TEST REPORT

No. I20Z70015-WMD06

for

Samsung Electronics. Co., Ltd.

Mobile phone

Model Name: SM-A115U

FCC ID: ZCASMA115U

with

Hardware Version: REV1.0

Software Version: A115U.001

Issued Date: 2020-04-28

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20Z70015-WMD06	Rev.0	1st edition	2020-04-28

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

CONTENTS

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0 and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

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

Location 2: CTTL (Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China 100191

Location 3: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2020-02-17

Testing End Date: 2020-04-28

1.5. Signature

Dong Yuan

(Prepared this test report)

Zhou Yu

(Reviewed this test report)

Zhao Hui Lin

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Samsung Electronics. Co., Ltd.
Address /Post:	19 Chapin Rd.,Building D Pine Brook, NJ 07058
Contact:	Jenni Chun
Email:	j1.chun@samsung.com
Telephone:	+1-201-937-4203

2.2. Manufacturer Information

Company Name:	Samsung Electronics. Co., Ltd
Address /Post:	R5, A Tower 22 Floor A-1,(Maetan dong) 129,Samsung-ro,Yeongtong-gu, Suwon-Si, Gyeonggi-do 16677, Korea
Contact:	JP KIM
Email:	jp426.kim@samsung.com
Telephone:	+82-10-4376-0326

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Mobile phone
Model Name	SM-A115U
FCC ID	ZCASMA115U
Antenna	Embedded
Output power	20.97dBm maximum EIRP measured for LTE Band 41
Extreme vol. Limits	3.6VDC to 4.4VDC (nominal: 3.82VDC)
Extreme temp. Tolerance	-10°C to +65°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL.

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT20a	354223110083854	REV1.0	A115U.001	2020-02-17
UT17a	354223110084449	REV1.0	A115U.001	2020-03-13
UT11a	354223110214558	REV1.0	A115U.001	2020-03-30

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery

AE1

Model	Secondary Li-ion Battery
Manufacturer	Ningde Amperex Technology Limited
Capacitance	3900mAh/4000mAh

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

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

Reference	Title	Version
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-19 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

5. LABORATORY ENVIRONMENT

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

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

Fully-anechoic chamber 2 (8.6 meters×6.1 meters×3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 1 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

Semi-anechoic chamber 2 / Fully-anechoic chamber 3 (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	<±3.5 dB, 3 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

6. SUMMARY OF TEST RESULT

LTE Band 41

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	2.1051/27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

Terms used in Verdict column

P	Pass. The EUT complies with the essential requirements in the standard.
NP	Not Performed. The test was not performed by CTTL.
NA	Not Applicable. The test was not applicable.
BR	Re-use test data from basic model report.
F	Fail. The EUT does not comply with the essential requirements in the standard.

Explanation of worst-case configuration

The worst-case scenario for all measurements is based on the conducted output power measurement investigation results. Output power was measured on QPSK,16QAM and 64QAM modulations. It was found that QPSK was the worst case. All testing was performed using QPSK modulations to represent the worst case unless otherwise stated. The test results shown in the following sections represent the worst case emission.

7. Test Equipment Utilized

NO.	Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
1	Spectrum Analyzer	FSU26	200030	R&S	2020-06-03	1 year
2	Climate chamber	SH-242	93008556	ESPEC	2020-12-21	3 year
3	Radio Communication Analyzer	MT8821C	6201763159	Anritsu	2020-07-23	1 year
4	EMI Antenna	VULB9163	9163-483	Schwarzbeck	2020-09-16	1 year
5	EMI Antenna	3117	00058889	ETS-Lindgren	2020-11-18	1 year
6	EMI Antenna	3117	00119021	ETS-Lindgren	2021-01-14	1 year
7	EMI Antenna	9117	167	Schwarzbeck	2020-05-27	1 year
8	Signal Generator	N5183A	MY49060052	R&S	2020-06-24	1 year
10	Test Receiver	E4440A	MY48250642	Agilent	2021-03-13	1 year
11	Power Amplifier	5S1G4	0341863	AR	/	
12	Universal Radio Communication Tester	MT8821C	6201623363	Auritsu	2020-07-11	1 year

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

A.1.1 Summary

During the process of testing, the EUT was controlled via Anritsu Radio Communication Analyzer (MT8821C) to ensure max power transmission and proper modulation.
In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Measurement result

The conducted power measurement results of uplink LTE CA are as below Normal Power:

LTE CA Class	PCC					SCC					Power(dBm)
	PCC Band	PCC Bandwidth(MHz)	PCC ULRB size	PCC ULRB offset	PCC UL Channel	SCC Band	SCC Bandwidth (MHz)	SCC ULRB size	SCC ULRB offset	SCC UL Channel	
41C	41	20	1	0	39750	41	20	1	0	39948	22.91

A.1.3 Radiated

A.1.3.1 Description

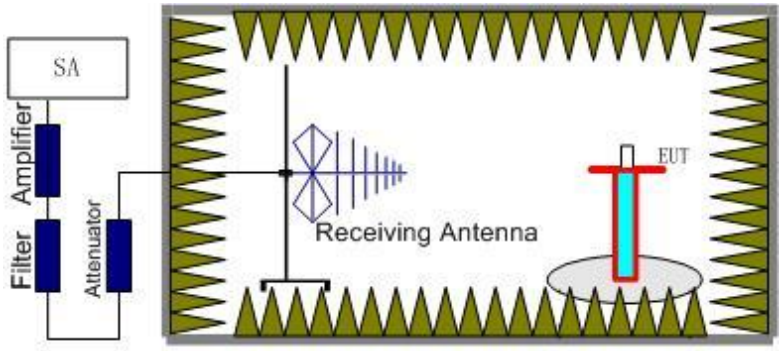
This is the test for the maximum radiated power from the EUT.

Rule Part 27.50(h)(2) specifies "Mobilestations are limited to 2.0 wattsEIRP."

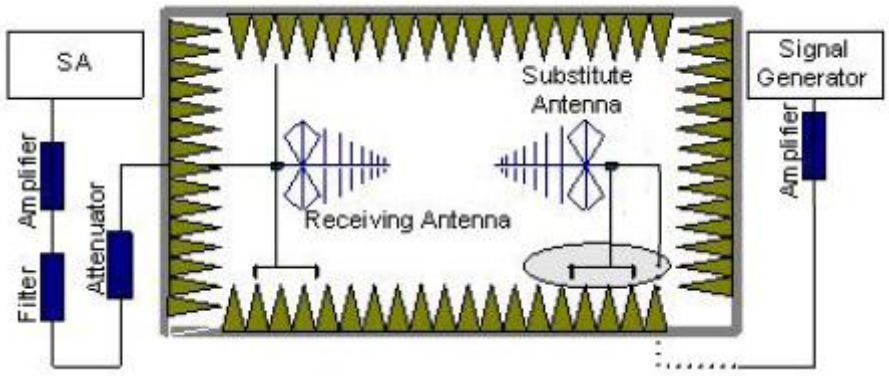
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603E-2016 are used.

1. EUT was placed on a 1.5-meter-high non-conductive stand at a 3-meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360 and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with rms detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna

polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss (P_{cl}), the substitution antenna Gain (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) = P_{Mea} +P_{Ag} - P_{cl} + G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP - 2.15.

A.1.3.3 Measurement result

LTE band 41- EIRP

Limits: ≤33dBm (2W)

LTE_B41C_5MHz+20MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2499.30	2511.00	-34.75	3.58	45.61	6.10	20.54	33.00	12.46	V
2583.80	2595.50	-35.13	3.67	44.92	6.25	19.71	33.00	13.29	V
2668.30	2680.00	-36.43	3.74	44.96	6.41	18.68	33.00	14.32	H

LTE_B41C_10MHz+20MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2501.50	2515.90	-34.37	3.58	45.66	6.10	20.97	33.00	12.03	V
2583.60	2598.00	-35.09	3.67	44.92	6.24	19.74	33.00	13.26	V
2665.60	2680.00	-36.34	3.73	44.96	6.40	18.75	33.00	14.25	H

LTE_B41C_15MHz+20MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2503.80	2520.90	-27.32	3.58	45.65	6.11	20.86	33.00	12.14	V
2583.30	2595.50	-27.41	3.67	44.92	6.24	20.08	33.00	12.92	V
2662.90	2680.00	-29.00	3.72	44.96	6.40	18.64	33.00	14.36	H

LTE_B41C_20MHz+5MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2517.70	-27.51	3.59	45.15	6.11	20.16	33.00	12.84	V
2590.50	2602.50	-27.65	3.69	44.93	6.26	19.85	33.00	13.15	V
2675.00	2686.70	-28.48	3.74	44.97	6.42	19.17	33.00	13.83	H

LTE_B41C_20MHz+10MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2520.40	-27.95	3.59	45.15	6.11	19.72	33.00	13.28	V
2588.10	2602.50	-28.03	3.69	44.93	6.26	19.47	33.00	13.53	V
2670.10	2684.50	-29.40	3.74	44.97	6.41	18.24	33.00	14.76	H

LTE_B41C_20MHz+15MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2523.00	-28.36	3.59	45.15	6.11	19.31	33.00	13.69	V
2585.60	2602.70	-28.41	3.68	44.92	6.25	19.08	33.00	13.92	V
2665.10	2682.20	-29.87	3.73	44.96	6.40	17.76	33.00	15.24	H

LTE_B41C_15MHz+15MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2503.50	2518.50	-27.56	3.58	45.65	6.11	20.62	33.00	12.38	V
2585.50	2600.50	-27.16	3.68	44.92	6.25	20.33	33.00	12.67	V
2667.50	2682.50	-28.51	3.74	44.96	6.41	19.12	33.00	13.88	H

LTE_B41C_20MHz+20MHz_QPSK

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2525.80	-28.62	3.59	45.15	6.11	19.05	33.00	13.95	V
2583.10	2602.90	-28.59	3.67	44.92	6.24	18.90	33.00	14.10	V
2660.20	2680.00	-30.20	3.71	44.96	6.39	17.44	33.00	15.56	H

LTE_B41C_5MHz+20MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2499.30	2511.00	-35.42	3.58	45.61	6.10	19.87	33.00	13.13	V
2583.80	2595.50	-35.85	3.67	44.92	6.25	18.99	33.00	14.01	V
2668.30	2680.00	-37.14	3.74	44.96	6.41	17.97	33.00	15.03	H

LTE_B41C_10MHz+20MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2501.50	2515.90	-35.14	3.58	45.66	6.10	20.20	33.00	12.80	V
2583.60	2598.00	-35.80	3.67	44.92	6.24	19.03	33.00	13.97	V
2665.60	2680.00	-37.13	3.73	44.96	6.40	17.96	33.00	15.04	H

LTE_B41C_15MHz+20MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2503.80	2520.90	-28.09	3.58	45.65	6.11	20.09	33.00	12.91	V
2583.30	2595.50	-28.14	3.67	44.92	6.24	19.35	33.00	13.65	V
2662.90	2680.00	-29.68	3.72	44.96	6.40	17.96	33.00	15.04	H

LTE_B41C_20MHz+5MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2517.70	-28.32	3.59	45.15	6.11	19.35	33.00	13.65	V
2590.50	2602.50	-28.29	3.69	44.93	6.26	19.21	33.00	13.79	V
2675.00	2686.70	-29.43	3.74	44.97	6.42	18.22	33.00	14.78	H

LTE_B41C_20MHz+10MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2520.40	-28.57	3.59	45.15	6.11	19.10	33.00	13.90	V
2588.10	2602.50	-28.57	3.69	44.93	6.26	18.93	33.00	14.07	V
2670.10	2684.50	-30.08	3.74	44.97	6.41	17.56	33.00	15.44	H

LTE_B41C_20MHz+15MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2523.00	-28.99	3.59	45.15	6.11	18.68	33.00	14.32	V
2585.60	2602.70	-29.09	3.68	44.92	6.25	18.40	33.00	14.60	V
2665.10	2682.20	-30.54	3.73	44.96	6.40	17.09	33.00	15.91	H

LTE_B41C_15MHz+15MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2503.50	2518.50	-28.32	3.58	45.65	6.11	19.86	33.00	13.14	V
2585.50	2600.50	-27.79	3.68	44.92	6.25	19.70	33.00	13.30	V
2667.50	2682.50	-29.20	3.74	44.96	6.41	18.43	33.00	14.57	H

LTE_B41C_20MHz+20MHz_16QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2525.80	-29.25	3.59	45.15	6.11	18.42	33.00	14.58	V
2583.10	2602.90	-29.33	3.67	44.92	6.24	18.16	33.00	14.84	V
2660.20	2680.00	-30.66	3.71	44.96	6.39	16.98	33.00	16.02	H

LTE_B41C_5MHz+20MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2499.30	2511.00	-37.29	3.58	45.61	6.10	18.00	33.00	15.00	V
2583.80	2595.50	-37.60	3.67	44.92	6.25	17.24	33.00	15.76	V
2668.30	2680.00	-39.26	3.74	44.96	6.41	15.85	33.00	17.15	H

LTE_B41C_10MHz+20MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2501.50	2515.90	-37.01	3.58	45.66	6.10	18.33	33.00	14.67	V
2583.60	2598.00	-37.55	3.67	44.92	6.24	17.28	33.00	15.72	V
2665.60	2680.00	-39.22	3.73	44.96	6.40	15.87	33.00	17.13	H

LTE_B41C_15MHz+20MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2503.80	2520.90	-29.98	3.58	45.65	6.11	18.20	33.00	14.80	V
2583.30	2595.50	-29.88	3.67	44.92	6.24	17.61	33.00	15.39	V
2662.90	2680.00	-31.75	3.72	44.96	6.40	15.89	33.00	17.11	H

LTE_B41C_20MHz+5MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2517.70	-30.30	3.59	45.15	6.11	17.37	33.00	15.63	V
2590.50	2602.50	-30.01	3.69	44.93	6.26	17.49	33.00	15.51	V
2675.00	2686.70	-31.53	3.74	44.97	6.42	16.12	33.00	16.88	H

LTE_B41C_20MHz+10MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2520.40	-30.54	3.59	45.15	6.11	17.13	33.00	15.87	V
2588.10	2602.50	-30.50	3.69	44.93	6.26	17.00	33.00	16.00	V
2670.10	2684.50	-32.20	3.74	44.97	6.41	15.44	33.00	17.56	H

LTE_B41C_20MHz+15MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2523.00	-30.90	3.59	45.15	6.11	16.77	33.00	16.23	V
2585.60	2602.70	-30.82	3.68	44.92	6.25	16.67	33.00	16.33	V
2665.10	2682.20	-32.62	3.73	44.96	6.40	15.01	33.00	17.99	H

LTE_B41C_15MHz+15MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2503.50	2518.50	-30.24	3.58	45.65	6.11	17.94	33.00	15.06	V
2585.50	2600.50	-29.54	3.68	44.92	6.25	17.95	33.00	15.05	V
2667.50	2682.50	-31.28	3.74	44.96	6.41	16.35	33.00	16.65	H

LTE_B41C_20MHz+20MHz_64QAM

Frequency(MHz)	Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	PAg(dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2506.00	2525.80	-29.40	3.59	45.15	6.11	18.27	33.00	14.73	V
2583.10	2602.90	-29.45	3.67	44.92	6.24	18.04	33.00	14.96	V
2660.20	2680.00	-30.78	3.71	44.96	6.39	16.86	33.00	16.14	H

Peak EIRP(dBm) = P_{Mea}(-34.37dBm) + G_a (6.10dBi) + P_{Ag} (45.66dB) - P_{cl} (3.58dB) = 20.97dBm

Note: Expanded measurement uncertainty is U = 2.84 dB, k = 2.

A.2 EMISSION LIMIT

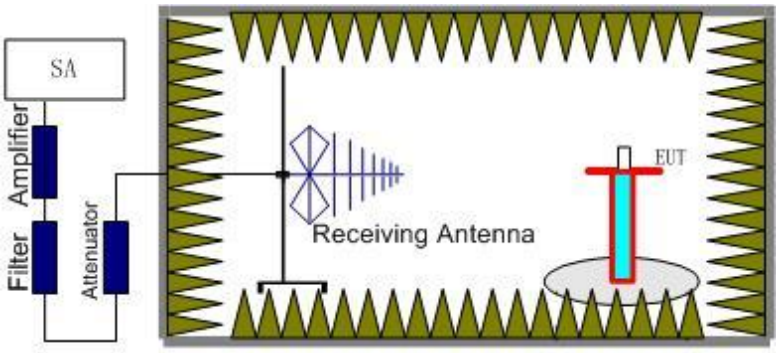
A.2.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully anechoic chamber.

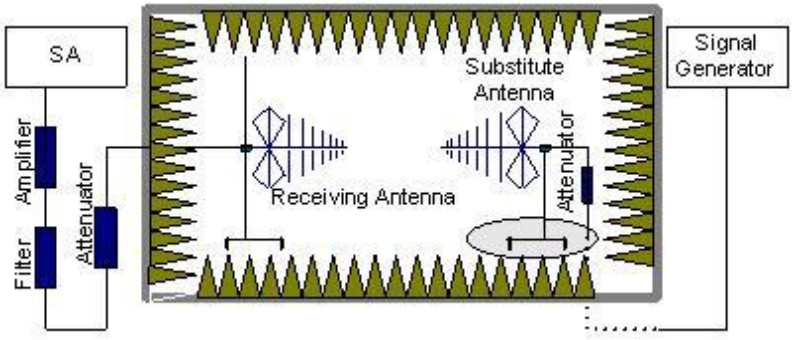
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Band 41.

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5-meter-high non-conductive stand at a 3-meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360 and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere

with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
   An amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   Power (EIRP)=P_{Mea}+ P_{pl} + G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP - 2.15dB.

A.2.2 Measurement Limit

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Band 41. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Band 41 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The range of evaluated frequency is from 30MHz to 26GHz.

