LTE Band CA_5B, 10MHz+10MHz, 16QAM, CH20450+CH20549

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2199.40	-49.99	0.90	9.80	-43.24	-13.00	V
2975.40	-52.38	1.00	11.50	-44.03	-13.00	V
7462.00	-56.19	1.90	11.30	-48.94	-13.00	V
8523.60	-56.33	2.00	12.00	-48.48	-13.00	H
8982.00	-54.26	2.00	11.60	-46.81	-13.00	V
9875.40	-52.25	2.20	11.30	-45.30	-13.00	V

LTE Band CA_5B, 10MHz+10MHz, 16QAM, CH20476+CH20575

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2261.00	-50.17	0.90	9.80	-43.42	-13.00	V
2776.40	-51.42	1.00	11.50	-43.07	-13.00	V
7438.00	-56.34	1.90	11.30	-49.09	-13.00	V
8674.00	-54.27	2.00	12.00	-46.42	-13.00	V
9270.00	-53.57	2.00	11.20	-46.52	-13.00	V
9975.80	-52.61	2.20	11.30	-45.66	-13.00	V

LTE Band CA_5B, 10MHz+10MHz, 16QAM, CH20501+CH20600

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2267.20	-51.61	0.90	9.80	-44.86	-13.00	V
2782.00	-52.22	1.00	11.50	-43.87	-13.00	V
8128.80	-55.94	2.20	11.30	-48.99	-13.00	V
8678.80	-55.52	2.00	12.00	-47.67	-13.00	H
9290.00	-54.71	2.00	11.20	-47.66	-13.00	V
9964.80	-53.18	2.20	11.30	-46.23	-13.00	V

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LTE Band CA_5B, 10MHz+10MHz, 64QAM, CH20450+CH20549

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2202.80	-50.63	0.90	9.80	-43.88	-13.00	H
2824.00	-52.04	1.00	11.50	-43.69	-13.00	V
7412.00	-55.71	1.90	11.30	-48.46	-13.00	V
8628.40	-55.59	2.00	12.00	-47.74	-13.00	V
8976.80	-55.06	2.00	11.60	-47.61	-13.00	V
9953.20	-52.14	2.20	11.30	-45.19	-13.00	V

LTE Band CA_5B, 10MHz+10MHz, 64QAM, CH20476+CH20575

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2226.80	-50.92	0.90	9.80	-44.17	-13.00	V
2982.60	-52.20	1.00	11.50	-43.85	-13.00	V
7407.60	-57.14	1.90	11.30	-49.89	-13.00	V
8725.20	-54.35	1.90	11.60	-46.80	-13.00	V
9250.40	-54.78	2.00	11.20	-47.73	-13.00	V
9921.40	-52.42	2.20	11.30	-45.47	-13.00	V

LTE Band CA_5B, 10MHz+10MHz, 64QAM, CH20501+CH20600

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2201.20	-51.56	0.90	9.80	-44.81	-13.00	V
2712.20	-51.55	1.00	10.70	-44.00	-13.00	V
7476.40	-57.14	1.90	11.30	-49.89	-13.00	V
8647.20	-54.60	2.00	12.00	-46.75	-13.00	V
9300.40	-54.13	2.10	11.20	-47.18	-13.00	V
9974.20	-52.57	2.20	11.30	-45.62	-13.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-40GHz), k = 2

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LTE Band CA_41C, 20MHz+5MHz, QPSK, CH39750+CH39867

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2998.40	-52.21	1.00	11.50	-41.71	-25.00	V
9988.80	-48.40	2.20	11.30	-39.30	-25.00	V
13514.10	-48.41	2.40	12.40	-38.41	-25.00	H
14707.95	-49.30	2.50	11.20	-40.60	-25.00	V
16379.10	-55.79	2.70	16.50	-41.99	-25.00	H
17818.50	-40.14	3.20	6.20	-37.14	-25.00	V

LTE Band CA_41C, 20MHz+5MHz, QPSK, CH40595+CH40712

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2980.80	-52.64	1.00	11.50	-42.14	-25.00	V
13557.75	-48.77	2.40	12.40	-38.77	-25.00	V
14252.55	-49.34	2.60	11.90	-40.04	-25.00	H
15327.90	-51.26	2.70	12.40	-41.56	-25.00	V
16938.00	-53.46	2.90	14.50	-41.86	-25.00	V
17977.80	-40.04	3.20	6.20	-37.04	-25.00	V

LTE Band CA_41C, 20MHz+5MHz, QPSK, CH41440+CH41557

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2983.60	-52.31	1.00	11.50	-41.81	-25.00	H
13510.05	-49.95	2.40	12.40	-39.95	-25.00	H
14715.15	-49.88	2.50	11.20	-41.18	-25.00	V
15898.50	-56.47	2.60	17.40	-41.67	-25.00	V
16868.70	-53.65	2.90	14.50	-42.05	-25.00	V
17976.00	-40.82	3.20	6.20	-37.82	-25.00	V

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LTE Band CA_41C, 20MHz+5MHz, 16QAM, CH39750+CH39867

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2994.80	-52.93	1.00	11.50	-42.43	-25.00	H
13504.20	-49.80	2.40	12.40	-39.80	-25.00	H
14720.55	-49.25	2.50	11.20	-40.55	-25.00	V
15995.10	-56.09	2.60	17.40	-41.29	-25.00	V
16980.90	-52.77	2.90	14.50	-41.17	-25.00	H
17973.30	-39.14	3.20	6.20	-36.14	-25.00	V

LTE Band CA_41C, 20MHz+5MHz, 16QAM, CH40595+CH40712

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2995.20	-52.58	1.00	11.50	-42.08	-25.00	V
13461.45	-48.96	2.50	12.40	-39.06	-25.00	H
14584.65	-48.37	2.60	11.20	-39.77	-25.00	V
15323.10	-51.74	2.70	12.40	-42.04	-25.00	V
16323.90	-55.77	2.70	16.50	-41.97	-25.00	H
17825.70	-46.31	3.60	12.80	-37.11	-25.00	V

LTE Band CA_41C, 20MHz+5MHz, 16QAM, CH41440+CH41557

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2974.00	-52.66	1.00	11.50	-42.16	-25.00	V
9944.00	-52.50	2.50	12.40	-42.60	-25.00	V
11269.15	-53.55	2.60	11.20	-44.95	-25.00	V
13374.15	-50.35	2.70	12.40	-40.65	-25.00	H
15461.40	-56.47	2.70	16.50	-42.67	-25.00	V
17694.30	-48.22	3.60	12.80	-39.02	-25.00	V

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LTE Band CA_41C, 20MHz+5MHz, 64QAM, CH39750+CH39867

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2981.60	-52.35	1.00	11.50	-41.85	-25.00	V
13552.35	-48.94	2.40	12.40	-38.94	-25.00	H
14791.65	-50.97	2.70	12.40	-41.27	-25.00	V
16026.90	-56.58	2.60	17.40	-41.78	-25.00	V
16828.80	-53.64	2.90	14.50	-42.04	-25.00	V
17992.50	-39.87	3.20	6.20	-36.87	-25.00	V

LTE Band CA_41C, 20MHz+5MHz, 64QAM, CH40595+CH40712

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2990.80	-52.11	1.00	11.50	-41.61	-25.00	V
13526.25	-49.44	2.40	12.40	-39.44	-25.00	H
14247.60	-50.43	2.60	11.90	-41.13	-25.00	H
15647.10	-55.23	2.70	15.60	-42.33	-25.00	V
16757.10	-55.54	2.90	16.50	-41.94	-25.00	H
17822.40	-40.96	3.20	6.20	-37.96	-25.00	H

LTE Band CA_41C, 20MHz+5MHz, 64QAM, CH41440+CH41557

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2981.60	-50.68	1.00	11.50	-40.18	-25.00	V
8501.20	-58.35	2.00	12.00	-48.35	-25.00	V
9930.40	-51.30	2.20	11.30	-42.20	-25.00	V
11599.55	-54.36	2.60	11.00	-45.96	-25.00	V
13496.55	-52.15	2.50	12.40	-42.25	-25.00	H
17860.20	-40.55	3.20	6.20	-37.55	-25.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-40GHz), k = 2

