-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	Mid	19.82	16.67	18.82	33
CP-OFDM 16QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	18.74	15.59	17.74	33
CP-OFDM 64QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	17.40	14.25	16.40	33
CP-OFDM 256QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	14.58	11.43	13.58	33
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 15	15K	FULL	Mid	Mid	20.51	17.36	19.51	33
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 10	15K	FULL	Mid	Mid	20.53	17.38	19.53	33
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 5	15K	FULL	Mid	Mid	20.52	17.37	19.52	33
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Left	Mid	Mid	20.55	17.40	19.55	33
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Righth	Mid	Mid	20.54	17.39	19.54	33
DFT-S-OFDM Pi/2 BPSK	LTE 20 + NR 20	15K	FULL	Mid	Low	20.52	17.37	19.52	33
DFT-S-OFDM Pi/2 BPSK	LTE 20 + NR 20	15K	FULL	Mid	high	20.51	17.36	19.51	33
CP-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	Low	19.49	16.34	18.49	33
CP-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	high	19.75	16.60	18.75	33

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Antenna gain (dBi) -1.1										
5A_n66										
Modulation	BW	SCS	RB	5A CH	n66CH	Total Power (dBm)	Total EIRP (dBm)	EIRP limit (dBm)	Margin (dB)	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	FULL	Mid	Mid	20.43	19.33	30	-10.67	
DFT-S-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	Mid	20.27	19.17	30	-10.83	
DFT-S-OFDM 16QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	19.46	18.36	30	-11.64	
DFT-S-OFDM 64QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	17.99	16.89	30	-13.11	
DFT-S-OFDM 256QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	15.93	14.83	30	-15.17	
CP-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	Mid	18.96	17.86	30	-12.14	
CP-OFDM 16QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	17.83	16.73	30	-13.27	
CP-OFDM 64QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	16.57	15.47	30	-14.53	
CP-OFDM 256QAM	LTE 10 + NR 20	15K	FULL	Mid	Mid	15.73	14.63	30	-15.37	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 15	15K	FULL	Mid	Mid	20.43	19.33	30	-10.67	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 10	15K	FULL	Mid	Mid	20.38	19.28	30	-10.72	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 5	15K	FULL	Mid	Mid	20.35	19.25	30	-10.75	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Left	Mid	Mid	20.33	19.23	30	-10.77	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Righth	Mid	Mid	20.10	19.00	30	-11	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	FULL	Mid	Low	20.49	19.39	30	-10.61	
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	FULL	Mid	High	20.48	19.38	30	-10.62	
CP-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	Low	18.55	17.45	30	-12.55	
CP-OFDM QPSK	LTE 10 + NR 20	15K	FULL	Mid	High	18.42	17.32	30	-12.68	

Antenna gain (dBi) -1										
2A_n71										
Modulation	BW	SCS	RB	2A CH	n71CH	Total Power (dBm)	Total ERP (dBm)	Total EIRP (dBm)	EIRP limit (dBm)	Margin (dB)
DFT-S-OFDM Pi/2 BPSK	LTE 20 + NR 20	15K	FULL	Mid	Mid	22.18	19.03	21.18	33	-13.97
DFT-S-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	Mid	21.68	18.53	20.68	33	-14.47
DFT-S-OFDM 16QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	20.45	17.30	19.45	33	-15.7
DFT-S-OFDM 64QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	20.24	17.09	19.24	33	-15.91
DFT-S-OFDM 256QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	18.17	15.02	17.17	33	-17.98
CP-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	Mid	19.40	16.25	18.40	33	-16.75
CP-OFDM 16QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	19.35	16.20	18.35	33	-16.8
CP-OFDM 64QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	18.91	15.76	17.91	33	-17.24
CP-OFDM 256QAM	LTE 20 + NR 20	15K	FULL	Mid	Mid	15.86	12.71	14.86	33	-20.29
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 15	15K	FULL	Mid	Mid	22.11	18.96	21.11	33	-14.04
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 10	15K	FULL	Mid	Mid	22.03	18.88	21.03	33	-14.12
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 5	15K	FULL	Mid	Mid	21.94	18.79	20.94	33	-14.21
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Left	Mid	Mid	22.03	18.88	21.03	33	-14.12
DFT-S-OFDM Pi/2 BPSK	LTE 10 + NR 20	15K	1RB Righth	Mid	Mid	21.24	18.09	20.24	33	-14.91
DFT-S-OFDM Pi/2 BPSK	LTE 20 + NR 20	15K	FULL	Mid	Low	22.37	19.22	21.37	33	-13.78
DFT-S-OFDM Pi/2 BPSK	LTE 20 + NR 20	15K	FULL	Mid	High	22.85	19.70	21.85	33	-13.3
CP-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	Low	19.43	16.28	18.43	33	-16.72
CP-OFDM QPSK	LTE 20 + NR 20	15K	FULL	Mid	High	19.46	16.31	18.46	33	-16.69

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6.7 5G NR SA Mode

Antenna gain (dBi)	-2.9								
n41									
Modulation	BW	SCS	RB	n41CH	Power (dBm)	EIRP (dBm)	EIRP limit (dBm)	Margin (dB)	
DFT-S-OFDM Pi/2 BPSK	NR 100	30K	FULL	Mid	23.08	20.18	33	-12.82	
DFT-S-OFDM QPSK	NR 100	30K	FULL	Mid	22.91	20.01	33	-12.99	
DFT-S-OFDM 16QAM	NR 100	30K	FULL	Mid	22.21	19.31	33	-13.69	
DFT-S-OFDM 64QAM	NR 100	30K	FULL	Mid	21.75	18.85	33	-14.15	
DFT-S-OFDM 256QAM	NR 100	30K	FULL	Mid	19.70	16.80	33	-16.2	
CP-OFDM QPSK	NR 100	30K	FULL	Mid	21.45	18.55	33	-14.45	
CP-OFDM 16QAM	NR 100	30K	FULL	Mid	21.32	18.42	33	-14.58	
CP-OFDM 64QAM	NR 100	30K	FULL	Mid	20.60	17.70	33	-15.3	
CP-OFDM 256QAM	NR 100	30K	FULL	Mid	17.78	14.88	33	-18.12	
DFT-S-OFDM Pi/2 BPSK	NR 100	30K	1RB Left	Mid	23.94	21.04	33	-11.96	
DFT-S-OFDM Pi/2 BPSK	NR 100	30K	1RB Righth	Mid	23.37	20.47	33	-12.53	
DFT-S-OFDM Pi/2 BPSK	NR 90	30K	1RB Left	Mid	23.22	20.32	33	-12.68	
DFT-S-OFDM Pi/2 BPSK	NR 80	30K	1RB Left	Mid	23.19	20.29	33	-12.71	
DFT-S-OFDM Pi/2 BPSK	NR 60	30K	1RB Left	Mid	23.36	20.46	33	-12.54	
DFT-S-OFDM Pi/2 BPSK	NR 50	30K	1RB Left	Mid	23.52	20.62	33	-12.38	
DFT-S-OFDM Pi/2 BPSK	NR 40	30K	1RB Left	Mid	23.93	21.03	33	-11.97	
DFT-S-OFDM Pi/2 BPSK	NR 20	30K	1RB Left	Mid	23.82	20.92	33	-12.08	
DFT-S-OFDM Pi/2 BPSK	NR 100	30K	1RB Left	Low	22.48	19.58	33	-13.42	
DFT-S-OFDM Pi/2 BPSK	NR 100	30K	1RB Left	High	23.98	21.08	33	-11.92	

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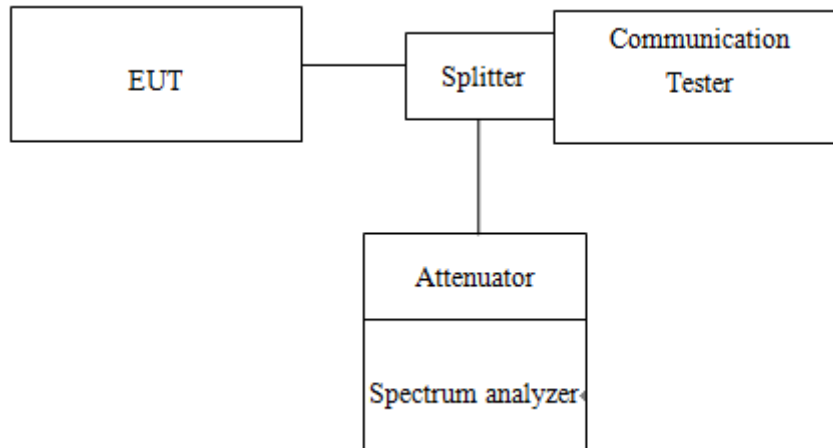
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7 OCCUPIED BANDWIDTH MEASUREMENT

7.1 Standard Applicable

The occupied bandwidth 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.

7.2 Test Set-up



7.3 Measurement Procedure

99% & 26dB Bandwidth with detector peak

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 RBW, with span > 2 * Signal BW, set % Power = 99%.

99% Bandwidth with detector sample

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% ~ 5% of emission BW, VBW= 3 times RBW, -20dBc display line was placed on the screen (or 20dB bandwidth). Set RBW to 99% bandwidth, RBW= 1% ~ 5%, VBW= 3 RBW, with span > 2 * Signal BW, set % Power = 99%.

7.4 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	02/20/2020	02/19/2021
UXM 5G	KEYSIGHT	E7515B	MY59321561	12/16/2019	12/15/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

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7.5 Measurement Result

Each bandwidth has been evaluated with the modulation that generated highest output power.

7.5.1 DFT-s-OFDM

NR BAND 2 Channel bandwidth: 5MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1852.5	370500	4.5712	4.4922	4.4866	4.4924	4.4872	4.959	4.978	5.000	5.011	5.060
1880.0	376000	4.5726	4.4994	4.4826	4.4873	4.4975	4.925	5.094	5.009	5.081	5.070
1907.5	381500	4.5676	4.4721	4.4861	4.4836	4.4825	5.022	5.071	5.072	5.003	5.015

NR BAND 2 Channel bandwidth: 10MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1855.0	371000	9.1399	8.9898	8.9894	8.9878	8.9683	9.768	9.727	9.683	9.750	9.623
1880.0	376000	9.1395	8.9852	8.9920	8.9815	8.9656	9.652	9.735	9.600	9.794	9.590
1905.0	381000	9.1264	8.9746	9.0186	8.9738	8.9674	9.712	9.571	9.624	9.733	9.678

NR BAND 2 Channel bandwidth: 15MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1857.5	371500	13.703	13.466	13.497	13.480	13.476	14.250	14.260	14.290	14.290	14.470
1880.0	376000	13.687	13.469	13.490	13.469	13.490	14.290	14.290	14.300	14.340	14.260
1902.5	380500	13.706	13.482	13.466	13.459	13.497	14.340	14.240	14.310	14.340	14.430

NR BAND 5 Channel bandwidth: 5MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
826.5	165300	4.5536	4.4773	4.5011	4.4829	4.4860	4.990	5.092	5.098	5.051	4.987
836.5	167300	4.5397	4.4817	4.4809	4.4817	4.4820	4.940	5.048	4.954	5.033	5.033
846.5	169300	4.5330	4.4818	4.5098	4.4884	4.4798	5.024	5.044	5.046	4.982	4.991

NR BAND 5 Channel bandwidth: 10MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
829.0	165800	9.1262	8.9868	8.9905	8.9784	8.9903	9.815	9.616	9.660	9.701	9.657
836.5	167300	9.1064	8.9490	8.9962	8.9679	8.9570	9.798	9.637	9.644	9.746	9.644
844.0	168800	9.1057	8.9515	8.9958	8.9649	8.9788	9.739	9.611	9.616	9.715	9.655

