TEST REPORT

No. I22Z60589-WMD08

for

Sonim Technologies, Inc.

Smart phone

Model Name: XP9900(P14001), XP9900(P14002), XP9900(P14003), XP9900(P14004), XP9900(P14005), XP9900(P14006), XP9900(P14010)

FCC ID: WYPP14010

with

Hardware Version: V1.0

Software Version: 10.0.0-01-12.0.0-10.60.10

Issued Date: 2022-11-02

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.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z60589-WMD08	Rev.0	1st edition	2022-09-27
I22Z60589-WMD08	Rev.1	2nd edition Added the test results of LTE Band 7 and 41.	2022-10-09
I22Z60589-WMD08	Rev.2	3rd edition Removed the spot check measurement results.	2022-11-02

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

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1. Test Laboratory

1.1. Introduction & Accreditation

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

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

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

Location 2: CTTL (BDA)

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

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1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project Data

Testing Start Date: 2022-06-10

Testing End Date: 2022-10-08

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)

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2. Client Information

2.1. Applicant Information

Company Name:	Sonim Technologies, Inc.
Address /Post:	6500 River Place Blvd.Building 7, Suite 250 Austin, TX 78730 USA
Contact:	Avena xu
Email:	Avena.xu@sonimtech.com
Telephone:	1-650-378-8100

2.2. Manufacturer Information

Company Name:	Sonim Technologies, Inc.
Address /Post:	6500 River Place Blvd.Building 7, Suite 250 Austin, TX 78730 USA
Contact:	Avena xu
Email:	Avena.xu@sonimtech.com
Telephone:	1-650-378-8100

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

3.1. About EUT

Description	Smart phone		
Model Name	XP9900(P14001),	XP9900(P14002),	XP9900(P14003),
	XP9900(P14004),	XP9900(P14005),	XP9900(P14006),
	XP9900(P14010)		
FCC ID	WYPP14010		
Antenna	Embedded		
Output power	19.49dBm maximum EIRP measured for LTE Band 42L		
Extreme vol. Limits	3.6VDC to 4.45VDC (nominal: 3.9VDC)		
Extreme temp. Tolerance	-20°C to +55°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
UT89a	016188000003595	V1.0	10.0.0-01-12.0.0-10.60.10	2022-06-10
UT114a	016188000068069	V1.0	10.0.0-01-12.0.0-10.60.10	2022-08-09

*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	BAT-05000-01S
Manufacturer	Dongguan Veken Battery Co., Ltd.
Capacitance	4850mAh

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

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4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters are supplied by the customer, which are the bases of testing. CAICT is not responsible for the accuracy of customer supplied technical information that may affect the test results (for example, antenna gain and loss of customer supplied cable).

4.2. Reference Documents for testing

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

Reference	Title	Version
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-21 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

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5. Laboratory Environment

Fully-anechoic chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
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

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω

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6. Summary Of Test Result

First source:

LTE Band 42L

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Frequency Stability	2.1055	P
3	Occupied Bandwidth	2.1049	P
4	Emission Bandwidth	27.53	P
5	Band Edge Compliance	27.53	P
6	Conducted Spurious Emission	27.53	P
7	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.

All the test results are based on normal power.

All the test results are based on XP9900(P14001).

Band 42L: 3450MHz-3550MHz

Band 42H: 3550MHz-3600MHz

Band 43: 3600MHz-3650MHz

LTE Band 48 overlaps Band 42H and Band 43. Therefore, test data provided in this report covers Band 42H, Band 43 as well as Band 48.

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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, 64QAM and 256QAM 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.

The Equipment Under Test (EUT) is a Class 2 Permissive Change to XP9900(P14001), XP9900(P14002), XP9900(P14003), XP9900(P14004), XP9900(P14005), XP9900(P14006), XP9900(P14010)(FCC ID: WYPP14010).

For detail differences between two models please refer the Declaration of Changes document.

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7. Test Equipment Utilized

Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
Wideband Radio Communication Tester	CMW500	159082	R&S	2023-01-17	25 months
Spectrum Analyzer	FSU	200030	R&S	2022-06-02	1 year
Spectrum Analyzer	FSU	200030	R&S	2023-05-25	1 year
Signal&Spectrum Analyzer	FSW	104038	R&S	2022-06-24	1 year
Signal&Spectrum Analyzer	FSW	104038	R&S	2023-06-20	1 year
Radio Communication Analyzer	MT8821C	6201763159	Anritsu	2022-08-09	1 year
Radio Communication Analyzer	MT8821C	6201763159	Anritsu	2023-08-02	1 year
Climate Chamber	SH-242	93008556	ESPEC	2023-12-23	3 years
Test Receiver	E4440A	MY48250642	Agilent	2023-03-10	1 year
Universal Radio Communication Tester	CMW500	143008	R&S	2022-12-01	1 year
EMI Antenna	VULB9163	9163-482	Schwarzbeck	2022-11-16	1 year
Signal Generator	SMF100A	101295	R&S	2022-12-23	1 year
EMI Antenna	3117	00058889	ETS-Lindgren	2022-11-07	1 year
EMI Antenna	LB-7180-NF	J203001300005	A-INFO	2023-02-23	1 year

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Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

During the process of testing, the EUT was controlled via communication tester 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.

The results below include a correction factor for cable loss that is provided by the customer.

A.1.2.2 Measurement Result

LTE band 42L

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
5MHz	1 RB high	3547.5	22.72	22.03	20.69	17.65
		3500	22.91	22.30	20.87	17.90
		3452.5	23.13	22.49	21.05	17.98
	1 RB low	3547.5	22.76	22.13	20.72	17.67
		3500	22.95	22.19	20.81	17.76
		3452.5	23.19	22.55	21.05	18.10
	50% RB mid	3547.5	21.84	20.95	20.03	17.98
		3500	22.07	21.18	20.14	18.08
		3452.5	22.35	21.37	20.48	18.43
	100% RB	3547.5	21.84	20.95	19.93	17.92
		3500	22.00	21.12	20.15	18.18
		3452.5	22.29	21.34	20.45	18.24
10MHz	1 RB high	3545	22.68	22.08	20.74	17.68
		3500	22.86	22.11	20.64	17.62
		3455	23.21	22.55	20.97	18.04
	1 RB low	3545	22.79	22.12	20.74	17.81
		3500	23.07	22.38	20.91	17.89
		3455	23.28	22.62	21.09	18.13
	50% RB mid	3545	21.96	21.00	20.03	18.06
		3500	22.00	21.08	20.19	18.13
		3455	22.30	21.40	20.48	18.29

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	100% RB	3545	21.96	20.98	19.89	17.86
		3500	21.93	20.98	19.98	17.99
		3455	22.32	21.34	20.28	18.35
15MHz	1 RB high	3542.5	22.46	21.76	20.34	17.92
		3500	22.68	21.99	20.42	18.01
		3457.5	22.79	22.22	20.71	18.38
	1 RB low	3542.5	22.57	21.97	20.52	18.17
		3500	22.67	22.06	20.59	18.19
		3457.5	22.99	22.28	20.88	18.32
	50% RB mid	3542.5	21.74	20.80	19.76	18.22
		3500	21.82	20.86	19.84	18.20
		3457.5	22.10	21.17	20.17	18.23
	100% RB	3542.5	21.83	20.81	19.76	18.10
		3500	21.88	20.86	19.90	18.37
		3457.5	22.18	21.16	20.07	18.41
20MHz	1 RB high	3540	22.76	21.90	20.33	17.99
		3500	22.79	21.97	20.44	18.05
		3460	22.81	22.16	20.69	18.27
	1 RB low	3540	22.88	21.99	20.52	18.05
		3500	22.89	22.03	20.63	18.27
		3460	22.98	22.34	20.85	18.37
	50% RB mid	3540	21.79	20.84	19.82	18.19
		3500	21.81	20.91	19.81	18.16
		3460	22.13	21.18	20.15	18.25
	100% RB	3540	21.82	20.82	19.86	18.23
		3500	21.81	20.88	19.86	18.21
		3460	22.16	21.14	20.20	18.30

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A.1.3 Radiated

A.1.3.1 Description

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

LTE Band 42L: Rule Part 27.50(k)(3) specifies, " Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications."

The antenna gain provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

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LTE Band 42L

Limits: ≤30dBm (1W)

Max EIRP: 19.49dBm

Band width	RB size/ offset	Frequency (MHz)	Conducted Power (dBm)				Radiated Power (dBm) GT = -3.79dBi			
			QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
5MHz	1 RB high	3547.5	22.72	22.03	20.69	17.65	18.93	18.24	16.90	13.86
		3500	22.91	22.30	20.87	17.90	19.12	18.51	17.08	14.11
		3452.5	23.13	22.49	21.05	17.98	19.34	18.70	17.26	14.19
	1 RB low	3547.5	22.76	22.13	20.72	17.67	18.97	18.34	16.93	13.88
		3500	22.95	22.19	20.81	17.76	19.16	18.40	17.02	13.97
		3452.5	23.19	22.55	21.05	18.10	19.40	18.76	17.26	14.31
	50% RB mid	3547.5	21.84	20.95	20.03	17.98	18.05	17.16	16.24	14.19
		3500	22.07	21.18	20.14	18.08	18.28	17.39	16.35	14.29
		3452.5	22.35	21.37	20.48	18.43	18.56	17.58	16.69	14.64
	100% RB	3547.5	21.84	20.95	19.93	17.92	18.05	17.16	16.14	14.13
		3500	22.00	21.12	20.15	18.18	18.21	17.33	16.36	14.39
		3452.5	22.29	21.34	20.45	18.24	18.50	17.55	16.66	14.45
10MHz	1 RB high	3545	22.68	22.08	20.74	17.68	18.89	18.29	16.95	13.89
		3500	22.86	22.11	20.64	17.62	19.07	18.32	16.85	13.83
		3455	23.21	22.55	20.97	18.04	19.42	18.76	17.18	14.25
	1 RB low	3545	22.79	22.12	20.74	17.81	19.00	18.33	16.95	14.02
		3500	23.07	22.38	20.91	17.89	19.28	18.59	17.12	14.10
		3455	23.28	22.62	21.09	18.13	19.49	18.83	17.30	14.34
	50% RB mid	3545	21.96	21.00	20.03	18.06	18.17	17.21	16.24	14.27
		3500	22.00	21.08	20.19	18.13	18.21	17.29	16.40	14.34
		3455	22.30	21.40	20.48	18.29	18.51	17.61	16.69	14.50
	100% RB	3545	21.96	20.98	19.89	17.86	18.17	17.19	16.10	14.07
		3500	21.93	20.98	19.98	17.99	18.14	17.19	16.19	14.20
		3455	22.32	21.34	20.28	18.35	18.53	17.55	16.49	14.56
15MHz	1 RB high	3542.5	22.46	21.76	20.34	17.92	18.67	17.97	16.55	14.13
		3500	22.68	21.99	20.42	18.01	18.89	18.20	16.63	14.22
		3457.5	22.79	22.22	20.71	18.38	19.00	18.43	16.92	14.59
	1 RB low	3542.5	22.57	21.97	20.52	18.17	18.78	18.18	16.73	14.38
		3500	22.67	22.06	20.59	18.19	18.88	18.27	16.80	14.40
		3457.5	22.99	22.28	20.88	18.32	19.20	18.49	17.09	14.53
	50% RB mid	3542.5	21.74	20.80	19.76	18.22	17.95	17.01	15.97	14.43
		3500	21.82	20.86	19.84	18.20	18.03	17.07	16.05	14.41
		3457.5	22.10	21.17	20.17	18.23	18.31	17.38	16.38	14.44
	100% RB	3542.5	21.83	20.81	19.76	18.10	18.04	17.02	15.97	14.31
		3500	21.88	20.86	19.90	18.37	18.09	17.07	16.11	14.58
		3457.5	22.18	21.16	20.07	18.41	18.39	17.37	16.28	14.62

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20MHz	1 RB high	3540	22.76	21.90	20.33	17.99	18.97	18.11	16.54	14.20
		3500	22.79	21.97	20.44	18.05	19.00	18.18	16.65	14.26
		3460	22.81	22.16	20.69	18.27	19.02	18.37	16.90	14.48
	1 RB low	3540	22.88	21.99	20.52	18.05	19.09	18.20	16.73	14.26
		3500	22.89	22.03	20.63	18.27	19.10	18.24	16.84	14.48
		3460	22.98	22.34	20.85	18.37	19.19	18.55	17.06	14.58
	50% RB mid	3540	21.79	20.84	19.82	18.19	18.00	17.05	16.03	14.40
		3500	21.81	20.91	19.81	18.16	18.02	17.12	16.02	14.37
		3460	22.13	21.18	20.15	18.25	18.34	17.39	16.36	14.46
	100% RB	3540	21.82	20.82	19.86	18.23	18.03	17.03	16.07	14.44
		3500	21.81	20.88	19.86	18.21	18.02	17.09	16.07	14.42
		3460	22.16	21.14	20.20	18.30	18.37	17.35	16.41	14.51

Note: Expanded measurement uncertainty is U = 0.578 dB, k = 2.

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A.2 Frequency Stability

A.2.1 Method of Measurement

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as F_L and F_H respectively.

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 CMW500.

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 each LTE band, 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 ℃ decrements from +50℃ to -30℃. 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 the lower, higher and nominal voltage. 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.

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A.2.2 Measurement results

LTE Band 42L, 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	3.9	3450.801	3549.135	-2.62	0.0007
50				-1.37	0.0004
40				-3.72	0.0011
30				-1.69	0.0005
10				-2.30	0.0007
0				-2.26	0.0006
-10				-3.78	0.0011
-20				-0.79	0.0002
-30					

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	3450.801	3549.135	-2.16	0.0006
4.45				-0.79	0.0002

Note: Expanded measurement uncertainty is U = 0.01 PPM, k = 2.

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A.3 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 mid frequencies 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. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts.
b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
d) Set the detection mode to peak, and the trace mode to max-hold.