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LTE Band CA_41C, 20MHz+20MHz, QPSK, CH39750+CH39948

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2976.00	-53.26	1.00	11.50	-42.76	-25.00	V
13509.15	-49.45	2.40	12.40	-39.45	-25.00	H
14586.00	-50.24	2.60	11.20	-41.64	-25.00	V
15477.30	-55.78	2.40	15.60	-42.58	-25.00	H
16770.30	-55.55	2.90	16.50	-41.95	-25.00	H
17827.80	-40.42	3.20	6.20	-37.42	-25.00	H

LTE Band CA_41C, 20MHz+20MHz, QPSK, CH40521+CH40719

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2986.00	-52.52	1.00	11.50	-42.02	-25.00	V
13561.35	-49.01	2.40	12.40	-39.01	-25.00	V
14492.85	-49.74	2.60	11.20	-41.14	-25.00	V
15967.20	-55.73	2.60	17.40	-40.93	-25.00	H
16996.80	-53.62	2.90	14.50	-42.02	-25.00	V
17818.80	-41.12	3.20	6.20	-38.12	-25.00	V

LTE Band CA_41C, 20MHz+20MHz, QPSK, CH41292+CH41490

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2991.60	-52.41	1.00	11.50	-41.91	-25.00	V
13507.80	-49.10	2.40	12.40	-39.10	-25.00	H
14167.95	-50.05	2.50	11.90	-40.65	-25.00	V
15898.20	-56.69	2.60	17.40	-41.89	-25.00	H
16830.60	-53.48	2.90	14.50	-41.88	-25.00	H
17957.10	-40.69	3.20	6.20	-37.69	-25.00	V

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LTE Band CA_41C, 20MHz+20MHz, 16QAM, CH39750+CH39948

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2980.80	-52.18	1.00	11.50	-41.68	-25.00	V
13515.45	-49.09	2.40	12.40	-39.09	-25.00	H
14084.25	-49.93	2.50	11.90	-40.53	-25.00	V
14724.60	-49.15	2.50	11.20	-40.45	-25.00	V
16769.10	-54.92	2.90	16.50	-41.32	-25.00	H
17960.40	-38.99	3.20	6.20	-35.99	-25.00	V

LTE Band CA_41C, 20MHz+20MHz, 16QAM, CH40521+CH40719

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2989.20	-51.58	1.00	11.50	-41.08	-25.00	V
13502.40	-49.62	2.40	12.40	-39.62	-25.00	H
14684.10	-49.44	2.50	11.20	-40.74	-25.00	H
15510.00	-55.62	2.70	15.60	-42.72	-25.00	H
16702.50	-54.80	2.90	16.50	-41.20	-25.00	V
17961.90	-39.98	3.20	6.20	-36.98	-25.00	V

LTE Band CA_41C, 20MHz+20MHz, 16QAM, CH41292+CH41490

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2991.20	-52.10	1.00	11.50	-41.60	-25.00	V
13451.10	-49.03	2.50	12.40	-39.13	-25.00	V
14718.30	-49.95	2.50	11.20	-41.25	-25.00	V
15969.30	-56.75	2.60	17.40	-41.95	-25.00	V
16887.90	-52.67	2.90	14.50	-41.07	-25.00	H
17983.50	-39.75	3.20	6.20	-36.75	-25.00	H

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LTE Band CA_41C, 20MHz+20MHz, 64QAM, CH39750+CH39948

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2980.80	-52.35	1.00	11.50	-41.85	-25.00	V
13442.10	-49.67	2.50	12.40	-39.77	-25.00	H
14705.25	-49.97	2.50	11.20	-41.27	-25.00	H
15976.20	-56.72	2.60	17.40	-41.92	-25.00	V
16981.20	-52.67	2.90	14.50	-41.07	-25.00	V
17962.20	-40.59	3.20	6.20	-37.59	-25.00	V

LTE Band CA_41C, 20MHz+20MHz, 64QAM, CH40521+CH40719

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2979.20	-52.27	1.00	11.50	-41.77	-25.00	V
13499.70	-49.32	2.50	12.40	-39.42	-25.00	V
14394.30	-49.29	2.60	11.20	-40.69	-25.00	V
15310.20	-55.12	2.40	15.60	-41.92	-25.00	V
16809.00	-53.20	2.90	14.50	-41.60	-25.00	H
17806.20	-40.65	3.20	6.20	-37.65	-25.00	V

LTE Band CA_41C, 20MHz+20MHz, 64QAM, CH41292+CH41490

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2993.20	-52.36	1.00	11.50	-41.86	-25.00	V
13509.15	-49.26	2.40	12.40	-39.26	-25.00	H
14109.00	-49.26	2.50	11.90	-39.86	-25.00	V
15284.10	-51.36	2.70	12.40	-41.66	-25.00	H
16781.70	-54.74	2.90	16.50	-41.14	-25.00	H
17974.20	-39.91	3.20	6.20	-36.91	-25.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-40GHz), k = 2

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A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 24.235, 27.54, 90.213.

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 R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -10℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel, 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 -10℃ 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 centre 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 +50℃ to -10℃. 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.

A.3.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. 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 3.5VDC and 4.35VDC, with a nominal voltage of 3.8VDC. 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. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

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A.3.3 Measurement results

LTE Band 2, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	21	12	34	0.011	0.006	0.018
3.8	21	13	21	0.011	0.007	0.011
4.35	20	13	23	0.011	0.007	0.012

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	13	23	16	0.007	0.012	0.009
0	39	15	3	0.021	0.008	0.002
10	23	4	13	0.012	0.002	0.007
20	15	1	21	0.008	0.001	0.011
30	-1	-12	23	0.001	0.006	0.012
40	31	-19	12	0.016	0.010	0.006
50	21	7	-8	0.011	0.004	0.004

Expanded measurement uncertainty is 10 Hz, *k* = 2

LTE Band 4, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	41	12	12	0.024	0.007	0.007
3.8	11	-10	31	0.006	0.006	0.018
4.35	-4	14	-12	0.002	0.008	0.007

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	16	24	16	0.009	0.014	0.009
0	9	8	9	0.005	0.005	0.005
10	3	8	16	0.002	0.005	0.009
20	-1	5	5	0.001	0.003	0.003
30	16	17	16	0.009	0.010	0.009
40	25	28	28	0.014	0.016	0.016
50	11	-8	-8	0.006	0.005	0.005

Expanded measurement uncertainty is 10Hz, *k* = 2

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LTE Band 5, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.022	0.018	0.018
3.8	6	16	25	0.007	0.019	0.030
4.35	10	18	18	0.012	0.022	0.022

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.017	0.029	0.029
0	16	9	9	0.019	0.011	0.011
10	-8	16	-8	0.010	0.019	0.010
20	16	5	5	0.019	0.006	0.006
30	-10	16	16	0.012	0.019	0.019
40	13	23	28	0.016	0.027	0.033
50	28	-8	-8	0.033	0.010	0.010

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band 7, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.007	0.006	0.006
3.8	25	18	25	0.010	0.007	0.010
4.35	10	18	3	0.004	0.007	0.001

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	B	23	24	0.005	0.009	0.009
0	16	9	9	0.006	0.004	0.004
10	3	8	8	0.001	0.003	0.003
20	-1	-12	5	0.000	0.005	0.002
30	-10	-19	16	0.004	0.007	0.006
40	25	28	28	0.010	0.011	0.011
50	38	-8	-8	0.015	0.003	0.003

Expanded measurement uncertainty is 10 Hz, k = 2

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LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.025	0.021	0.021
3.8	6	25	25	0.008	0.035	0.035
4.35	13	23	18	0.018	0.033	0.025

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.020	0.034	0.034
0	16	-12	9	0.023	0.017	0.013
10	3	-19	8	0.004	0.027	0.011
20	13	23	5	0.018	0.033	0.007
30	-10	16	16	0.014	0.023	0.023
40	-12	28	28	0.017	0.040	0.040
50	-19	-8	-8	0.027	0.011	0.011