NR BAND 5 Channel bandwidth: 15MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
831.5	166300	13.665	13.504	13.506	13.475	13.474	14.33	14.49	14.27	14.29	14.32
836.5	167300	13.658	13.474	13.451	13.442	13.458	14.16	14.24	14.33	14.31	14.27
841.5	168300	13.647	13.489	13.470	13.453	13.473	14.16	14.27	14.27	14.30	14.35

NR BAND 41 Channel bandwidth: 20MHz											
DFT-S-OFDM_SCS 30 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
2506.02	501204	18.218	17.952	17.965	17.929	17.927	19.400	19.260	19.330	19.400	19.400
2592.99	518598	18.214	17.961	17.984	17.941	17.976	19.170	19.250	19.250	19.380	19.550
2679.99	535998	18.207	17.958	17.966	17.892	17.927	19.050	19.240	19.140	19.110	19.350

NR BAND 41 Channel bandwidth: 20MHz											
DFT-S-OFDM_SCS 30 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
2516.01	503202	36.12	35.672	35.753	35.700	35.685	36.960	37.440	37.490	37.520	37.310
2592.99	518598	36.137	35.789	35.781	35.735	35.756	37.170	37.320	37.280	37.480	37.320
2670.00	534000	36.107	35.695	35.731	35.749	35.737	37.190	37.250	37.420	37.490	37.310

NR BAND 41 Channel bandwidth: 40MHz											
DFT-S-OFDM_SCS 30 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
2526.00	505200	58.514	57.700	57.768	57.664	57.648	59.450	60.060	59.990	60.130	60.080
2592.99	518598	58.548	57.810	57.943	57.817	57.805	59.770	59.850	60.190	60.130	60.200
2659.98	531996	58.381	57.732	57.868	57.752	57.714	59.810	60.170	59.940	60.100	60.090

NR BAND 41 Channel bandwidth: 60MHz											
DFT-S-OFDM_SCS 30 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
2526.00	505200	86.514	86.618	86.556	86.679	86.537	89.400	89.840	89.750	89.810	89.880
2592.99	518598	87.556	86.685	86.683	86.615	86.627	89.440	89.910	89.920	89.770	89.780
2644.98	528996	87.36	86.502	86.600	86.576	86.415	89.410	89.800	89.900	89.840	89.660

NR BAND 41 Channel bandwidth: 80MHz											
DFT-S-OFDM_SCS 30 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
2536.02	507204	77.79	76.772	77.130	76.753	76.667	79.580	79.760	79.930	79.910	79.740
2592.99	518598	77.769	77.074	77.303	76.989	76.910	79.560	79.830	80.030	79.750	79.770
2649.99	529998	77.777	76.851	77.168	76.807	76.821	79.580	79.720	79.930	79.820	79.780

NR BAND 41 Channel bandwidth: 100MHz											
DFT-S-OFDM_SCS 30 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
2546.01	509202	97.147	96.233	96.207	96.211	96.136	99.320	99.530	99.730	99.680	99.750
2592.99	518598	97.415	96.467	96.356	96.380	96.116	99.320	99.550	99.640	99.780	99.660
2640.00	528000	97.185	96.266	96.165	96.251	96.056	99.350	99.530	99.560	99.660	99.610

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NR BAND 66 Channel bandwidth: 5MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1712.5	342500	4.5646	4.4764	4.4987	4.5041	4.4855	5.0700	5.104	5.146	5.017	5.036
1745.0	349000	4.5678	4.4796	4.5119	4.4925	4.4782	4.9790	5.092	5.138	5.049	5.004
1777.5	355500	4.5538	4.4780	4.5010	4.5102	4.4754	5.0100	5.088	5.124	5.091	5.032

NR BAND 66 Channel bandwidth: 10MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1715.0	343000	9.1191	8.9852	9.0057	8.9986	8.9949	9.7910	9.542	9.647	9.862	9.758
1745.0	349000	9.1134	8.9756	8.9887	8.9897	8.9618	9.7370	9.689	9.688	9.781	9.633
1775.0	355000	9.1424	8.9636	9.0050	8.9850	8.9784	9.7910	9.578	9.743	9.854	9.677

NR BAND 66 Channel bandwidth: 15MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1717.5	343500	13.675	13.484	13.483	13.456	13.465	14.270	14.290	14.340	14.360	14.350
1745.0	349000	13.656	13.470	13.502	13.453	13.476	14.240	14.490	14.320	14.310	14.280
1772.5	354500	13.719	13.473	13.512	13.461	13.438	14.190	14.410	14.340	14.250	14.340

NR BAND 66 Channel bandwidth: 20MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
1720.0	344000	18.204	17.913	17.929	17.883	17.909	18.950	18.950	18.900	18.910	18.910
1745.0	349000	18.200	17.937	17.912	17.876	17.883	18.920	18.980	18.970	18.900	18.910
1770.0	354000	18.203	17.932	17.950	17.901	17.912	18.910	18.920	18.980	18.940	18.920

NR BAND 71 Channel bandwidth: 5MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
665.5	133100	4.5604	4.4898	4.4926	4.4869	4.4762	5.028	5.034	5.112	4.964	4.952
680.5	136100	4.5542	4.5057	4.4891	4.4831	4.4774	5.013	5.044	5.101	5.030	5.011
695.5	139100	4.5537	4.4804	4.4670	4.4963	4.5002	4.992	5.022	5.038	5.112	5.084

NR BAND 71 Channel bandwidth: 10MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
668.0	133600	9.1167	8.9636	8.9742	8.9651	8.9604	9.777	9.556	9.750	9.866	9.733
680.5	136100	9.1047	8.9764	8.9682	8.9744	8.9731	9.799	9.655	9.722	9.677	9.677
693.0	138600	9.1072	8.9722	8.9869	8.9663	8.9733	9.821	9.555	9.647	9.656	9.743

NR BAND 71 Channel bandwidth: 15MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
670.5	134100	13.703	13.469	13.536	13.435	13.471	14.300	14.330	14.420	14.350	14.310
680.5	136100	13.675	13.510	13.510	13.451	13.482	14.200	14.370	14.320	14.340	14.320
690.5	138100	13.642	13.523	13.504	13.450	13.474	14.140	14.510	14.350	14.330	14.230

NR BAND 71 Channel bandwidth: 20MHz											
DFT-S-OFDM_SCS 15 kHz											
Freq. (MHz)	CH	99% BW (MHz)					26 dB BW (MHz)				
		BPSK	QPSK	16QAM	64QAM	256QAM	BPSK	QPSK	16QAM	64QAM	256QAM
673.0	134600	18.194	17.865	17.906	17.855	17.882	18.920	19.000	18.940	18.910	18.960
680.5	136100	18.153	17.854	17.889	17.859	17.898	18.910	18.970	18.950	18.880	18.890
688.0	137600	18.167	17.888	17.901	17.879	17.875	18.850	18.950	18.960	18.910	18.880

7.5.2 CP-OFDM

NR BAND 2 Channel bandwidth: 5MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1852.5	370500	4.5606	4.5733	4.5587	4.5650	4.957	4.943	4.900	4.879
1880.0	376000	4.5671	4.5669	4.5658	4.5510	4.937	4.910	4.945	4.895
1907.5	381500	4.5473	4.5454	4.5774	4.5632	4.938	4.843	4.961	4.870

NR BAND 2 Channel bandwidth: 10MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1855.0	371000	9.4884	9.4756	9.5217	9.4845	10.120	10.100	10.120	10.090
1880.0	376000	9.4655	9.4597	9.4701	9.5690	10.100	10.060	10.120	10.110
1905.0	381000	9.4613	9.4624	9.4953	9.4880	10.140	10.110	10.090	10.060

NR BAND 2 Channel bandwidth: 15MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1857.5	371500	14.401	14.368	14.369	14.371	14.950	14.840	14.820	14.910
1880.0	376000	14.283	14.426	14.355	14.326	15.000	14.930	14.950	14.890
1902.5	380500	14.383	14.390	14.330	14.374	14.940	14.860	14.960	14.840

NR BAND 2 Channel bandwidth: 20MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1860.0	372000	19.232	19.291	19.248	19.242	20.000	19.300	19.910	19.870
1880.0	376000	19.241	19.264	19.256	19.205	19.970	19.910	19.910	19.910
1900.0	380000	19.251	19.283	19.293	19.222	19.860	19.910	19.950	19.830

NR BAND 5 Channel bandwidth: 5MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
826.5	165300	4.5657	4.5833	4.5720	4.6011	4.955	4.955	4.900	4.926
836.5	167300	4.5683	4.5788	4.5625	4.5531	4.925	4.949	4.945	4.867
846.5	169300	4.5715	4.5705	4.5706	4.5521	4.942	4.930	4.954	4.981

NR BAND 5 Channel bandwidth: 10MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
829.0	165800	9.5175	9.5092	9.5130	9.5527	10.140	10.030	10.110	10.080
836.5	167300	9.4872	9.4879	9.5107	9.4876	10.050	10.100	10.120	10.020
844.0	168800	9.4988	9.5267	9.5307	9.5142	10.130	10.090	10.050	10.060

NR BAND 5 Channel bandwidth: 15MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
831.5	166300	14.3610	14.3810	14.3300	14.3300	14.910	14.910	14.780	14.760
836.5	167300	14.3460	14.3480	14.3040	14.2970	14.910	14.910	14.810	14.890
841.5	168300	14.3720	14.3480	14.2850	14.2660	14.820	14.880	14.790	14.840

NR BAND 5 Channel bandwidth: 20MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
834.0	166800	19.1940	19.1930	19.2230	19.0140	19.830	19.890	19.810	19.670
836.5	167300	19.1810	19.2080	19.2190	19.1830	19.880	19.850	19.790	19.880
839.0	167800	19.1690	19.1970	19.1820	19.0030	19.900	19.860	19.850	19.710

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NR BAND 41 Channel bandwidth: 20MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2506.02	501204	18.565	18.601	18.624	18.596	19.480	19.760	19.550	19.550
2592.99	518598	18.601	18.512	18.608	18.569	19.580	19.540	19.540	19.420
2679.99	535998	18.577	18.507	18.560	18.576	19.660	19.420	19.640	19.460

NR BAND 41 Channel bandwidth: 40MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2516.01	503202	38.194	38.261	38.222	38.091	39.120	39.290	39.070	39.040
2592.99	518598	38.182	38.230	38.193	38.112	39.030	39.050	39.170	39.010
2670.00	534000	37.989	38.087	38.217	38.046	39.030	38.930	39.110	39.040

NR BAND 41 Channel bandwidth: 50MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2521.02	504204	48.044	47.954	47.934	47.845	49.110	49.120	48.950	48.930
2592.99	518598	48.037	48.010	47.836	47.808	48.950	49.040	48.850	48.830
2664.99	532998	48.016	47.936	47.778	47.628	49.040	48.940	48.880	48.870

NR BAND 41 Channel bandwidth: 60MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2526.00	505200	58.373	58.398	58.437	58.113	59.570	59.540	59.600	59.320
2592.99	518598	58.291	58.326	58.404	58.108	59.540	59.600	59.680	59.410
2659.98	531996	58.195	58.326	58.242	58.084	59.520	59.600	59.500	59.390

NR BAND 41 Channel bandwidth: 80MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2536.02	507204	78.323	78.085	78.211	77.923	79.730	79.810	79.770	79.580
2592.99	518598	78.264	78.222	78.012	77.954	79.730	79.820	79.790	79.600
2649.99	529998	78.044	78.154	78.173	78.026	79.750	79.770	79.780	79.490

NR BAND 41 Channel bandwidth: 90MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2541.00	508200	88.471	88.311	88.574	87.941	90.100	90.130	89.910	89.620
2592.99	518598	88.314	88.273	88.403	88.360	90.070	89.970	90.030	90.160
2644.98	528996	88.160	88.100	88.269	87.949	90.180	90.050	90.000	89.760