LTE band 41

LB41C_20MHz+5MHz_CH39750_QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5033.02	-51.52	6.58	9.95	-48.15	-25.00	23.15	V
7571.01	-53.31	8.10	12.26	-49.15	-25.00	24.15	V
10052.01	-52.17	9.33	12.92	-48.58	-25.00	23.58	H
12475.01	-48.36	10.24	13.19	-45.41	-25.00	20.41	V
15046.00	-45.24	11.28	13.97	-42.55	-25.00	17.55	V
17493.00	-43.61	12.71	14.88	-41.44	-25.00	16.44	H

LB41C_20MHz+5MHz_CH40595_QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5202.02	-48.42	6.96	10.18	-45.20	-25.00	20.20	V
7806.01	-53.47	8.30	12.44	-49.33	-25.00	24.33	H
10333.01	-51.34	9.70	13.03	-48.01	-25.00	23.01	V
12986.01	-48.69	10.47	13.49	-45.67	-25.00	20.67	H
15494.00	-43.98	11.53	13.70	-41.81	-25.00	16.81	H
16832.00	-41.95	12.08	13.73	-40.30	-25.00	15.30	H

LB41C_20MHz+5MHz_CH41440_QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5358.02	-55.10	6.92	10.40	-51.62	-25.00	26.62	V
8007.01	-55.06	8.32	12.61	-50.77	-25.00	25.77	H
10706.01	-51.12	9.32	13.14	-47.30	-25.00	22.30	V
13372.01	-47.93	10.57	14.02	-44.48	-25.00	19.48	H
16057.00	-43.82	11.84	13.69	-41.97	-25.00	16.97	V
17384.00	-44.21	12.48	14.64	-42.05	-25.00	17.05	H

LB41C_20MHz+20MHz_CH39750_QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5031.02	-50.93	6.58	9.94	-47.57	-25.00	22.57	H
7482.01	-53.77	8.34	12.18	-49.93	-25.00	24.93	H
10074.01	-51.89	9.39	12.93	-48.35	-25.00	23.35	V
12525.01	-48.23	10.25	13.22	-45.26	-25.00	20.26	V
14992.00	-45.34	11.21	14.01	-42.54	-25.00	17.54	V
17596.00	-43.63	13.09	15.03	-41.69	-25.00	16.69	V

S30_LB41C_20MHz+20MHz_CH40521_QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5187.02	-52.40	6.94	10.16	-49.18	-25.00	24.18	V
7803.01	-54.05	8.29	12.44	-49.90	-25.00	24.90	V
10288.01	-50.46	9.60	13.02	-47.04	-25.00	22.04	V
12867.01	-48.00	10.59	13.42	-45.17	-25.00	20.17	V
15540.00	-43.66	11.51	13.70	-41.47	-25.00	16.47	H
16800.00	-41.95	12.11	13.72	-40.34	-25.00	15.34	V

S30_LB41C_20MHz+20MHz_CH41292_QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5316.02	-56.01	6.99	10.34	-52.66	-25.00	27.66	H
7970.01	-54.20	8.35	12.58	-49.97	-25.00	24.97	H
10635.01	-51.64	9.29	13.13	-47.80	-25.00	22.80	H
13302.01	-48.73	10.58	13.92	-45.39	-25.00	20.39	H
15969.00	-42.89	11.76	13.70	-40.95	-25.00	15.95	H
17291.00	-43.67	12.37	14.44	-41.60	-25.00	16.60	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 5.16 dB, k = 2.

A.3 FREQUENCY STABILITY

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of Anritsu Radio Communication Analyzer (MT8821C).

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for LTE band 41, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.6VDC and 4.4VDC, with a nominal voltage of 3.82VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress.

A.3.2 Measurement results

LTE band 41, 20MHz+20MHz bandwidth QPSK(worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.82	2496.70	2689.80	7.8	0.0030
50				12.0	0.0046
40				7.3	0.0028
30				8.0	0.0031
10				4.5	0.0017
0				21.8	0.0084
-10				3.4	0.0013
-20				11.4	0.0044
-30					

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	2496.70	2689.80	13.6	0.0052
4.4				4.5	0.0017

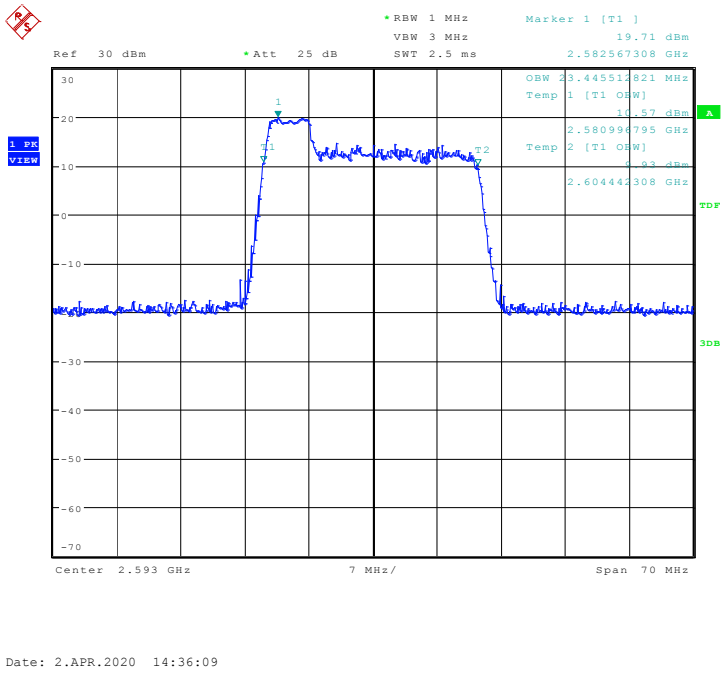
A.4 OCCUPIED BANDWIDTH

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequency. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.
The measurement method is from ANSI C63.26:
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. Thefrequency span for the spectrum analyzer shall be set wide enough to capture all modulationproducts including the emission skirts.
b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipatedOBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceedingthe maximum spectrum analyzer input mixer level for linear operation.
d) Set the detection mode to peak, and the trace mode to max-hold.

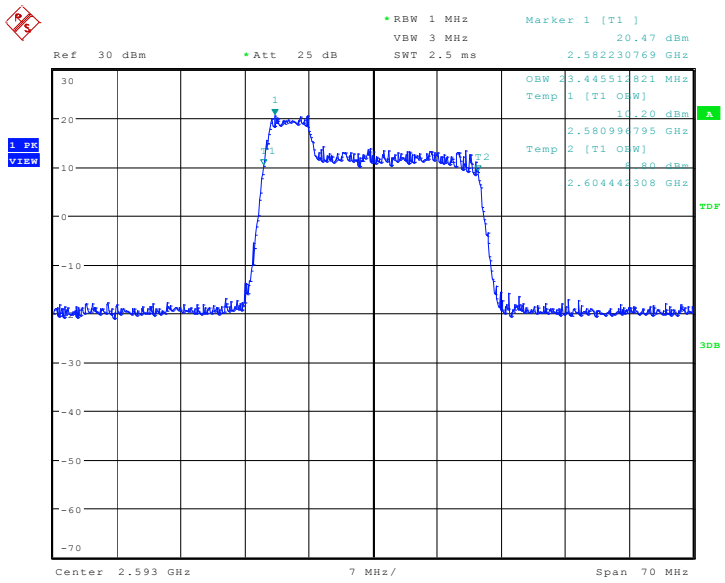
LTE band 41 HPUE, 5MHz+20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	23.445	23.445	23.445

LTE band 41 HPUE, 5MHz+20MHz Bandwidth, QPSK (99% BW)



LTE band 41 HPUE, 5MHz+20MHz Bandwidth,16QAM (99% BW)



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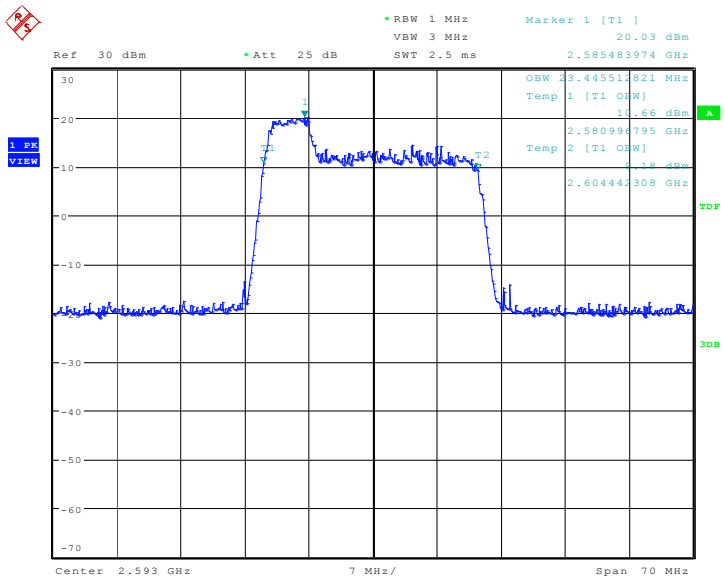
LTE band 41 HPUE, 5MHz+20MHz Bandwidth,64QAM (99% BW)



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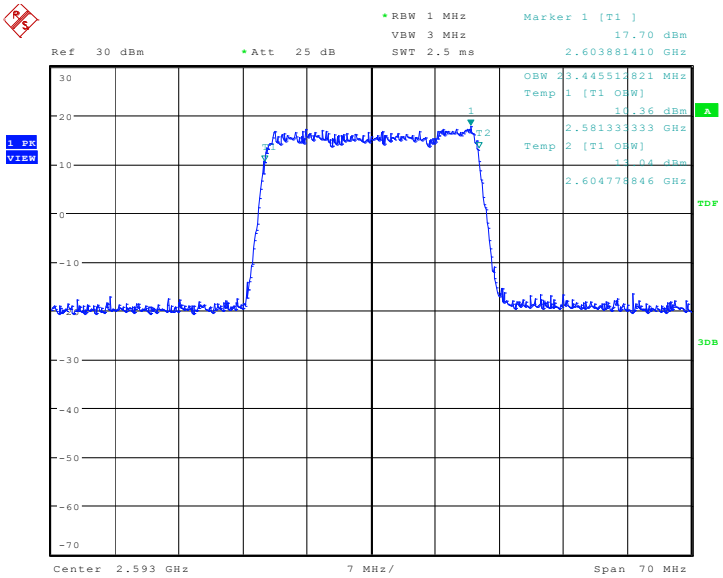
LTE band 41 HPUE, 20MHz+5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	23.445	23.558	23.445

LTE band 41 HPUE, 20MHz+5MHz Bandwidth, QPSK (99% BW)



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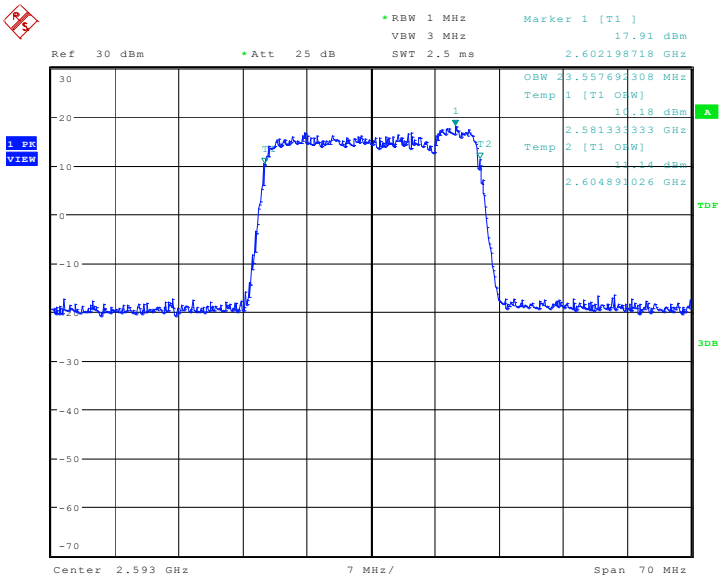
LTE band 41 HPUE, 20MHz+5MHz Bandwidth,16QAM (99% BW)



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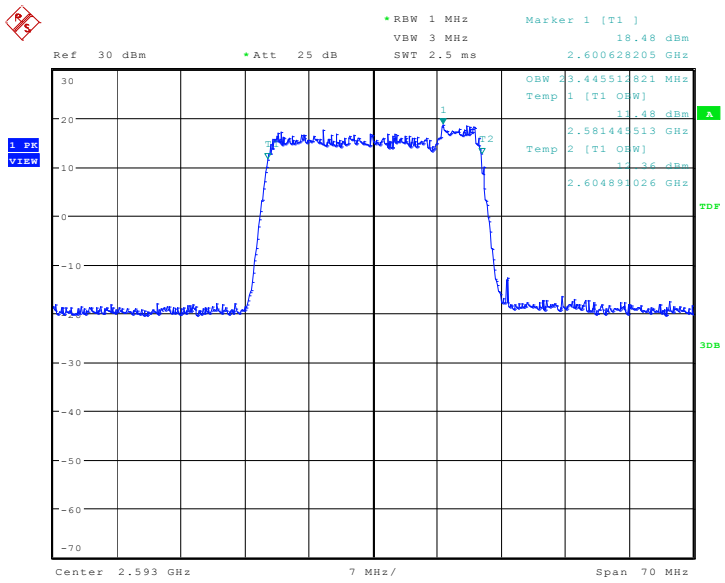
LTE band 41 HPUE, 20MHz+5MHz Bandwidth,64QAM (99% BW)



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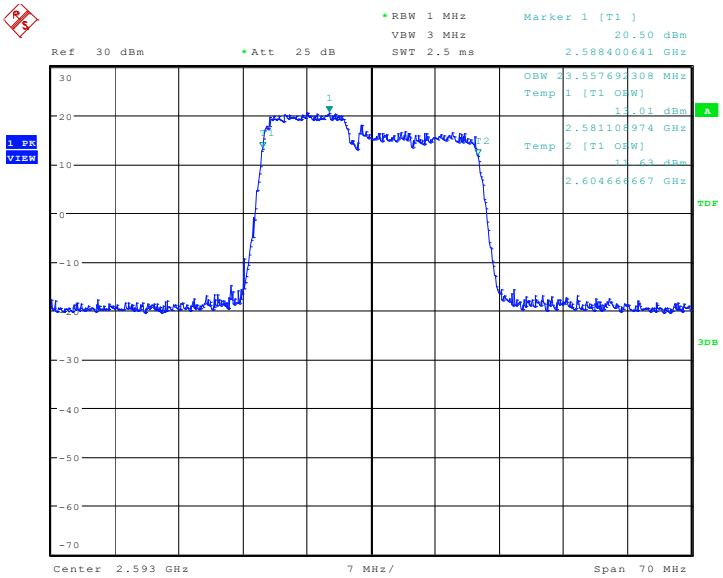
LTE band 41 HPUE, 10MHz+15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	23.558	23.670	23.558

LTE band 41 HPUE, 10MHz+15MHz Bandwidth, QPSK (99% BW)



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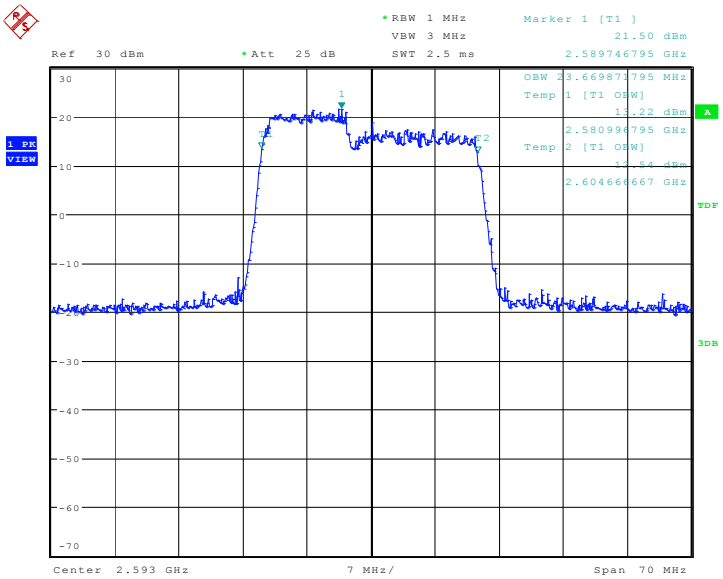
LTE band 41 HPUE, 10MHz+15MHz Bandwidth,16QAM (99% BW)



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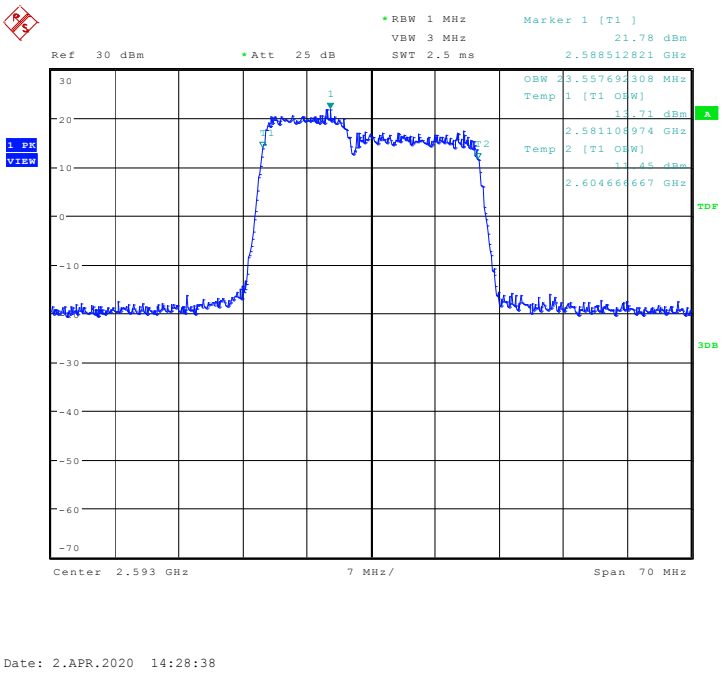
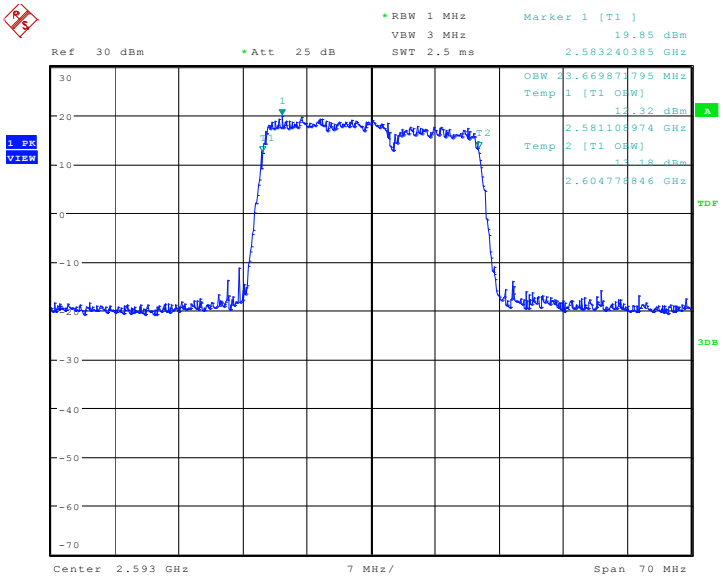
LTE band 41 HPUE, 10MHz+15MHz Bandwidth,64QAM (99% BW)