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band 13, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.023	0.019	0.019
3.8	6	25	25	0.008	0.032	0.032
4.35	10	18	18	0.013	0.023	0.023

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.018	0.031	0.031
0	16	9	9	0.020	0.012	0.012
10	13	23	-12	0.017	0.029	0.015
20	-1	5	-19	0.001	0.006	0.024
30	13	23	9	0.017	0.029	0.012
40	25	28	28	0.032	0.036	0.036
50	38	-8	-8	0.049	0.010	0.010

Expanded measurement uncertainty is 10Hz, k = 2

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LTE Band 14, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.023	0.019	0.019
3.8	6	25	25	0.008	0.032	0.032
4.35	13	23	18	0.017	0.029	0.023

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.018	0.031	0.031
0	16	9	9	0.020	0.012	0.012
10	3	8	-12	0.004	0.010	0.015
20	-1	-12	-19	0.001	0.015	0.024
30	16	8	5	0.020	0.010	0.006
40	9	-12	28	0.012	0.015	0.036
50	38	-19	-8	0.049	0.024	0.010

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band 17, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.023	0.019	0.019
3.8	6	25	25	0.008	0.032	0.032
4.35	10	18	18	0.013	0.023	0.023

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	9	0.018	0.031	0.012
0	16	16	9	0.020	0.020	0.012
10	3	3	8	0.004	0.004	0.010
20	8	-12	16	0.010	0.015	0.020
30	16	16	3	0.020	0.020	0.004
40	3	28	28	0.004	0.036	0.036
50	-12	-8	16	0.015	0.010	0.020

Expanded measurement uncertainty is 10Hz, k = 2

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LTE Band 25, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	22	45	24	0.012	0.024	0.013
3.8	26	9	37	0.014	0.005	0.020
4.35	43	15	16	0.023	0.008	0.008

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	26	46	44	0.014	0.024	0.023
0	35	49	36	0.019	0.026	0.019
10	14	25	22	0.007	0.013	0.012
20	18	38	24	0.010	0.020	0.013
30	29	47	17	0.015	0.025	0.009
40	33	43	39	0.018	0.023	0.021
50	35	41	46	0.019	0.022	0.024

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band 26(814MHz-824MHz), 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.022	0.018	0.018
3.8	6	25	25	0.007	0.031	0.031
4.35	10	18	18	0.012	0.022	0.022

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	29	-8	24	0.035	0.010	0.029
0	-10	4	9	0.012	0.005	0.011
10	3	8	36	0.004	0.010	0.044
20	-12	15	16	0.015	0.018	0.020
30	22	-12	3	0.027	0.015	0.004
40	25	-13	28	0.031	0.016	0.034
50	21	20	-8	0.026	0.024	0.010

Expanded measurement uncertainty is 10Hz, k = 2

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LTE band 26(824MHz-849MHz), 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.022	0.018	0.018
3.8	36	25	-12	0.043	0.030	0.014
4.35	5	18	18	0.006	0.022	0.022

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.017	0.029	0.029
0	16	-8	9	0.019	0.010	0.011
10	3	15	16	0.004	0.018	0.019
20	-1	-12	28	0.001	0.014	0.033
30	-10	16	28	0.012	0.019	0.033
40	-12	28	16	0.014	0.033	0.019
50	38	-8	-8	0.045	0.010	0.010

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band 30, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.010	0.008	0.008
3.8	6	-10	25	0.003	0.005	0.013
4.35	45	25	18	0.024	0.013	0.010

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.007	0.013	0.013
0	16	12	40	0.008	0.006	0.021
10	25	-25	8	0.013	0.013	0.004
20	18	18	45	0.010	0.010	0.024
30	38	27	18	0.020	0.014	0.010
40	28	28	28	0.015	0.015	0.015
50	-12	-8	-12	0.006	0.004	0.006

Expanded measurement uncertainty is 10 Hz, *k* = 2

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LTE Band 38, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	-18	15	45	0.007	0.006	0.017
3.8	45	25	25	0.017	0.010	0.010
4.35	10	-11	18	0.004	0.004	0.007

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	16	24	0.005	0.006	0.009
0	16	9	17	0.006	0.003	0.007
10	3	38	27	0.001	0.015	0.010
20	17	28	28	0.007	0.011	0.011
30	-12	42	17	0.005	0.016	0.007
40	25	28	28	0.010	0.011	0.011
50	38	-8	-8	0.015	0.003	0.003

Expanded measurement uncertainty is 10 Hz, $k = 2$

LTE Band 41, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	26	15	0.007	0.010	0.006
3.8	25	41	25	0.010	0.016	0.010
4.35	17	56	18	0.007	0.022	0.007

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	32	24	0.005	0.012	0.009
0	19	31	-1	0.007	0.012	0.000
10	32	27	8	0.012	0.010	0.003
20	27	5	27	0.010	0.002	0.010
30	19	26	19	0.007	0.010	0.007
40	25	41	28	0.010	0.016	0.011
50	16	17	-8	0.006	0.007	0.003

Expanded measurement uncertainty is 10 Hz, $k = 2$

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LTE Band 66, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.010	0.009	0.009
3.8	6	25	26	0.003	0.014	0.015
4.35	10	18	41	0.006	0.010	0.023

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.008	0.014	0.014
0	27	9	34	0.015	0.005	0.019
10	15	19	31	0.009	0.011	0.018
20	26	32	27	0.015	0.018	0.015
30	-10	-1	19	0.006	0.001	0.011
40	25	17	28	0.014	0.010	0.016
50	38	-8	-8	0.022	0.005	0.005

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band CA_5B, 5MHz+0MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	15	15	0.026	0.022	0.022
3.8	15	16	15	0.022	0.024	0.022
4.35	10	12	26	0.015	0.018	0.038

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	24	24	0.021	0.035	0.035
0	16	-1	12	0.024	0.001	0.018
10	34	8	17	0.050	0.012	0.025
20	19	31	40	0.028	0.046	0.059
30	32	27	15	0.047	0.040	0.022
40	27	6	26	0.040	0.009	0.038
50	19	15	-8	0.028	0.022	0.012

Expanded measurement uncertainty is 10Hz, k = 2

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LTE Band CA_41C, 5MHz+20MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.5	18	16	17	0.007	0.006	0.007
3.8	-10	25	25	0.004	0.010	0.010
4.35	-23	-10	15	0.009	0.004	0.006

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	16	21	-10	0.006	0.008	0.004
0	19	31	9	0.007	0.012	0.003
10	32	27	32	0.012	0.010	0.012
20	18	19	37	0.007	0.007	0.014
30	-12	38	27	0.005	0.015	0.010
40	25	28	28	0.010	0.011	0.011
50	17	-8	15	0.007	0.003	0.006

Expanded measurement uncertainty is 10Hz, k = 2

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A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53, 90.1215.