NR BAND 41 Channel bandwidth: 100MHz									
CP-OFDM_SCS 30 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
2546.01	509202	98.167	98.053	98.232	97.860	100.400	100.300	100.100	99.990
2592.99	518598	98.367	98.297	98.203	97.853	100.300	100.100	100.300	99.950
2640.00	528000	98.288	98.093	98.050	97.986	100.300	100.200	100.200	100.100

NR BAND 66 Channel bandwidth: 10MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1715.0	343000	9.4928	9.4862	9.5100	9.5198	10.040	10.050	10.080	9.992
1745.0	349000	9.5058	9.5018	9.5024	9.4884	10.070	10.090	10.100	10.070
1775.0	355000	9.4945	9.4787	9.5009	9.5087	10.090	10.070	9.832	10.060

NR BAND 66 Channel bandwidth: 5MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1712.5	342500	4.5778	4.6023	4.6006	4.5955	4.919	4.901	4.983	4.865
1745.0	349000	4.5844	4.5997	4.6068	4.5846	4.967	4.952	4.948	4.898
1777.5	355500	4.5868	4.5585	4.6046	4.5846	4.931	4.943	4.909	4.892

NR BAND 66 Channel bandwidth: 20MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1720.0	344000	19.285	19.244	19.318	19.244	19.920	20.000	19.960	19.940
1745.0	349000	19.288	19.297	19.319	19.263	19.870	19.960	19.970	19.970
1770.0	354000	19.280	19.327	19.308	19.292	19.990	19.890	19.930	19.950

NR BAND 66 Channel bandwidth: 15MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
1717.5	343500	14.384	14.347	14.347	14.376	15.040	15.010	14.840	14.860
1745.0	349000	14.389	14.363	14.399	14.402	14.880	15.010	15.000	14.980
1772.5	354500	14.440	14.418	14.407	14.409	15.020	15.000	14.910	14.970

NR BAND 71 Channel bandwidth: 10MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
668.0	133600	9.5013	9.4870	9.5175	9.5596	10.110	10.100	10.150	10.080
680.5	136100	9.4922	9.4904	9.4777	9.5456	10.130	10.120	10.130	10.070
693.0	138600	9.5129	9.4680	9.5245	9.5471	10.150	10.080	10.110	10.060

NR BAND 71 Channel bandwidth: 5MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
665.5	133100	4.5715	4.5677	4.5803	4.5816	4.955	4.931	4.952	4.917
680.5	136100	4.5876	4.5884	4.5741	4.5908	4.976	4.949	4.973	4.930
695.5	139100	4.5666	4.5596	4.5573	4.5698	4.935	4.971	4.920	4.888

NR BAND 71 Channel bandwidth: 20MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
673.0	134600	19.255	19.317	19.299	19.248	19.970	19.940	19.990	19.930
680.5	136100	19.248	19.294	19.284	19.250	20.000	19.930	19.970	19.910
688.0	137600	19.267	19.248	19.246	19.222	19.880	19.940	19.950	19.920

NR BAND 71 Channel bandwidth: 15MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
670.5	134100	14.391	14.394	14.365	14.378	14.960	14.960	14.940	14.870
680.5	136100	14.386	14.381	14.362	14.330	14.990	14.990	15.020	14.860
690.5	138100	14.369	14.371	14.353	14.365	14.980	14.970	14.960	14.930

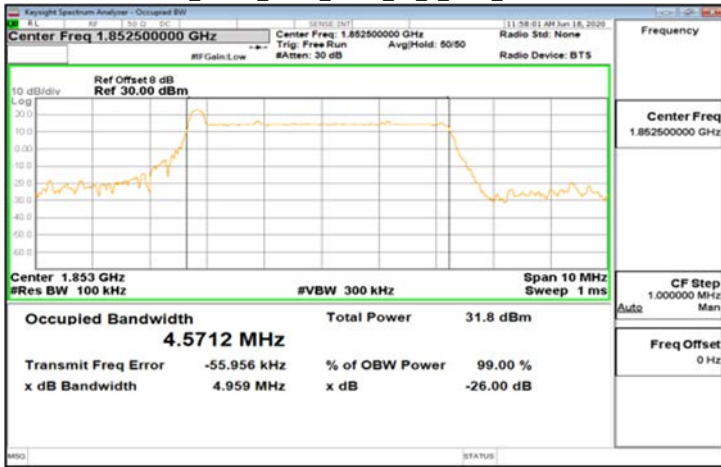
NR BAND 71 Channel bandwidth: 20MHz									
CP-OFDM_SCS 15 kHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
673.0	134600	19.255	19.317	19.299	19.248	19.970	19.940	19.990	19.930
680.5	136100	19.248	19.294	19.284	19.250	20.000	19.930	19.970	19.910
688.0	137600	19.267	19.248	19.246	19.222	19.880	19.940	19.950	19.920

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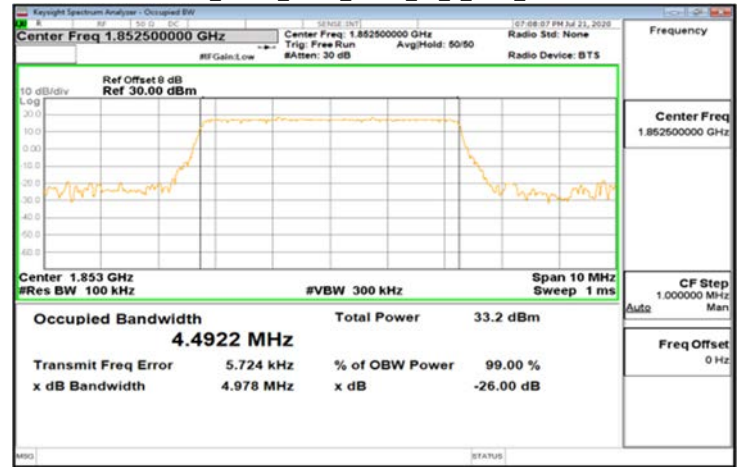
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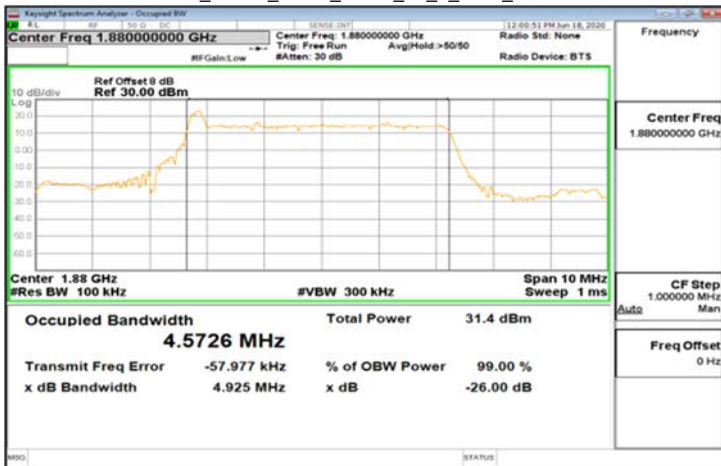
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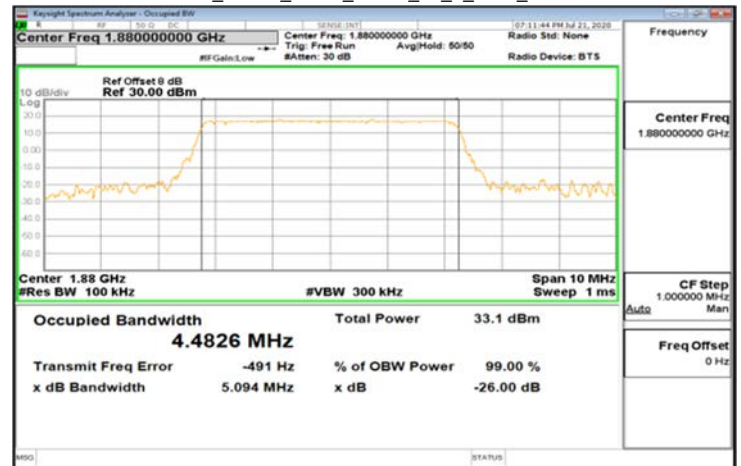
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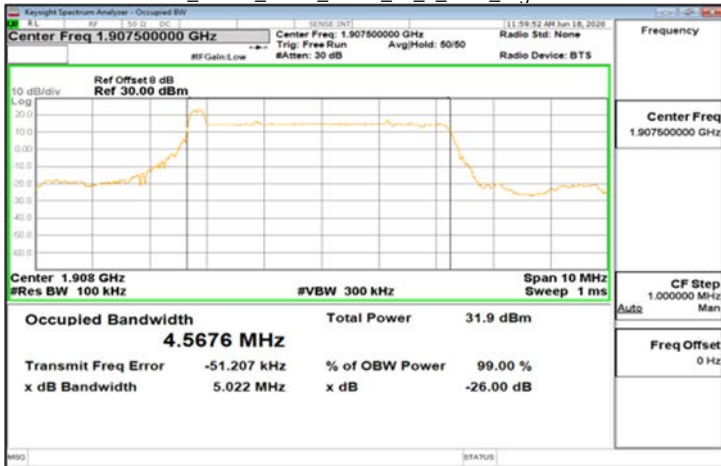
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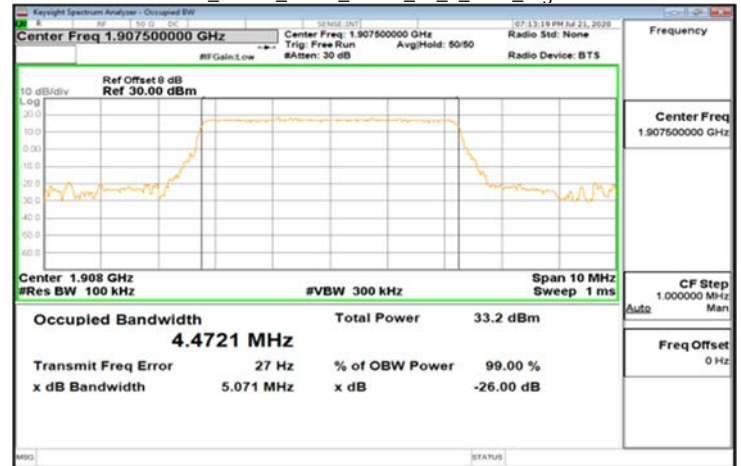
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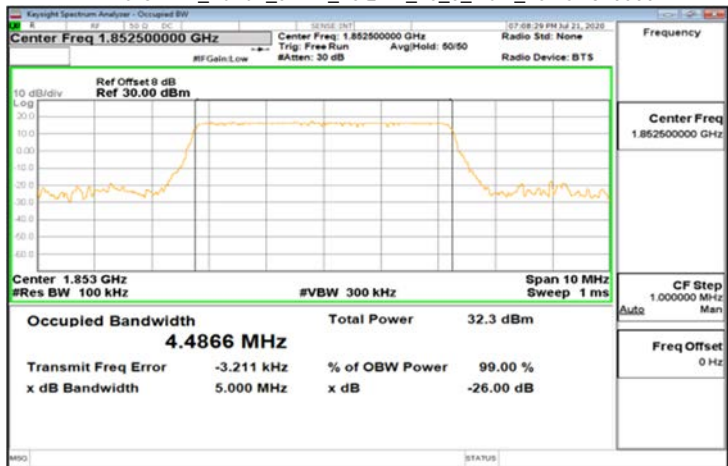