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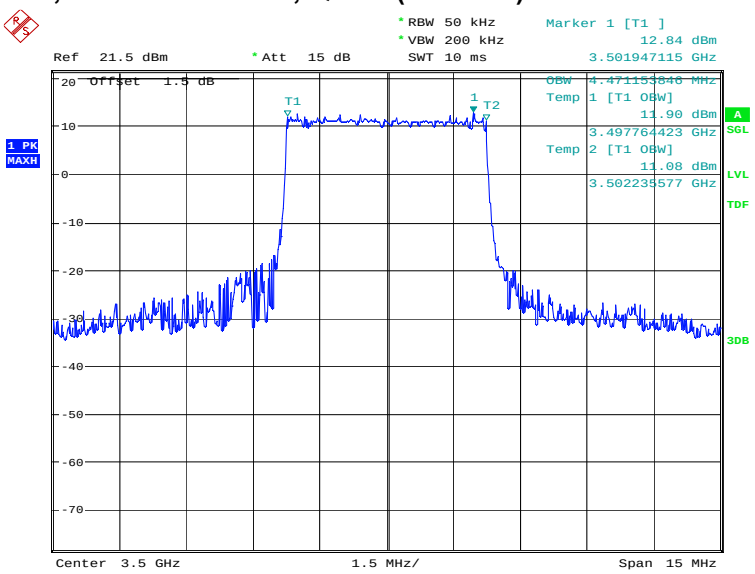
LTE band 42L, 5MHz (99%)

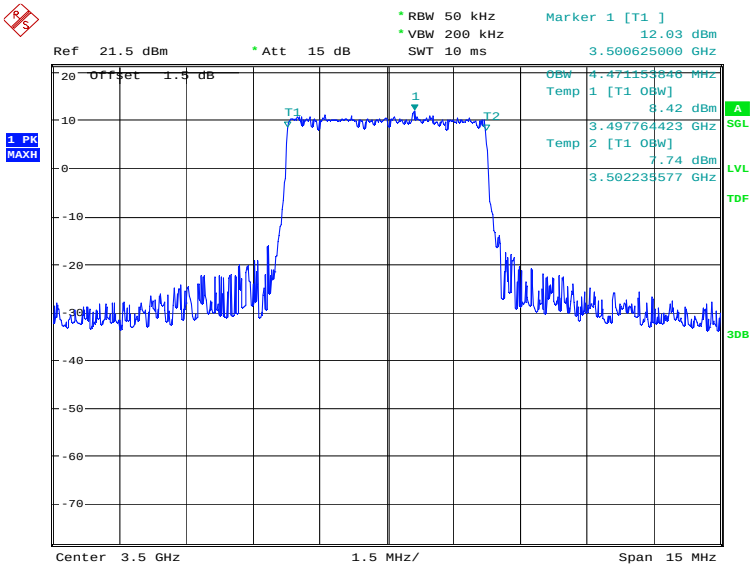
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
3500.0	QPSK	16QAM
	4471.15	4471.15

LTE band 42L, 5MHz Bandwidth, QPSK (99% BW)



Date: 27.JUL.2022 15:10:46

LTE band 42L, 5MHz Bandwidth,16QAM (99% BW)



Date: 27.JUL.2022 15:11:25

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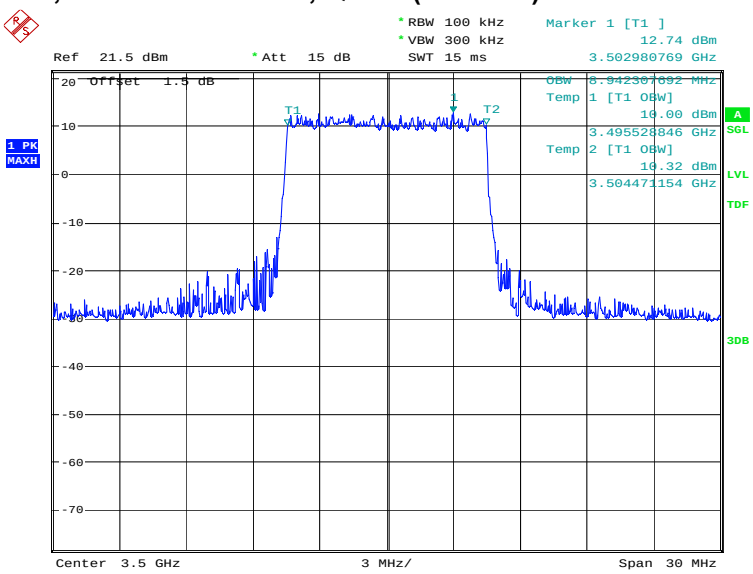
LTE band 42L, 10MHz (99%)

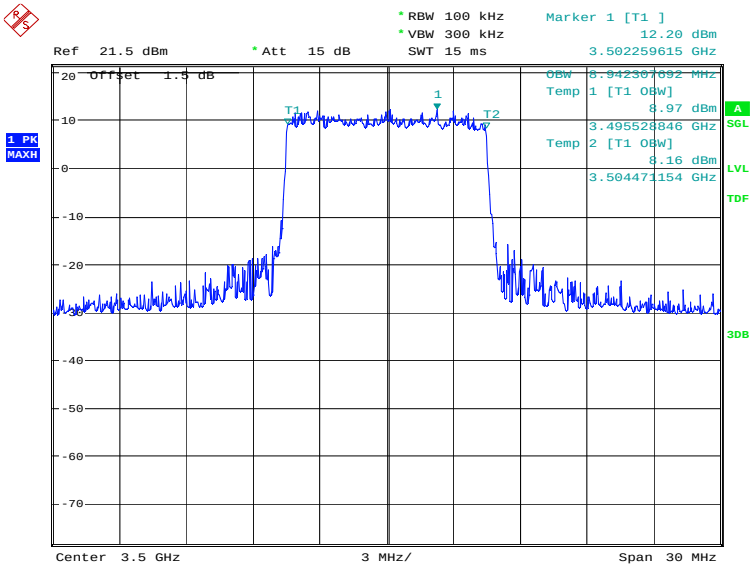
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
3500.0	QPSK	16QAM
	8942.31	8942.31

LTE band 42L, 10MHz Bandwidth, QPSK (99% BW)



Date: 27.JUL.2022 15:12:08

LTE band 42L, 10MHz Bandwidth,16QAM (99% BW)



Date: 27.JUL.2022 15:12:48

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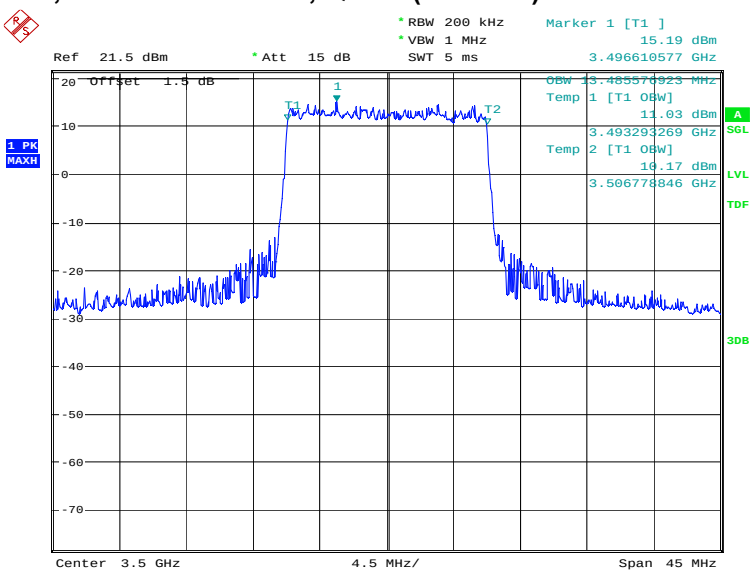
LTE band 42L, 15MHz (99%)

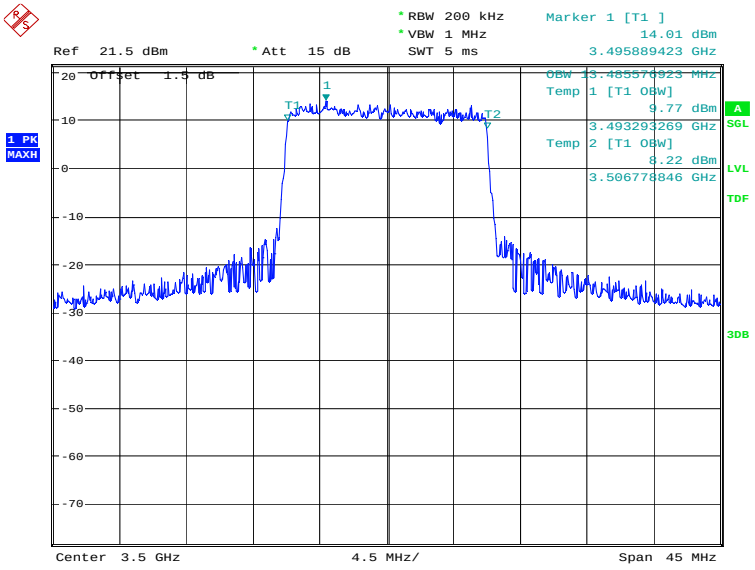
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
3500.0	QPSK	16QAM
	13485.58	13485.58

LTE band 42L, 15MHz Bandwidth, QPSK (99% BW)



Date: 27.JUL.2022 15:13:31

LTE band 42L, 15MHz Bandwidth,16QAM (99% BW)



Date: 27.JUL.2022 15:14:11

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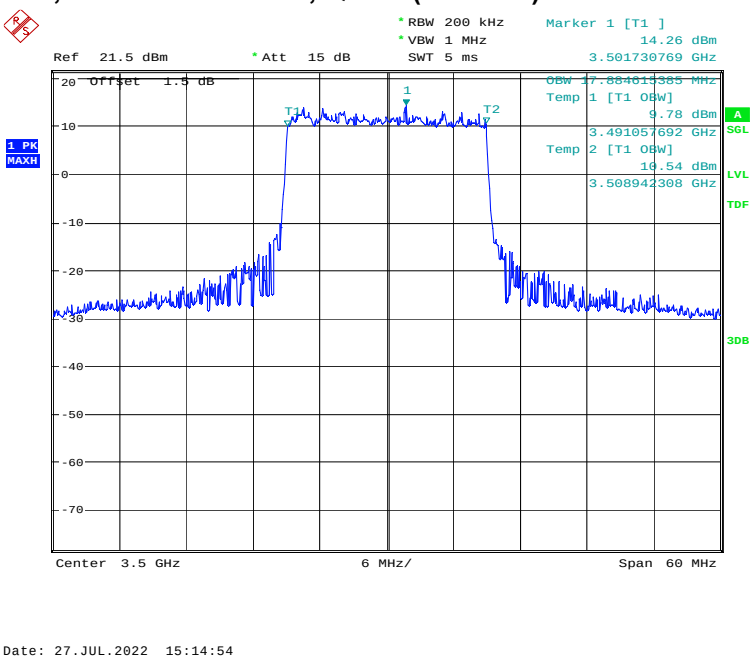
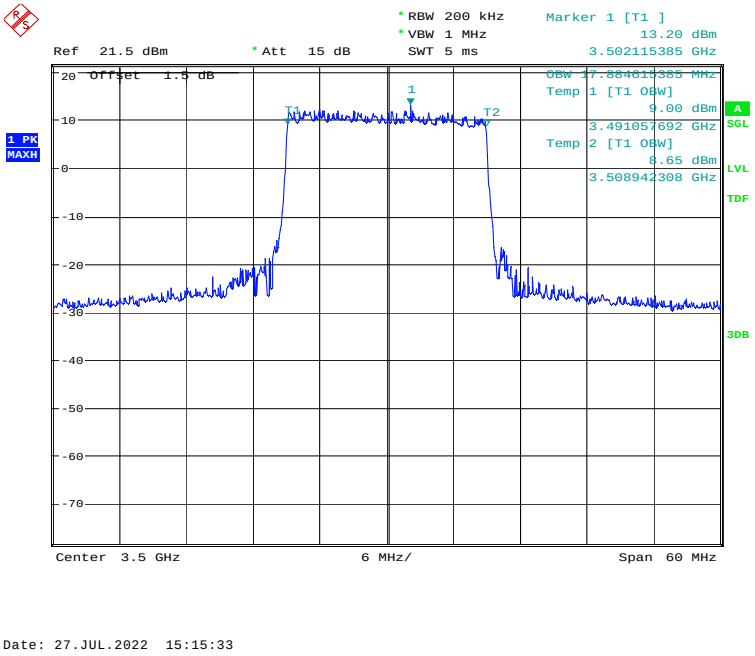
LTE band 42L, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
3500.0	QPSK	16QAM
	17884.62	17884.62

LTE band 42L, 20MHz Bandwidth, QPSK (99% BW)



LTE band 42L, 20MHz Bandwidth,16QAM (99% BW)



Note: Expanded measurement uncertainty is U = 3428 Hz, k = 2.

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A.4 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.

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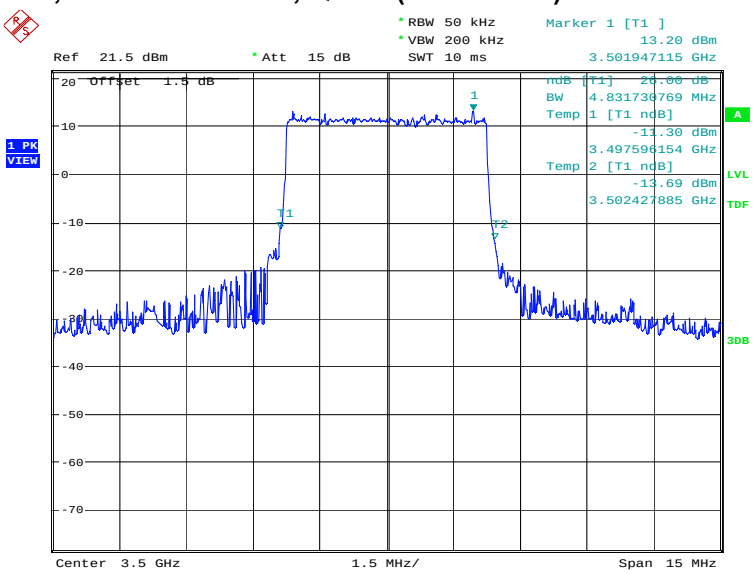
LTE band 42L, 5MHz (-26dBc)

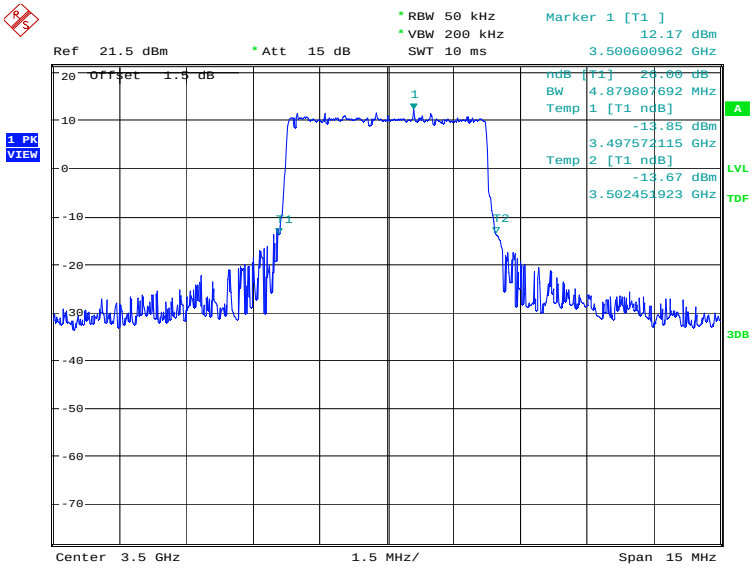
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
3500.0	QPSK	16QAM
	4831.73	4879.81

LTE band 42L, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 27.JUL.2022 15:33:52