A.4.1 Occupied Bandwidth Results

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 frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

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

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

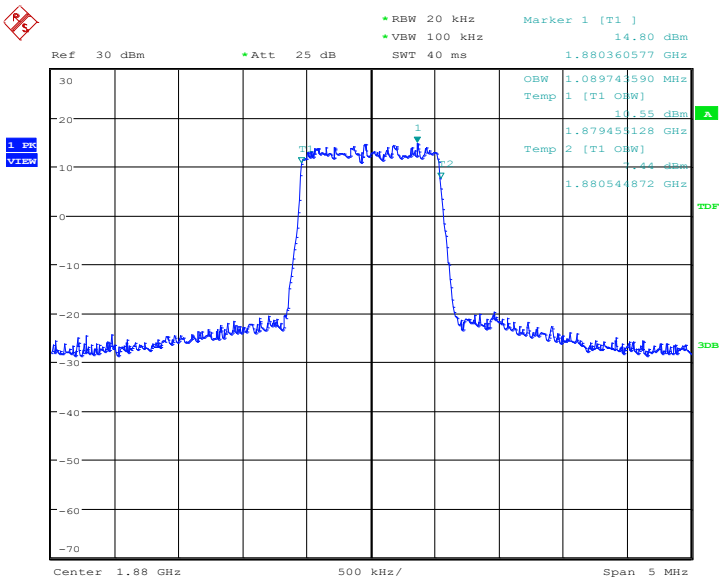
d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

LTE band 2, 1.4MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1880.0	QPSK	16QAM	64QAM
	1089.74	1097.76	1089.74

LTE band 2, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 13:35:55

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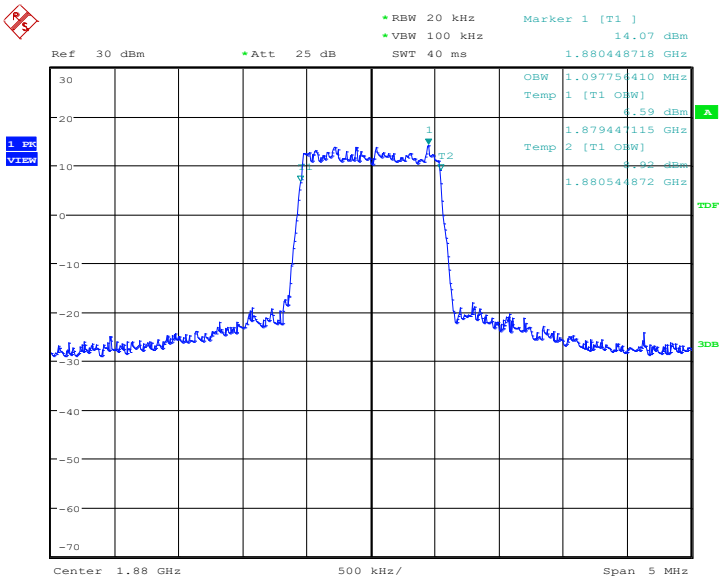
LTE band 2, 1.4MHz Bandwidth, 16QAM (99% BW)



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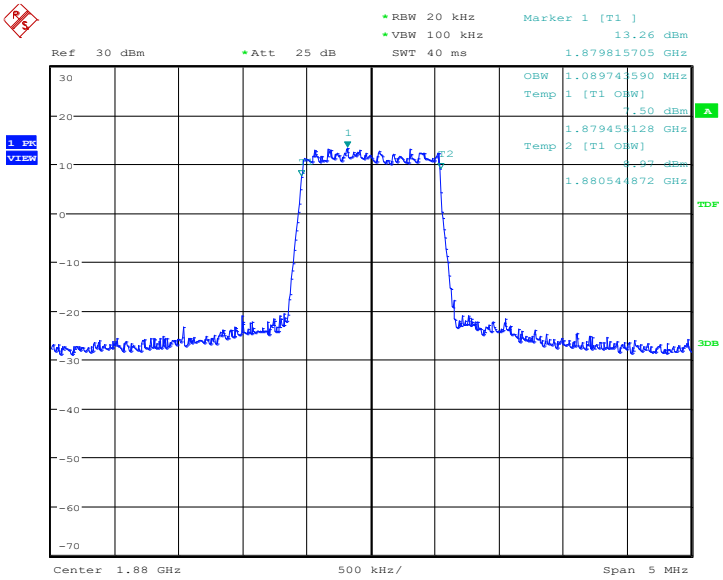
LTE band 2, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 19:46:12

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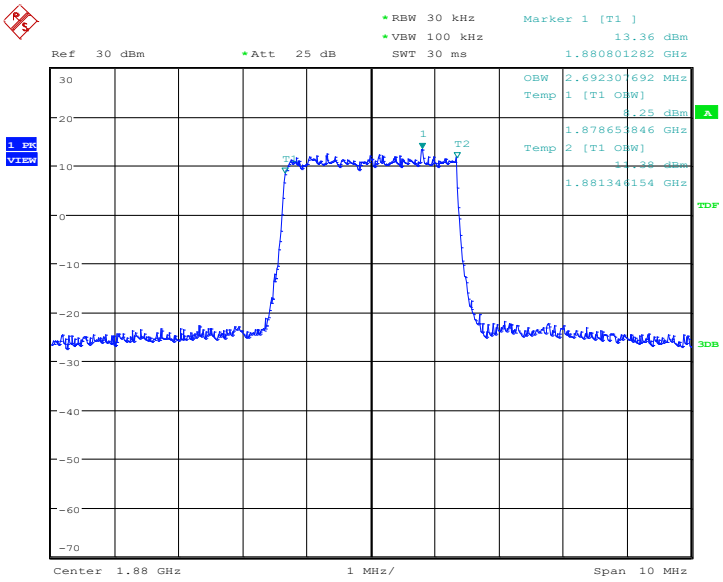
LTE band 2, 3MHz (99% BW)

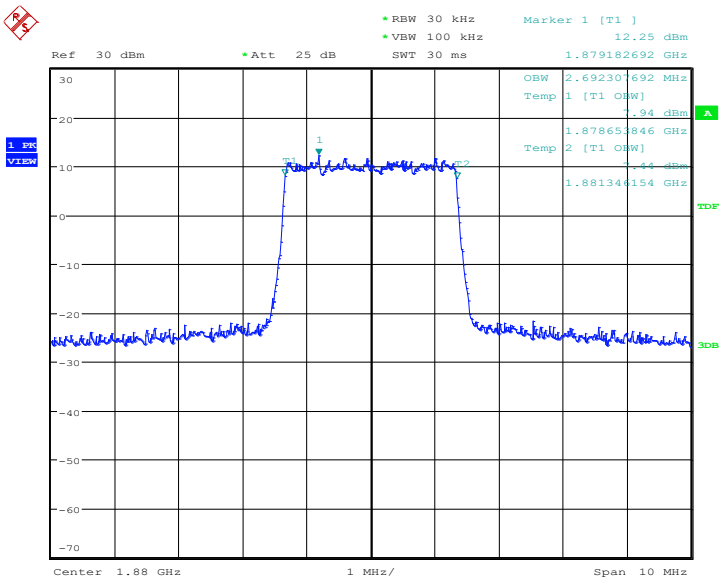
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1880.0	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

LTE band 2, 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 13:41:11

LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 13:41:24

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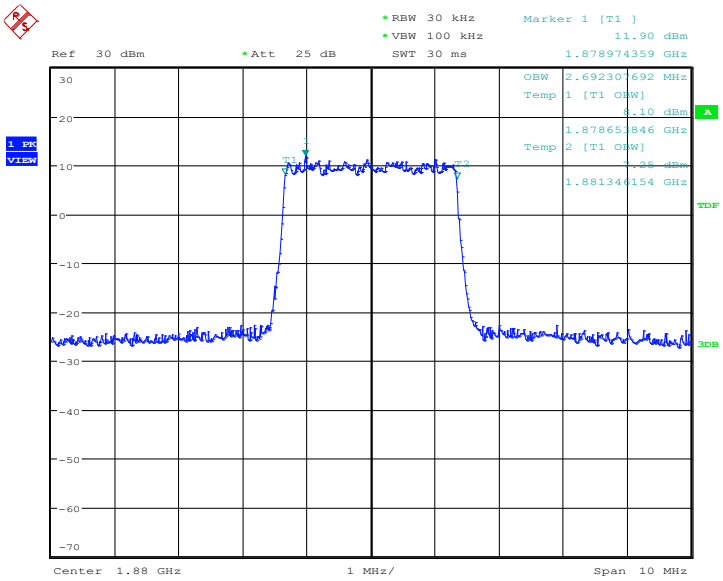
LTE band 2, 3MHz Bandwidth, 64QAM (99% BW)