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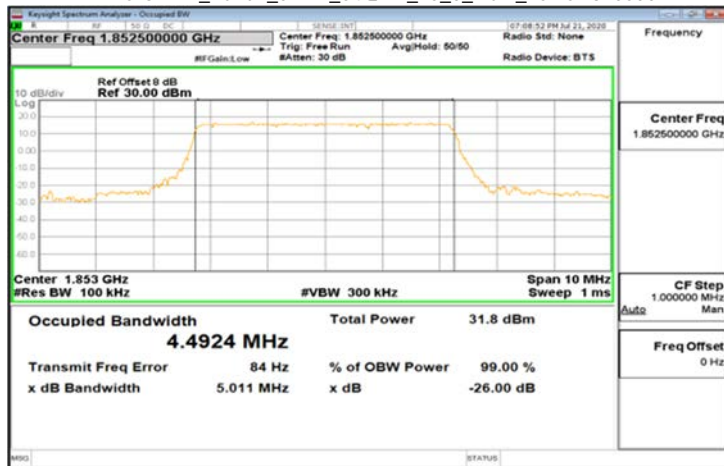
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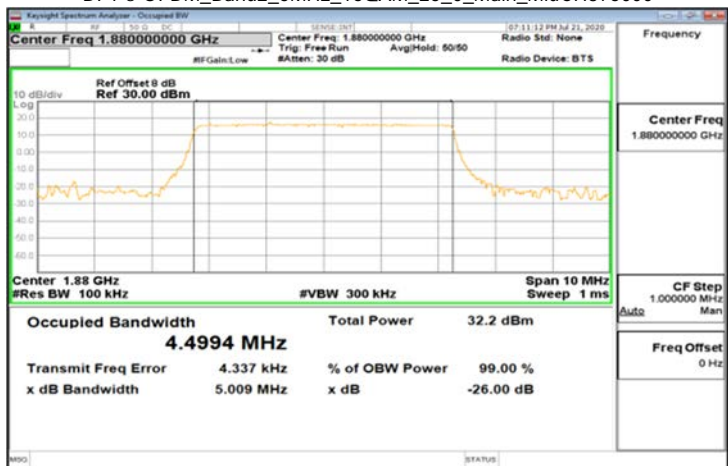
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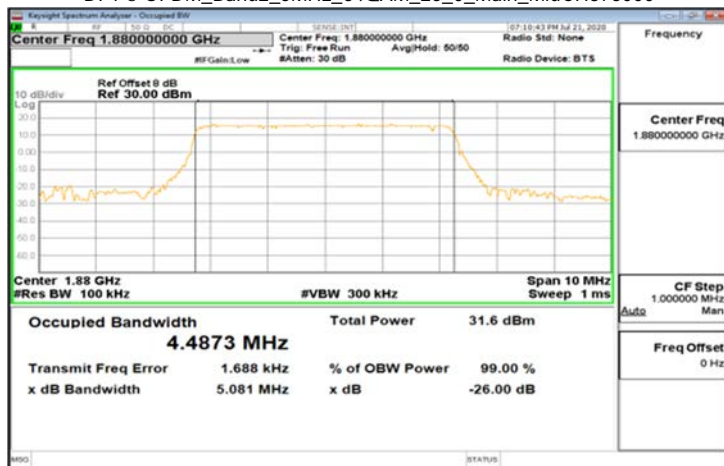
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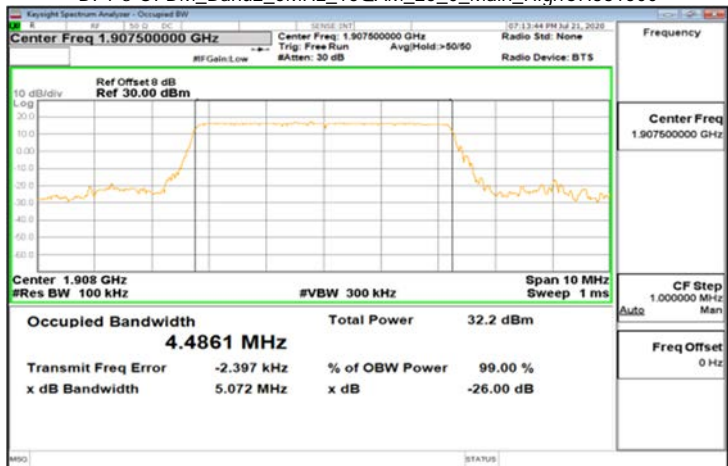
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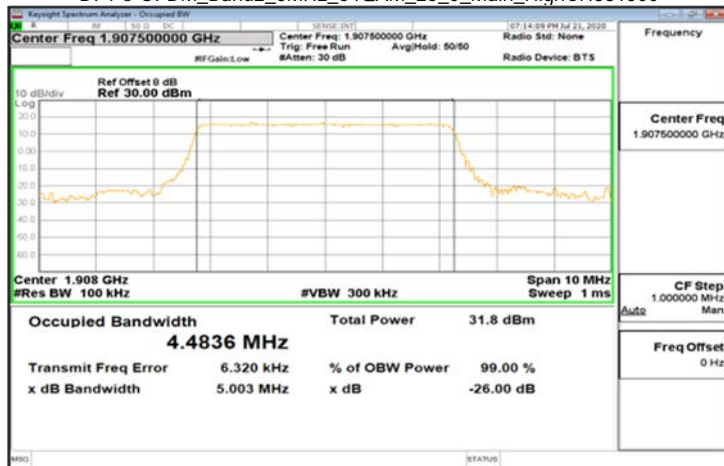
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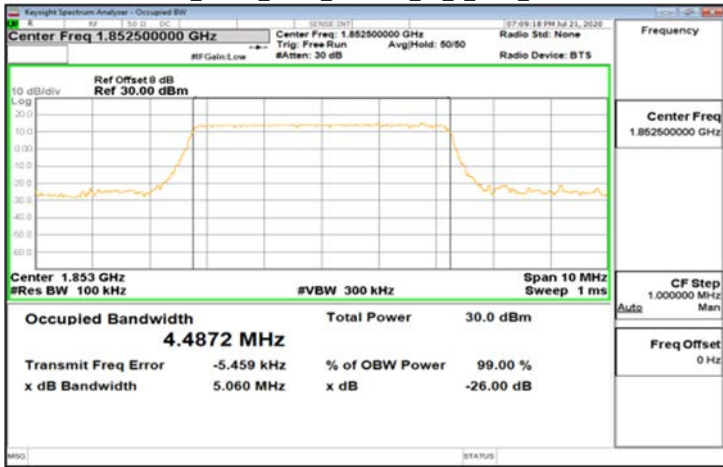


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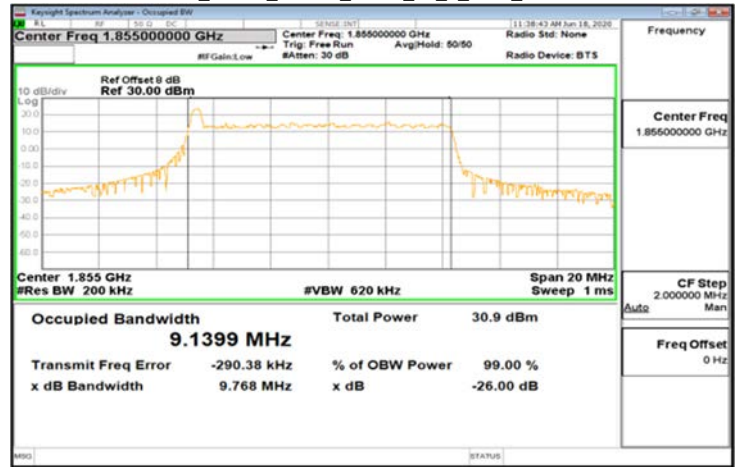
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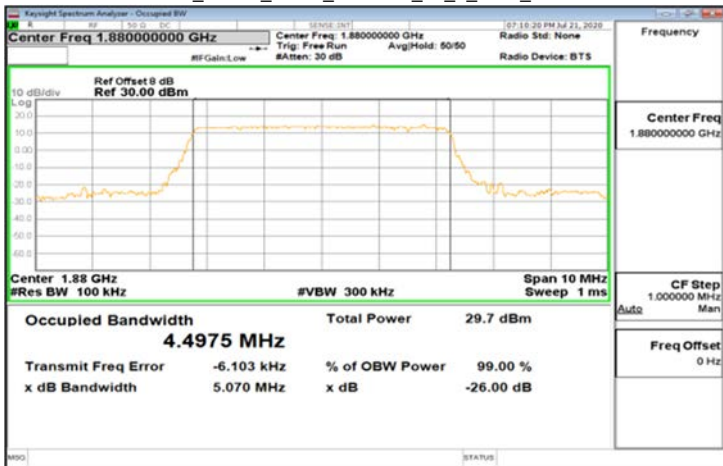
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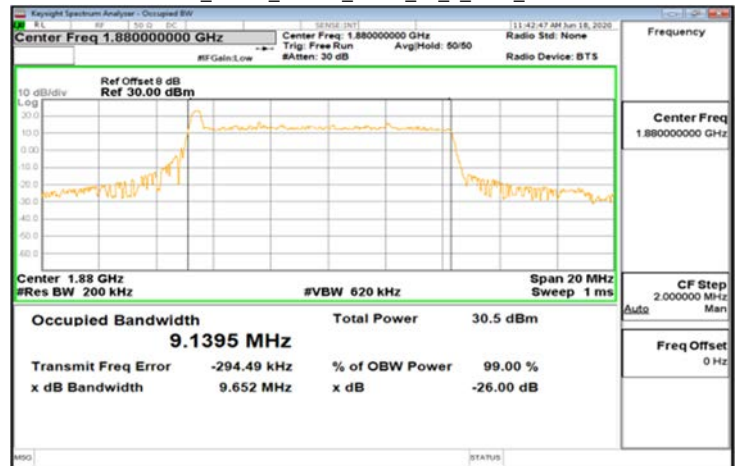
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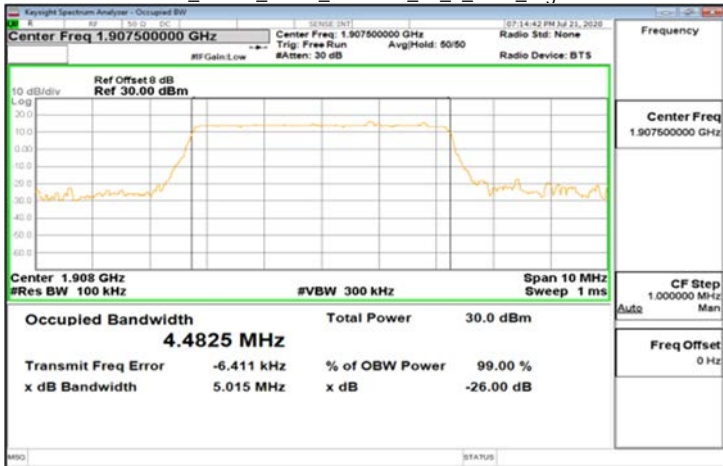
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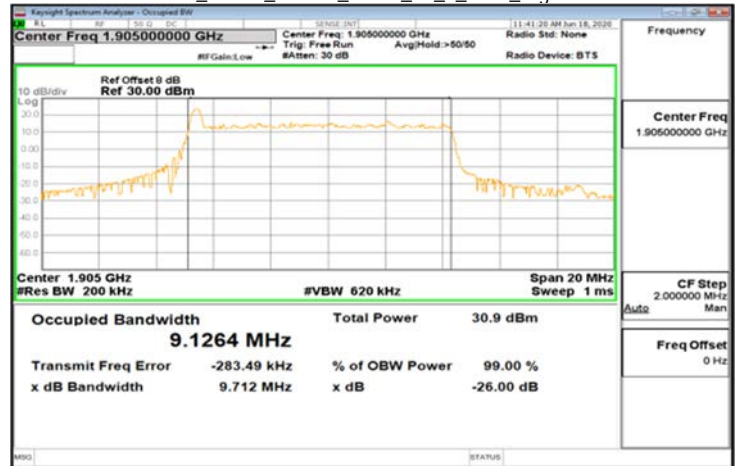
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DFT-s-OFDM_Band2_5MHz_256QAM_25_0_Main_HighCH381500