LTE band 42L, 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 27.JUL.2022 15:34:31

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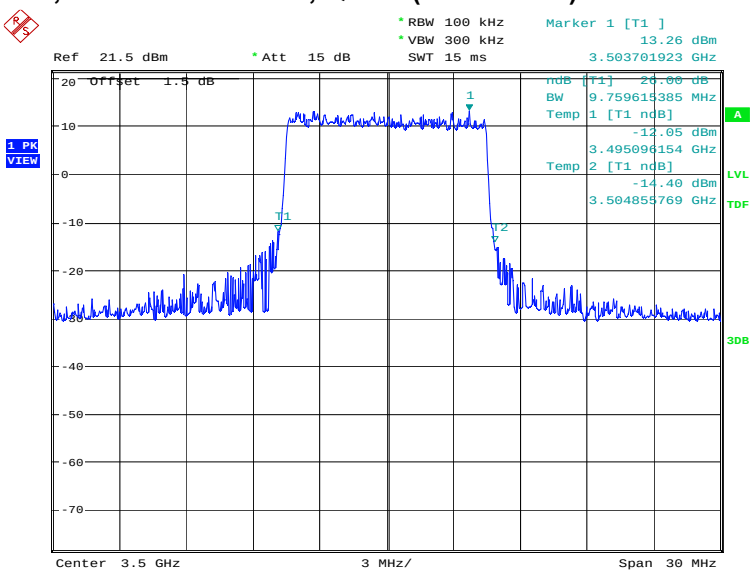
LTE band 42L, 10MHz (-26dBc)

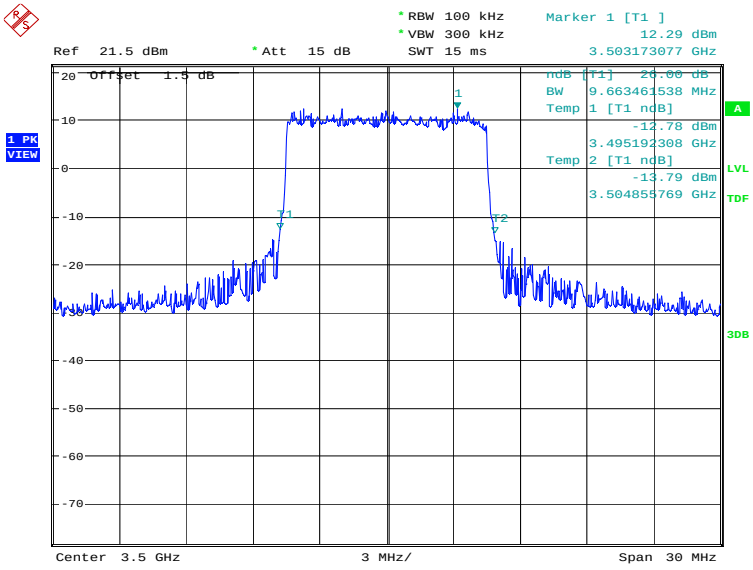
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
3500.0	QPSK	16QAM
	9759.62	9663.46

LTE band 42L, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 27.JUL.2022 15:35:15

LTE band 42L, 10MHz Bandwidth,16QAM (-26dBc BW)



Date: 27.JUL.2022 15:35:55

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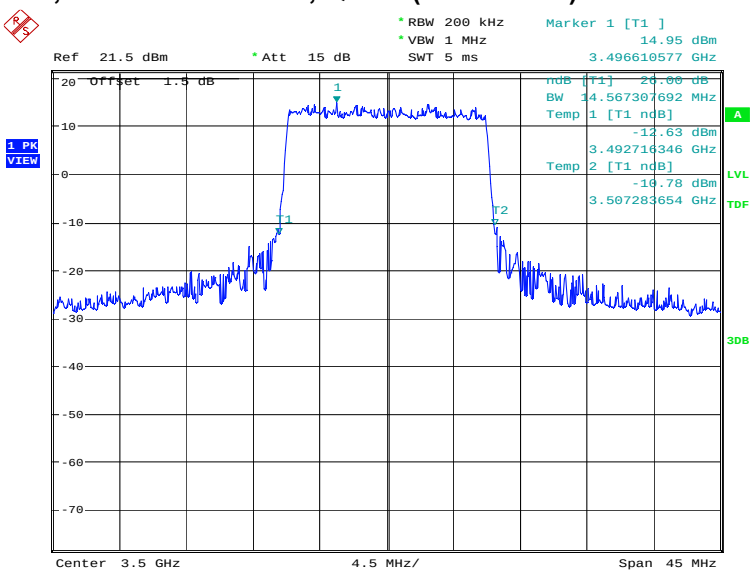
LTE band 42L, 15MHz (-26dBc)

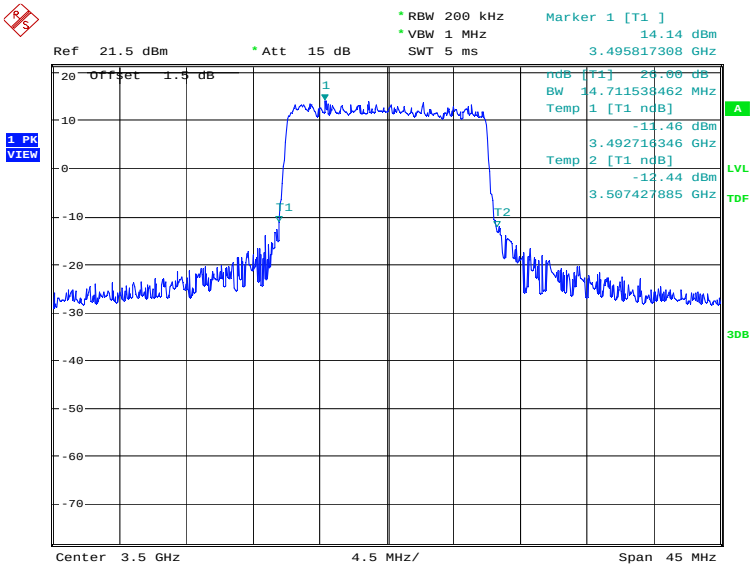
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
3500.0	QPSK	16QAM
	14567.31	14711.54

LTE band 42L, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 27.JUL.2022 15:36:39

LTE band 42L, 15MHz Bandwidth,16QAM (-26dBc BW)



Date: 27.JUL.2022 15:37:19

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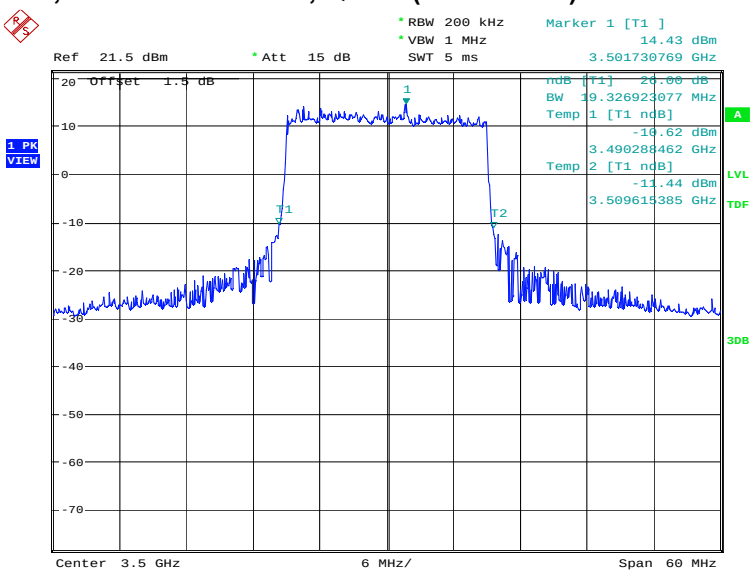
LTE band 42L, 20MHz (-26dBc)

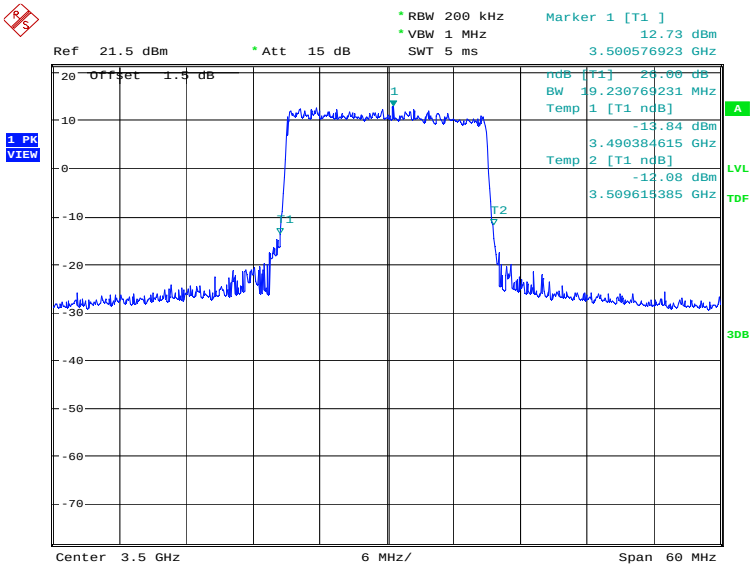
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
3500.0	QPSK	16QAM
	19326.92	19230.77

LTE band 42L, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 27.JUL.2022 15:38:03

LTE band 42L, 20MHz Bandwidth,16QAM (-26dBc BW)



Date: 27.JUL.2022 15:38:42

Note: Expanded measurement uncertainty is U = 3428 Hz, k = 2.

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A.5 Band Edge Compliance

A.5.1 Measurement limit

Part 27.53(n) states for mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.

Part 96.41(e) states for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed −25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB. The conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

The spectrum analyzer readings are corrected by [10 log (1/duty cycle)] for the non-continuous transmitting scenario.

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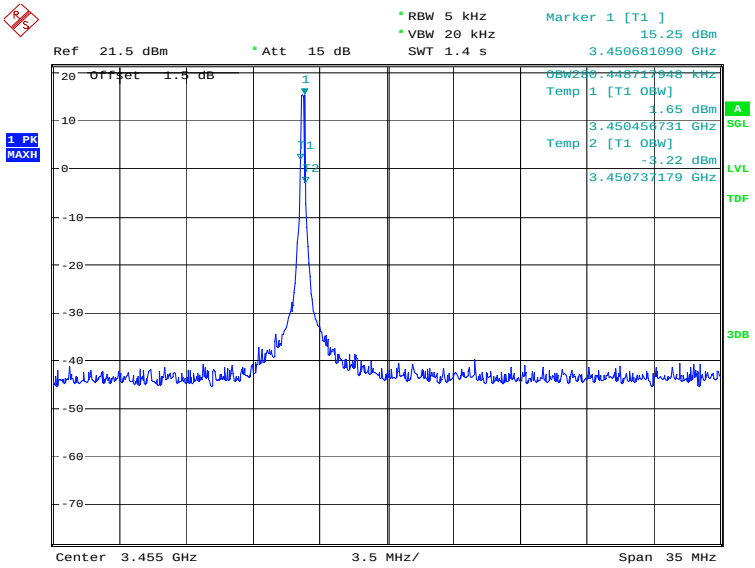
A.5.2 Measurement result

Only the worst case result is given below

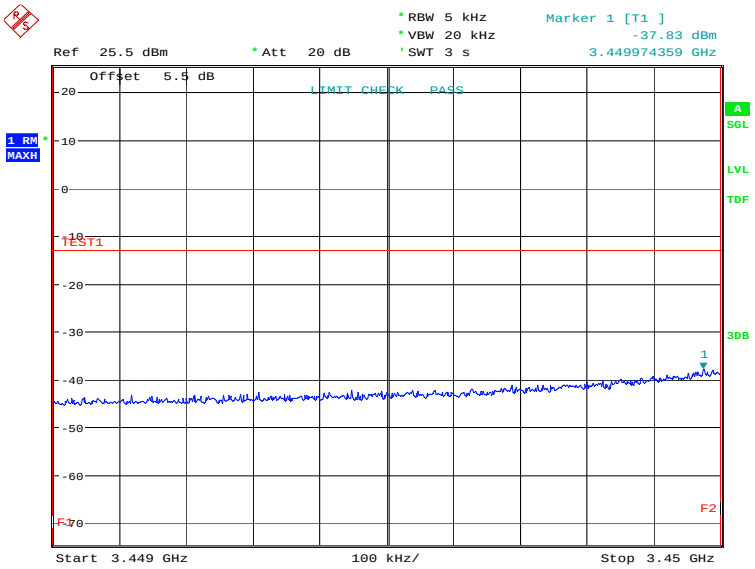
LTE band 42L

OBW: 1RB-low_offset



Date: 2.AUG.2022 10:48:42

LOW BAND EDGE BLOCK-1RB-low_offset



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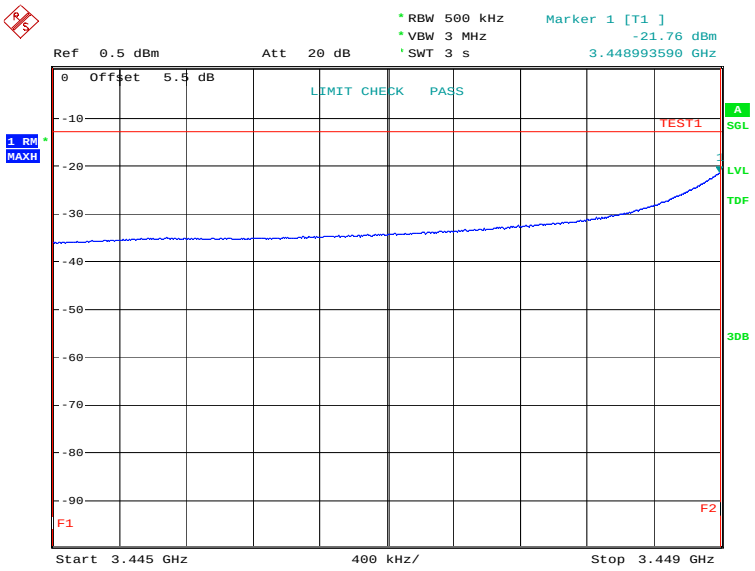
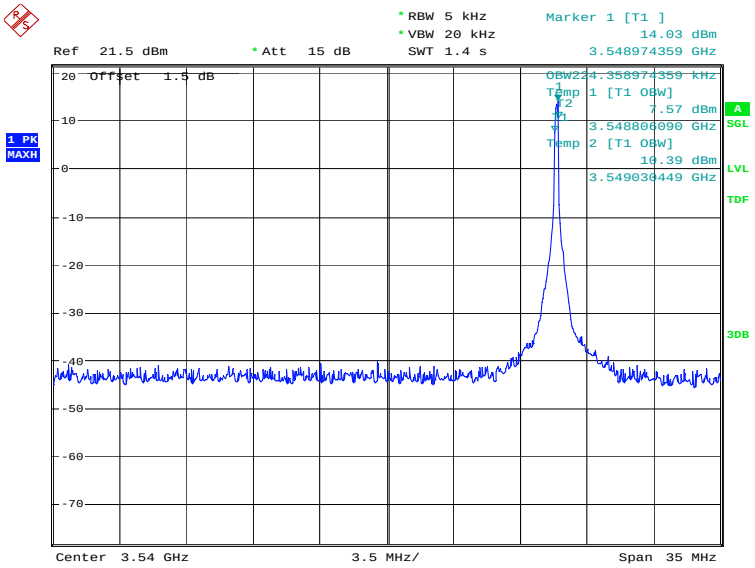