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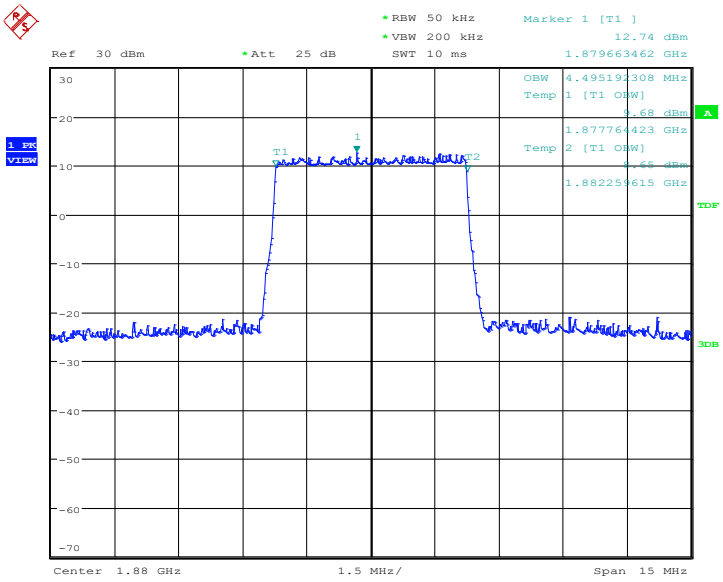
LTE band 2, 5MHz (99% BW)

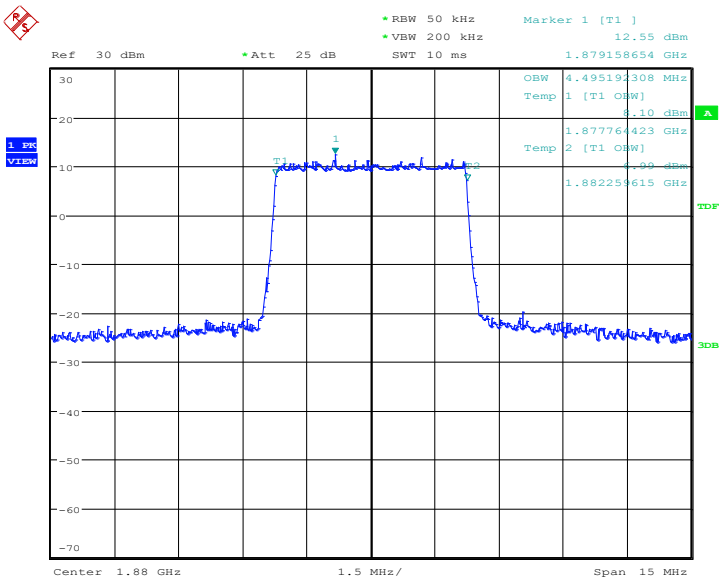
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1880.0	QPSK	16QAM	64QAM
	4495.19	4495.19	4495.19

LTE band 2, 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 13:46:26

LTE band 2, 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 13:46:40

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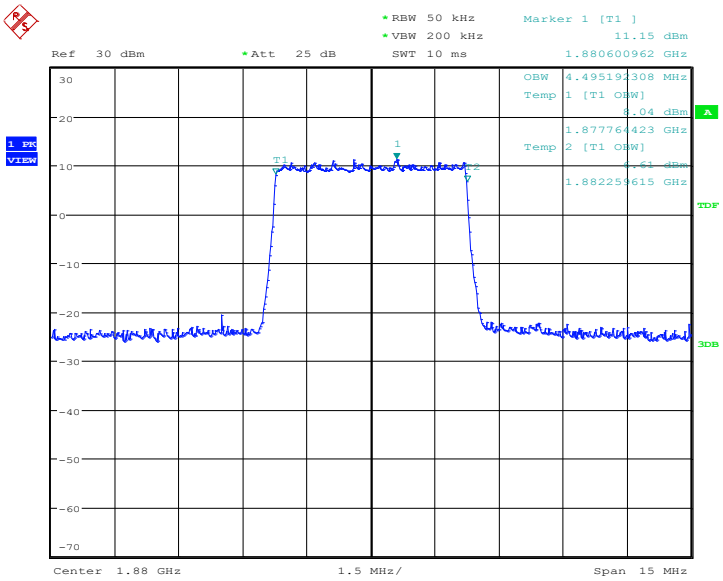
LTE band 2, 5MHz Bandwidth,64QAM (99% BW)



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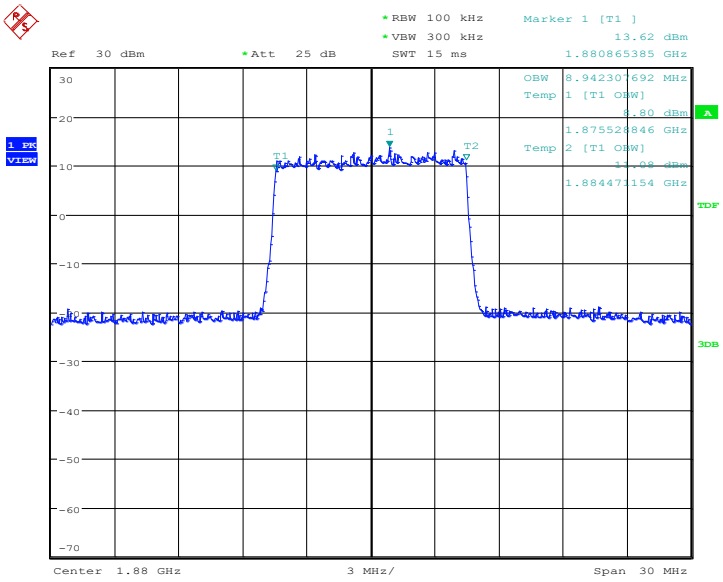
LTE band 2, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1880.0	QPSK	16QAM	64QAM
	8942.31	8942.31	8990.38

LTE band 2, 10MHz Bandwidth, QPSK (99% BW)



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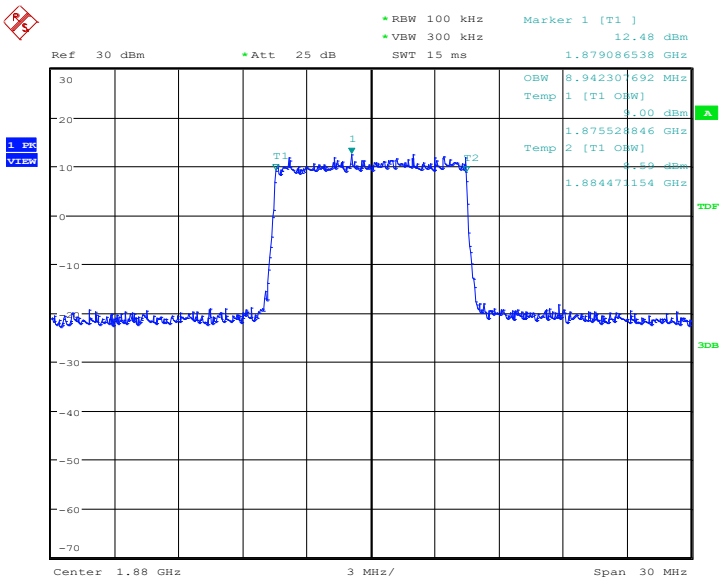
LTE band 2, 10MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 13:51:57

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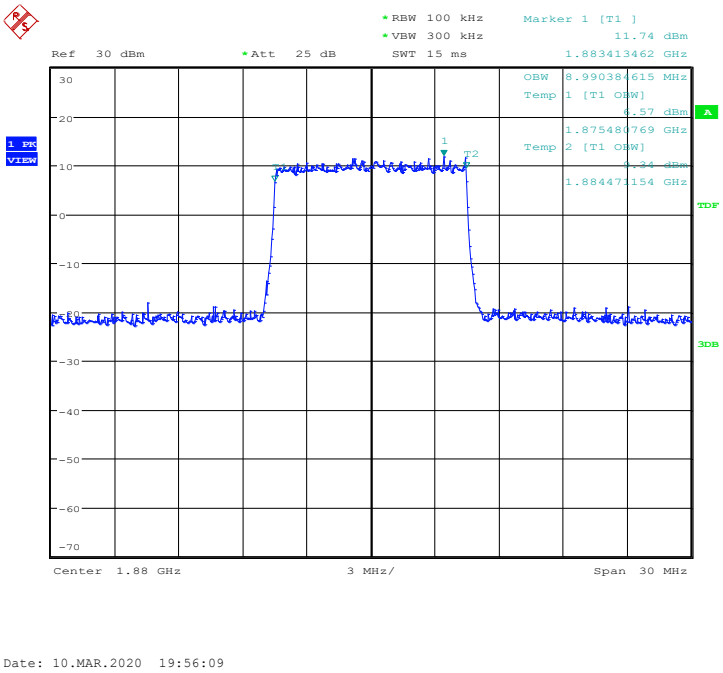
LTE band 2, 10MHz Bandwidth, 64QAM (99% BW)