LTE band 41 HPUE, 15MHz+10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	23.670	23.782	23.670

LTE band 41 HPUE, 15MHz+10MHz Bandwidth, QPSK (99% BW)



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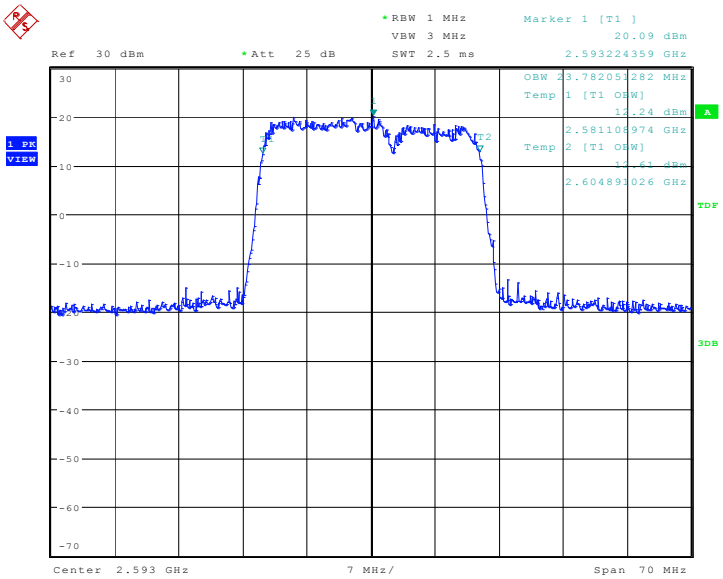
LTE band 41 HPUE, 15MHz+10MHz Bandwidth,16QAM (99% BW)



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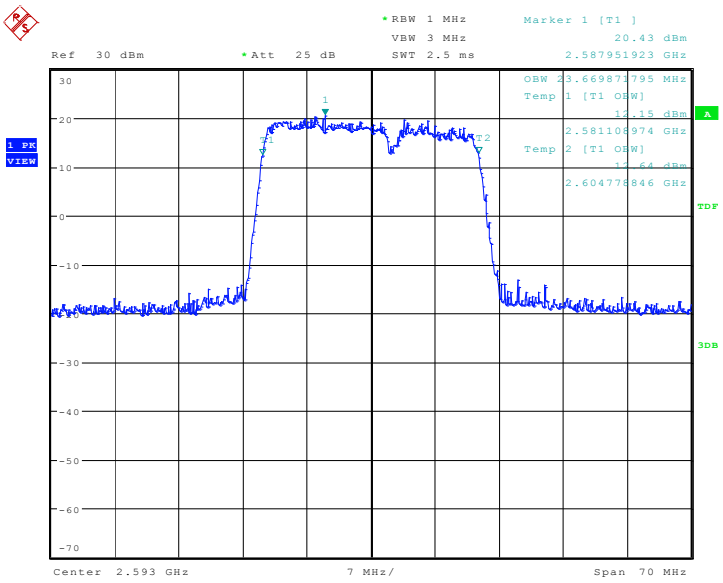
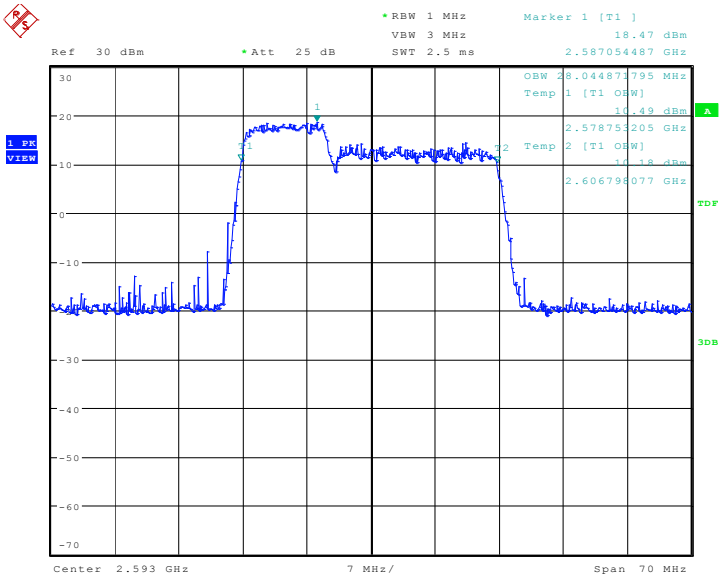
LTE band 41 HPUE, 15MHz+10MHz Bandwidth,64QAM (99% BW)



LTE band 41 HPUE, 10MHz+20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	28.045	28.269	28.269

LTE band 41 HPUE, 10MHz+20MHz Bandwidth, QPSK (99% BW)



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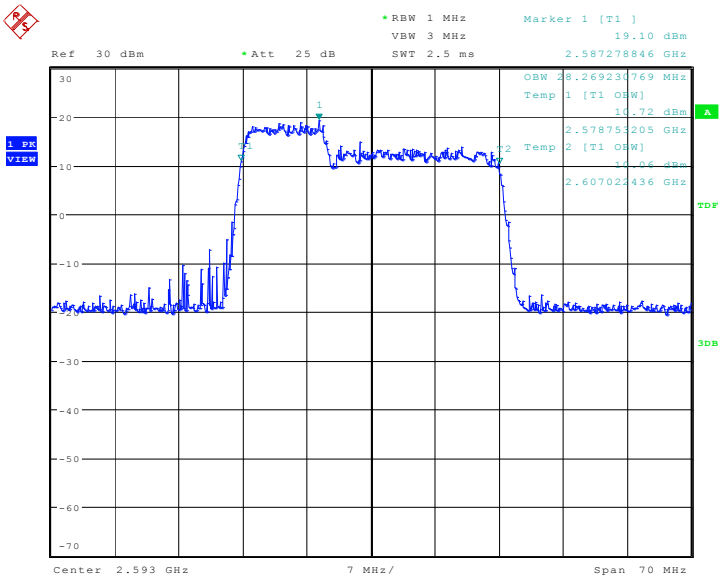
LTE band 41 HPUE, 10MHz+20MHz Bandwidth,16QAM (99% BW)



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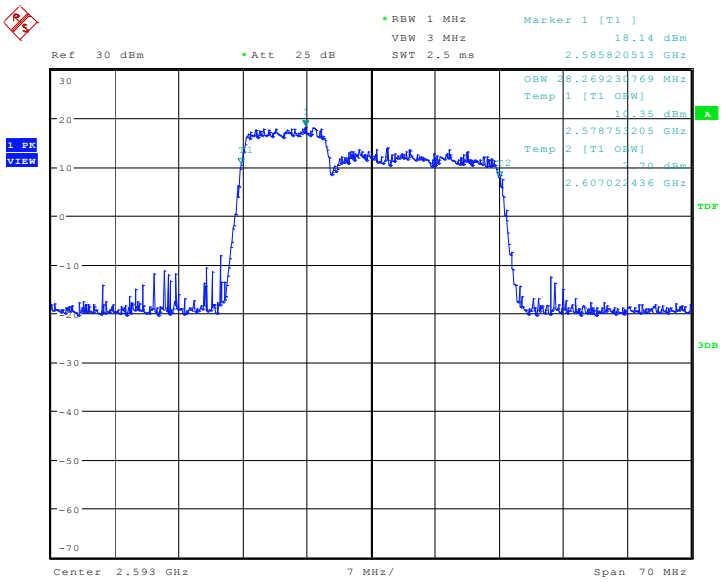
LTE band 41 HPUE, 10MHz+20MHz Bandwidth,64QAM (99% BW)



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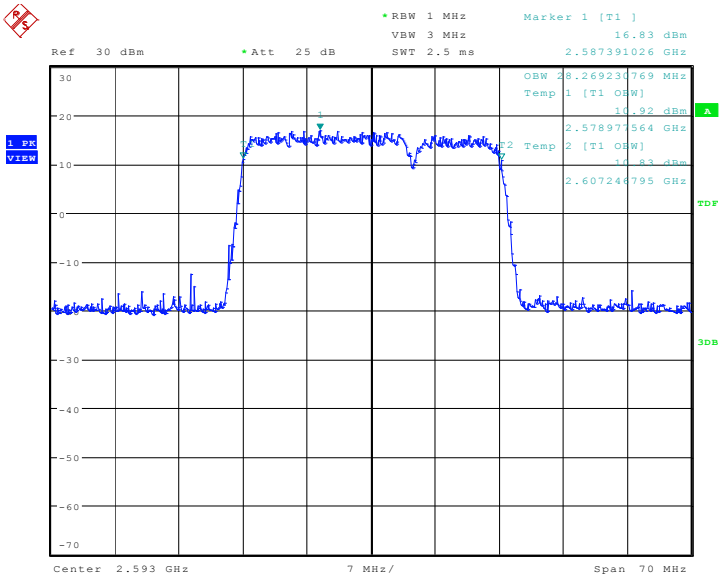
LTE band 41 HPUE, 20MHz+10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	28.269	28.157	28.269

LTE band 41 HPUE, 20MHz+10MHz Bandwidth, QPSK (99% BW)



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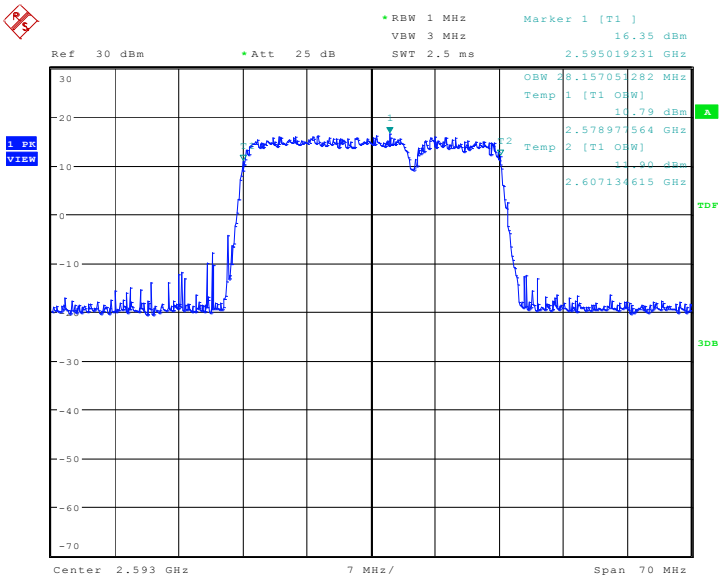
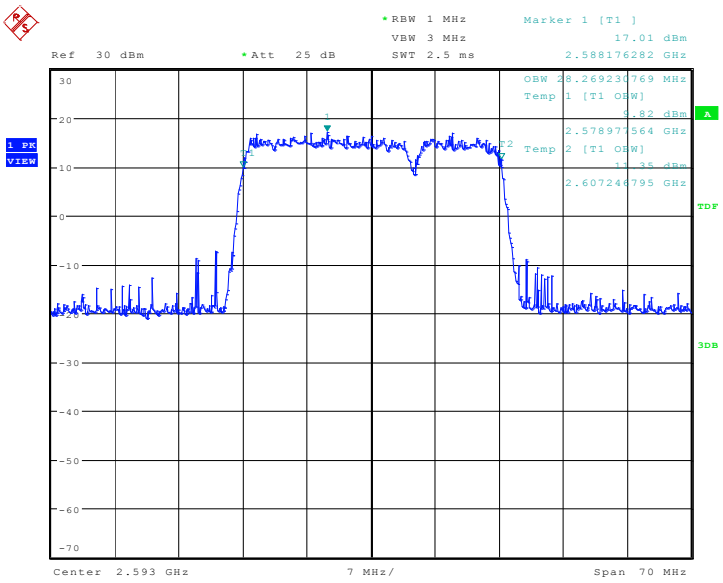
LTE band 41 HPUE, 20MHz+10MHz Bandwidth,16QAM (99% BW)



Date: 2.APR.2020 14:11:21

LTE band 41 HPUE, 20MHz+10MHz Bandwidth,64QAM (99% BW)

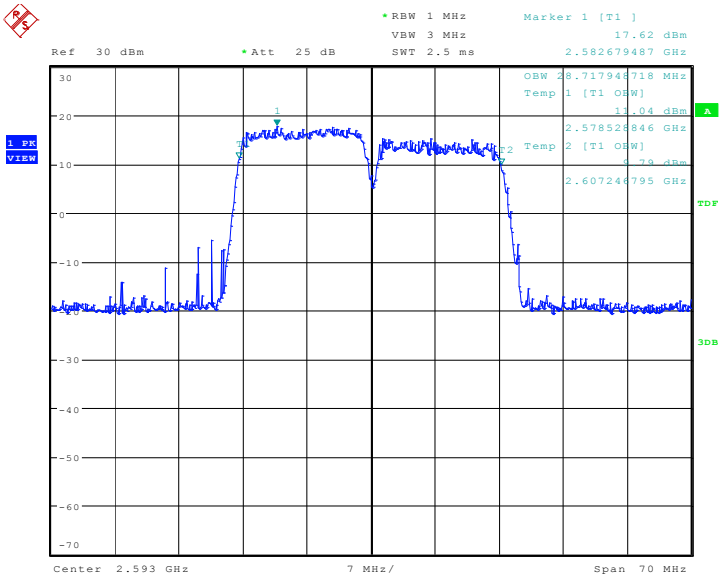


Date: 2.APR.2020 14:09:44

LTE band 41 HPUE, 15MHz+15MHz (99%)

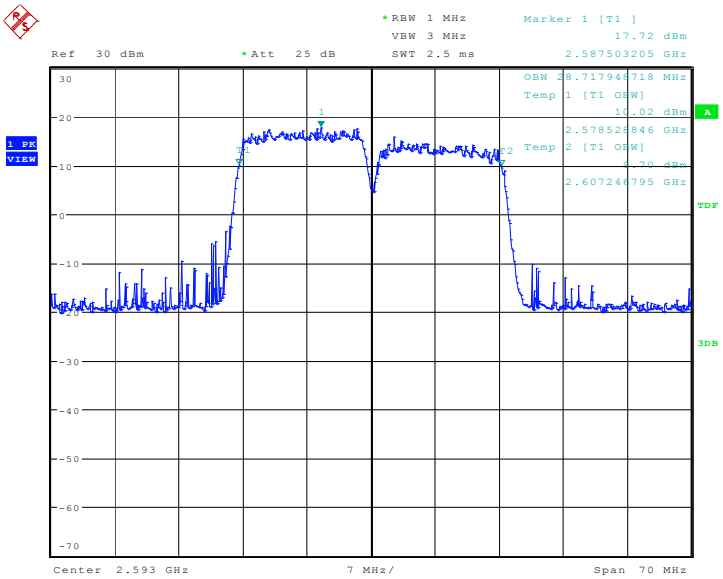
Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	28.718	28.718	28.606

LTE band 41 HPUE, 15MHz+15MHz Bandwidth, QPSK (99% BW)



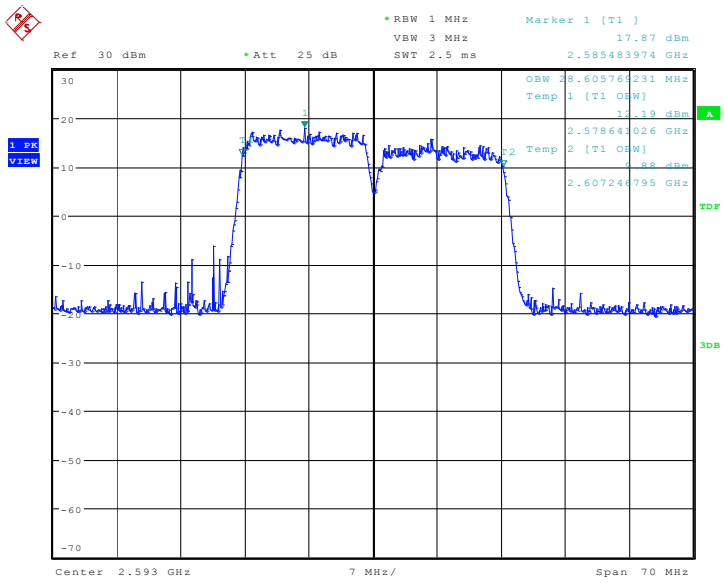
Date: 2.APR.2020 14:05:43

LTE band 41 HPUE, 15MHz+15MHz Bandwidth,16QAM (99% BW)



Date: 2.APR.2020 14:06:25

LTE band 41 HPUE, 15MHz+15MHz Bandwidth,64QAM (99% BW)