Date: 2.AUG.2022 10:50:01

OBW: 1RB-high_offset



Date: 2.AUG.2022 10:50:43

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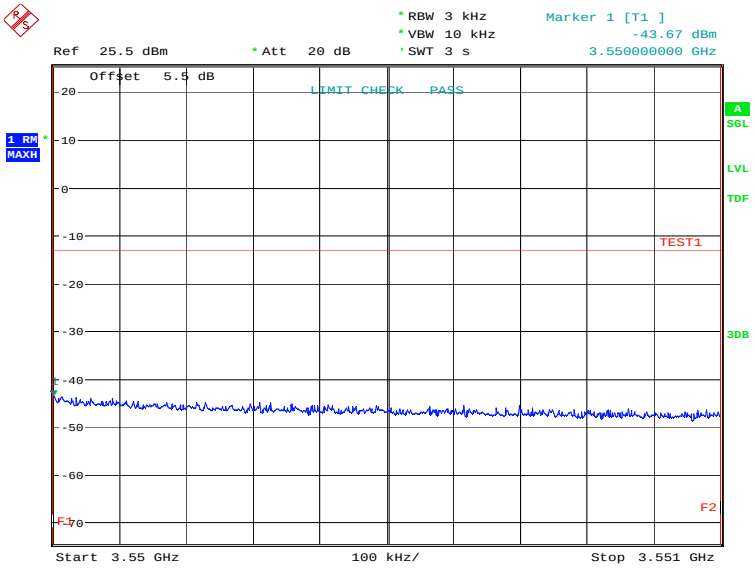
HIGH BAND EDGE BLOCK-1RB-high_offset



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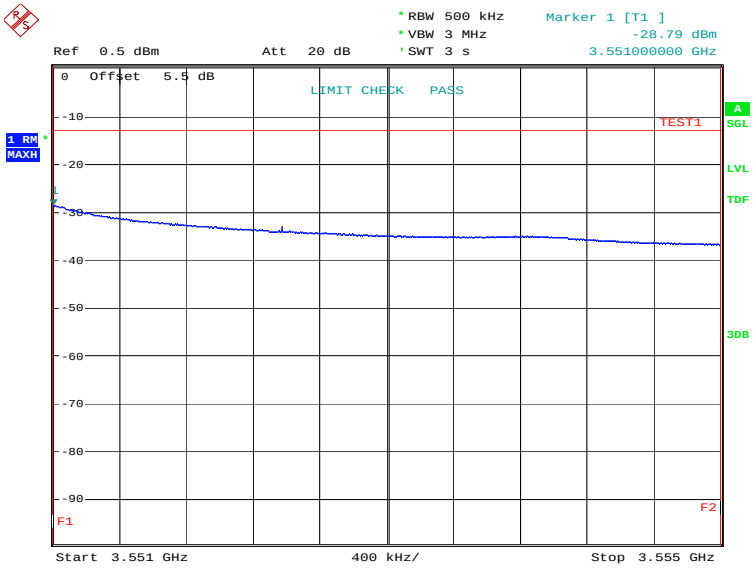

Date: 2.AUG.2022 10:52:02

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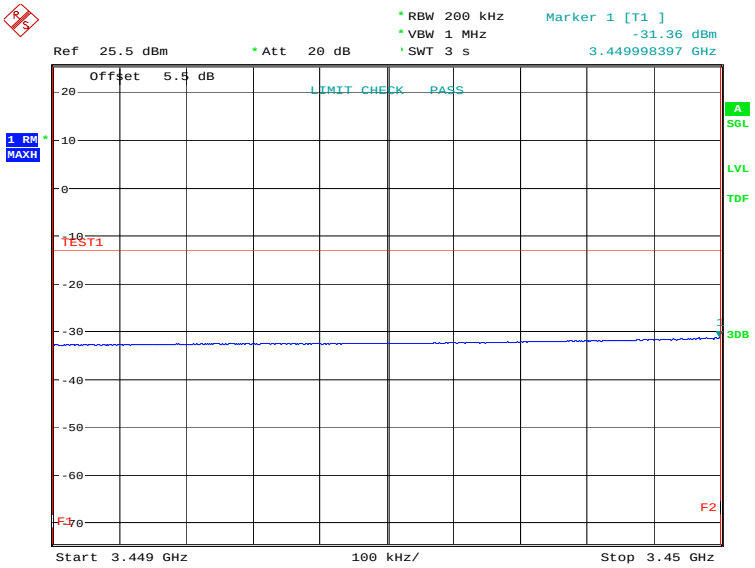
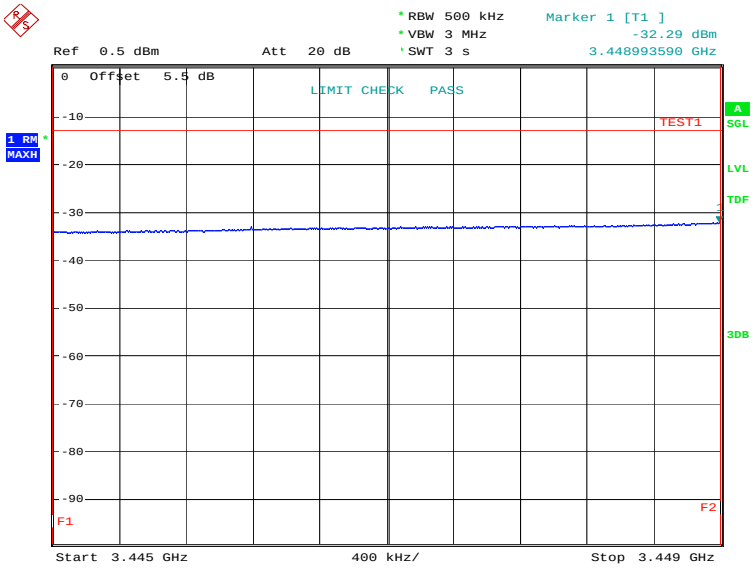
LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 27.JUL.2022 15:57:38



Date: 27.JUL.2022 15:58:17

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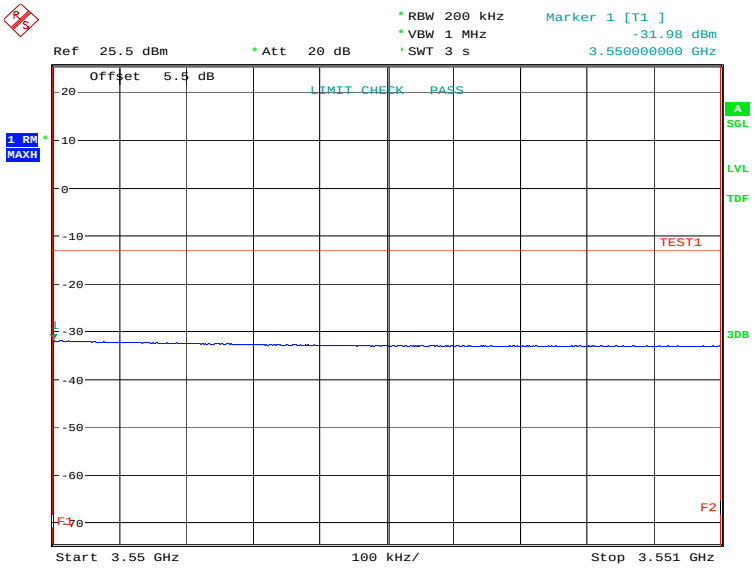
HIGH BAND EDGE BLOCK-20MHz-100%RB



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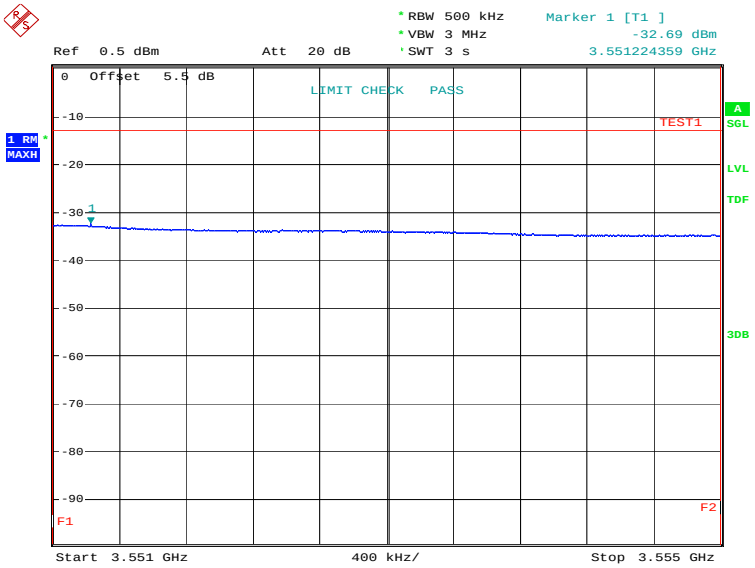

Date: 27.JUL.2022 16:00:50

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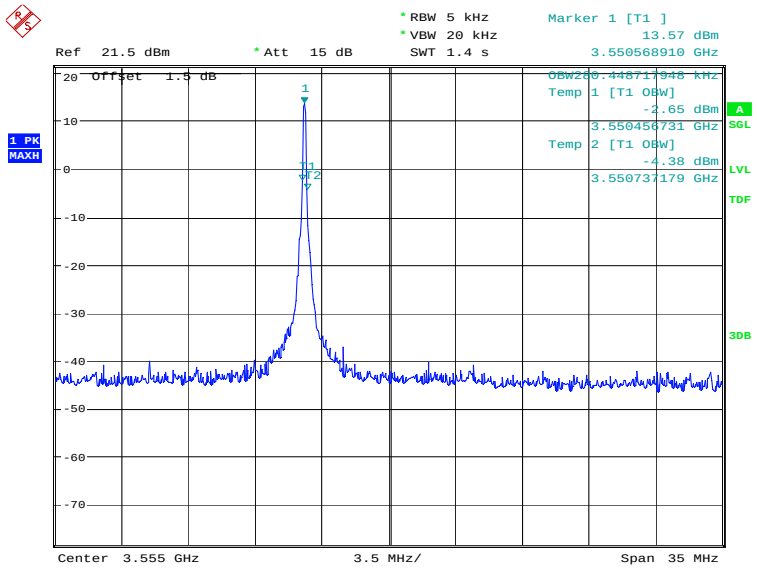
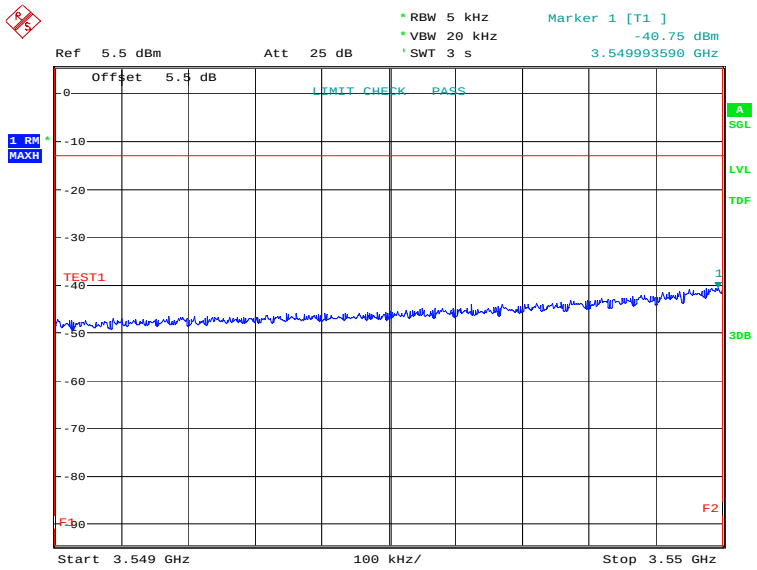
LTE band 42H

OBW: 1RB-low_offset



Date: 4.AUG.2022 13:56:12

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 4.AUG.2022 13:56:52

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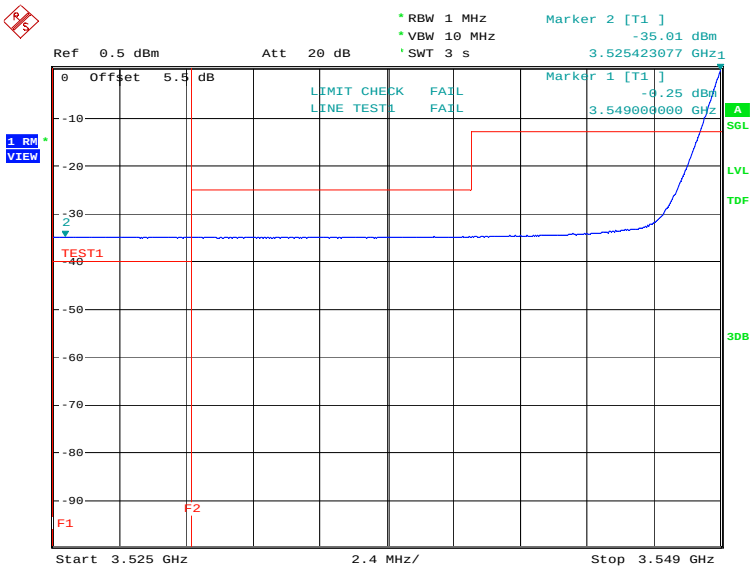
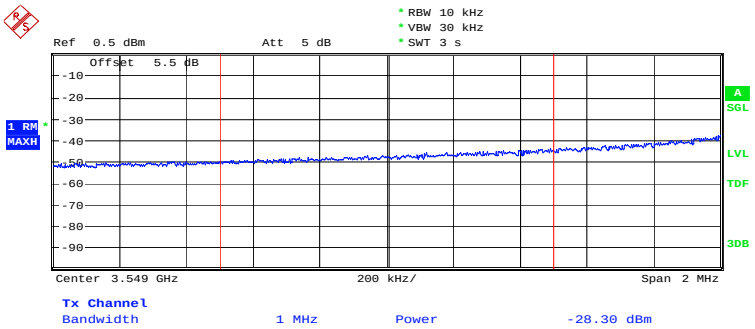