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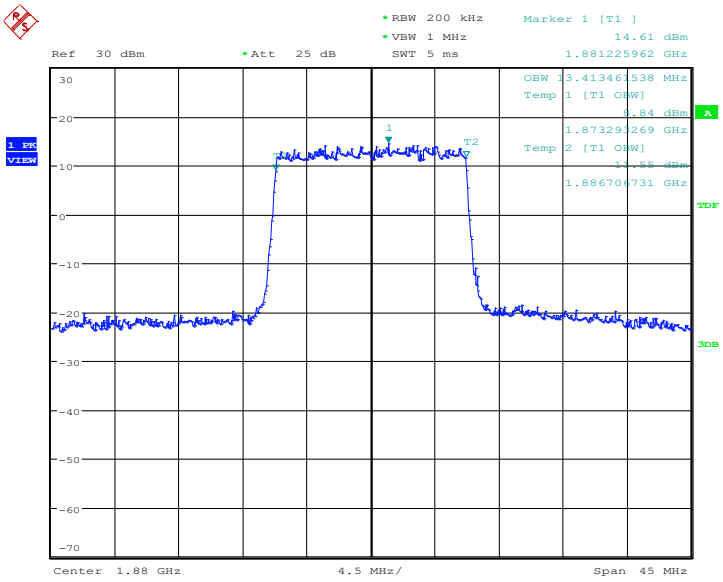
LTE band 2, 15MHz (99% BW)

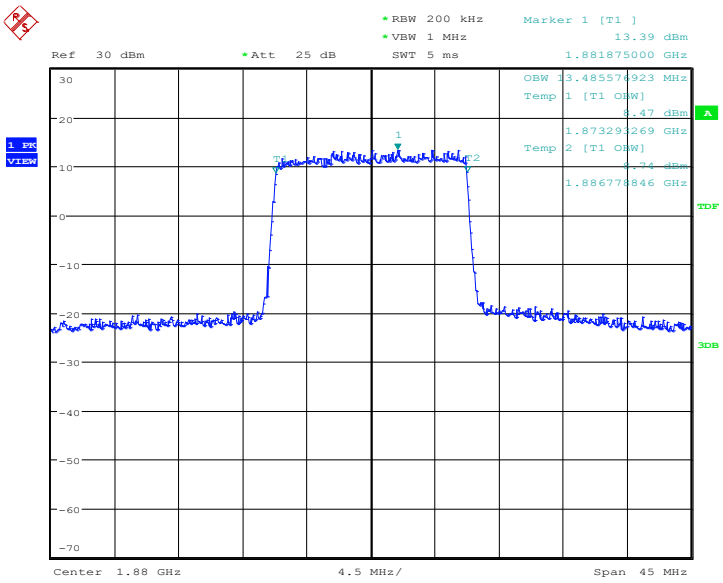
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1880.0	QPSK	16QAM	64QAM
	13413.46	13485.58	13485.58

LTE band 2, 15MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 13:57:00

LTE band 2, 15MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 13:57:14

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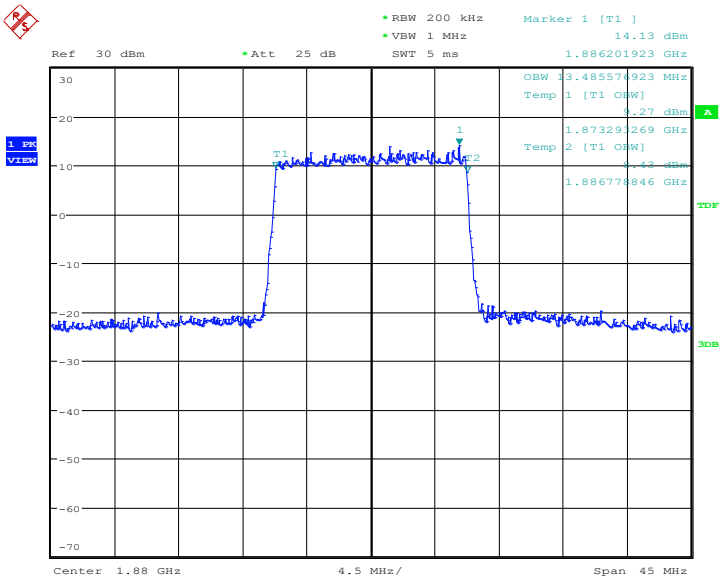
LTE band 2, 15MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 19:59:28

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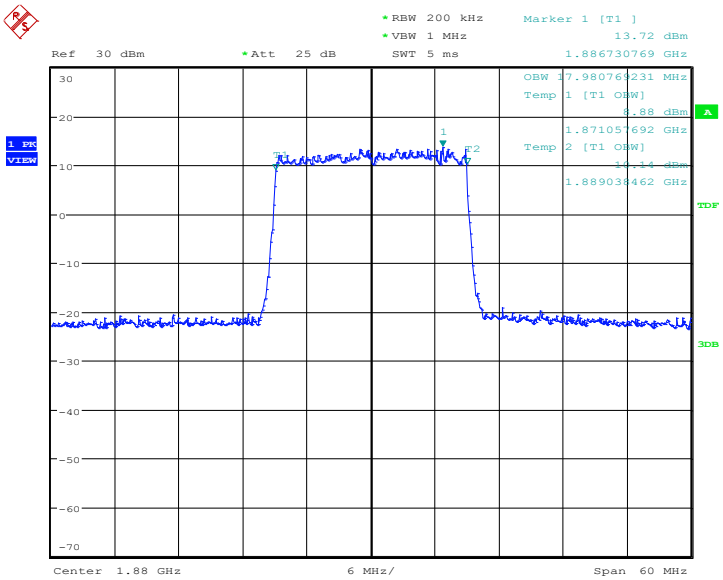
LTE band 2, 20MHz (99% BW)

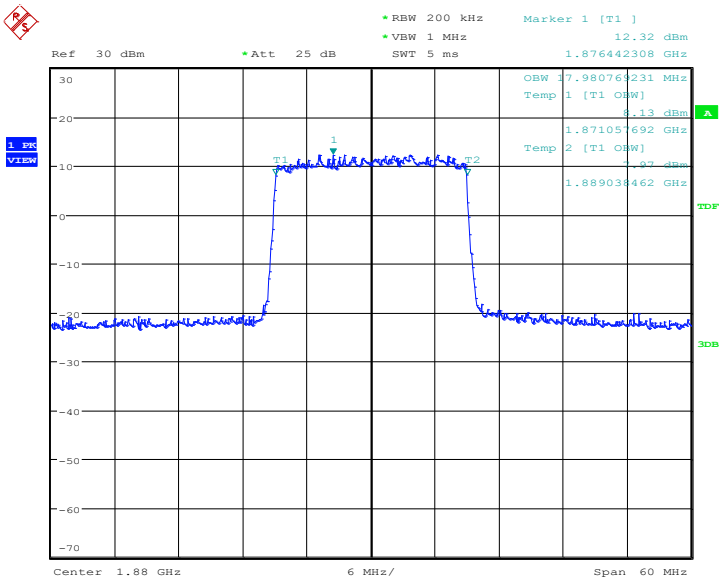
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1880.0	QPSK	16QAM	64QAM
	17980.77	17980.77	17980.77