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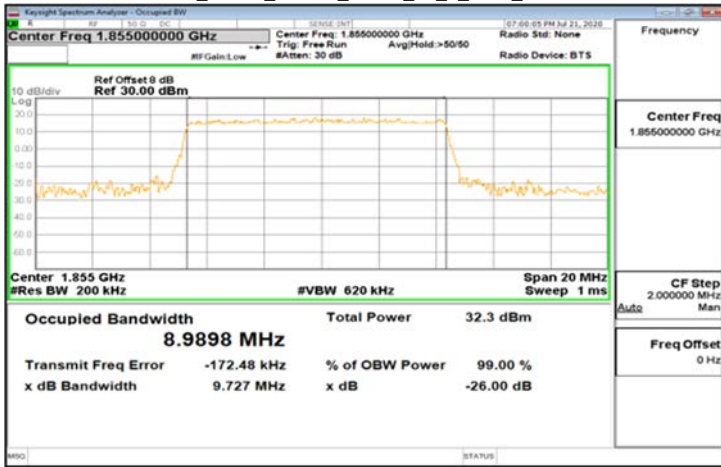


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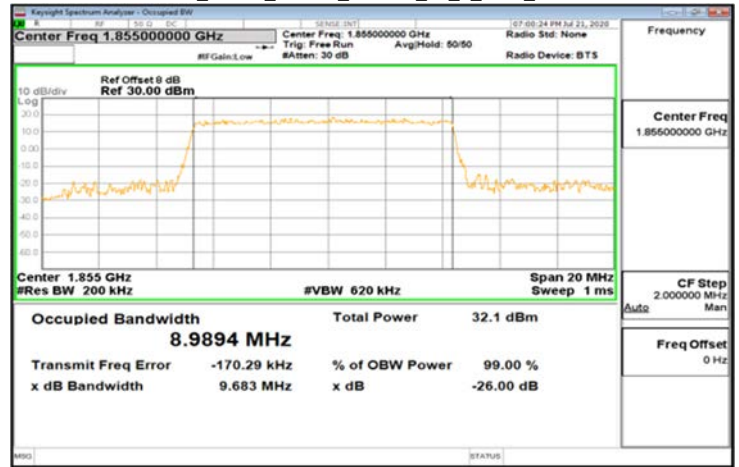
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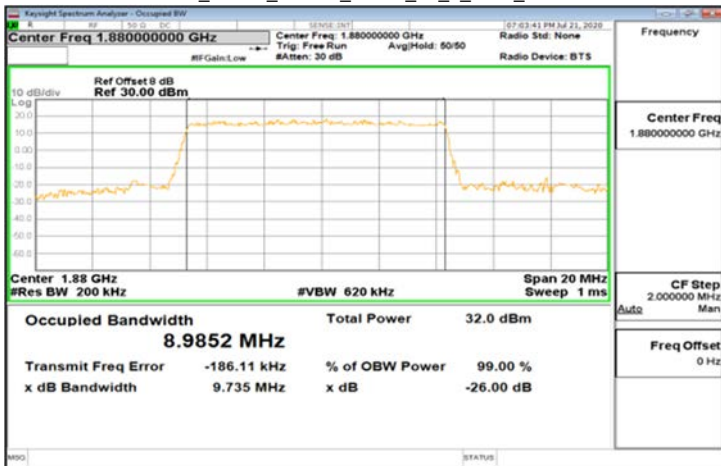
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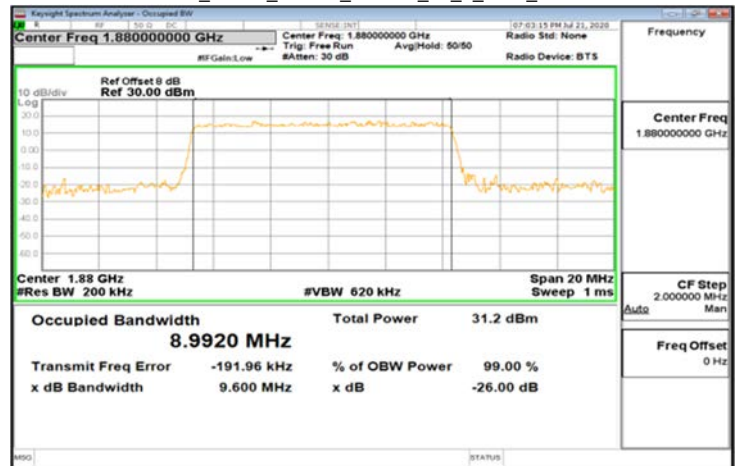
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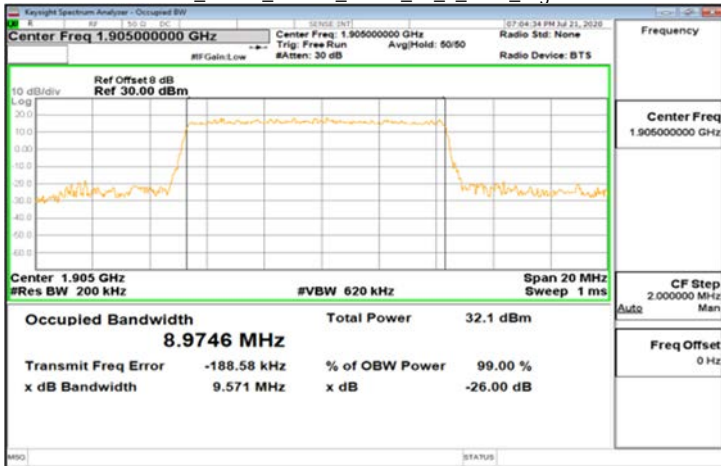
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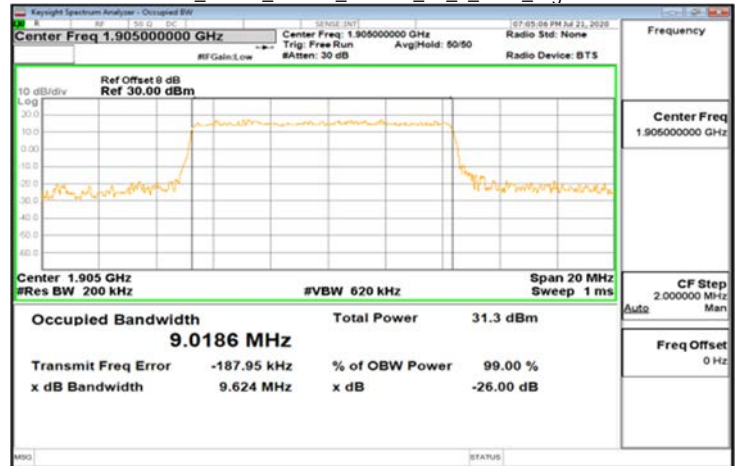
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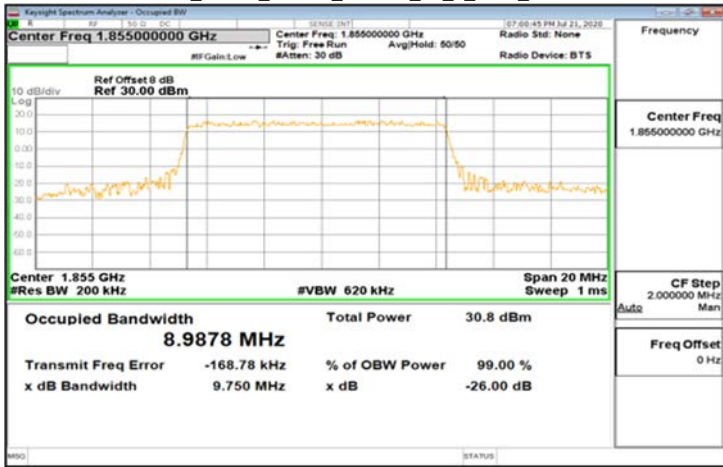


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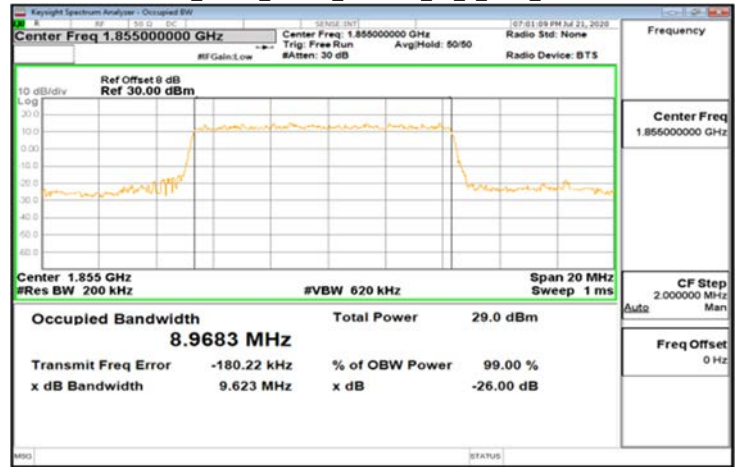
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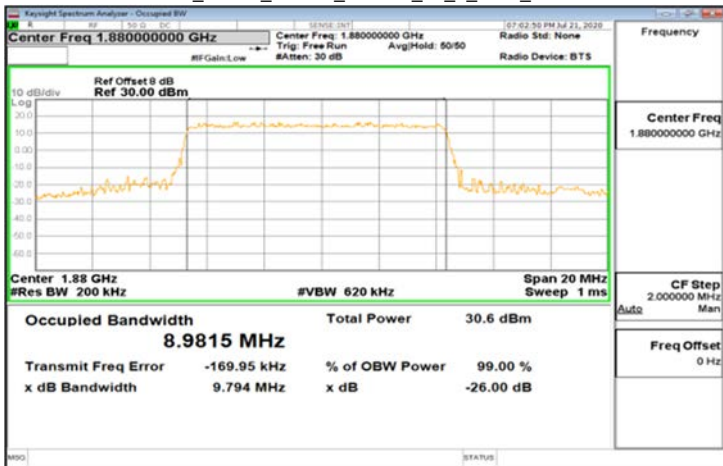
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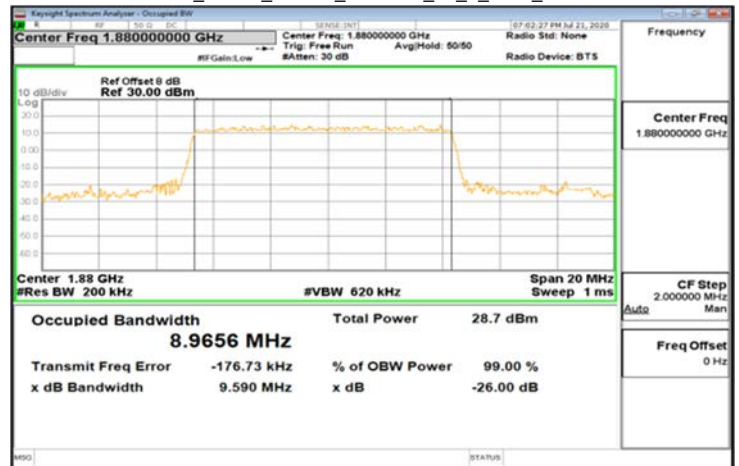
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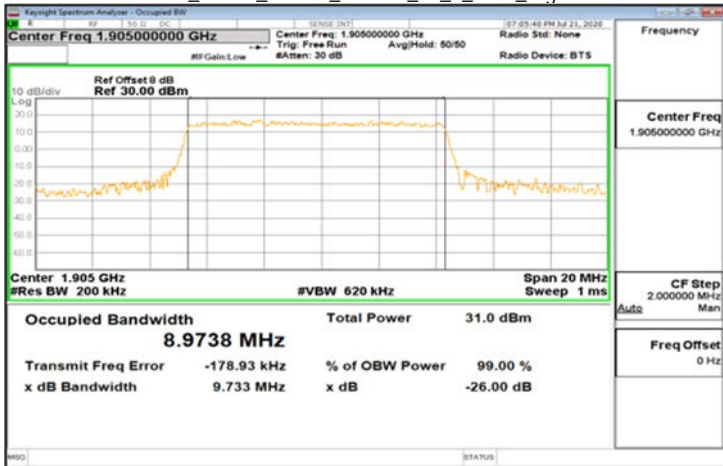
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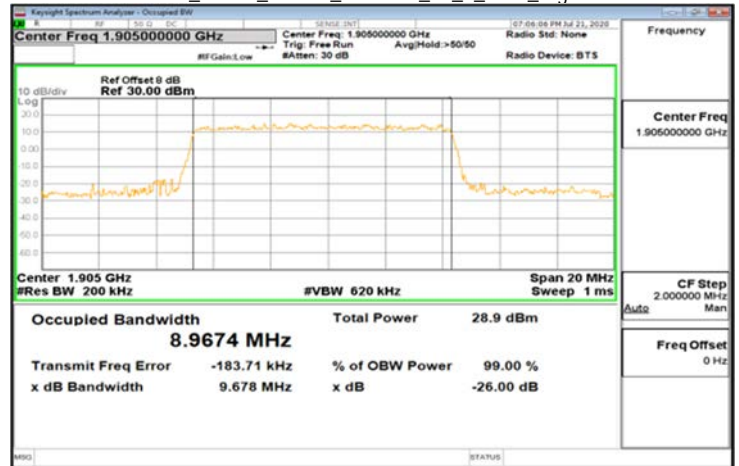
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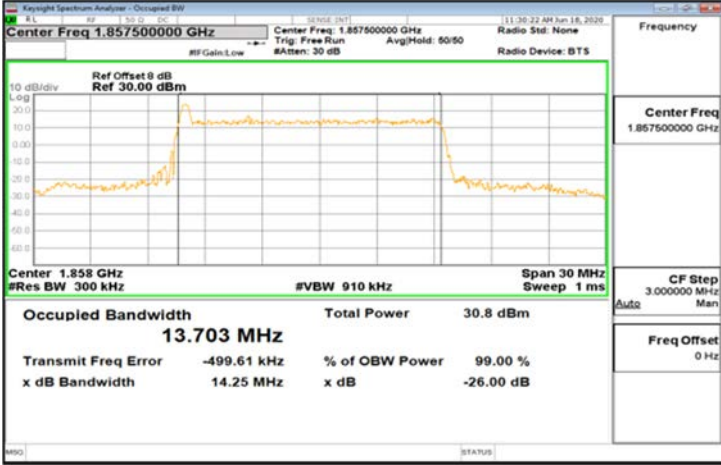