Date: 4.AUG.2022 13:58:19



Date: 4.AUG.2022 13:58:37

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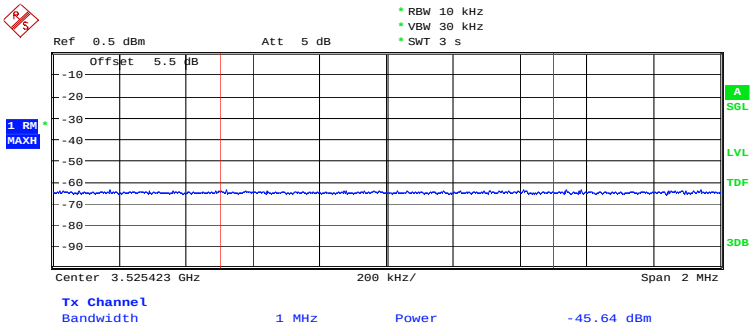

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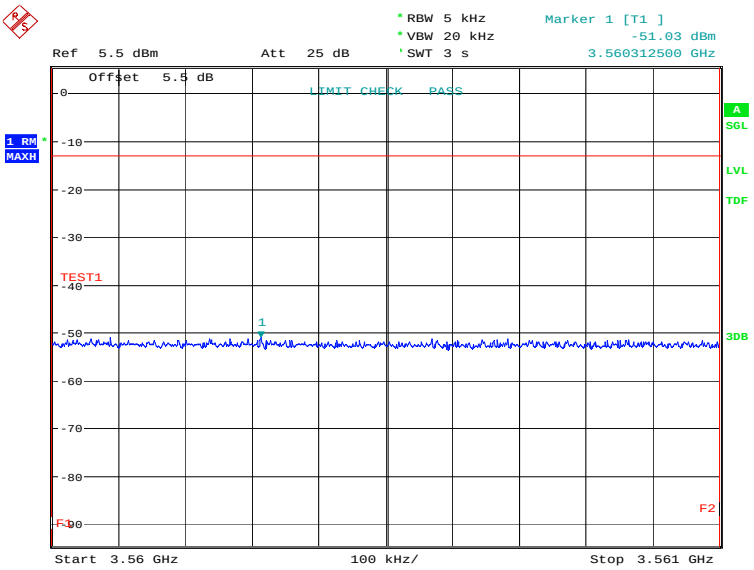

Date: 4.AUG.2022 13:57:33

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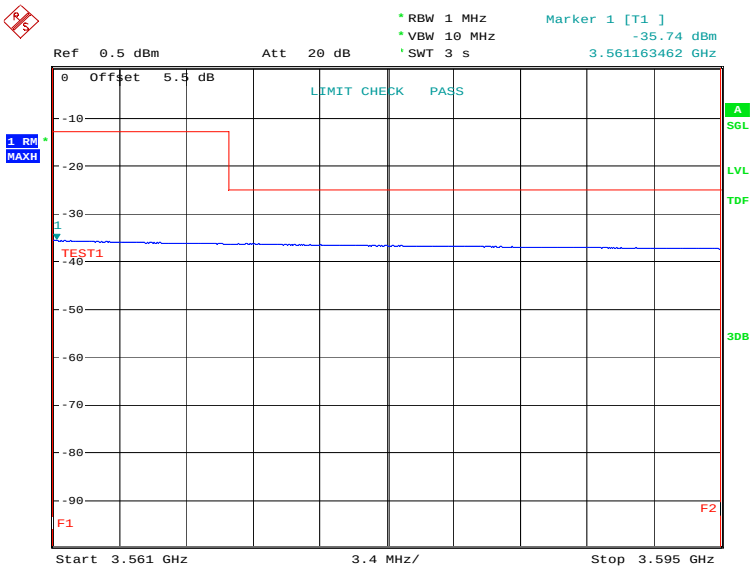

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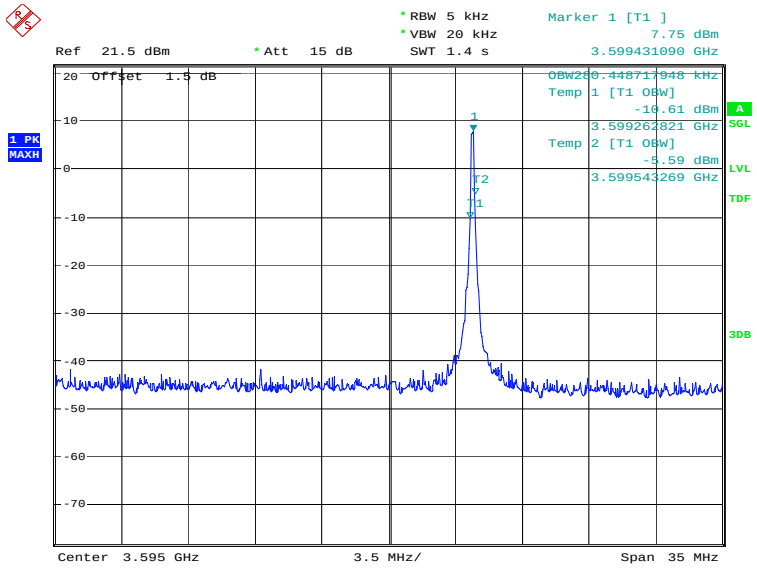
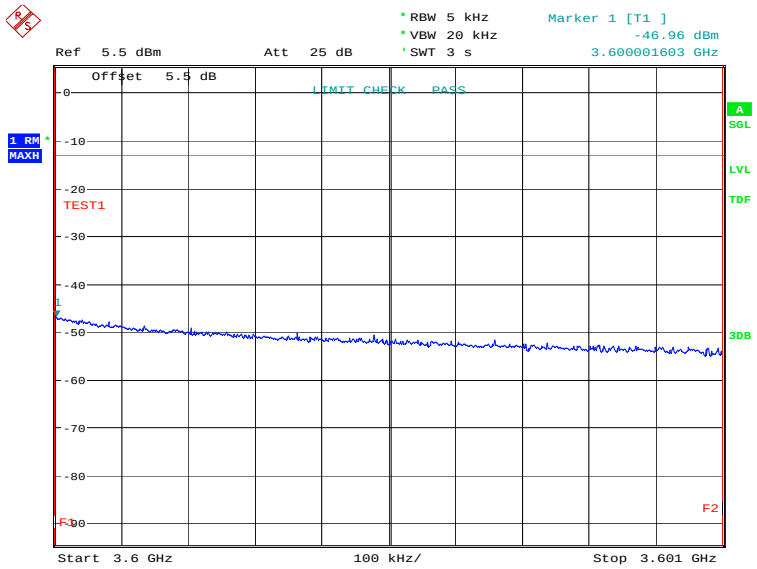
OBW: 1RB-high_offset



Date: 4.AUG.2022 14:05:25

HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 4.AUG.2022 14:06:06

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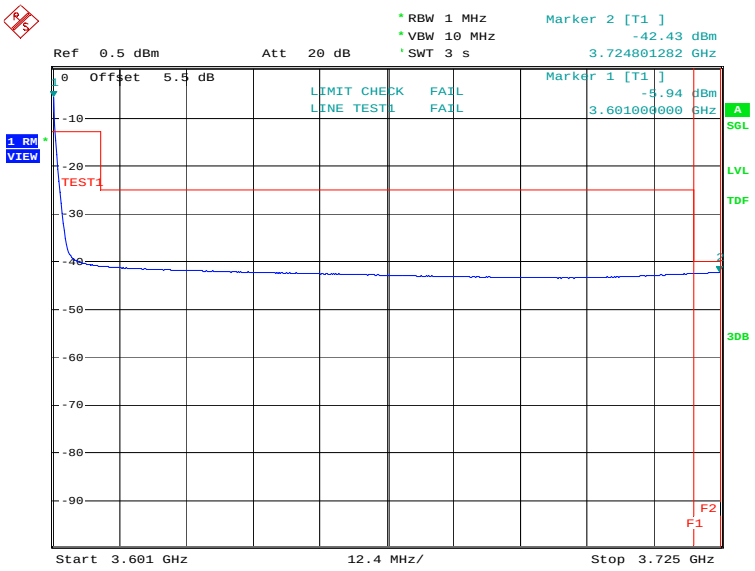

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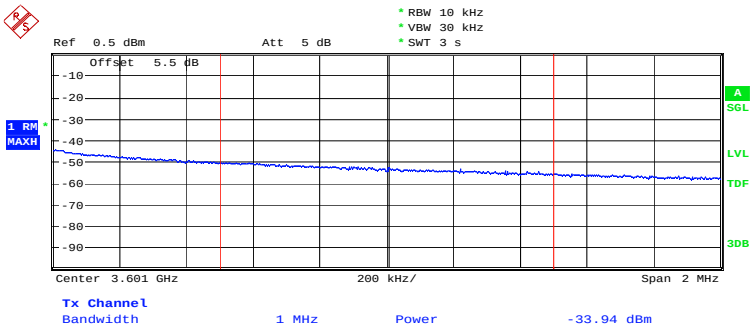

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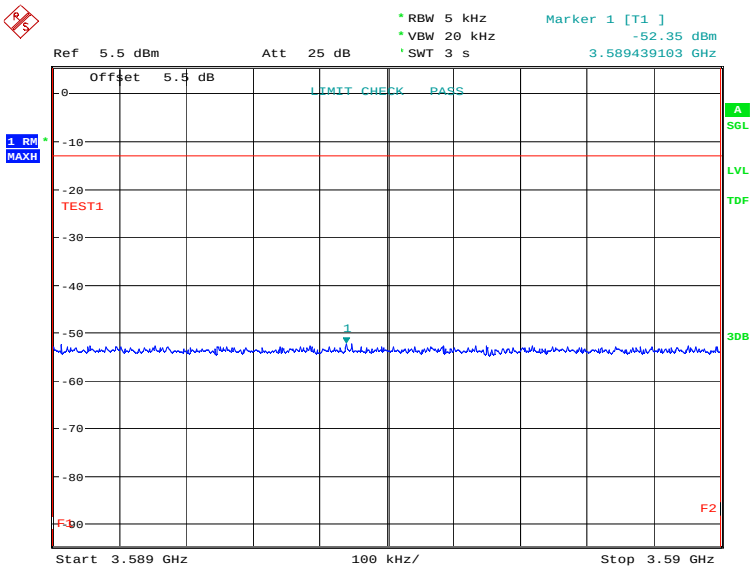

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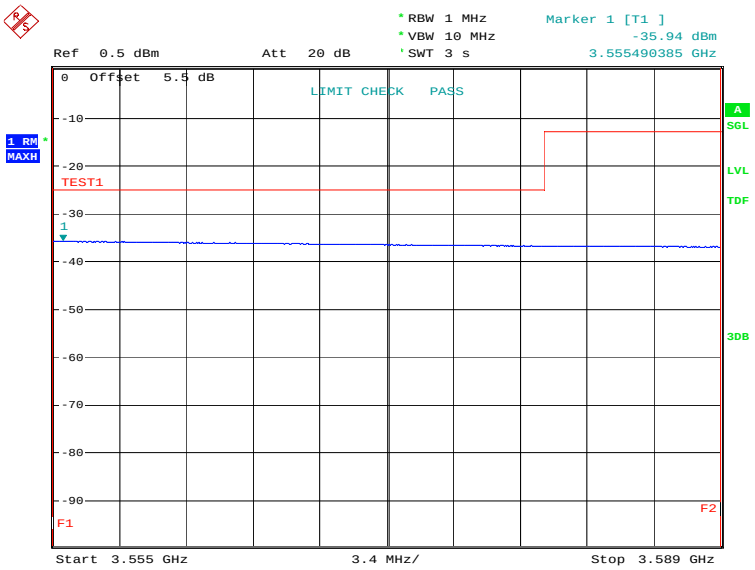

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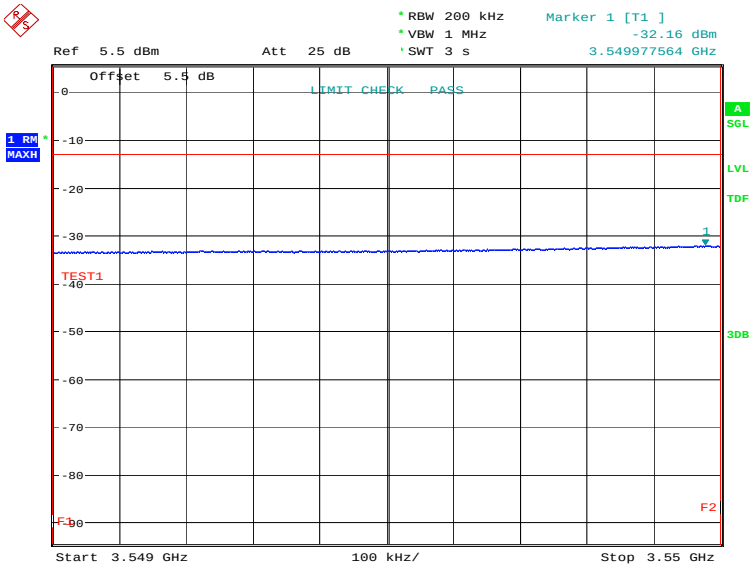
LOW BAND EDGE BLOCK-20MHz-100%RB



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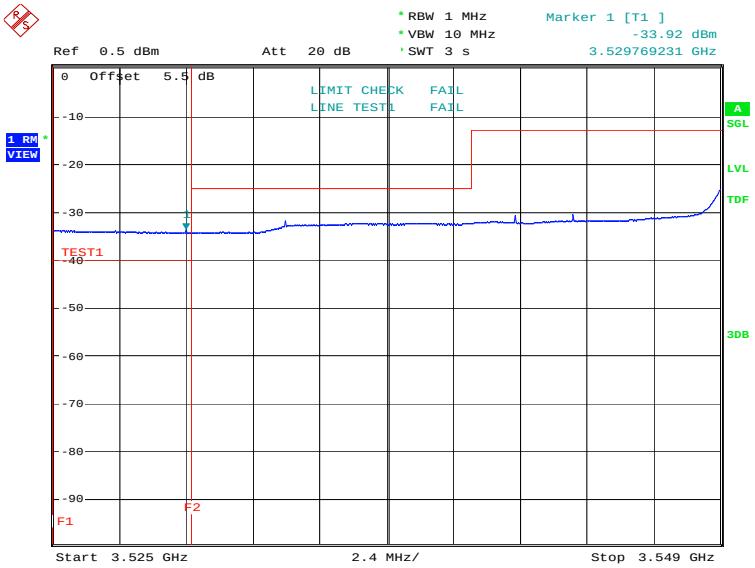

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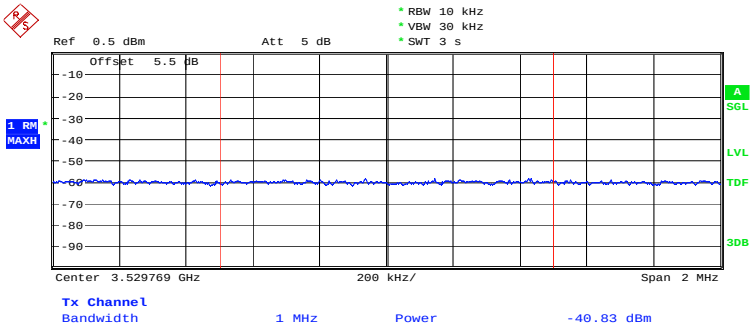