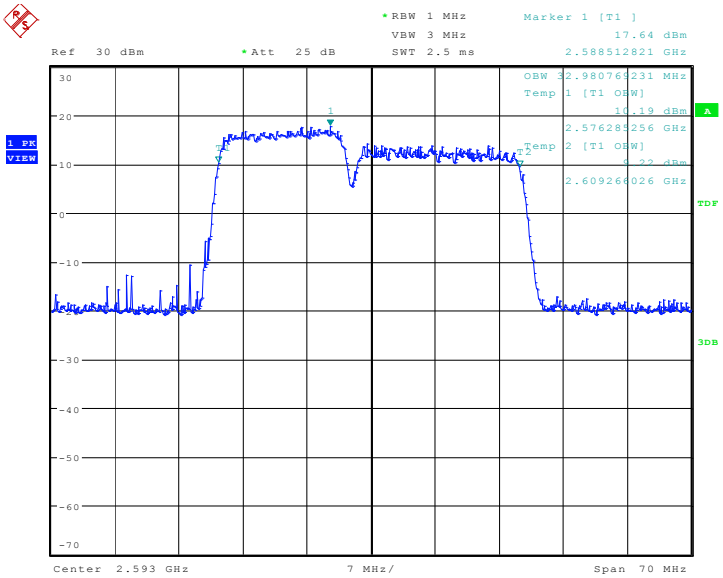


Date: 2.APR.2020 14:07:55

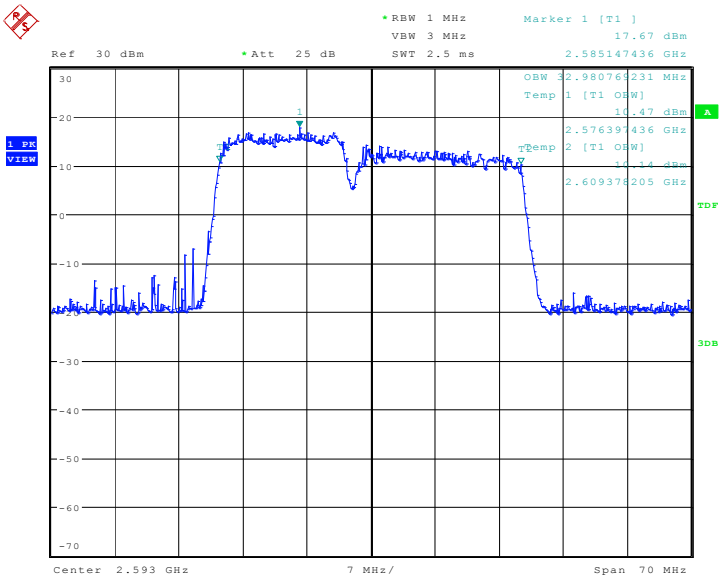
LTE band 41 HPUE, 15MHz+20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	32.981	32.981	32.869

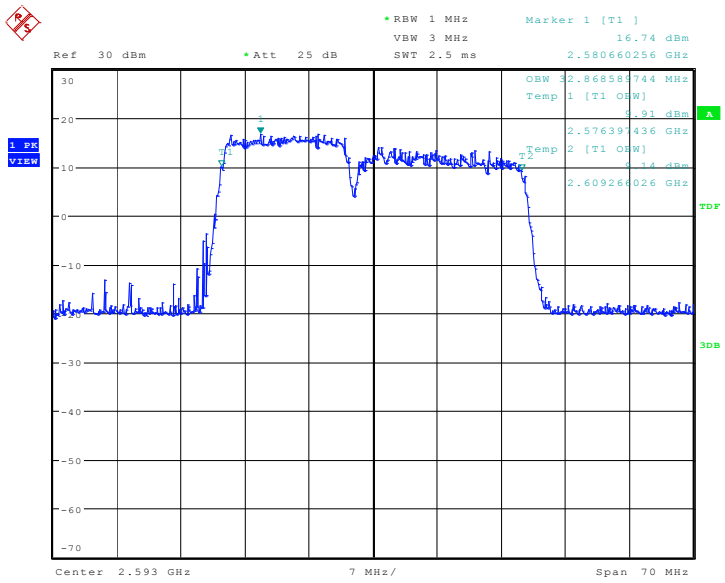
LTE band 41 HPUE, 15MHz+20MHz Bandwidth, QPSK (99% BW)



LTE band 41 HPUE, 15MHz+20MHz Bandwidth,16QAM (99% BW)



LTE band 41 HPUE, 15MHz+20MHz Bandwidth,64QAM (99% BW)

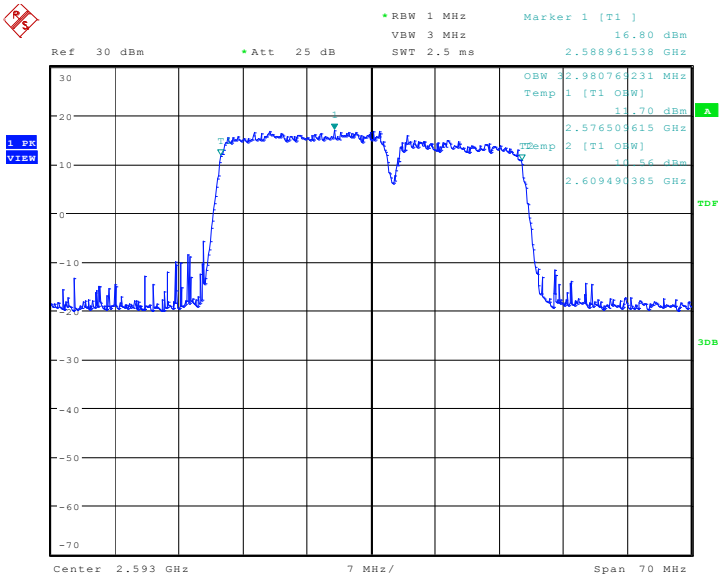


Date: 2.APR.2020 14:01:37

LTE band 41 HPUE, 20MHz+15MHz (99%)

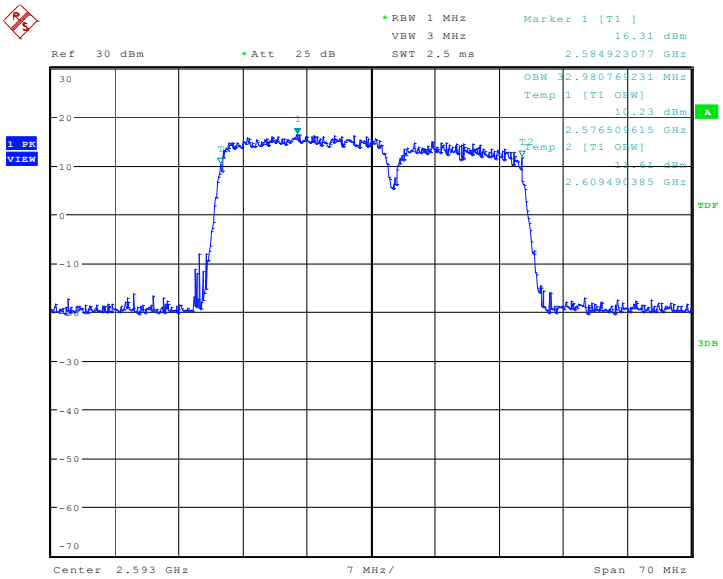
Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	32.981	32.981	32.756

LTE band 41 HPUE, 20MHz+15MHz Bandwidth, QPSK (99% BW)



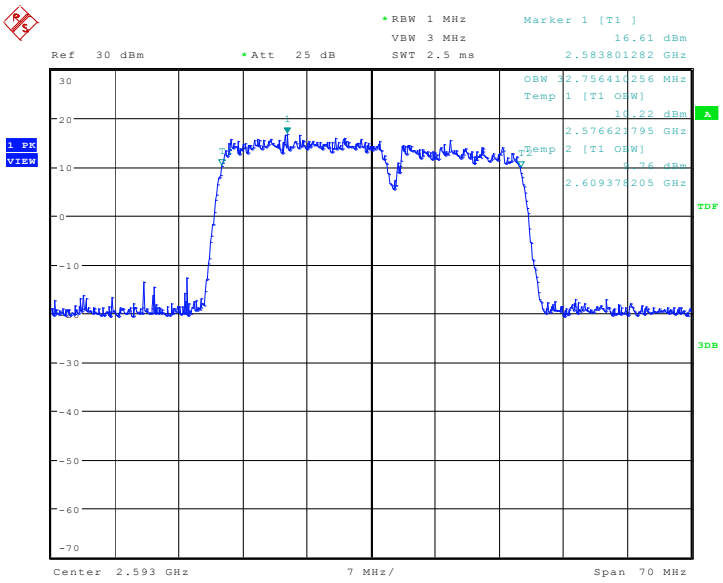
Date: 2.APR.2020 11:09:20

LTE band 41 HPUE, 20MHz+15MHz Bandwidth,16QAM (99% BW)



Date: 2.APR.2020 13:52:31

LTE band 41 HPUE, 20MHz+15MHz Bandwidth,64QAM (99% BW)

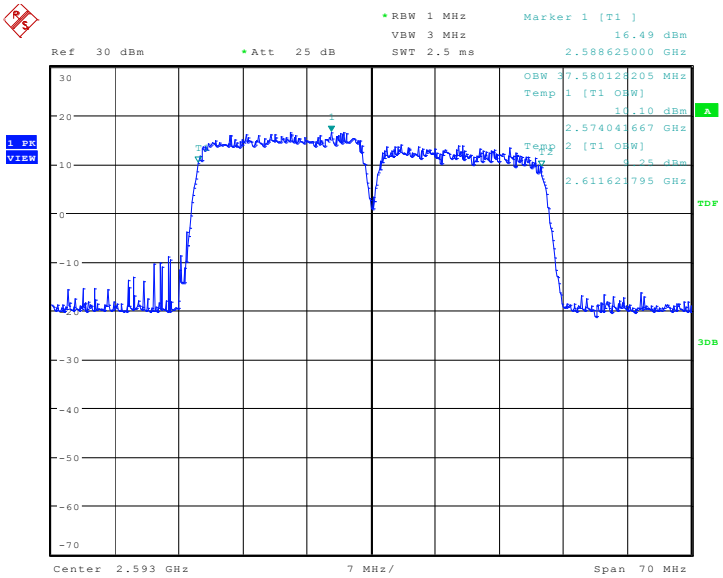


Date: 2.APR.2020 13:54:33

LTE band 41 HPUE, 20MHz+20MHz (99%)

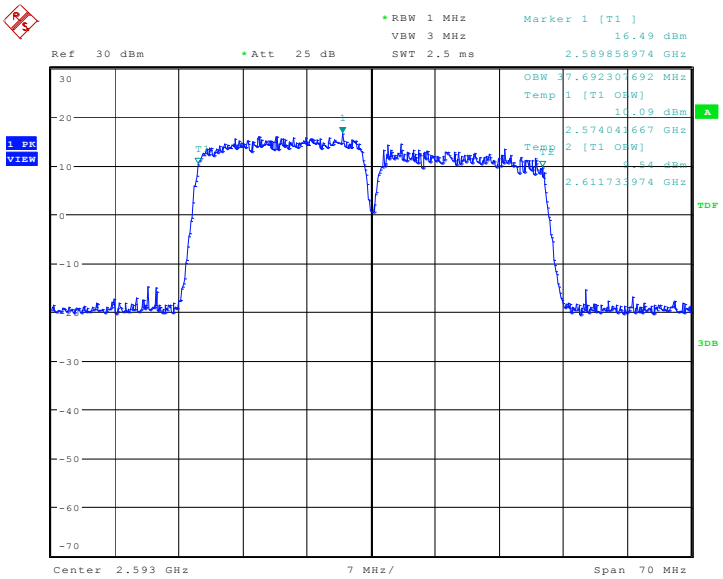
Frequency(MHz)	Occupied Bandwidth (99%)(MHz)		
2593.0	QPSK	16QAM	64QAM
	37.580	37.692	37.692

LTE band 41 HPUE, 20MHz+20MHz Bandwidth, QPSK (99% BW)



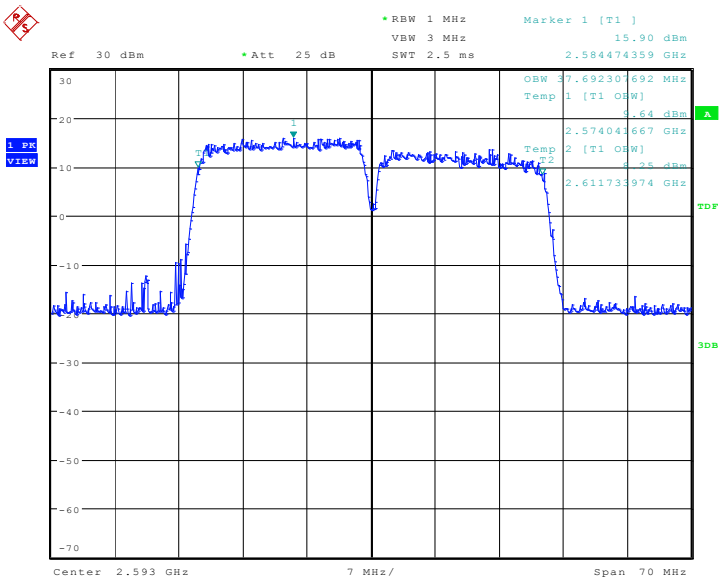
Date: 2.APR.2020 10:51:01

LTE band 41 HPUE, 20MHz+20MHz Bandwidth,16QAM (99% BW)



Date: 2.APR.2020 10:57:43

LTE band 41 HPUE, 20MHz+20MHz Bandwidth,64QAM (99% BW)



Date: 2.APR.2020 10:58:23

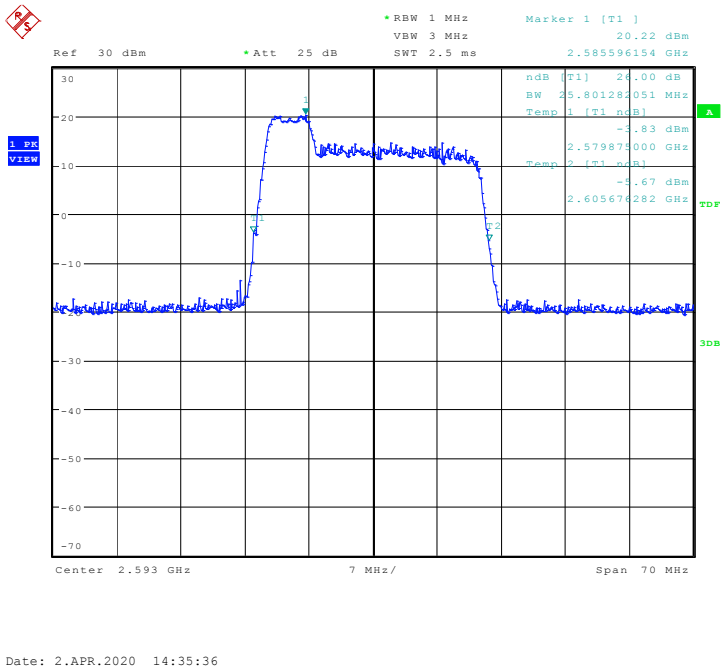
A.5 EMISSION BANDWIDTH

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.
The measurement method is from ANSI C63.26:
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.
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.

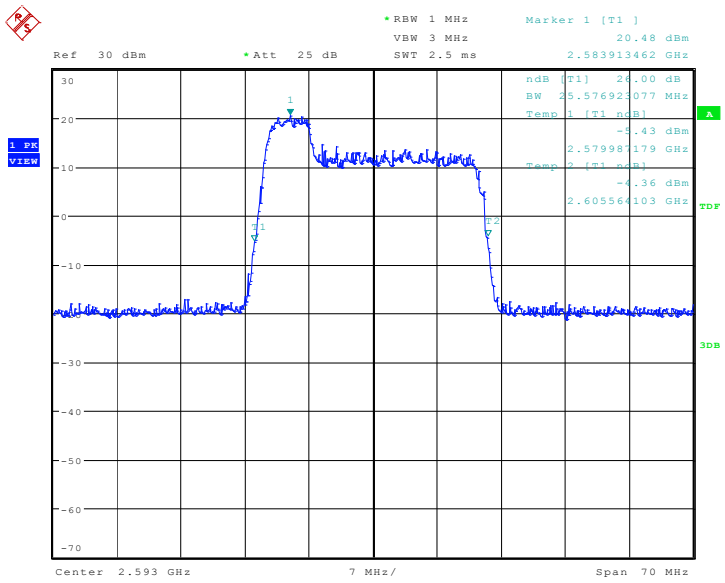
LTE band 41 HPUE, 5MHz+20MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(MHz)		
2593.0	QPSK	16QAM	64QAM
	25.801	25.577	25.689

LTE band 41 HPUE, 5MHz+20MHz Bandwidth, QPSK (-26dBc BW)

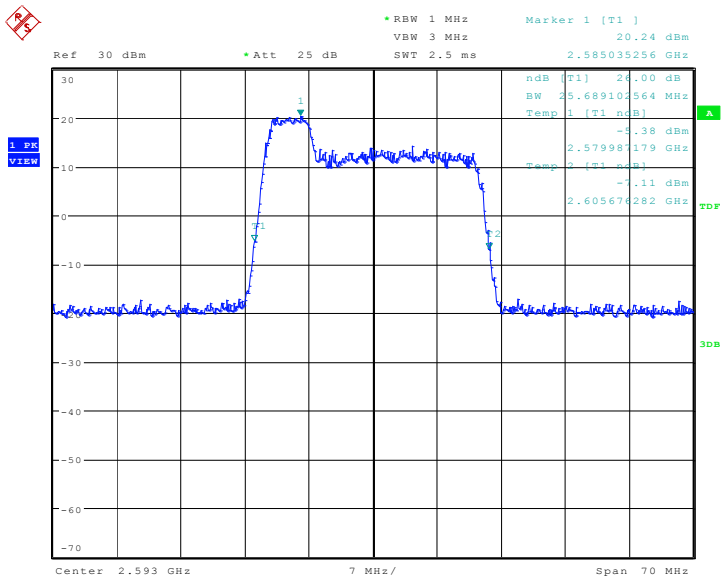


LTE band 41 HPUE, 5MHz+20MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:37:11

LTE band 41 HPUE, 5MHz+20MHz Bandwidth,64QAM (-26dBc BW)