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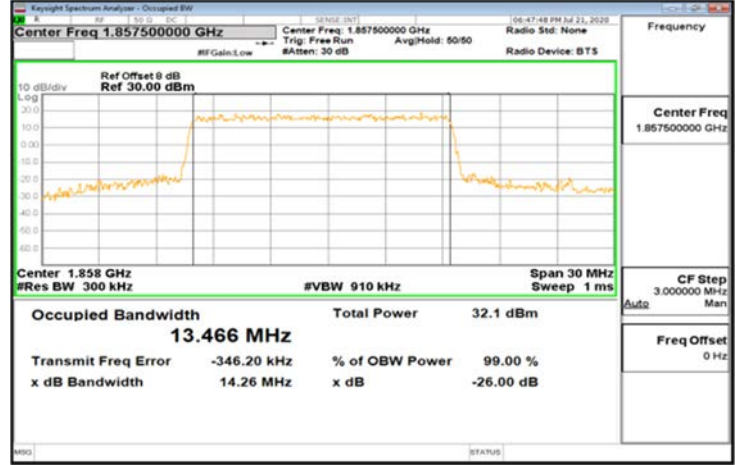
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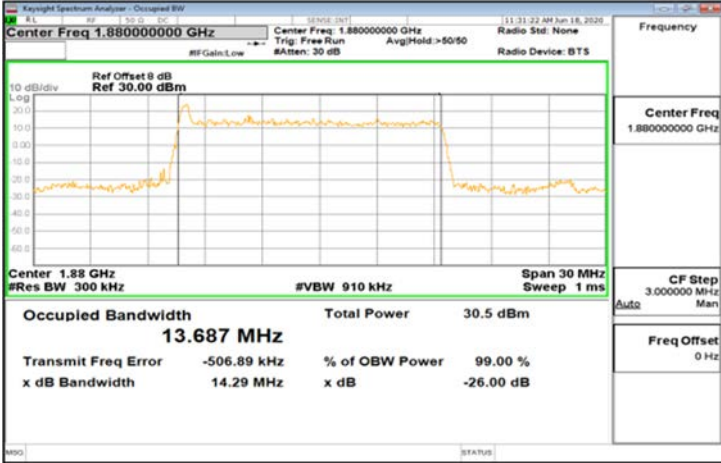
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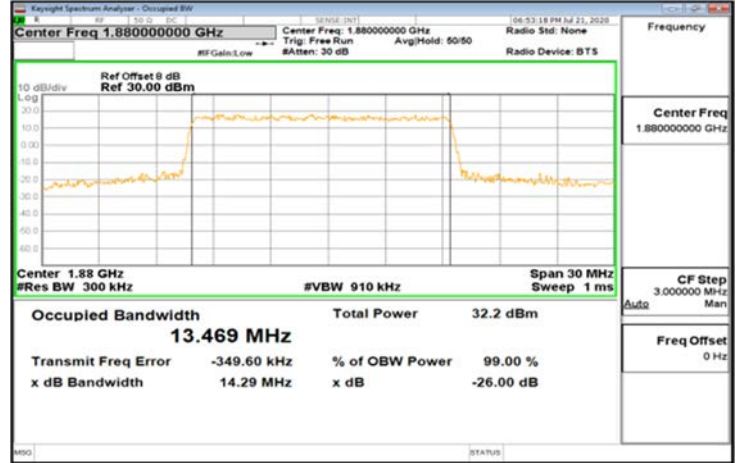
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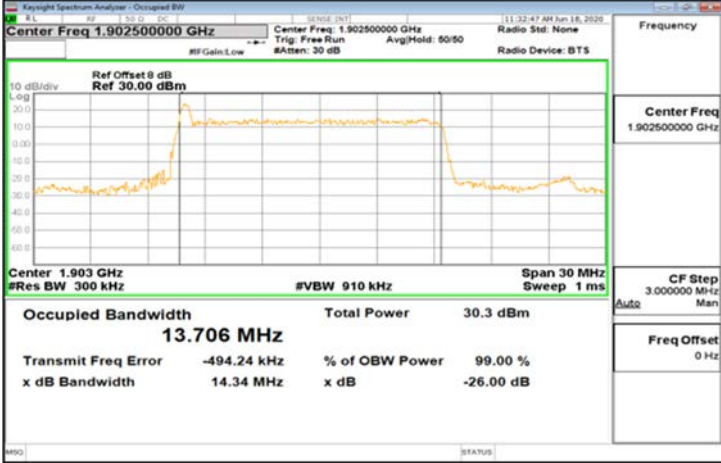
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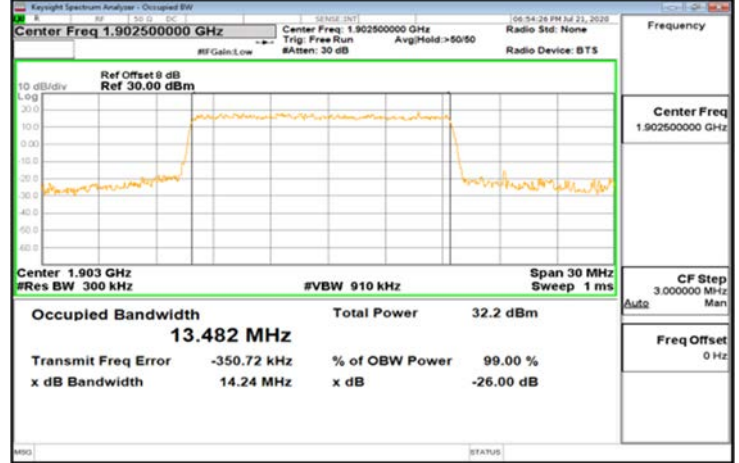
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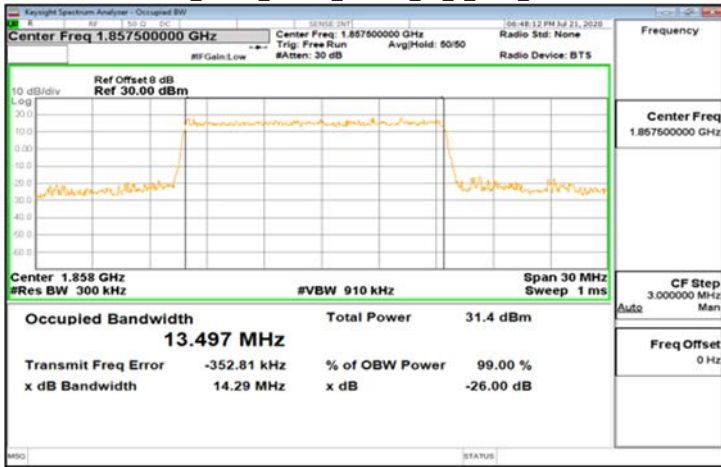