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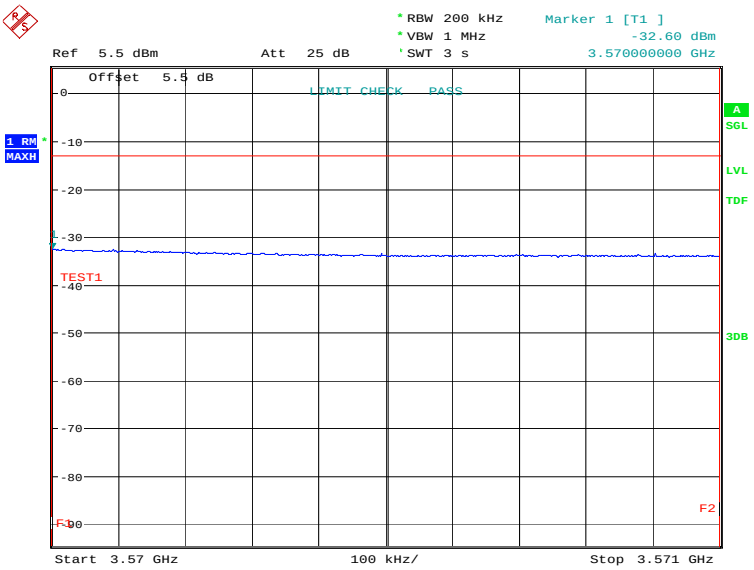

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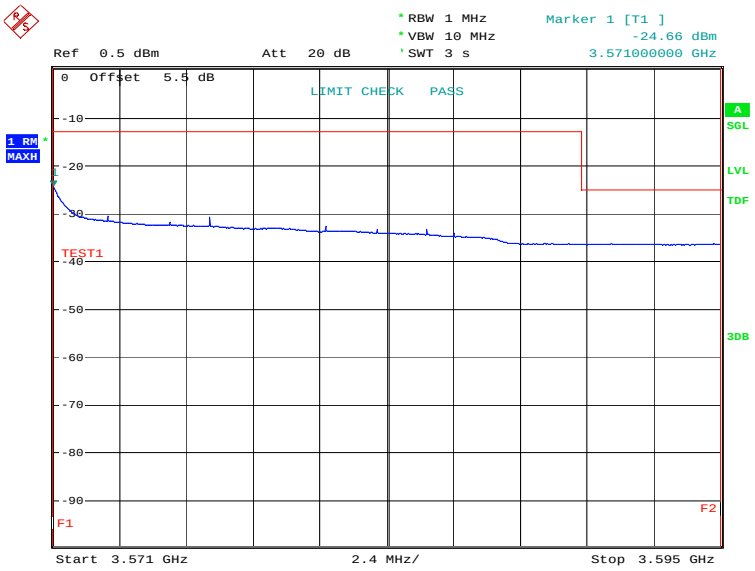

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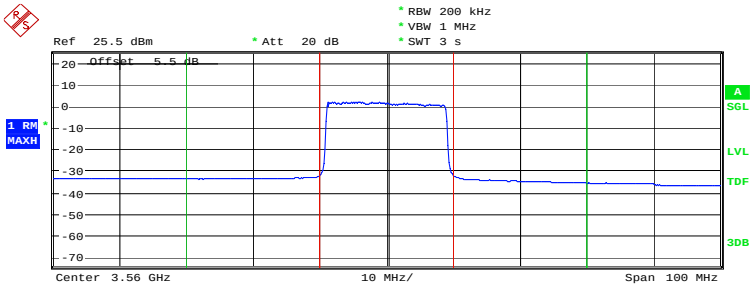

Tx Channel			
Bandwidth	20 MHz	Power	20.12 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-34.37 dB
Spacing	20 MHz	Upper	-35.59 dB

Date: 4.AUG.2022 14:04:07

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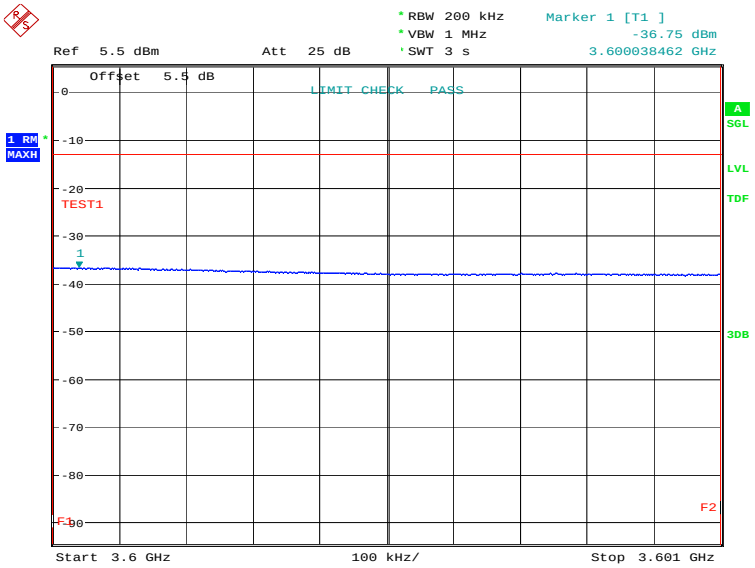
HIGH BAND EDGE BLOCK-20MHz-100%RB



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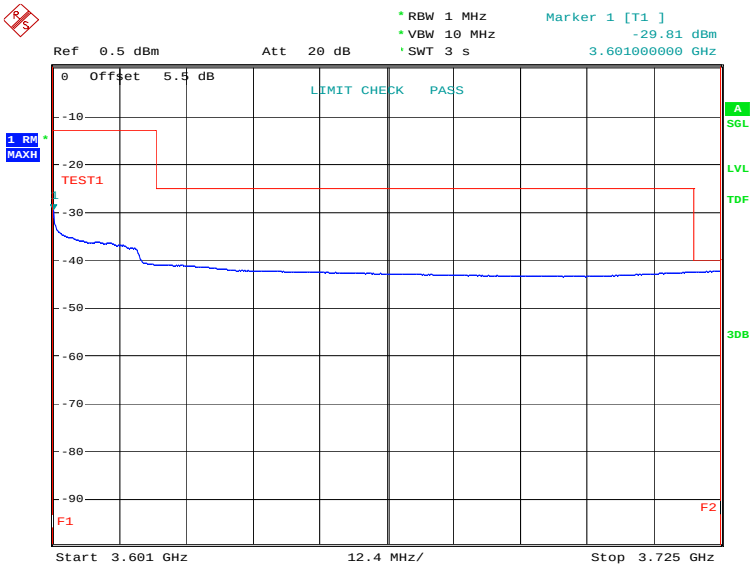

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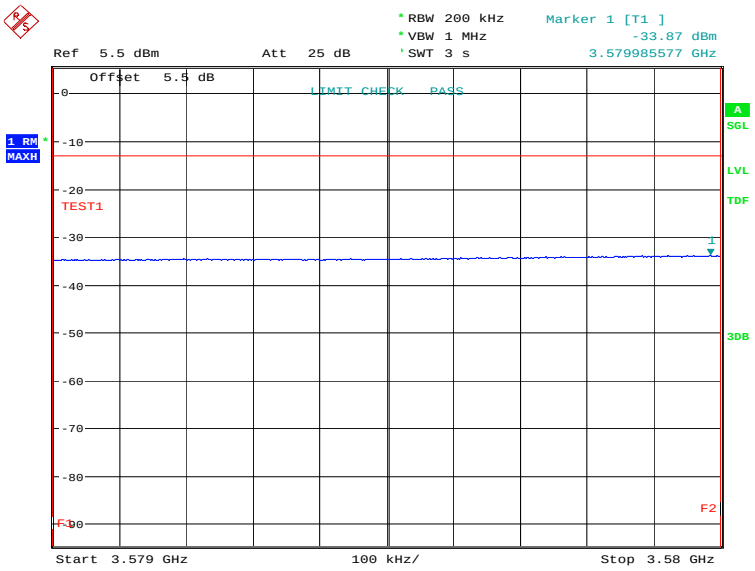

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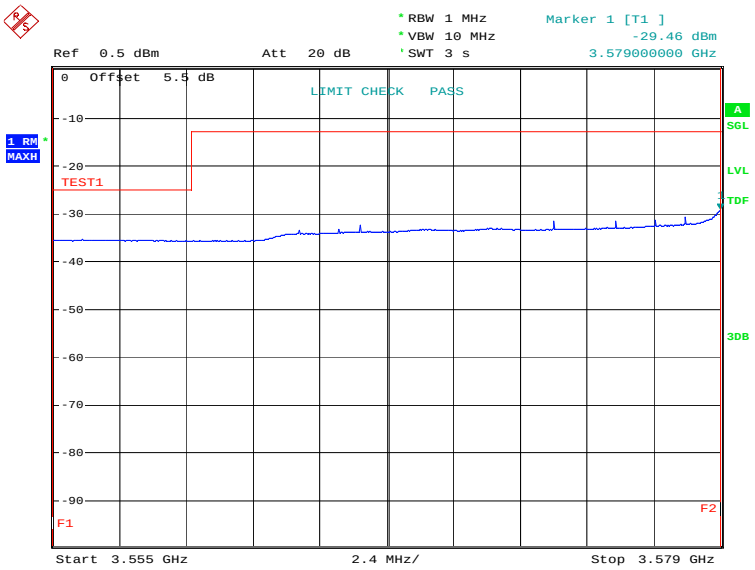

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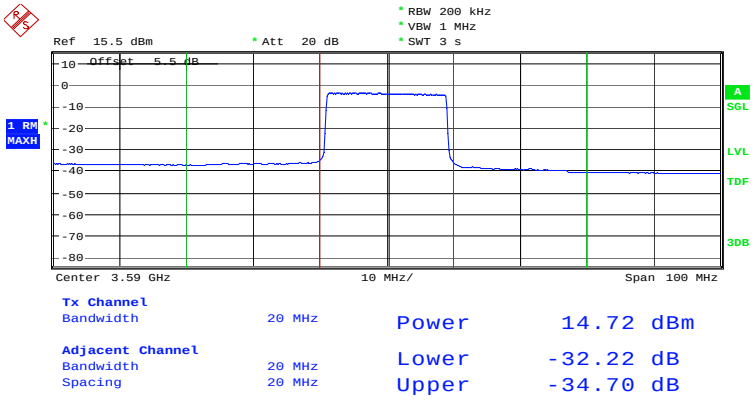

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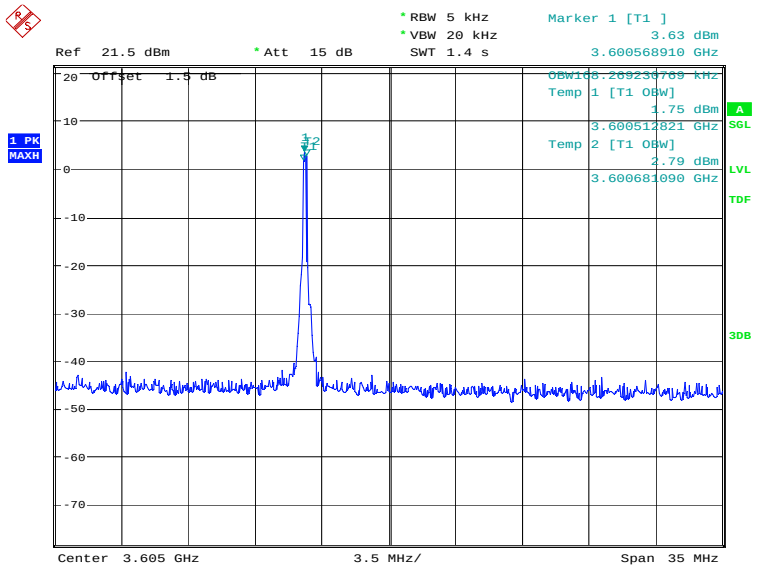
LTE band 43

OBW: 1RB-low_offset



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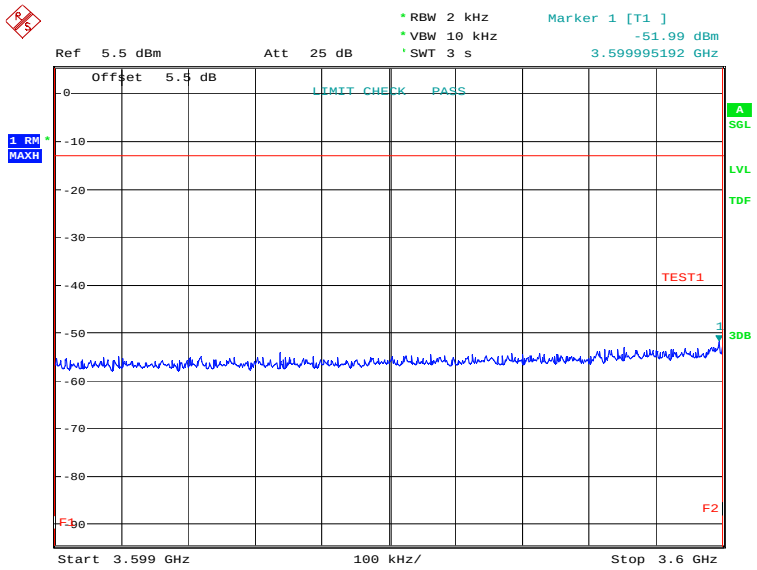
LOW BAND EDGE BLOCK-1RB-low_offset



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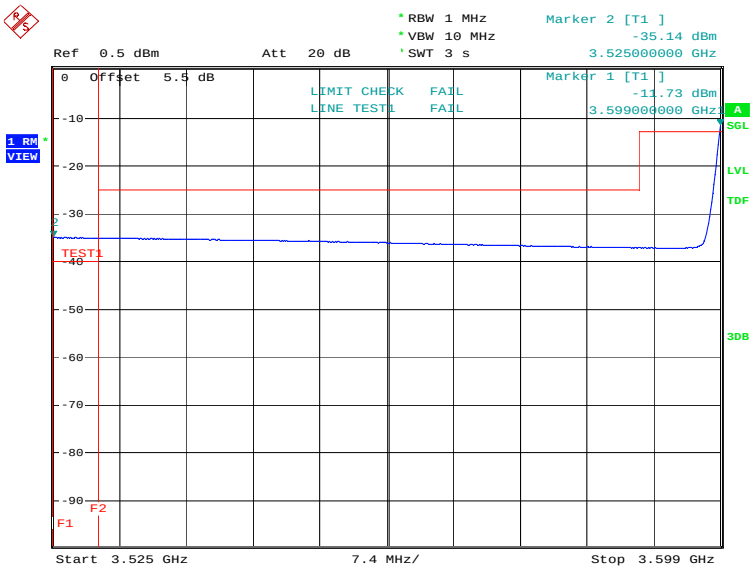