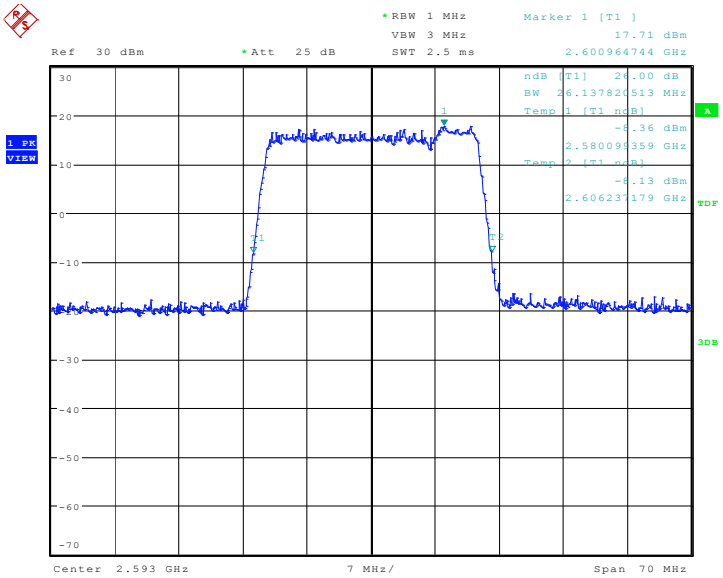


Date: 2.APR.2020 14:38:17

LTE band 41 HPUE, 20MHz+5MHz (-26dBc BW)

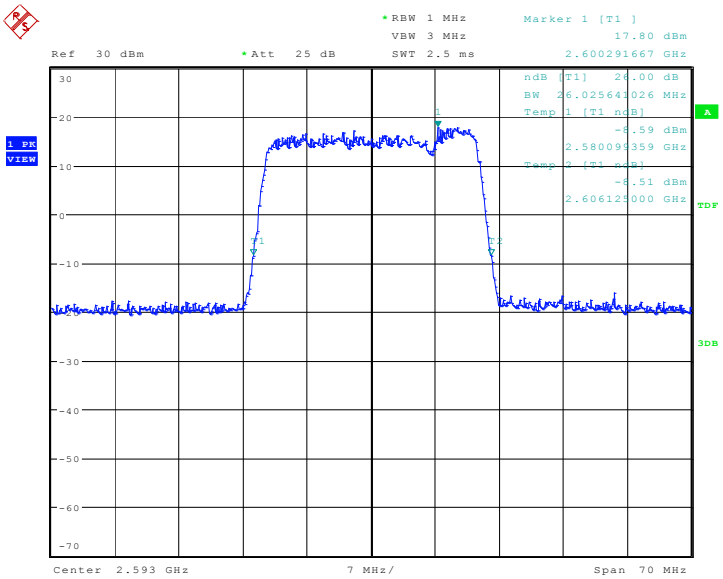
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	26.138	26.026	25.913

LTE band 41 HPUE, 20MHz+5MHz Bandwidth, QPSK (-26dBc BW)



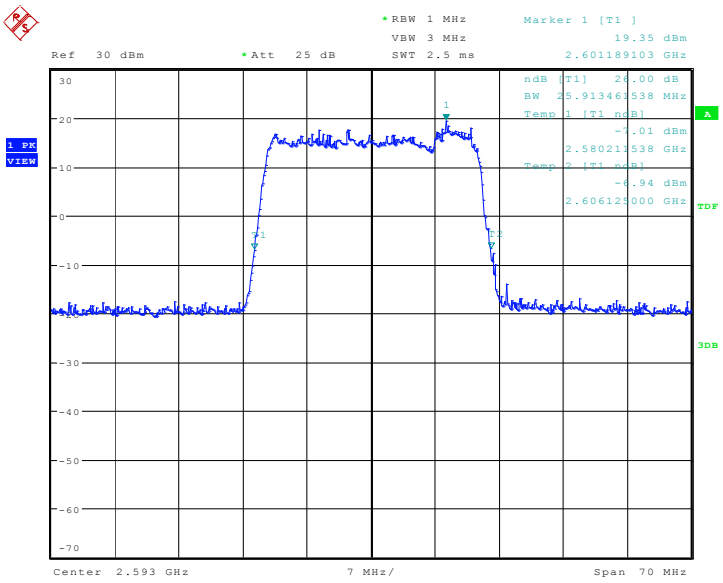
Date: 2.APR.2020 14:33:36

LTE band 41 HPUE, 20MHz+5MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:32:14

LTE band 41 HPUE, 20MHz+5MHz Bandwidth,64QAM (-26dBc BW)

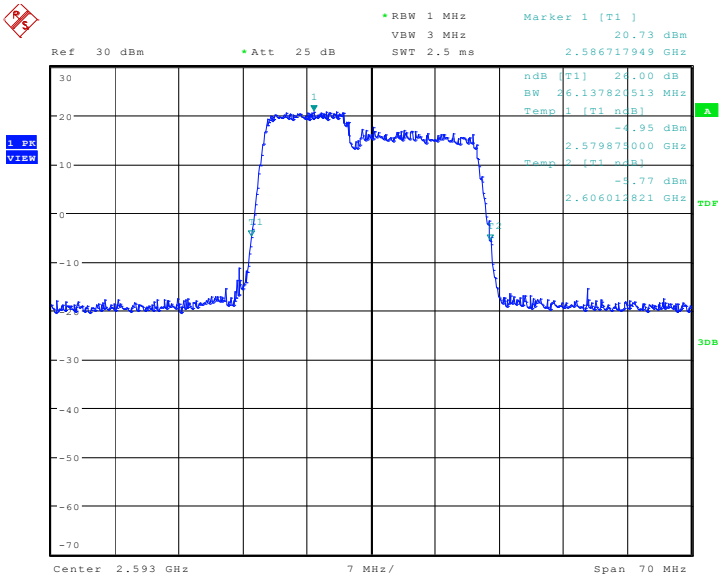


Date: 2.APR.2020 14:31:35

LTE band 41 HPUE, 10MHz+15MHz (-26dBc BW)

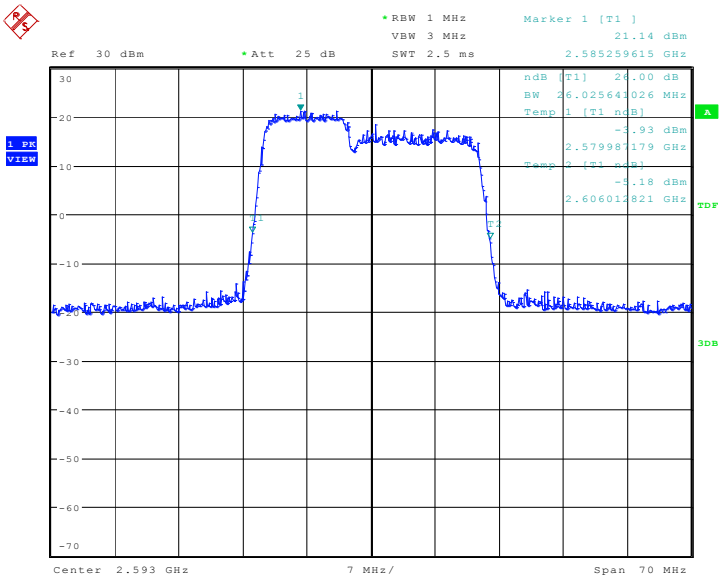
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	26.138	26.026	26.026

LTE band 41 HPUE, 10MHz+15MHz Bandwidth, QPSK (-26dBc BW)



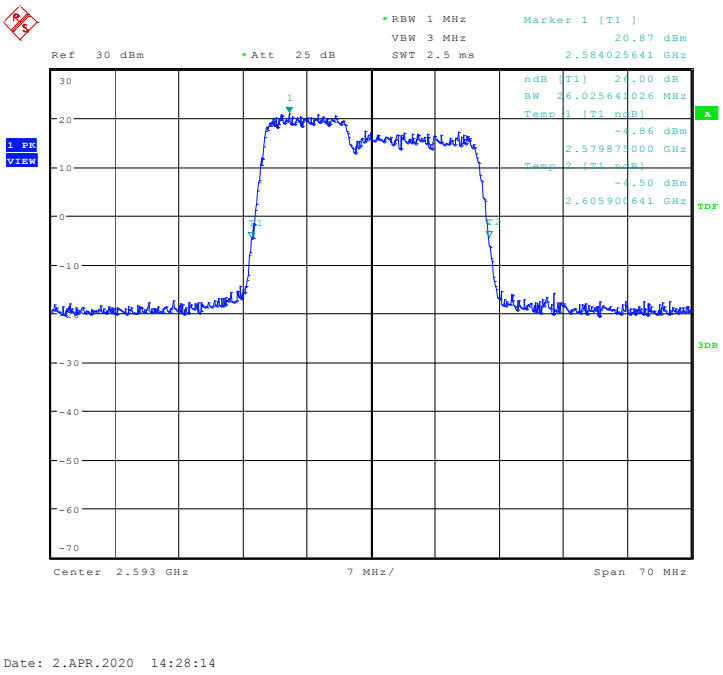
Date: 2.APR.2020 14:25:54

LTE band 41 HPUE, 10MHz+15MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:27:41

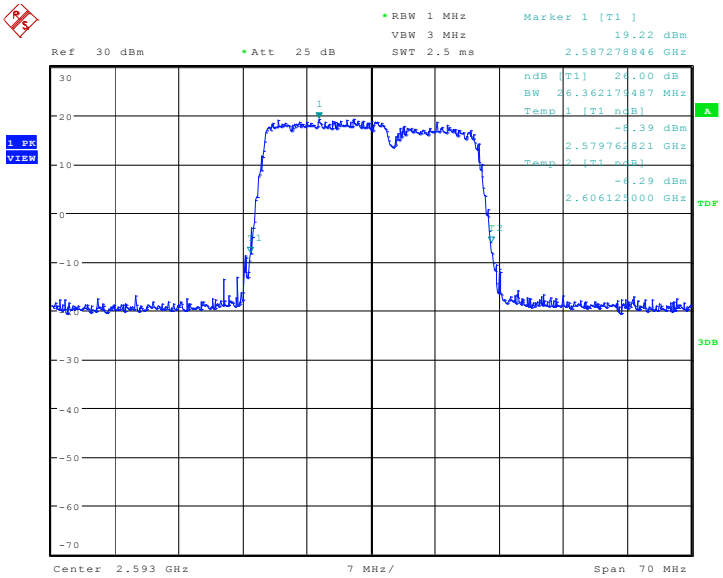
LTE band 41 HPUE, 10MHz+15MHz Bandwidth,64QAM (-26dBc BW)



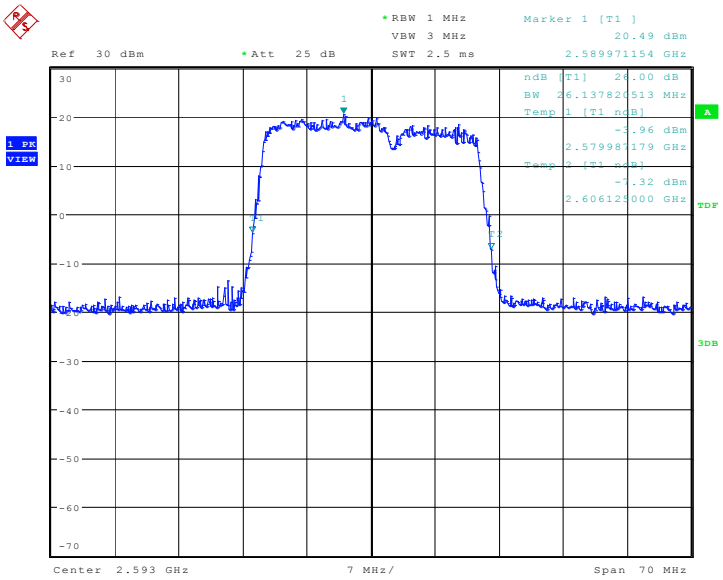
LTE band 41 HPUE, 15MHz+10MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	26.362	26.138	26.250

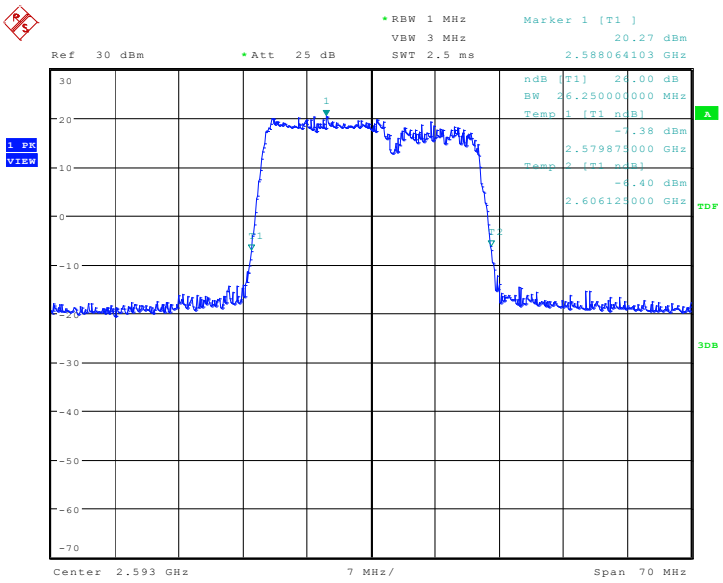
LTE band 41 HPUE, 15MHz+10MHz Bandwidth, QPSK (-26dBc BW)



LTE band 41 HPUE, 15MHz+10MHz Bandwidth,16QAM (-26dBc BW)



LTE band 41 HPUE, 15MHz+10MHz Bandwidth,64QAM (-26dBc BW)

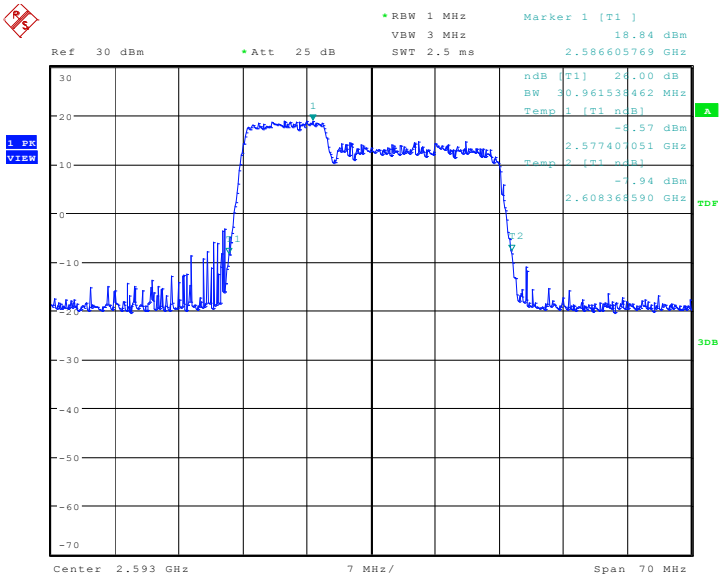


Date: 2.APR.2020 14:21:07

LTE band 41 HPUE, 10MHz+20MHz (-26dBc BW)

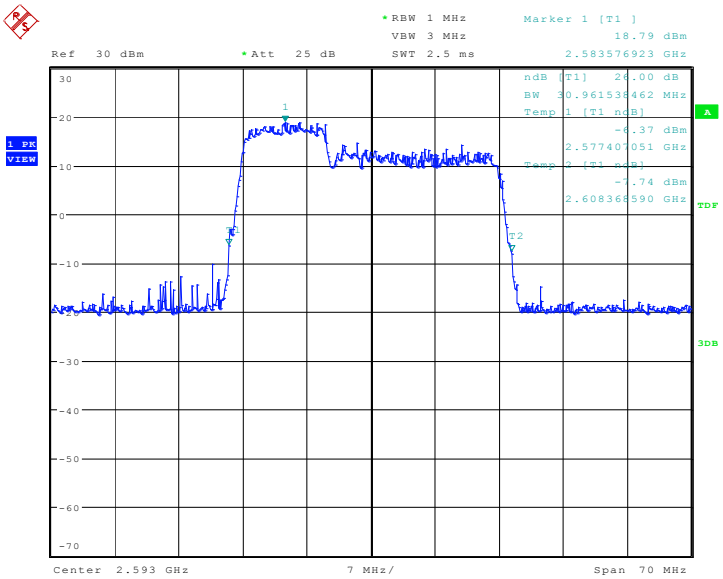
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	30.962	30.962	30.625

LTE band 41 HPUE, 10MHz+20MHz Bandwidth, QPSK (-26dBc BW)



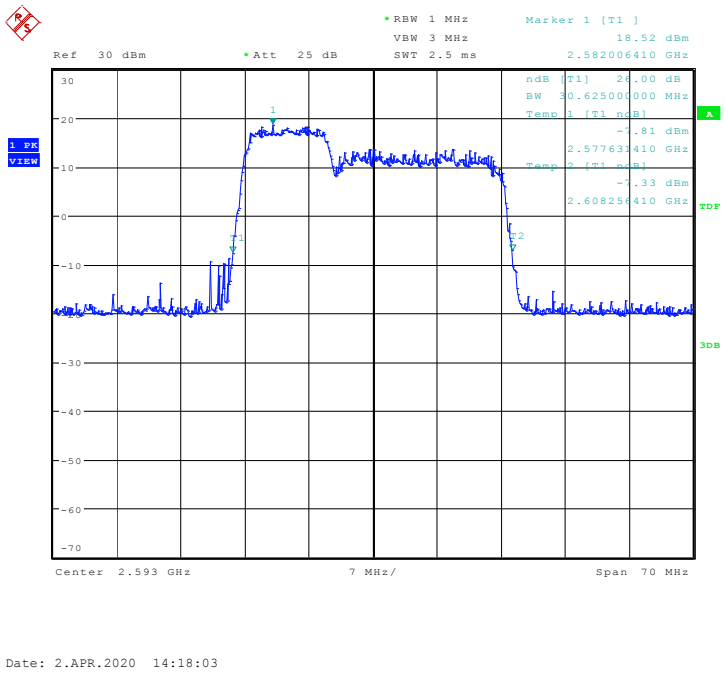
Date: 2.APR.2020 14:14:31

LTE band 41 HPUE, 10MHz+20MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:17:06