LTE band 2, 20MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 14:02:16

LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 14:02:30

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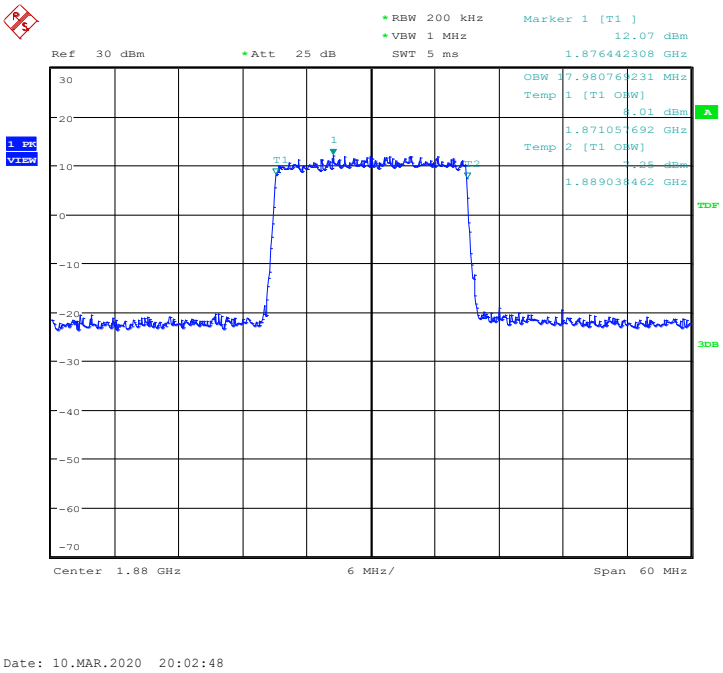
LTE band 2, 20MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:02:48

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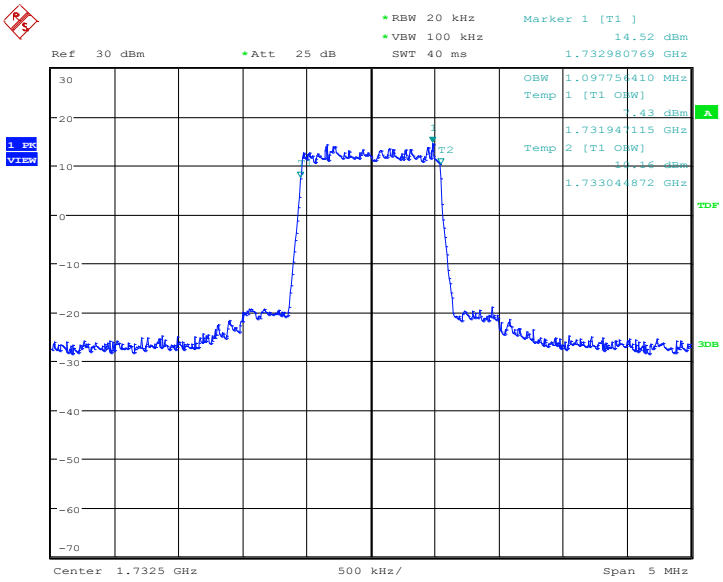
LTE band 4, 1.4MHz (99% BW)

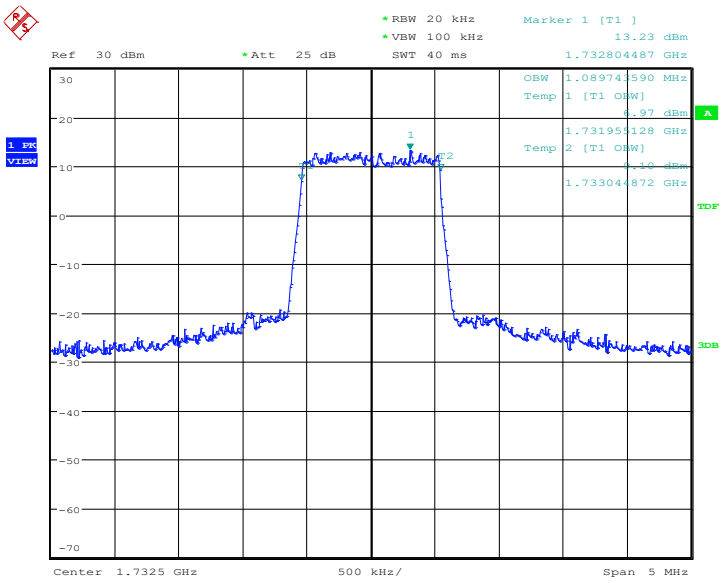
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1732.5	QPSK	16QAM	64QAM
	1097.76	1089.74	1089.74

LTE band 4, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 14:07:37

LTE band 4, 1.4MHz Bandwidth, 16QAM (99% BW)



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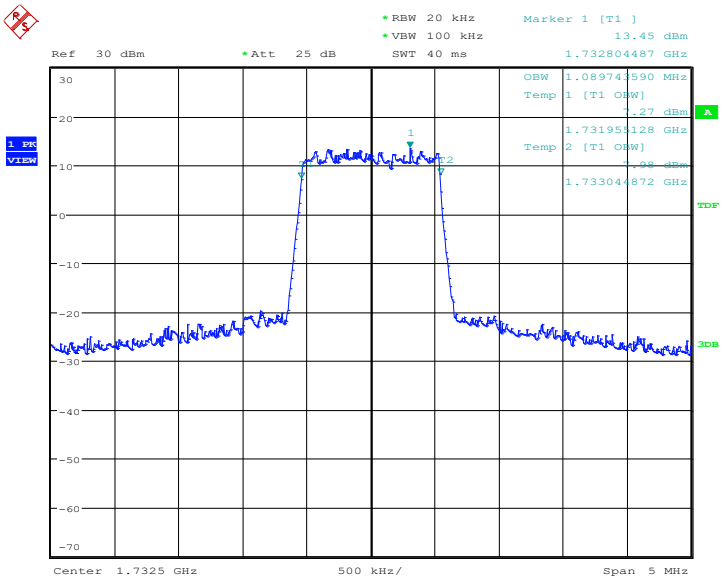
LTE band 4, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:06:09

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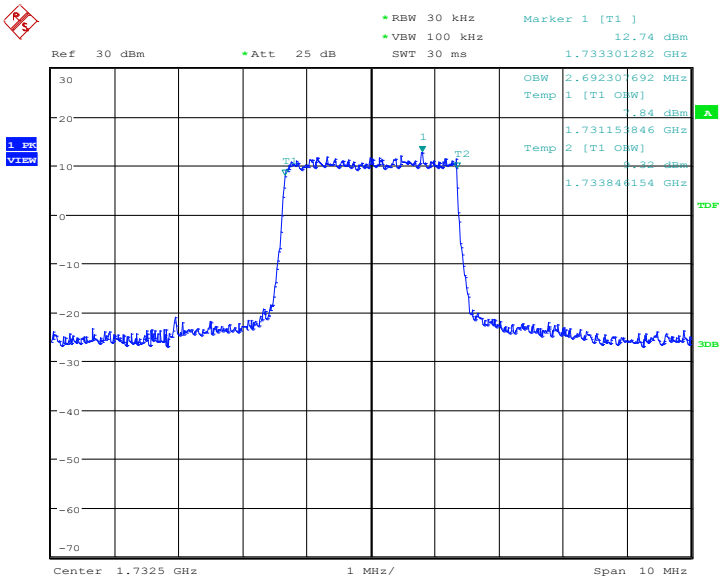
LTE band 4, 3MHz (99% BW)

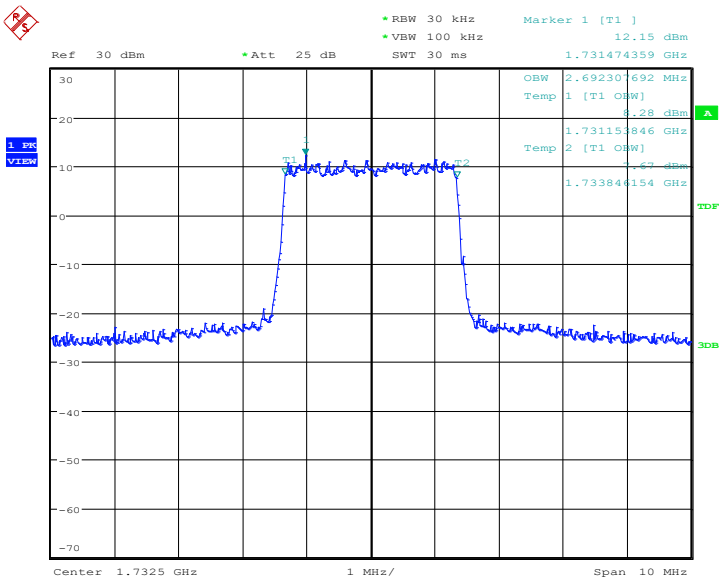
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1732.5	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