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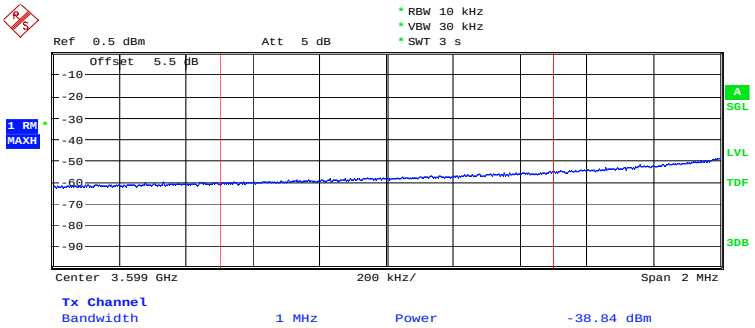

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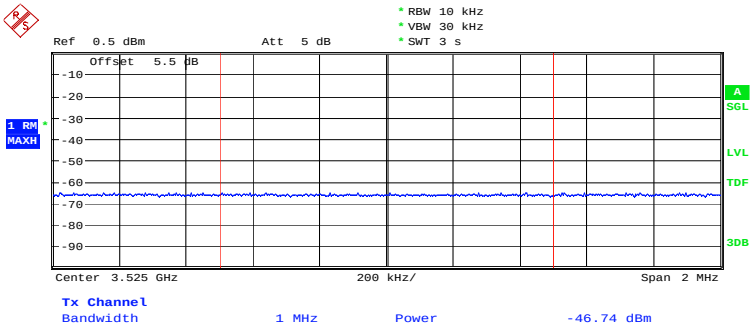

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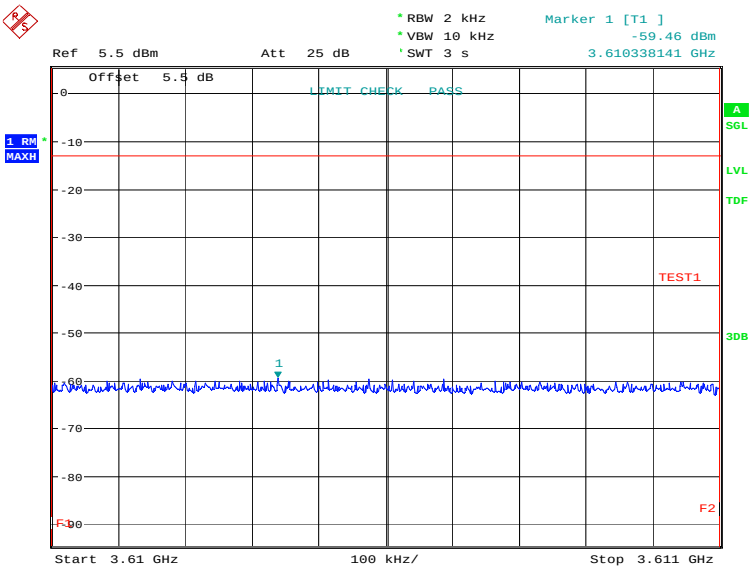

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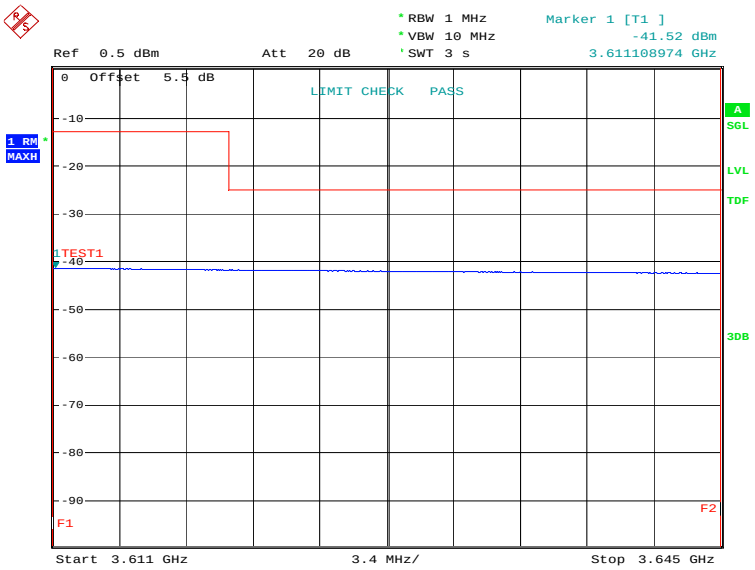

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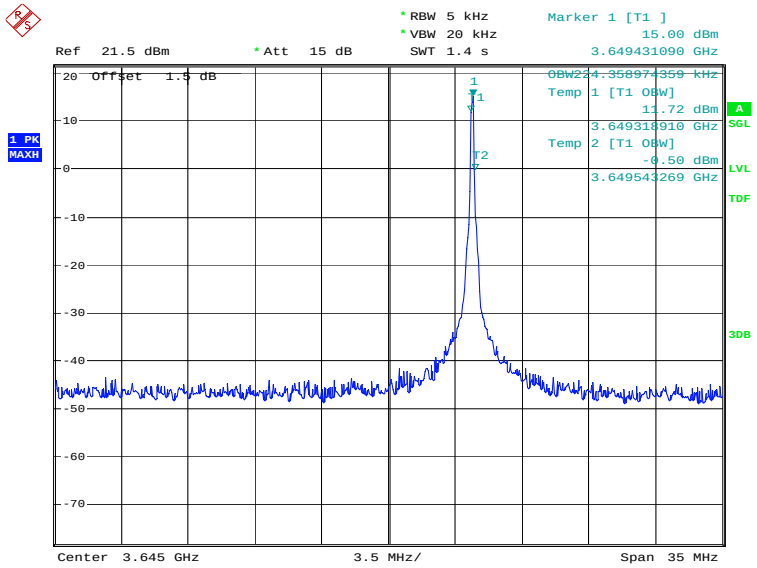
OBW: 1RB-high_offset



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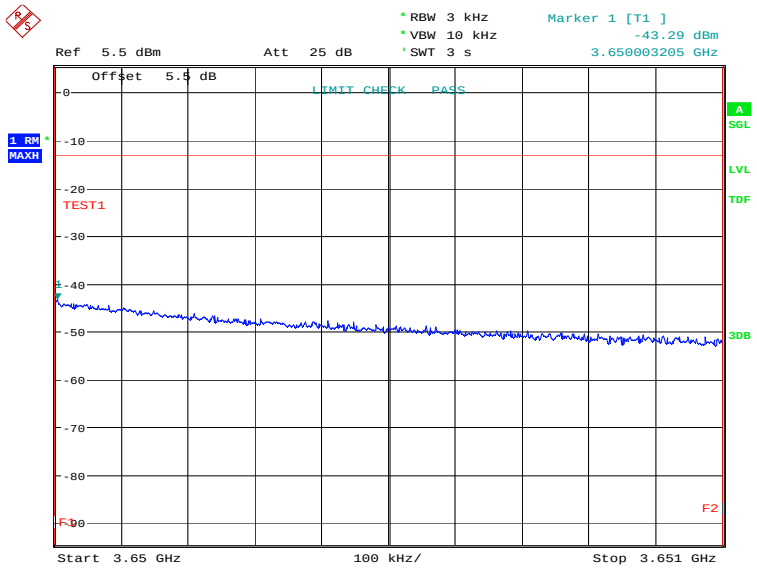
HIGH BAND EDGE BLOCK-1RB-high_offset



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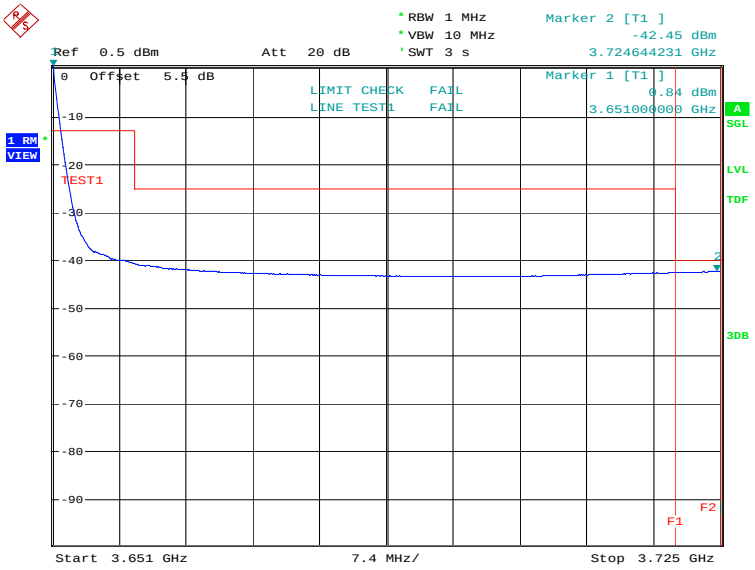

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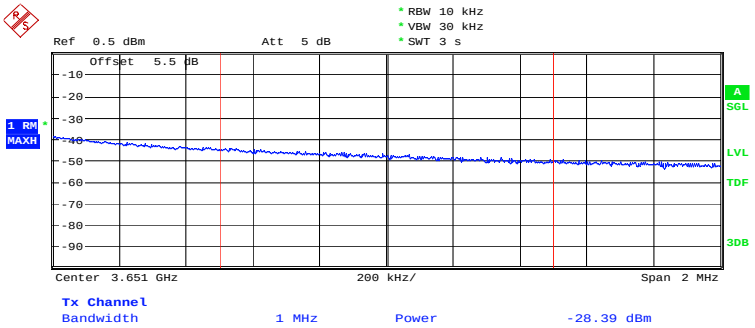

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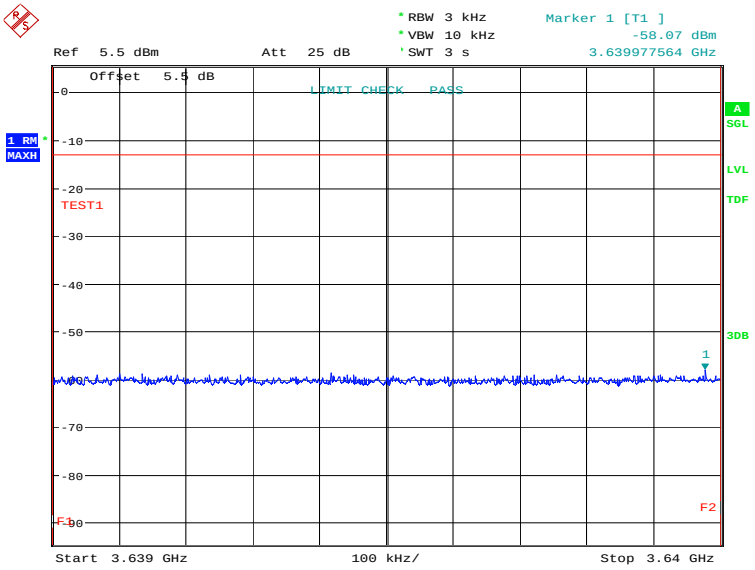

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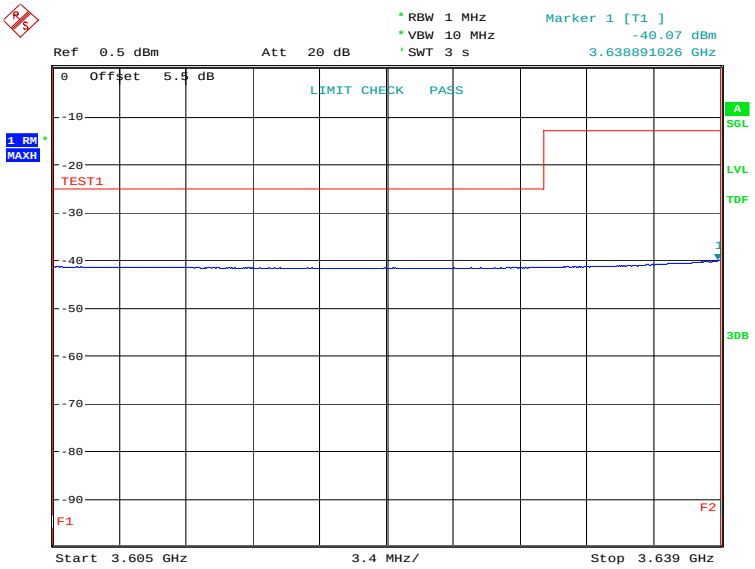

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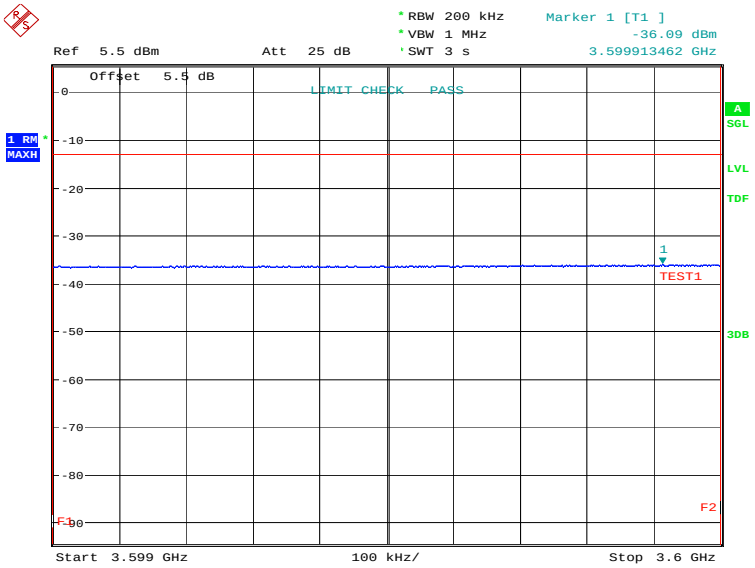
LOW BAND EDGE BLOCK-20MHz-100%RB



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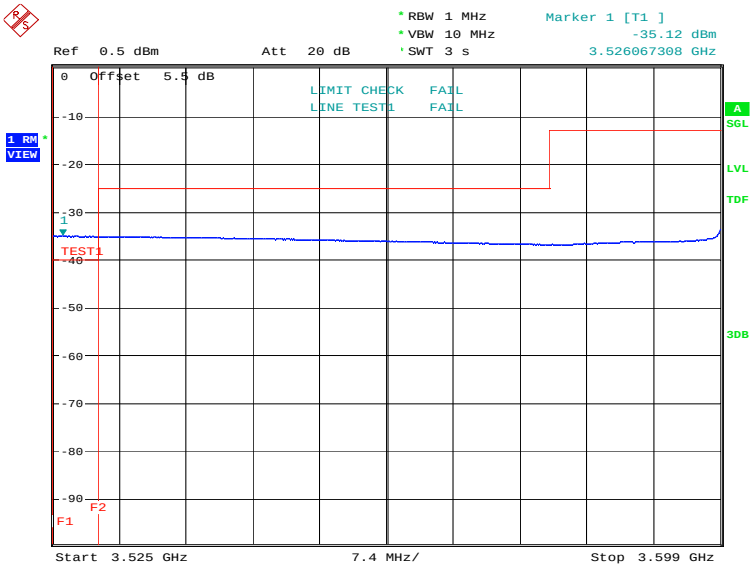