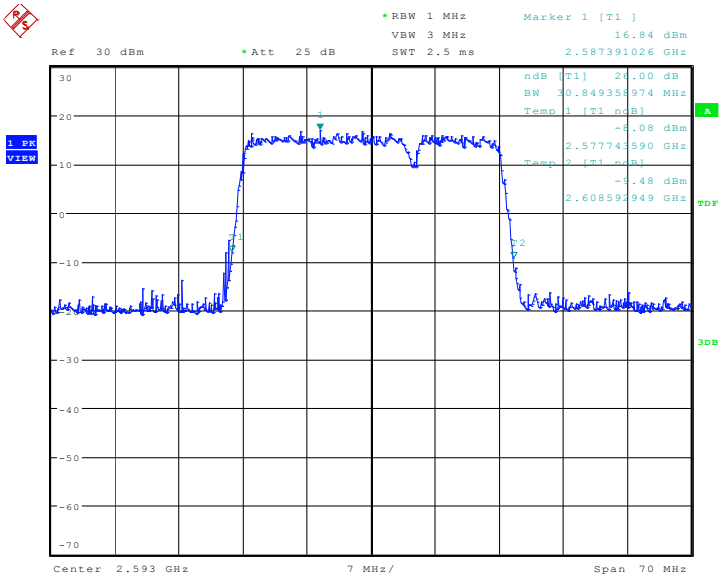
LTE band 41 HPUE, 10MHz+20MHz Bandwidth,64QAM (-26dBc BW)



LTE band 41 HPUE, 20MHz+10MHz (-26dBc BW)

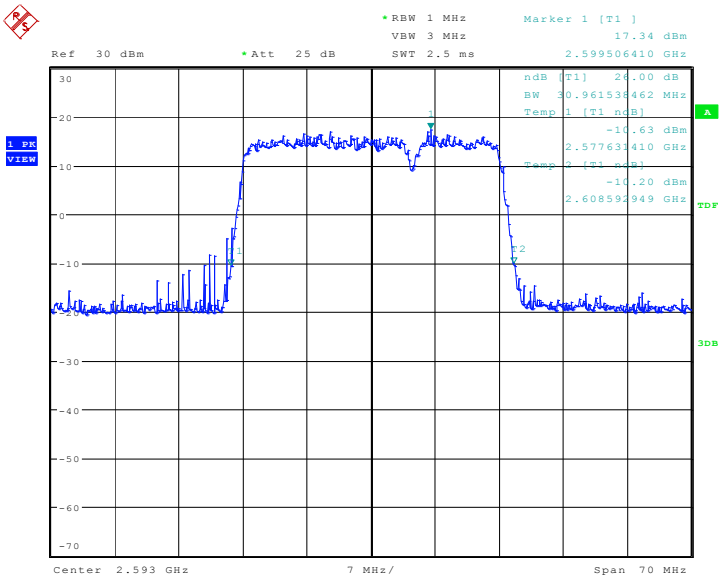
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	30.849	30.962	30.962

LTE band 41 HPUE, 20MHz+10MHz Bandwidth, QPSK (-26dBc BW)



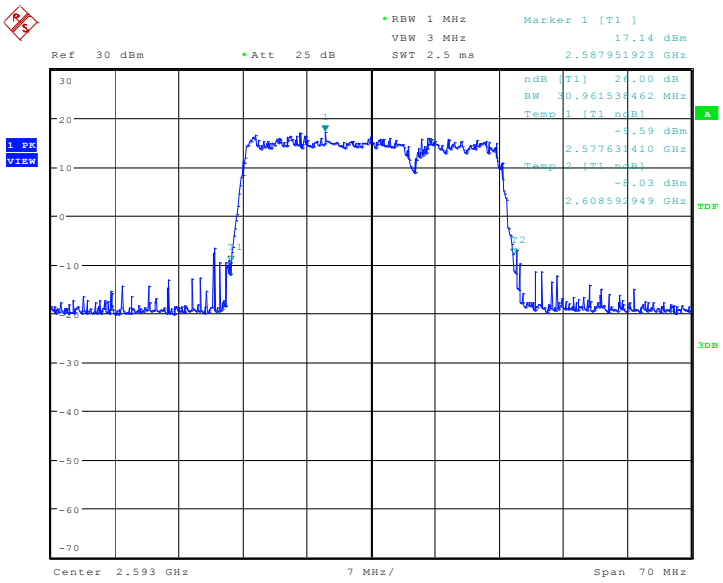
Date: 2.APR.2020 14:12:27

LTE band 41 HPUE, 20MHz+10MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:10:54

LTE band 41 HPUE, 20MHz+10MHz Bandwidth,64QAM (-26dBc BW)

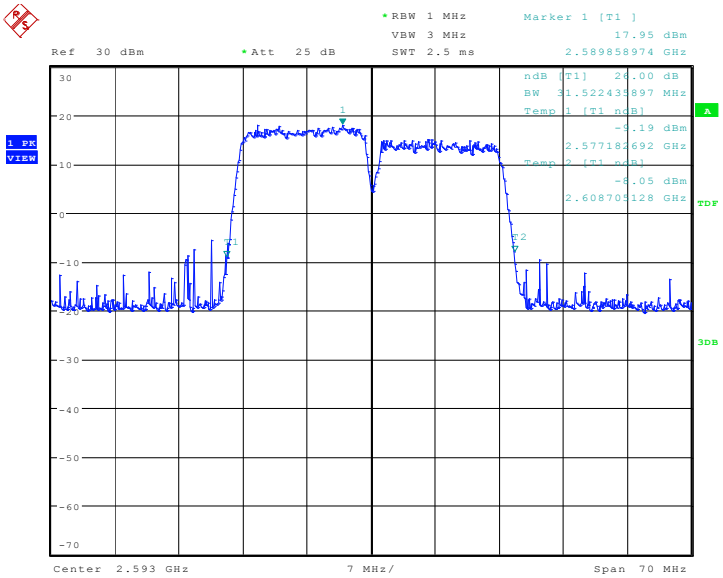


Date: 2.APR.2020 14:10:12

LTE band 41 HPUE, 15MHz+15MHz (-26dBc BW)

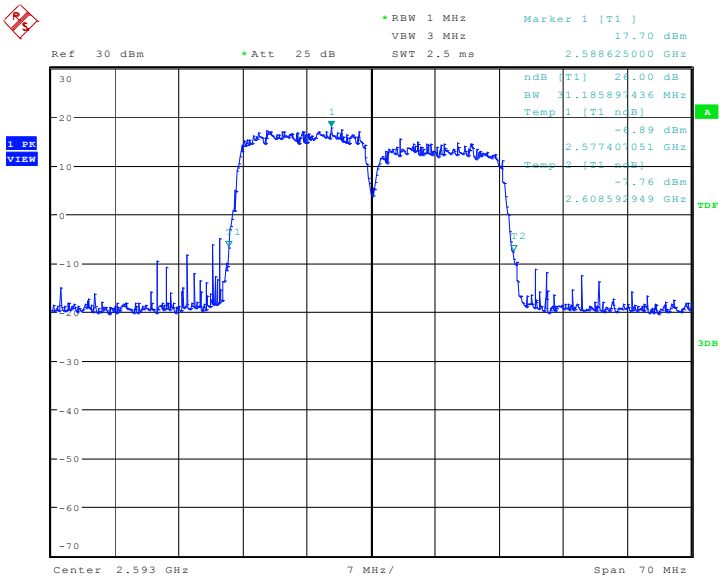
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	31.522	31.186	31.410

LTE band 41 HPUE, 15MHz+15MHz Bandwidth, QPSK (-26dBc BW)



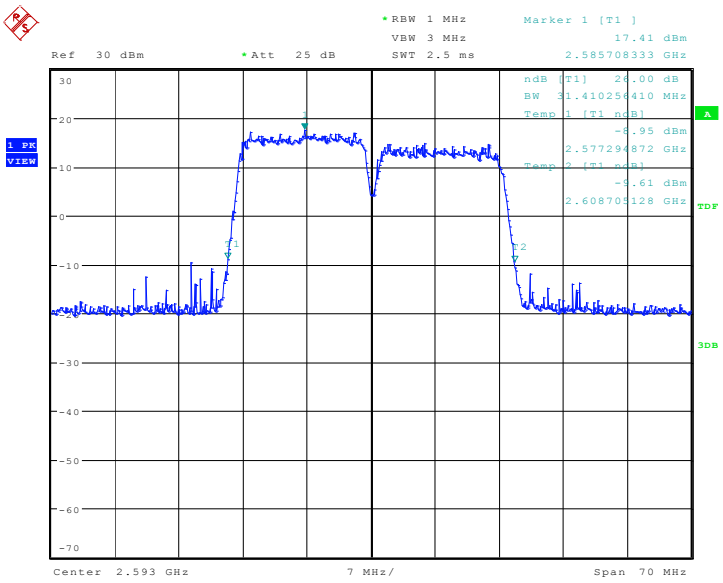
Date: 2.APR.2020 14:05:15

LTE band 41 HPUE, 15MHz+15MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:06:50

LTE band 41 HPUE, 15MHz+15MHz Bandwidth,64QAM (-26dBc BW)

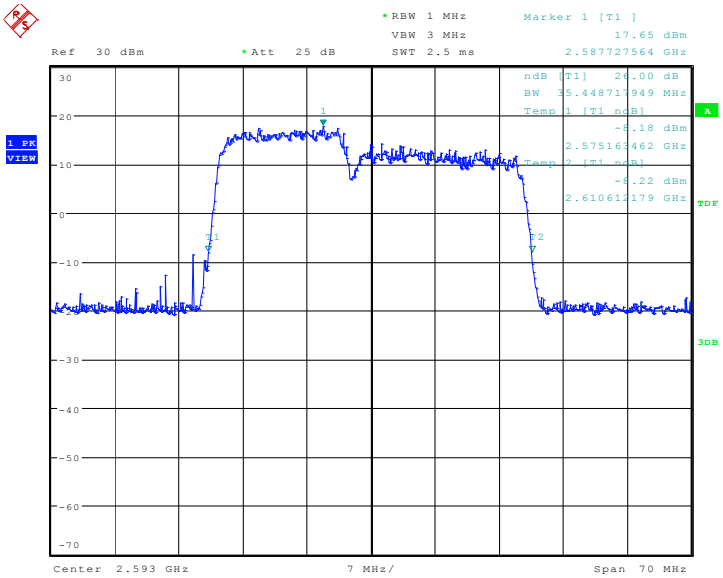


Date: 2.APR.2020 14:07:28

LTE band 41 HPUE, 15MHz+20MHz (-26dBc BW)

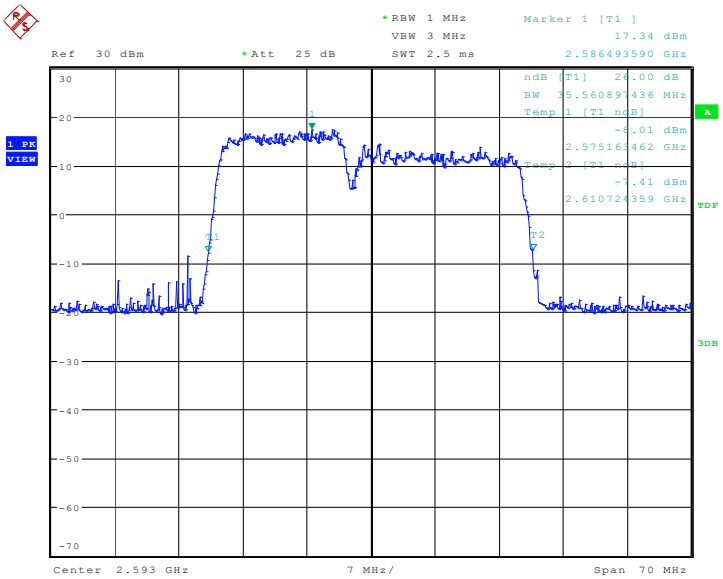
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	35.449	35.561	35.561

LTE band 41 HPUE, 15MHz+20MHz Bandwidth, QPSK (-26dBc BW)



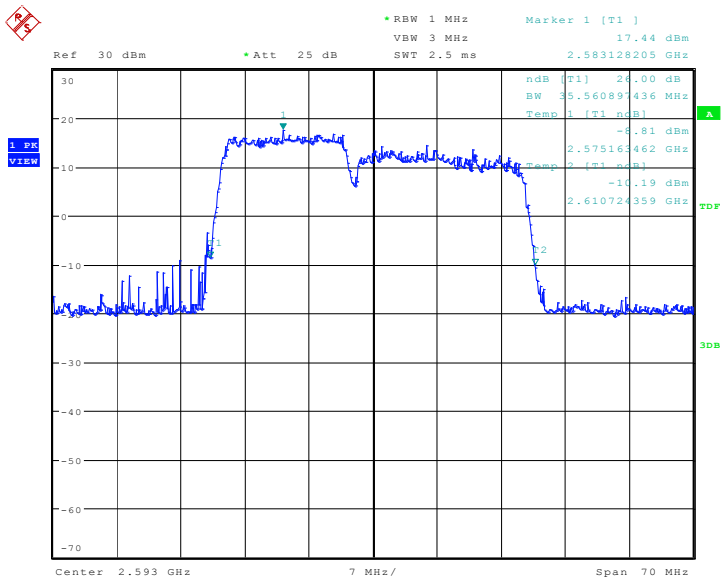
Date: 2.APR.2020 13:58:39

LTE band 41 HPUE, 15MHz+20MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 14:00:00

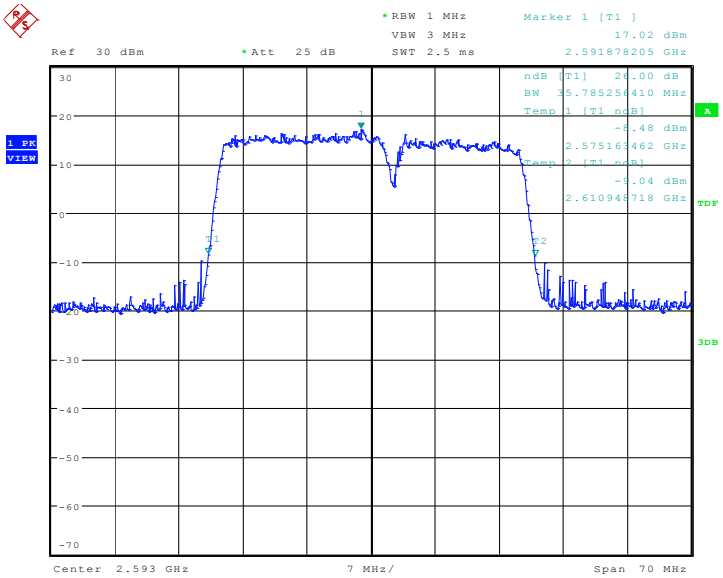
LTE band 41 HPUE, 15MHz+20MHz Bandwidth,64QAM (-26dBc BW)



LTE band 41 HPUE, 20MHz+15MHz (-26dBc BW)

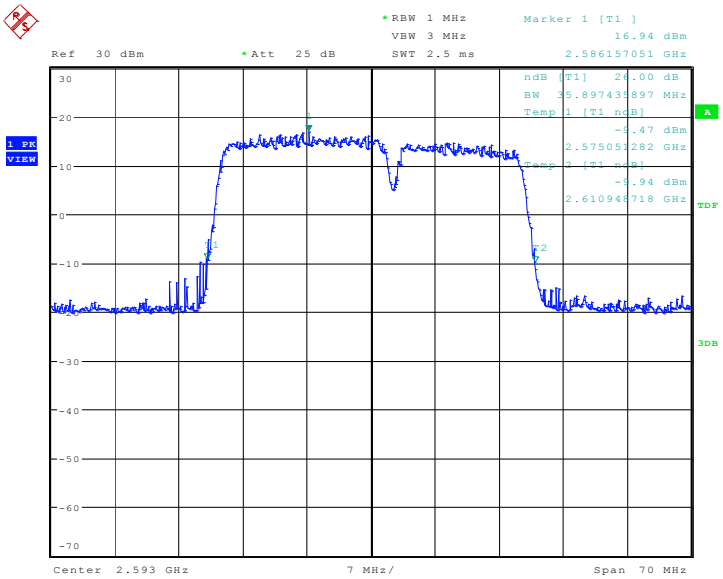
Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	35.785	35.897	35.673

LTE band 41 HPUE, 20MHz+15MHz Bandwidth, QPSK (-26dBc BW)



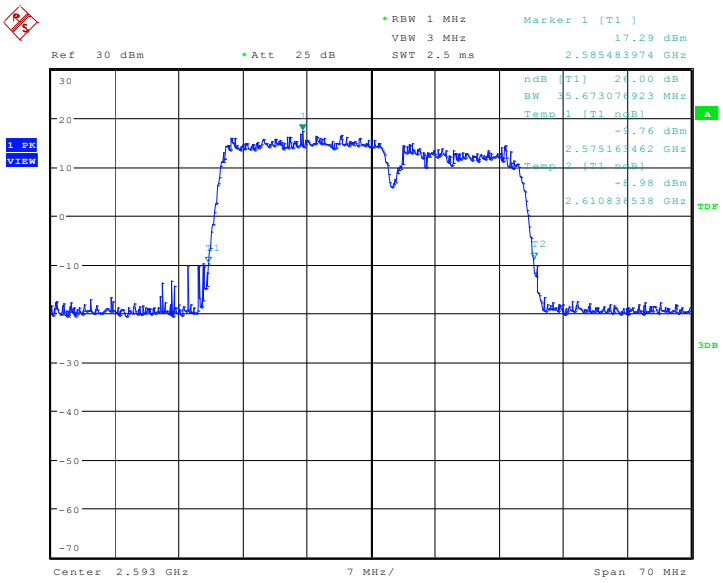
Date: 2.APR.2020 11:08:35

LTE band 41 HPUE, 20MHz+15MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.APR.2020 13:53:10