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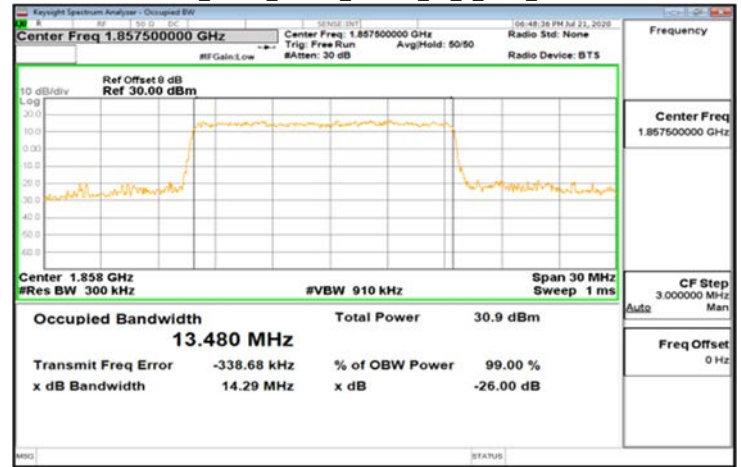
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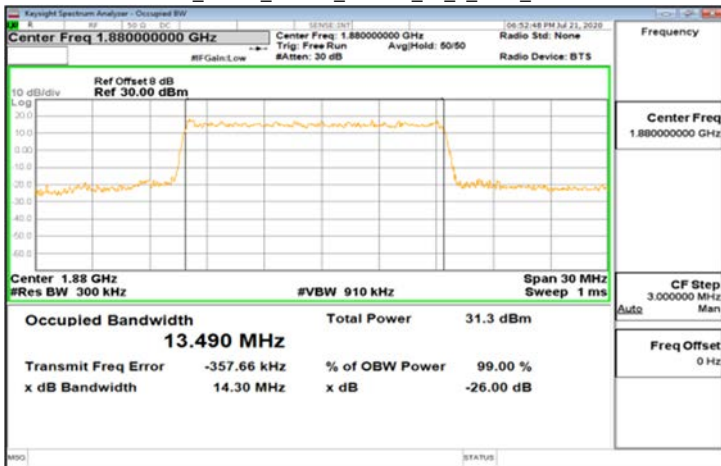
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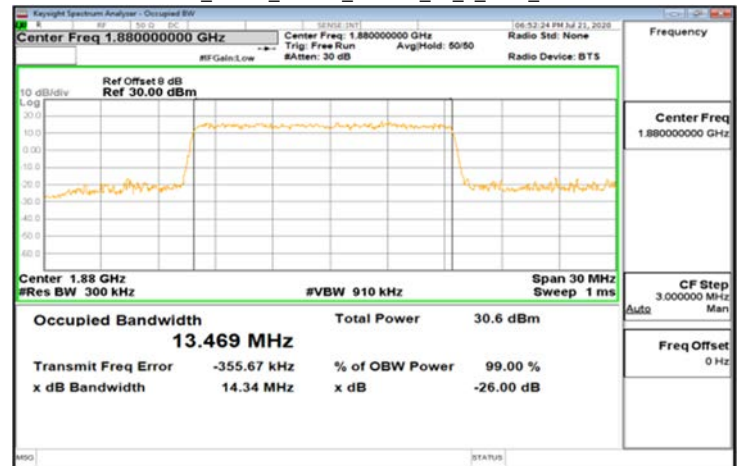
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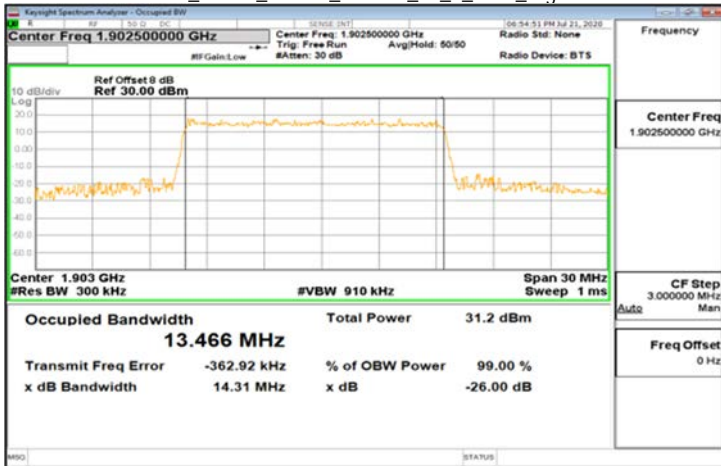
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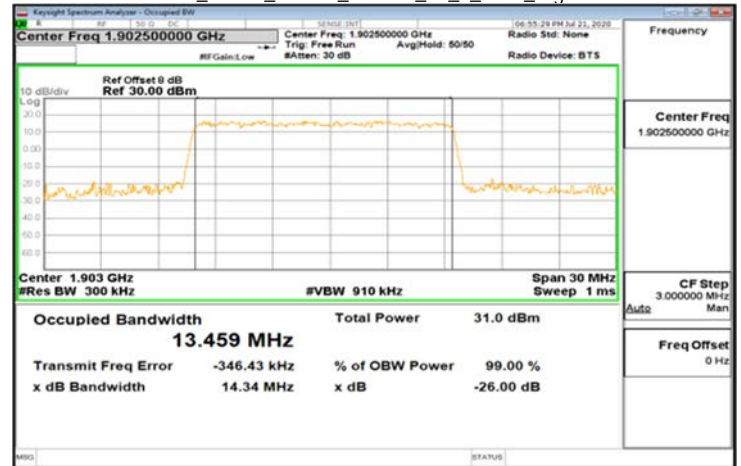
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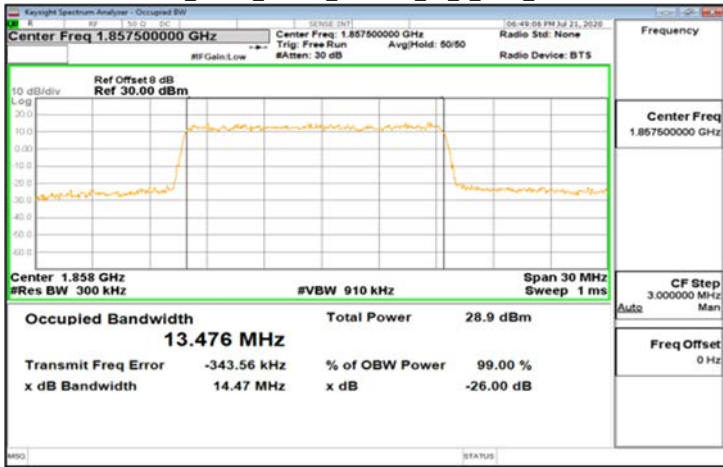


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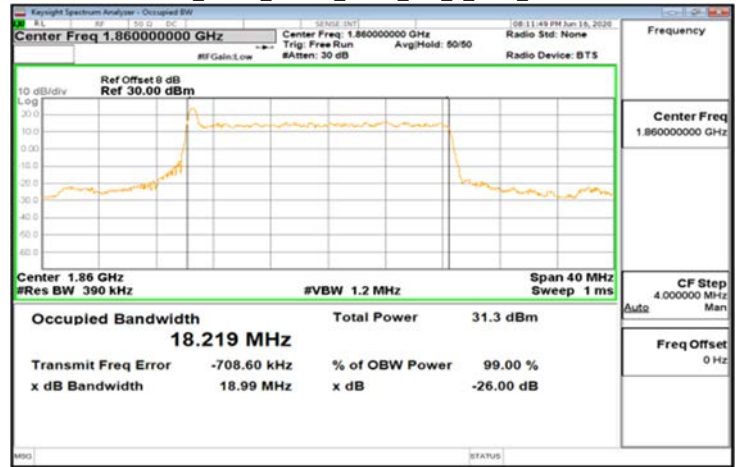
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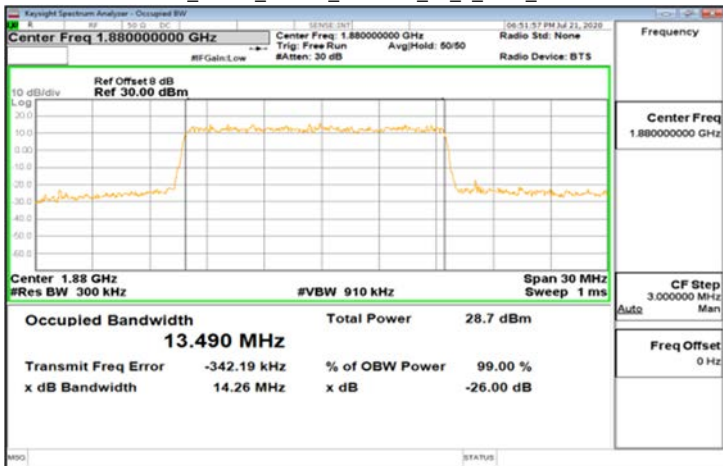
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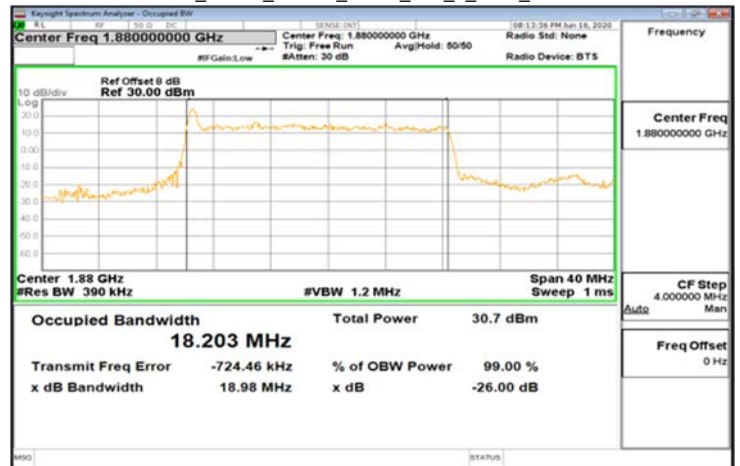
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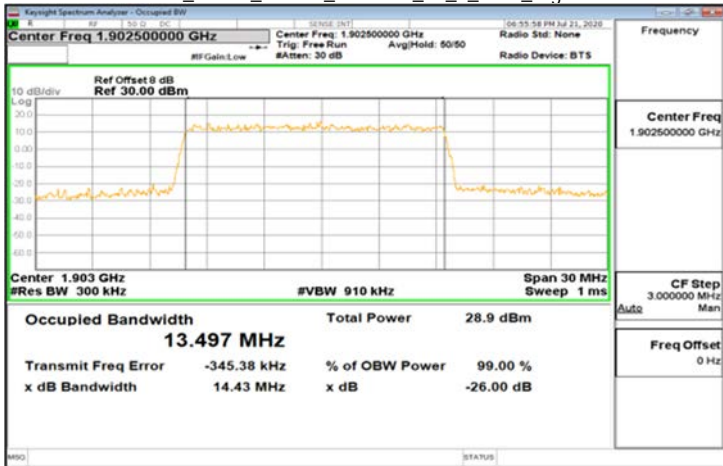
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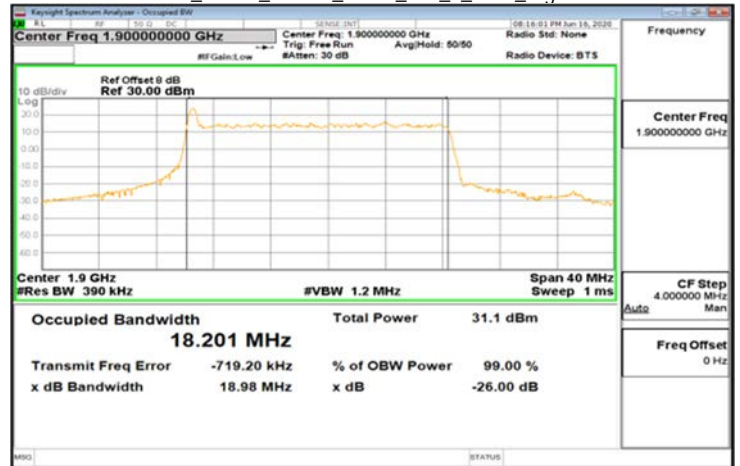
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DFT-s-OFDM_Band2_15MHz_256QAM_75_0_Main_HighCH380500



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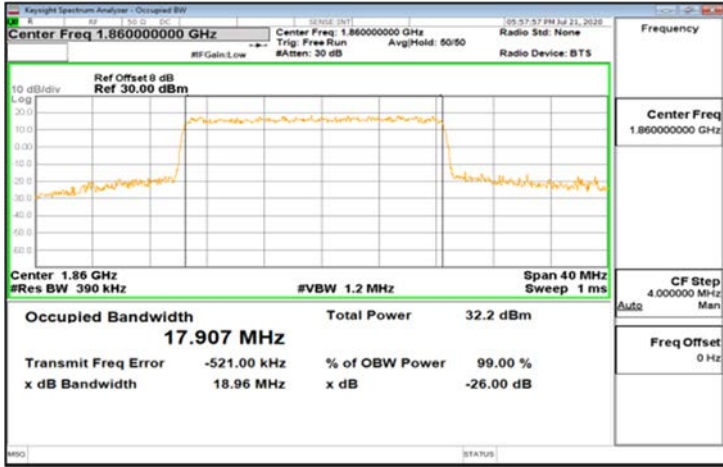