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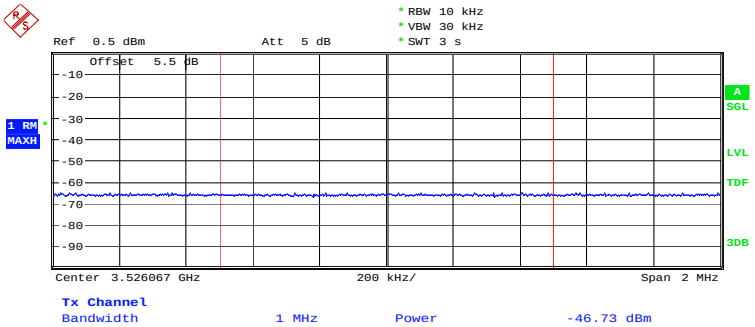

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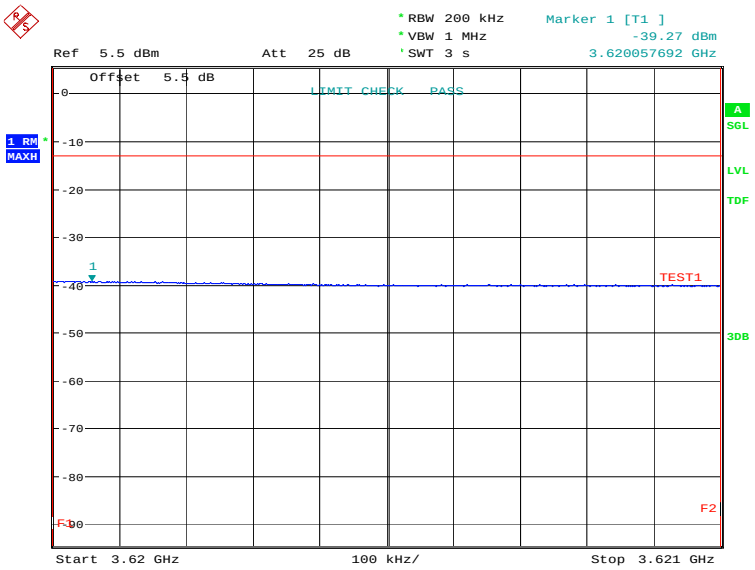

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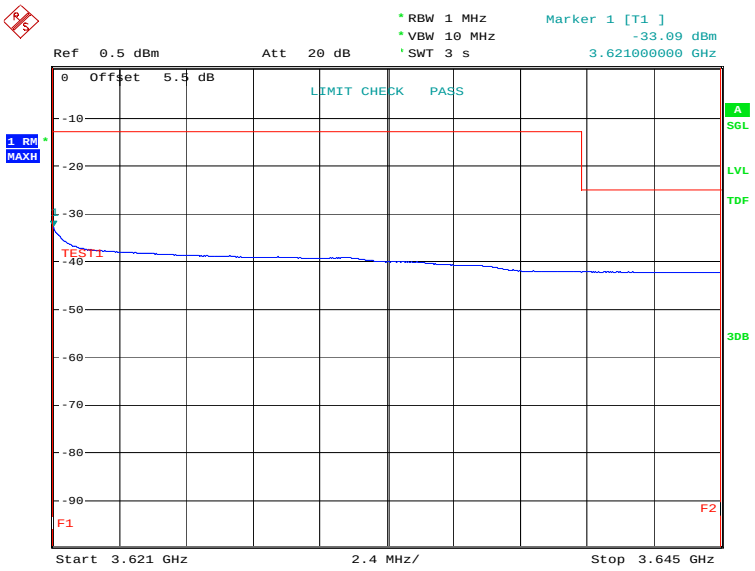

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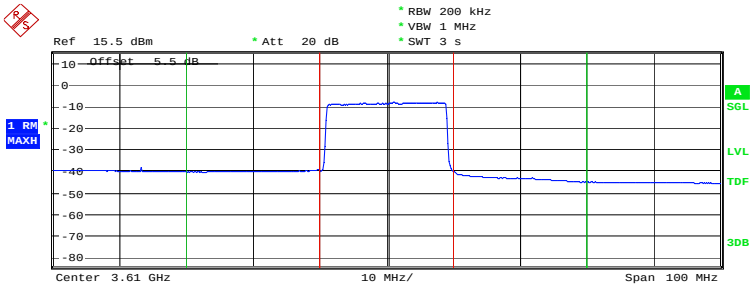

Tx Channel
Bandwidth 20 MHz

Power 10.20 dBm

Adjacent Channel
Bandwidth 20 MHz
Spacing 20 MHz

Lower -31.29 dB
Upper -34.44 dB

Date: 4.AUG.2022 15:21:05

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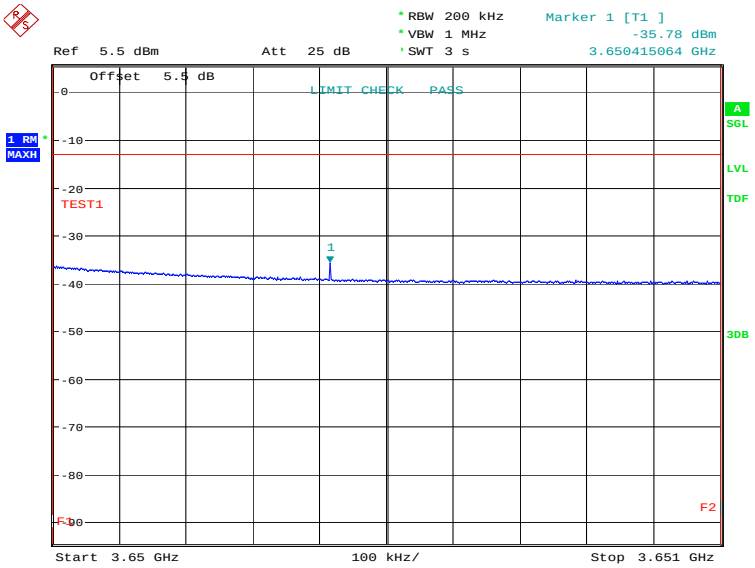
HIGH BAND EDGE BLOCK-20MHz-100%RB



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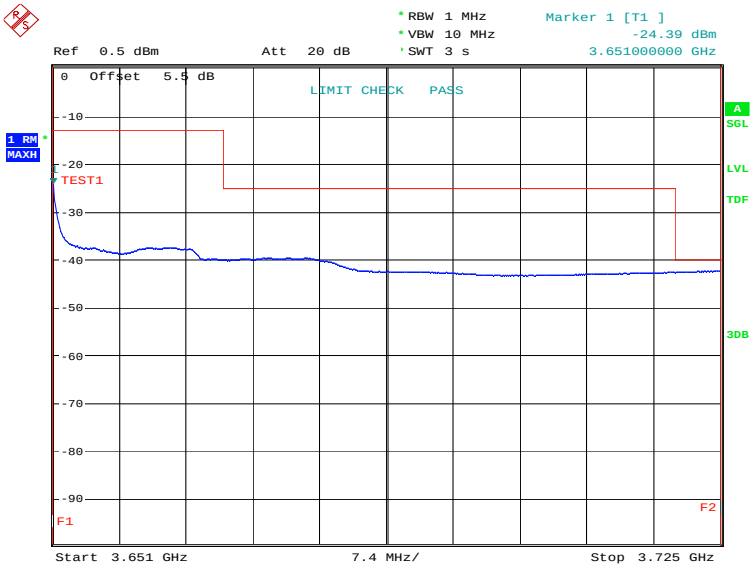

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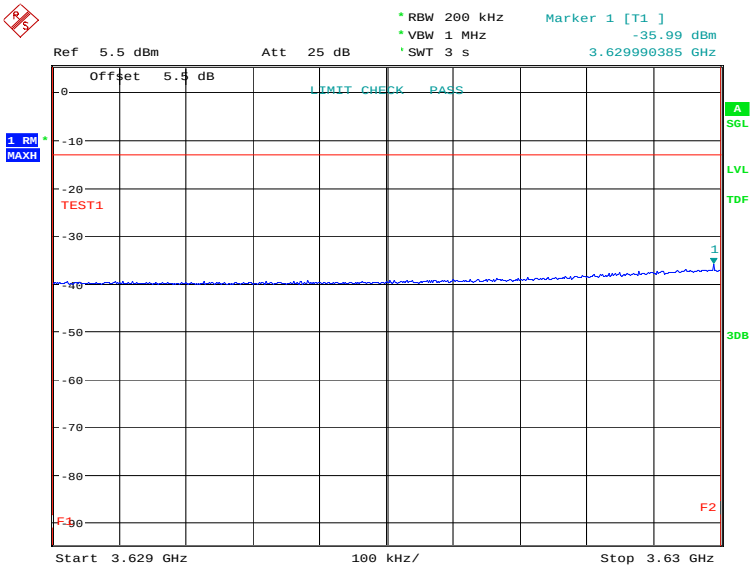

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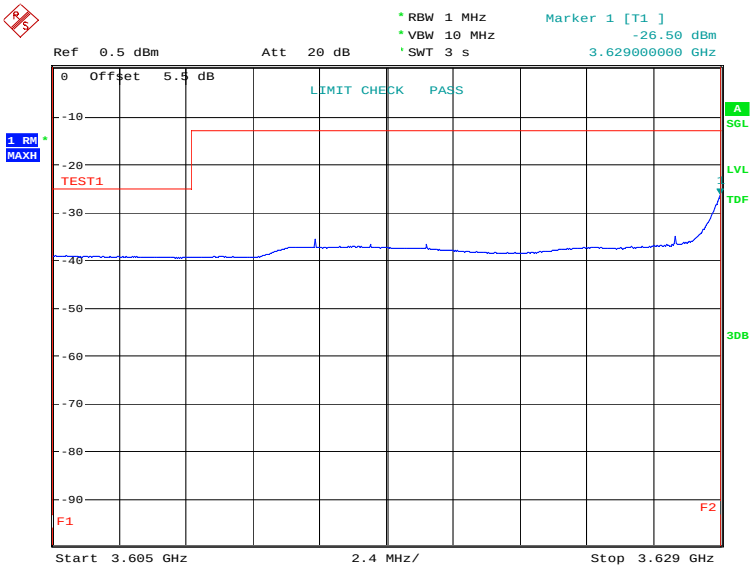

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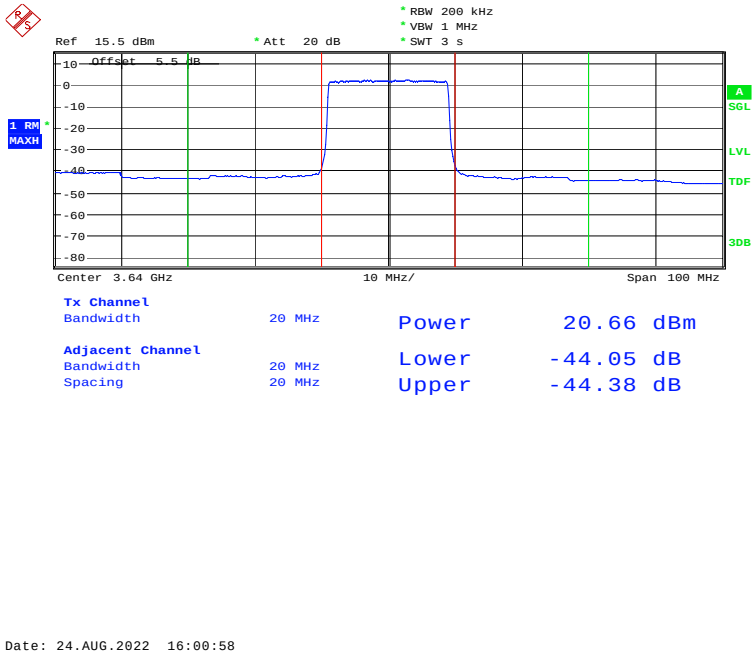

Note: Expanded measurement uncertainty is U = 0.622 dB, k = 2.

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A.6 Conducted Spurious Emission

A.6.1 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 greater than 2×span/RBW.

A.6.2 Measurement Limit

Part 27.53(n) states for mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

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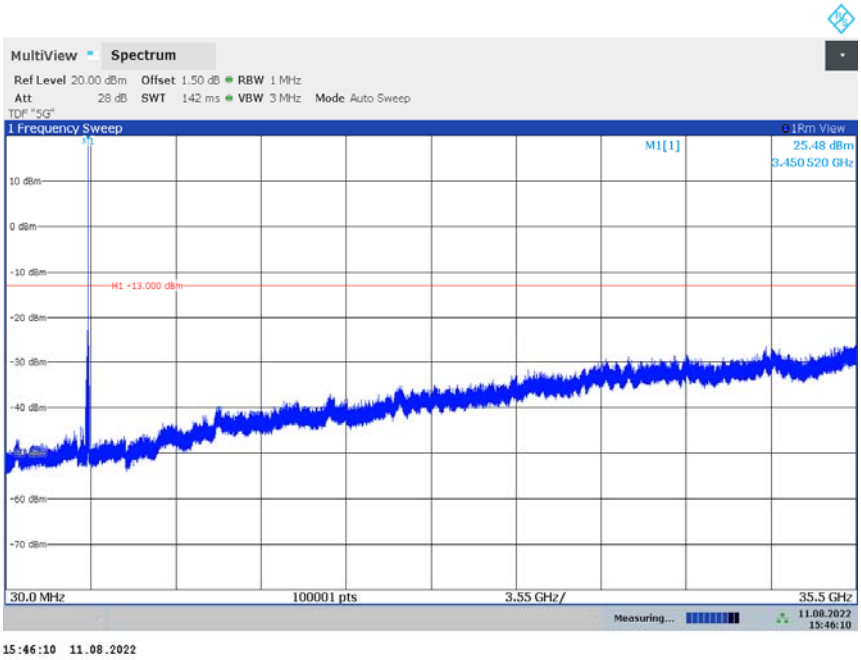
A.6.3 Measurement result

Only the worst case result is given below

LTE band 42L: 30MHz – 35.5GHz

NOTE: peak above the limit line is the carrier frequency.



Note: Expanded measurement uncertainty is U = 0.622 dB, k = 2.

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A.7 Peak-to-Average Power Ratio

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

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

LTE band 42L, 20MHz

Frequency (MHz)	PAPR (dB)			
3500.0	QPSK	16QAM	64QAM	256QAM
	8.17	8.91	9.01	9.07

Note: Expanded measurement uncertainty is U = 0.578 dB, k = 2.

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Annex B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ilac-MRA

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

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

Electromagnetic Compatibility & Telecommunications

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

2022-10-01 through 2023-09-30
Effective Dates

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program

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

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