LTE band 41 HPUE, 20MHz+15MHz Bandwidth,64QAM (-26dBc BW)

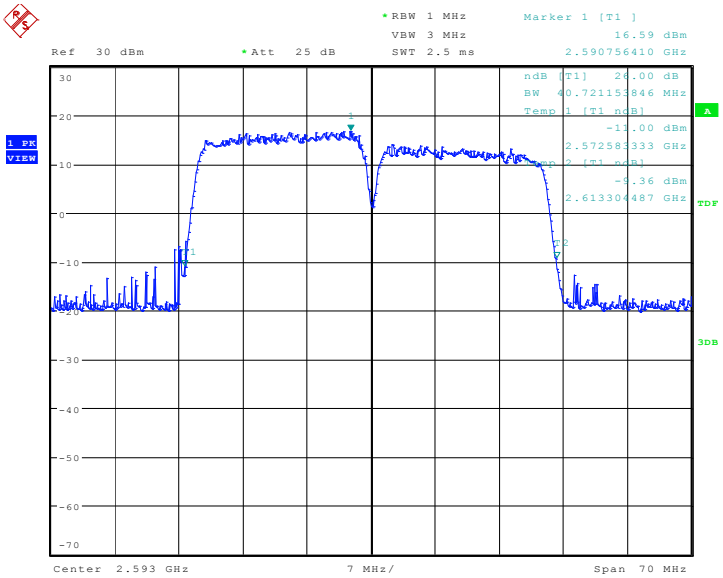


Date: 2.APR.2020 13:54:02

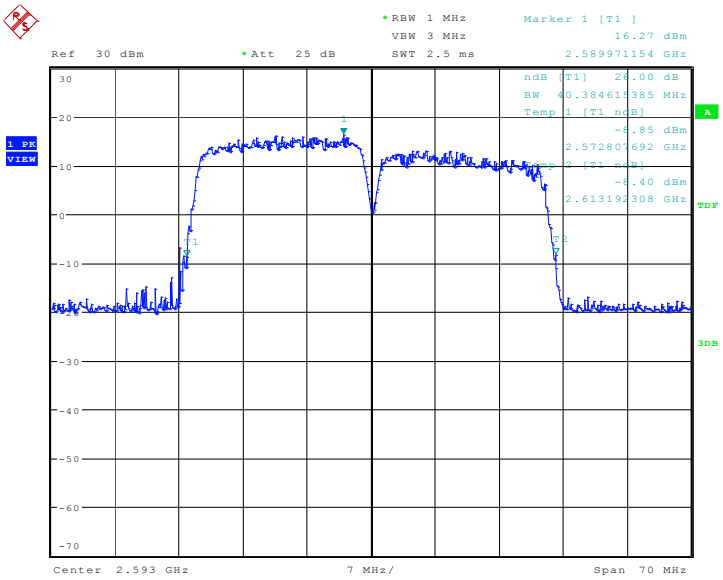
LTE band 41 HPUE, 20MHz+20MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW) (MHz)		
2593.0	QPSK	16QAM	64QAM
	40.721	40.385	40.385

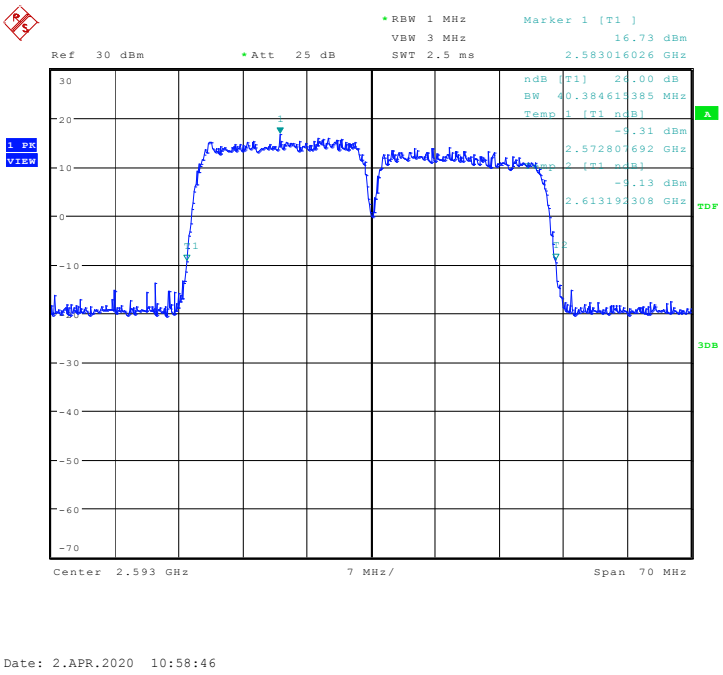
LTE band 41 HPUE, 20MHz+20MHz Bandwidth, QPSK (-26dBc BW)



LTE band 41 HPUE, 20MHz+20MHz Bandwidth,16QAM (-26dBc BW)



LTE band 41 HPUE, 20MHz+20MHz Bandwidth,64QAM (-26dBc BW)