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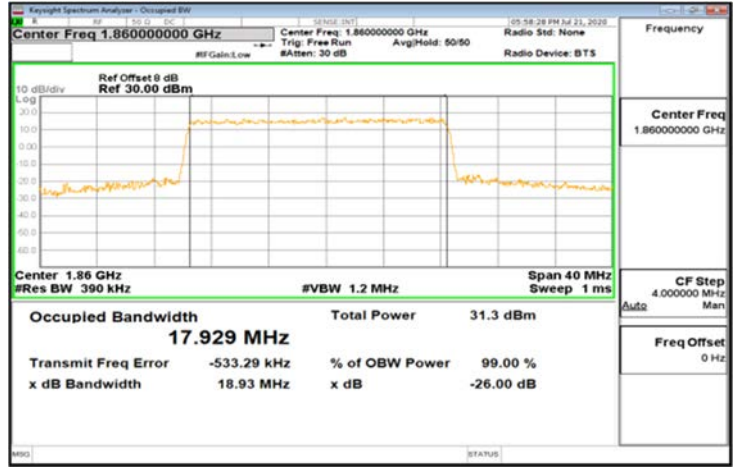
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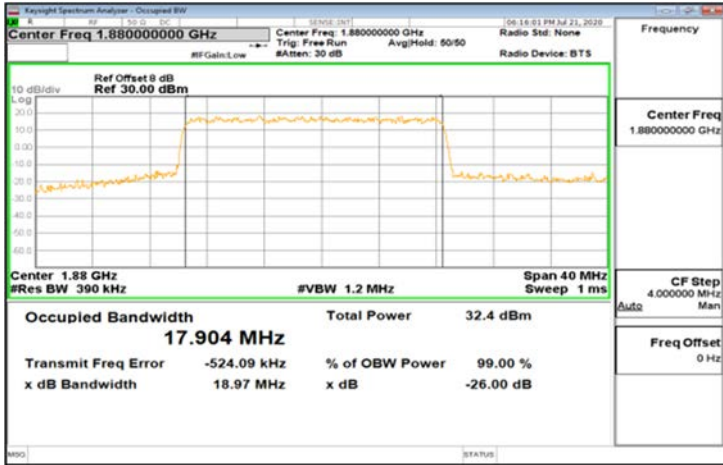
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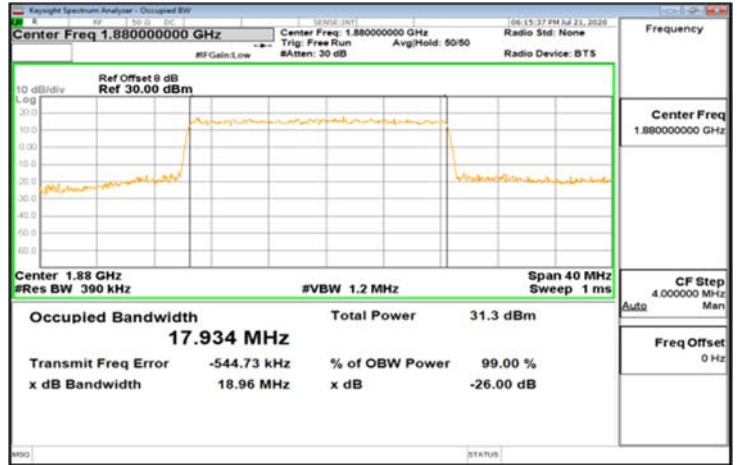
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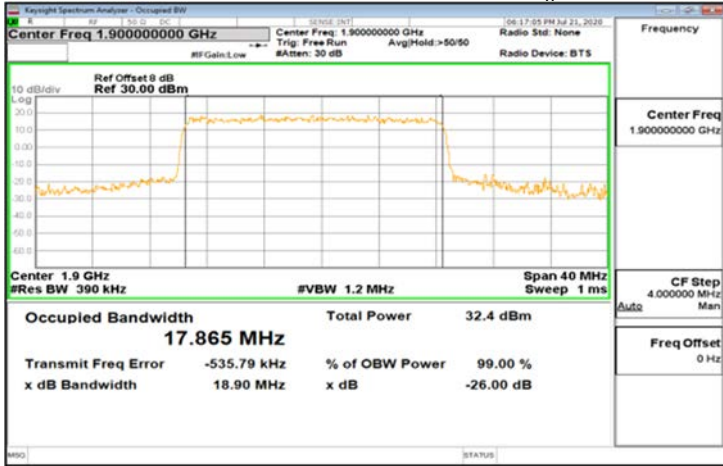
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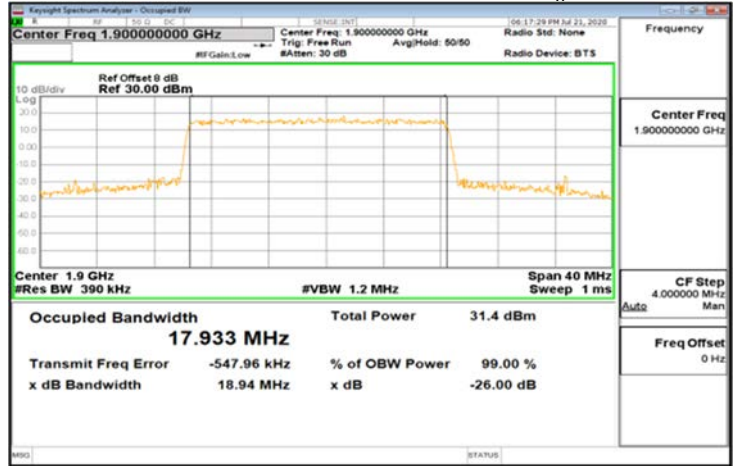
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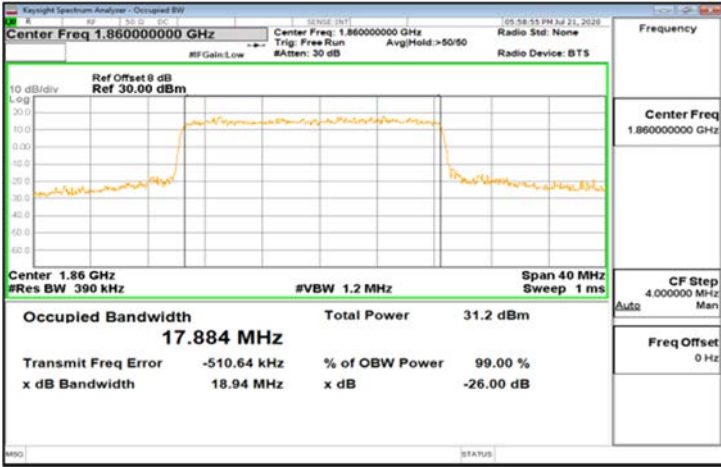


Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

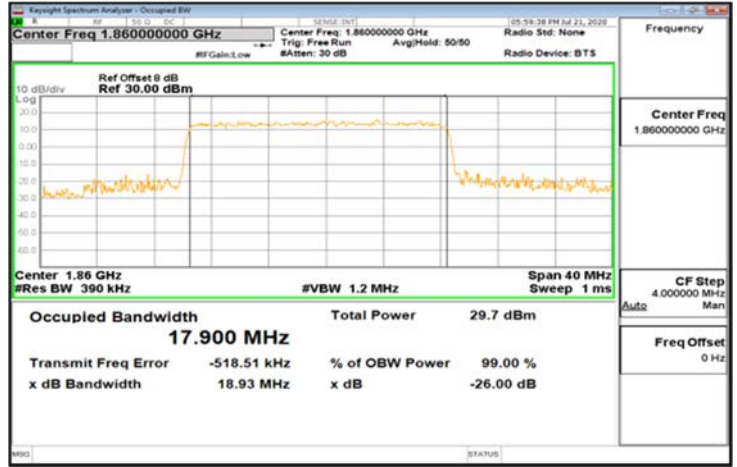
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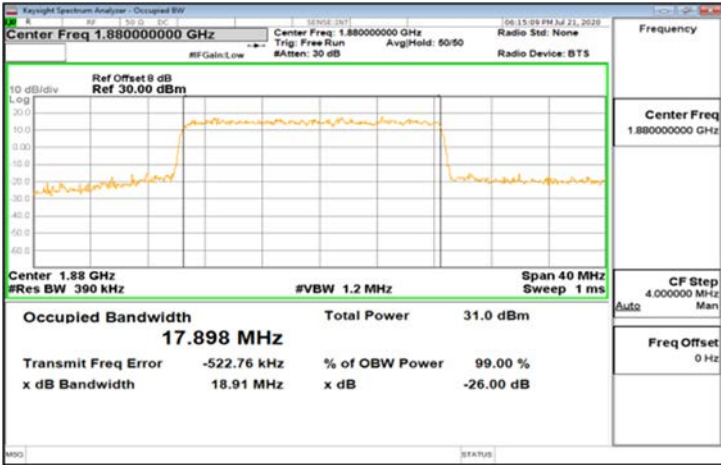
DFT-s-OFDM_Band2_20MHz_64QAM_100_0_Main_LowCH372000



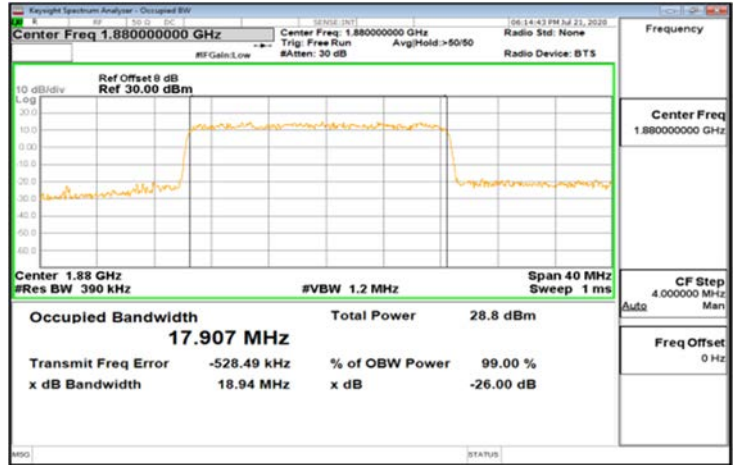
DFT-s-OFDM_Band2_20MHz_256QAM_100_0_Main_LowCH372000



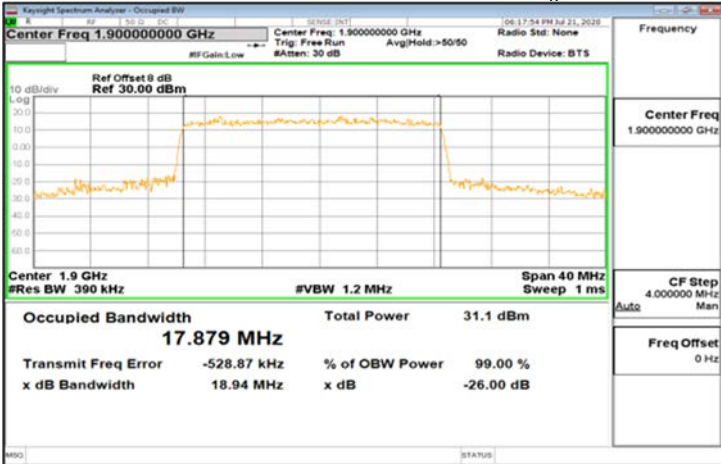
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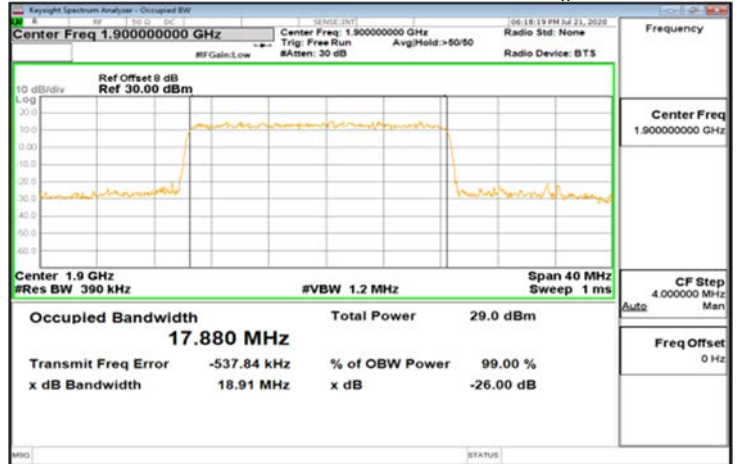
DFT-s-OFDM_Band2_20MHz_256QAM_100_0_Main_MidCH376000



DFT-s-OFDM_Band2_20MHz_64QAM_100_0_Main_HighCH380000



DFT-s-OFDM_Band2_20MHz_256QAM_100_0_Main_HighCH380000



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