A.6 BAND EDGE COMPLIANCE

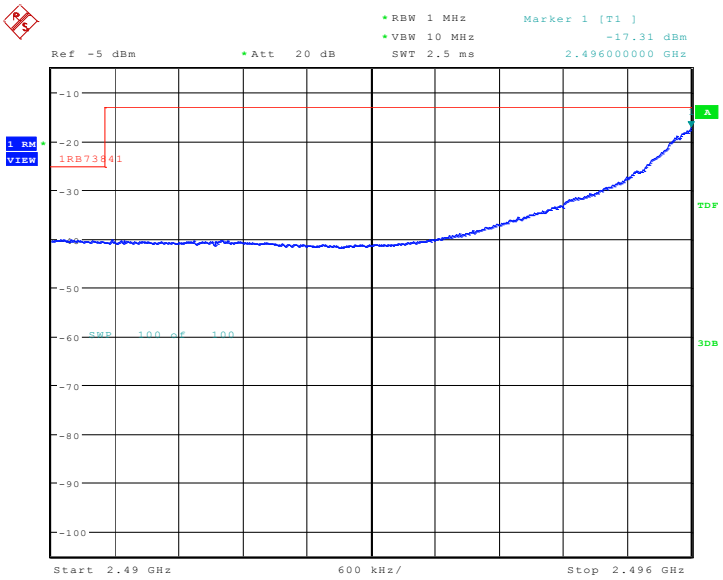
A.6.1 Measurement limit

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

A.6.2 Measurement result

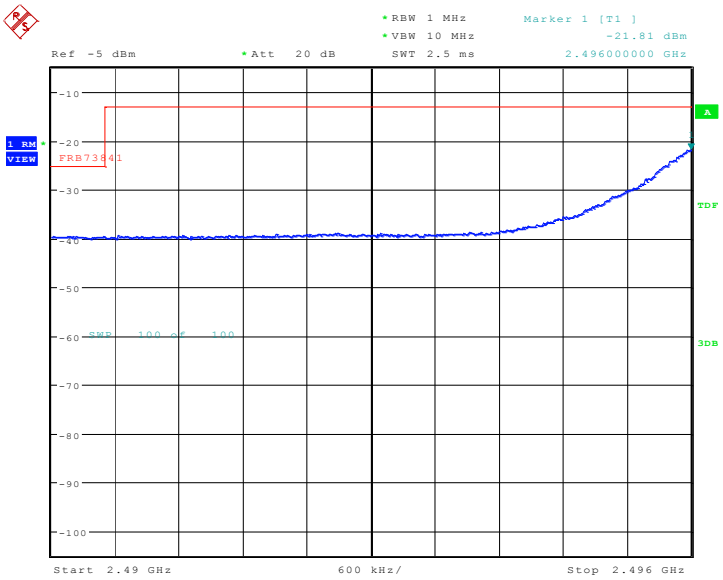
LTE band 41

LOW BAND EDGE BLOCK-5MHz+20MHz-1RB



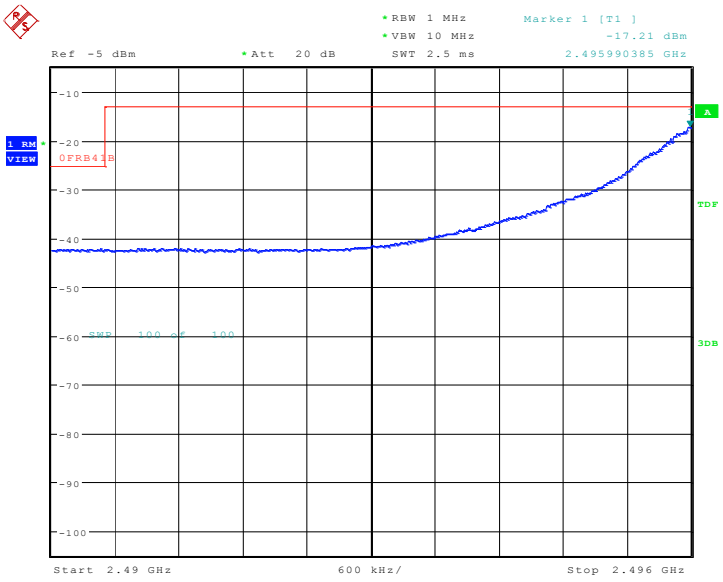
Date: 2.APR.2020 15:16:35

LOW BAND EDGE BLOCK-5MHz+20MHz -100%RB



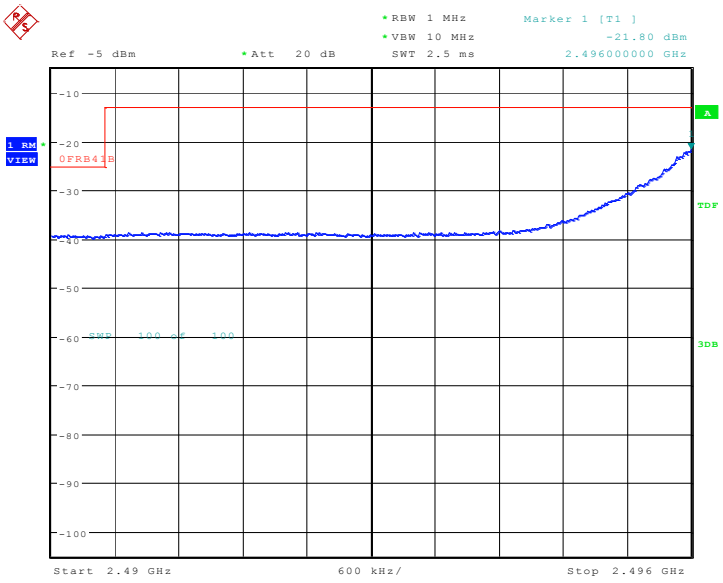
Date: 2.APR.2020 15:18:56

LOW BAND EDGE BLOCK-10MHz+20MHz-1RB



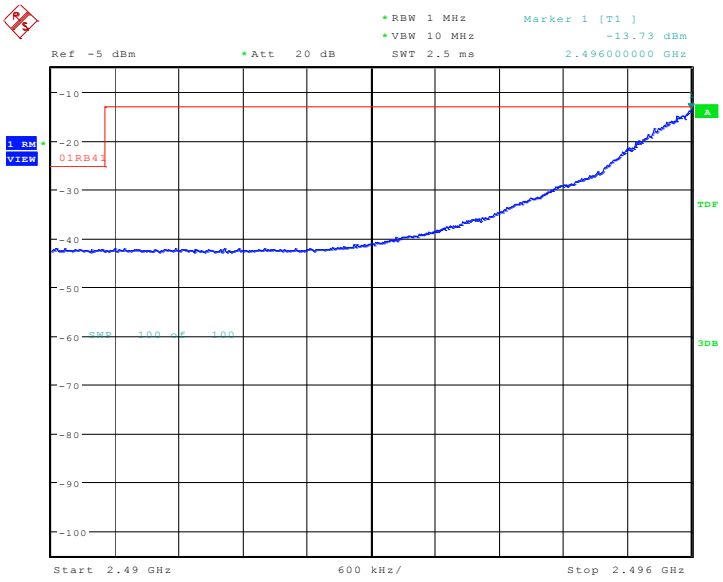
Date: 2.APR.2020 15:35:16

LOW BAND EDGE BLOCK-10MHz+20MHz -100%RB



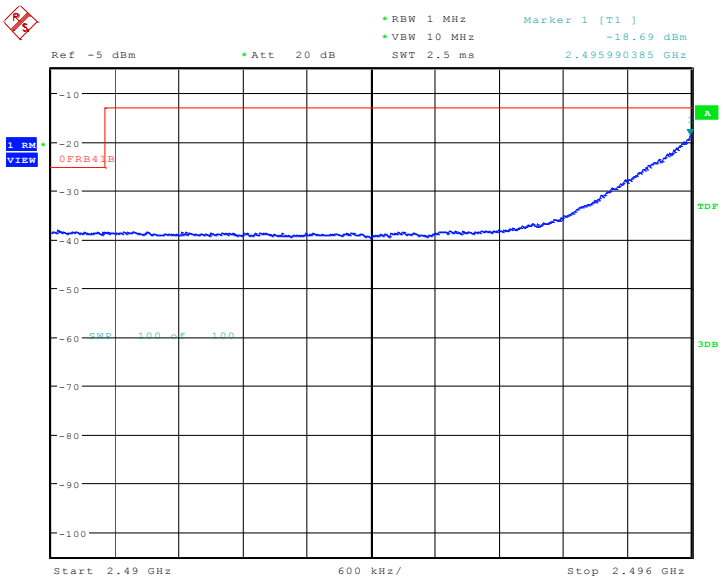
Date: 2.APR.2020 15:34:46

LOW BAND EDGE BLOCK-15MHz+15MHz-1RB



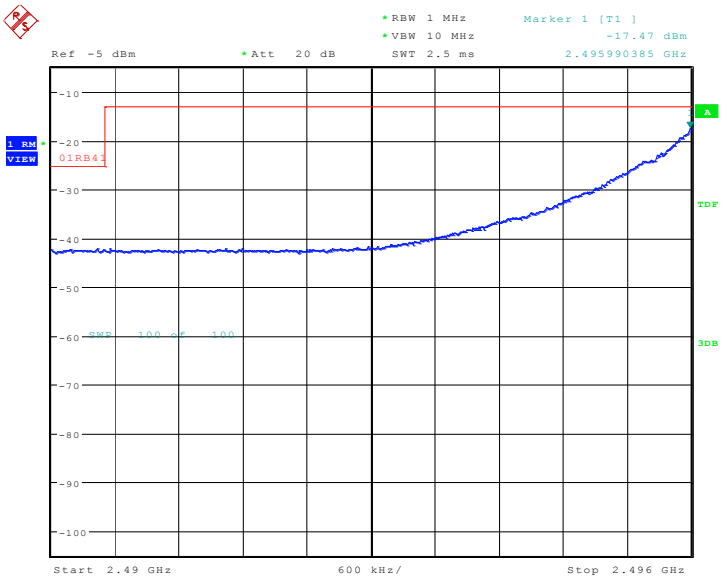
Date: 2.APR.2020 15:38:02

LOW BAND EDGE BLOCK-15MHz+15MHz -100%RB



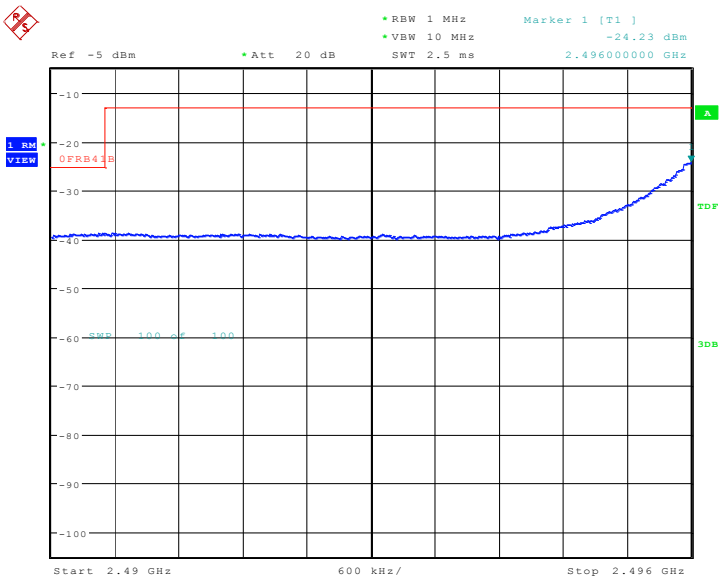
Date: 2.APR.2020 15:38:46

LOW BAND EDGE BLOCK-15MHz+20MHz-1RB



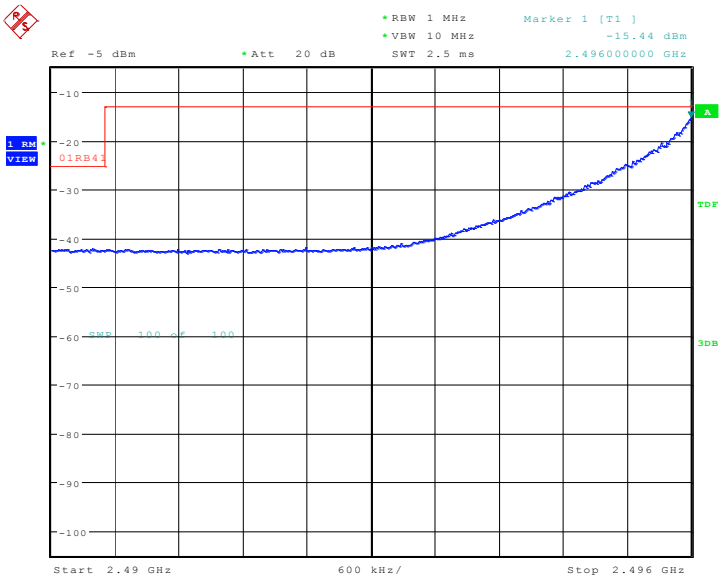
Date: 2.APR.2020 15:42:16

LOW BAND EDGE BLOCK-15MHz+20MHz -100%RB



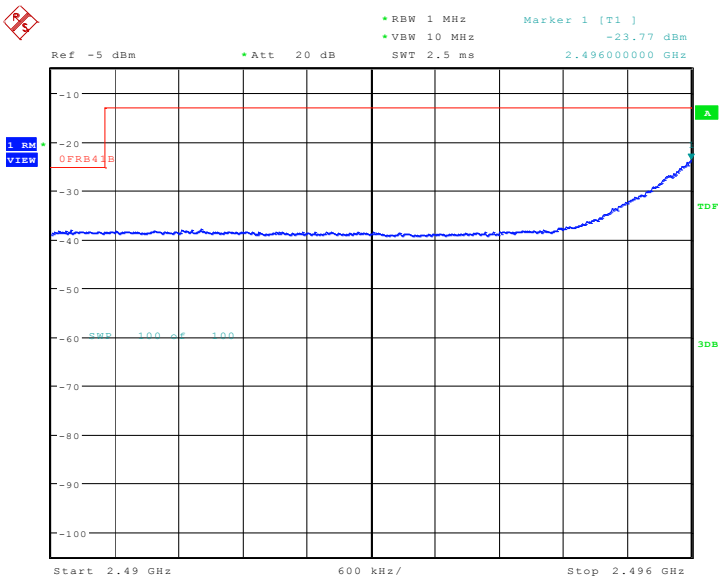
Date: 2.APR.2020 15:41:36

LOW BAND EDGE BLOCK-20MHz+20MHz-1RB



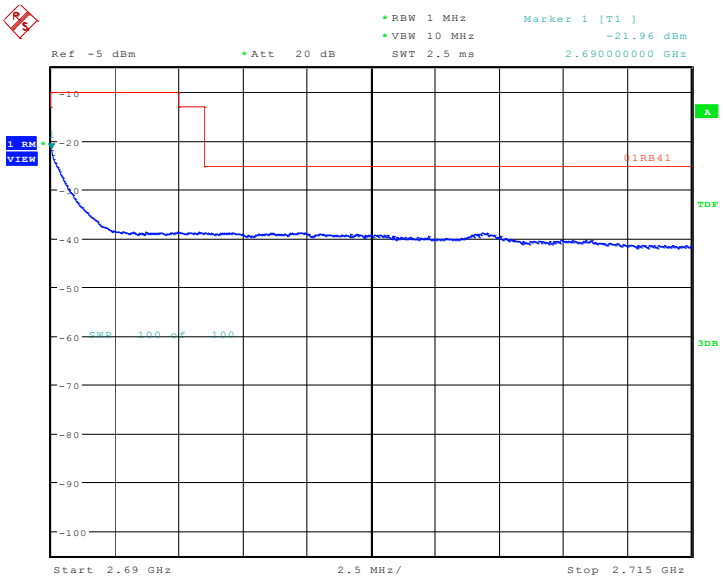
Date: 2.APR.2020 15:44:50

LOW BAND EDGE BLOCK-20MHz+20MHz -100%RB



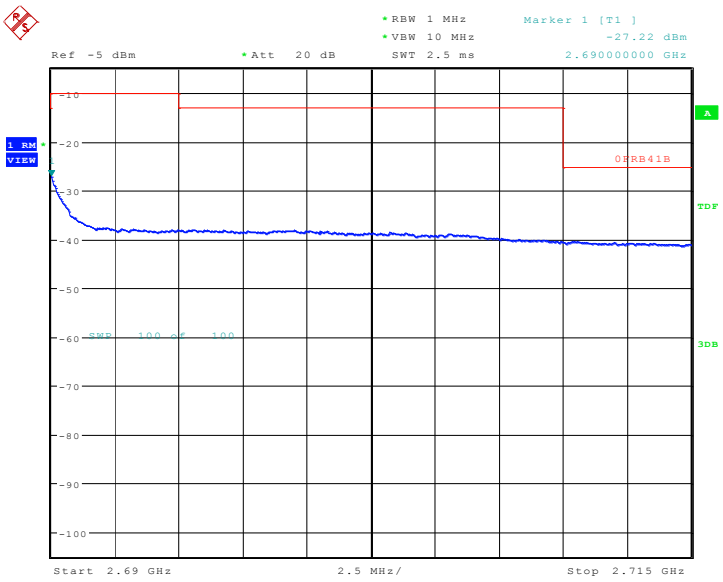
Date: 2.APR.2020 15:45:34

HIGH BAND EDGE BLOCK-20MHz+5MHz-1RB



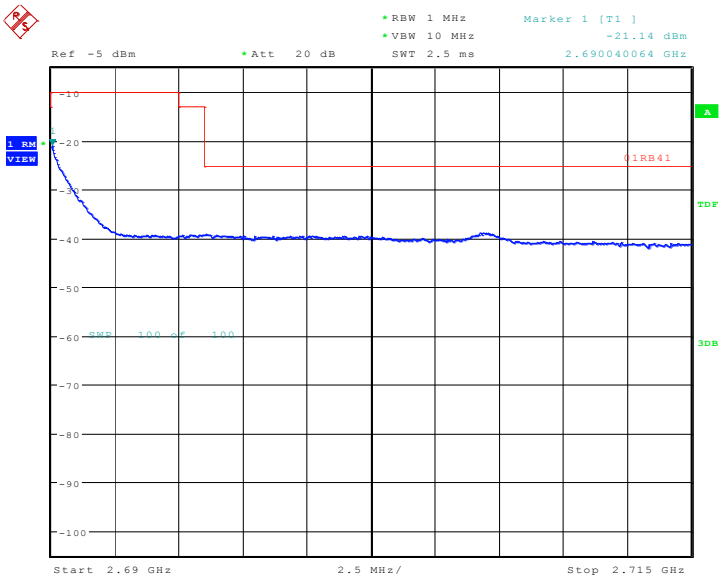
Date: 2.APR.2020 16:24:59

HIGH BAND EDGE BLOCK-20MHz+5MHz -100%RB



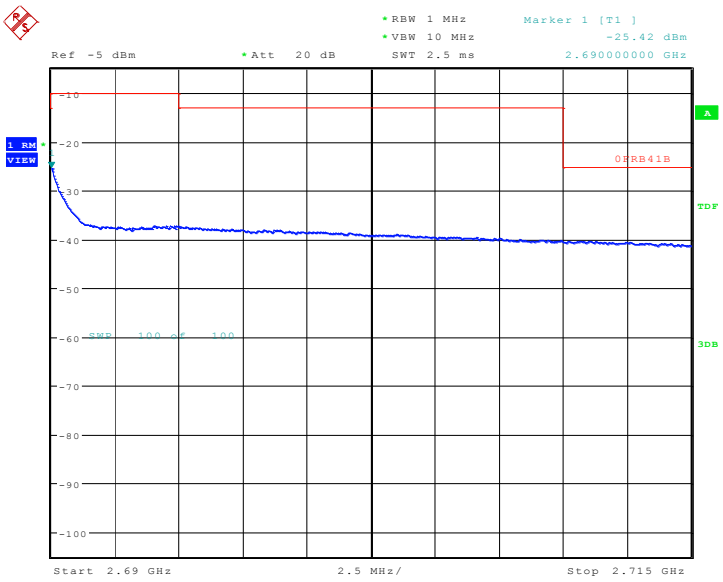
Date: 2.APR.2020 16:25:35

HIGH BAND EDGE BLOCK-20MHz+10MHz-1RB



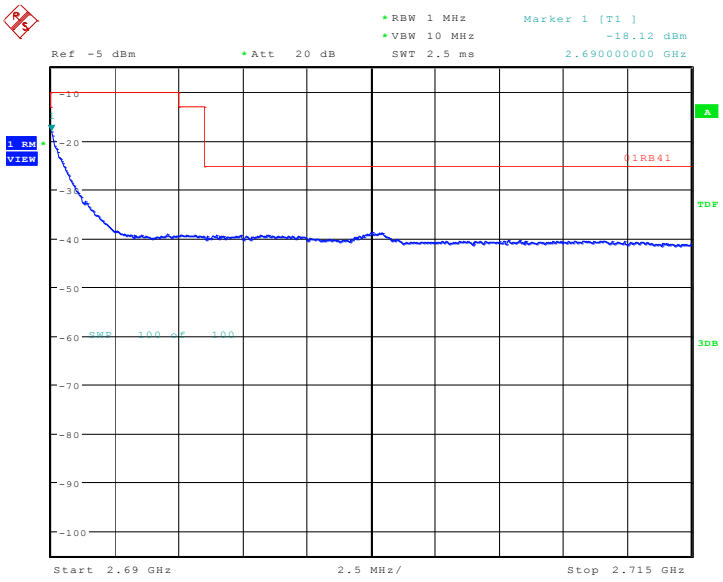
Date: 2.APR.2020 16:18:05

HIGH BAND EDGE BLOCK-20MHz+10MHz -100%RB



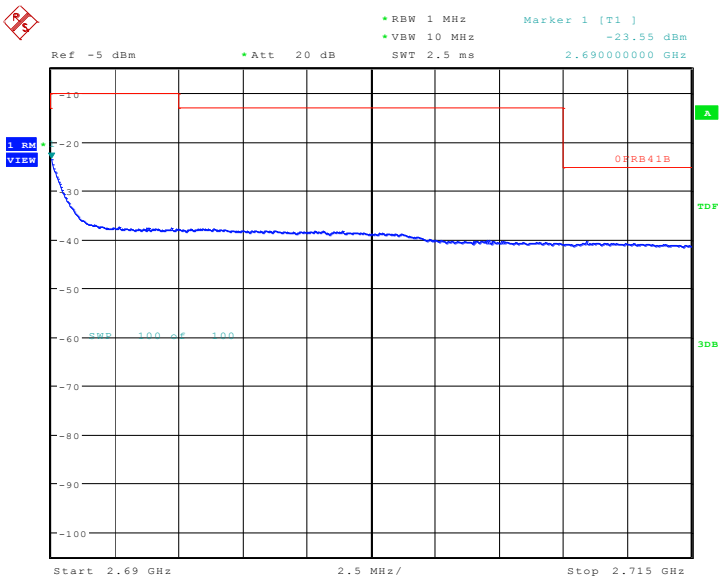
Date: 2.APR.2020 16:18:47

HIGH BAND EDGE BLOCK-15MHz+15MHz-1RB



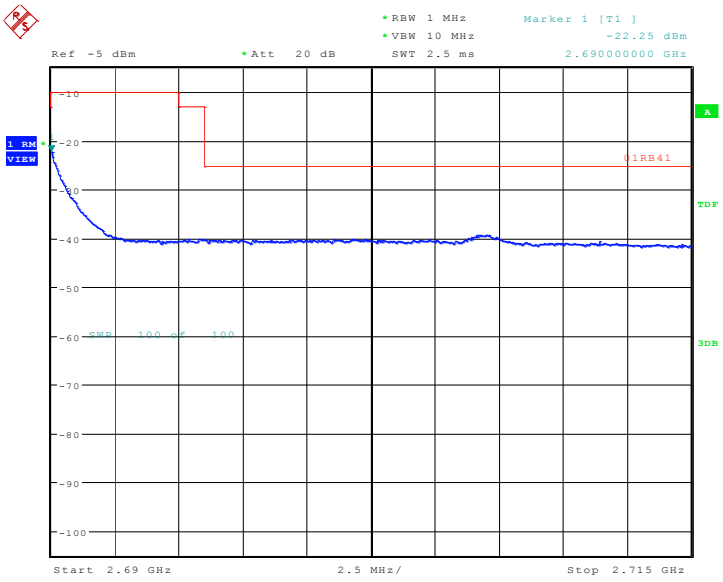
Date: 2.APR.2020 16:15:55

HIGH BAND EDGE BLOCK-15MHz+15MHz -100%RB



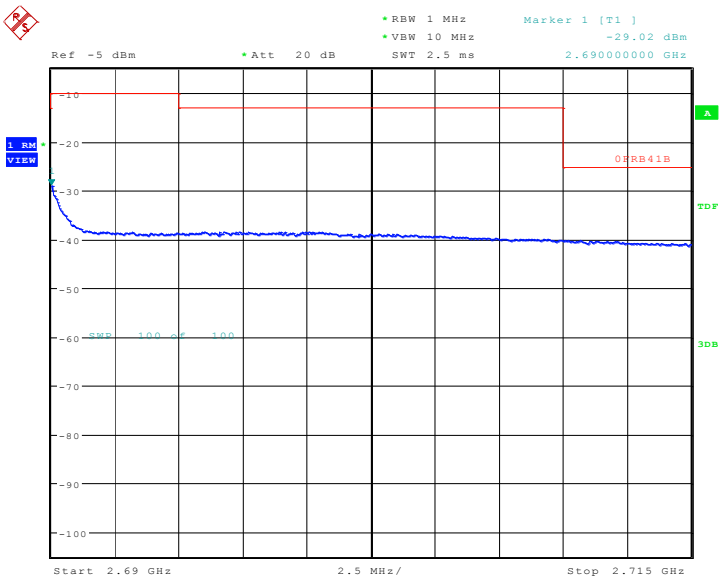
Date: 2.APR.2020 16:15:01

HIGH BAND EDGE BLOCK-20MHz+15MHz-1RB



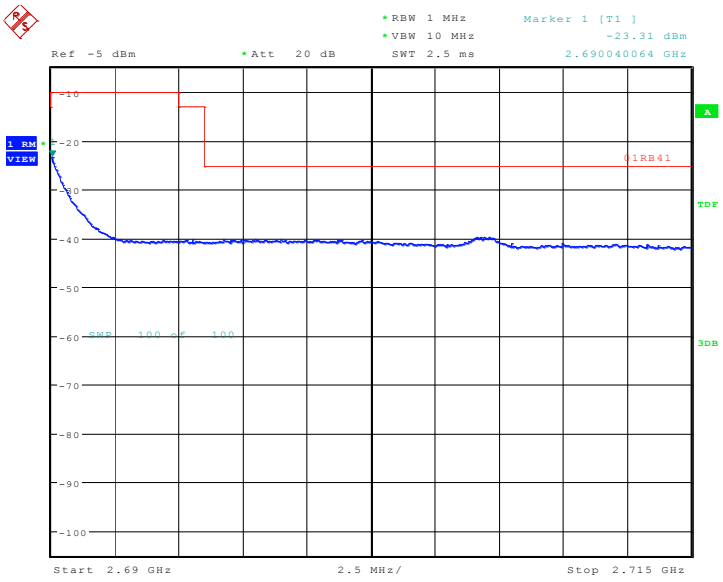
Date: 2.APR.2020 16:12:25

HIGH BAND EDGE BLOCK-20MHz+15MHz -100%RB



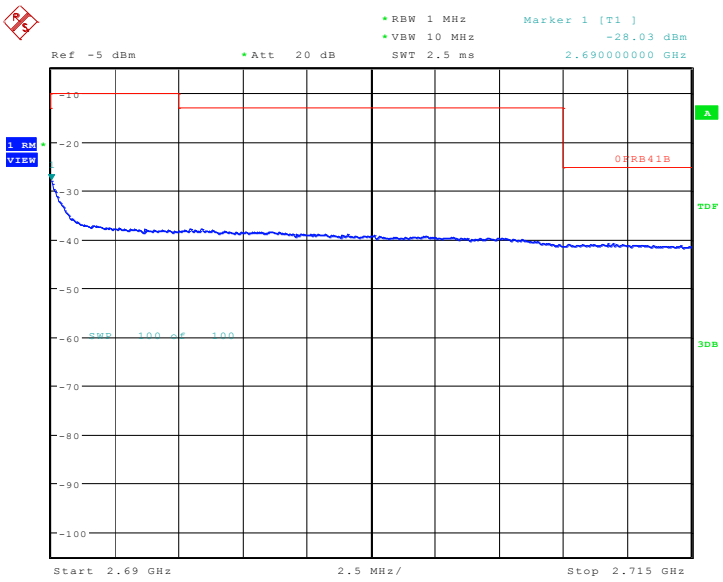
Date: 2.APR.2020 16:13:15

HIGH BAND EDGE BLOCK-20MHz+20MHz-1RB



Date: 2.APR.2020 16:11:06

HIGH BAND EDGE BLOCK-20MHz+20MHz -100%RB



Date: 2.APR.2020 16:09:49

A.7 CONDUCTED SPURIOUS EMISSION

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:
   (a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
   (b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

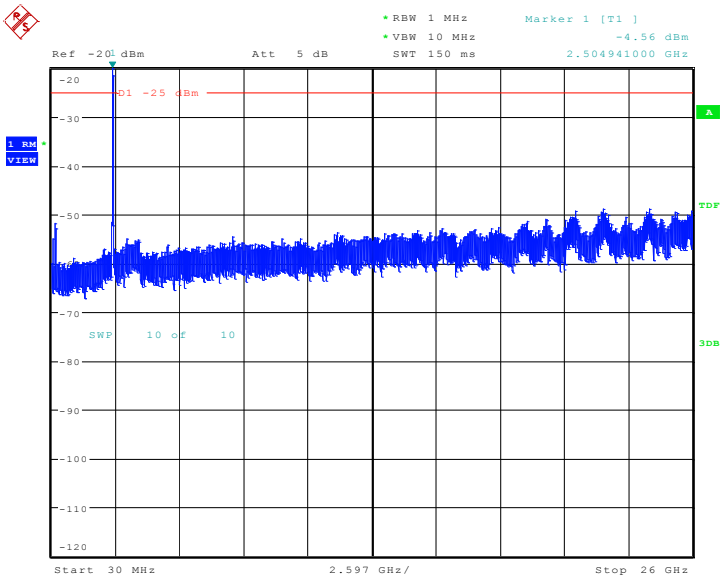
A. 7.2 Measurement Limit

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

A. 7.3 Measurement result

Only worst case result is given below

LTE band 41: 30MHz – 26GHz



A.8 PEAK-TO-AVERAGE POWER RATIO

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ⩾ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1ms;

e) Record the maximum PAPR level associated with a probability of 0.1%.

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

LTE band 41, 20MHz+20MHz

Frequency(MHz)	PAPR(dB)		
2593.0	QPSK	16QAM	64QAM
	9.04	9.26	9.33

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

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

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2019-09-26 through 2020-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

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