LTE band 4, 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 14:12:53

LTE band 4, 3MHz Bandwidth, 16QAM (99% BW)



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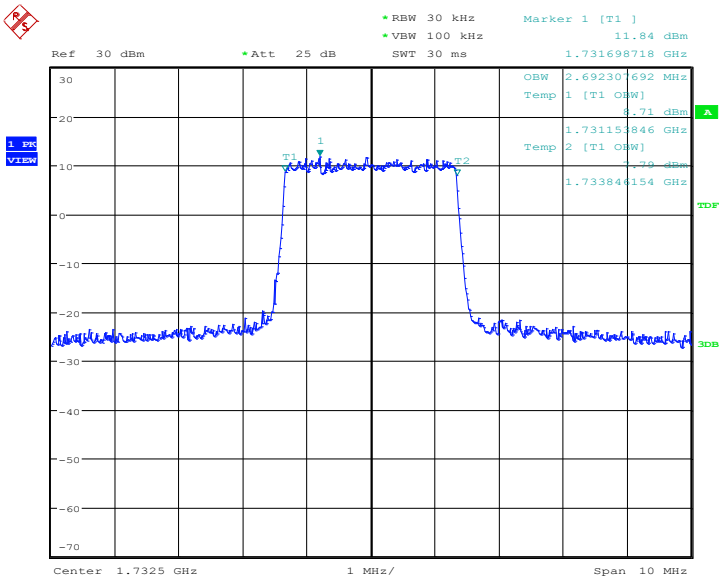
LTE band 4, 3MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:09:28

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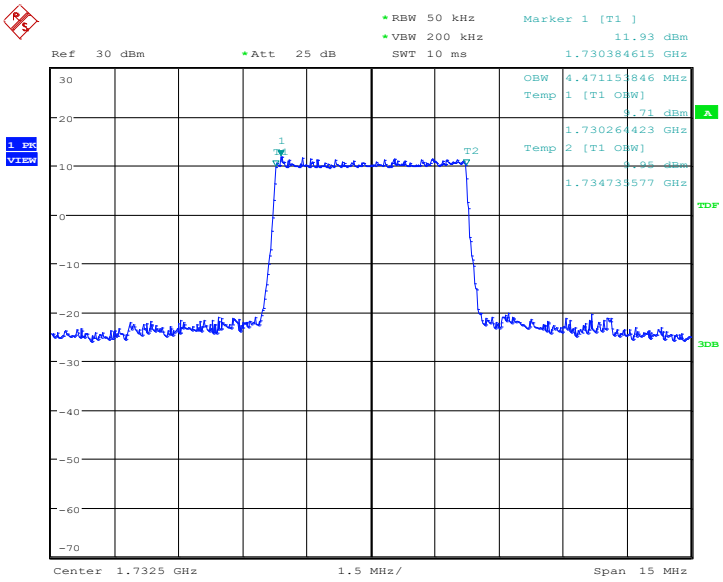
LTE band 4, 5MHz (99% BW)

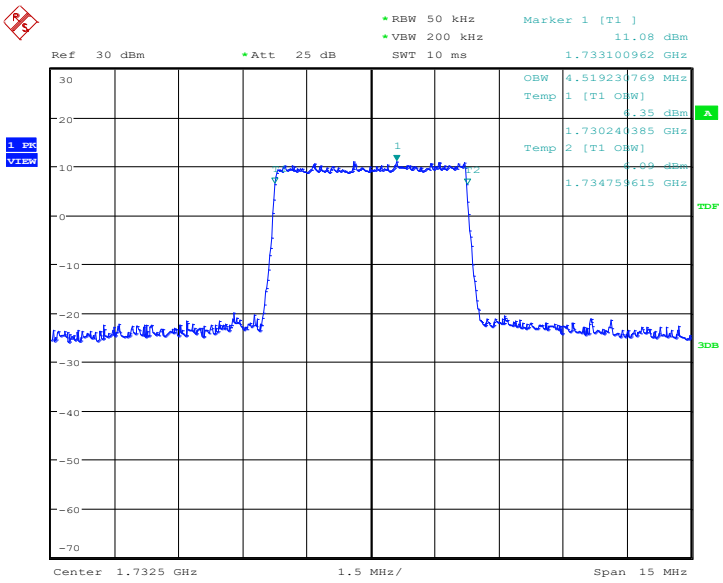
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1732.5	QPSK	16QAM	64QAM
	4471.15	4519.23	4495.19

LTE band 4, 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 14:18:08

LTE band 4, 5MHz Bandwidth,16QAM (99% BW)



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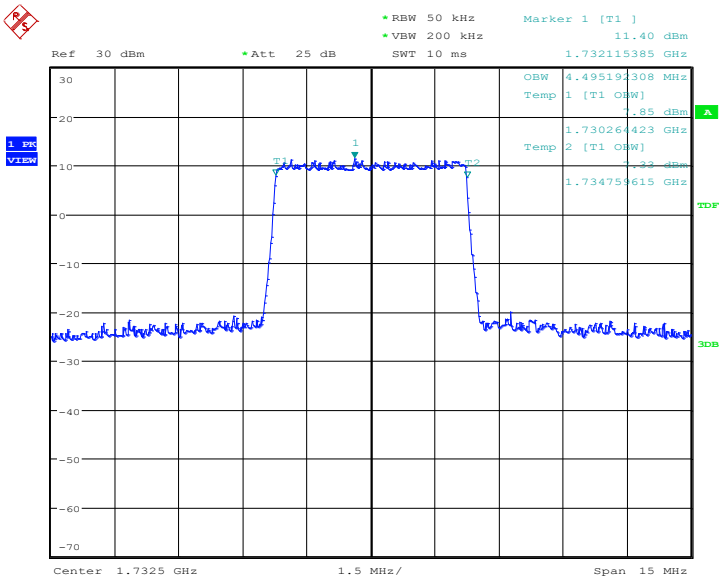
LTE band 4, 5MHz Bandwidth,64QAM (99% BW)



Date: 10.MAR.2020 20:12:47

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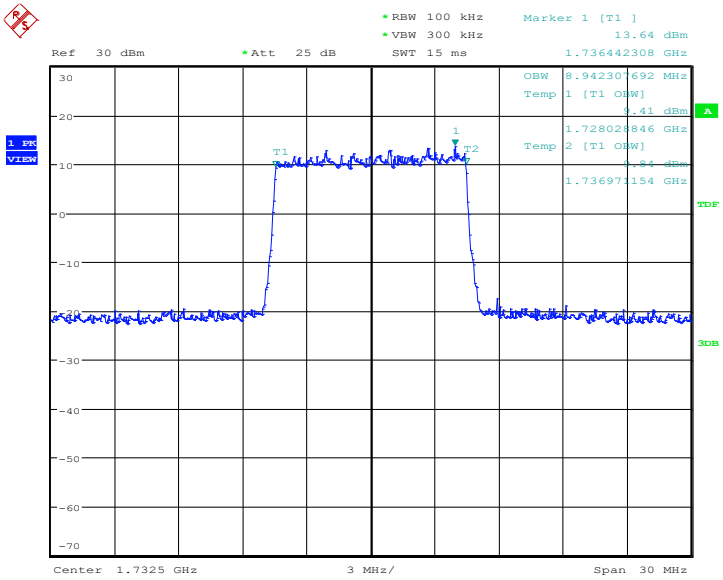
LTE band 4, 10MHz (99% BW)

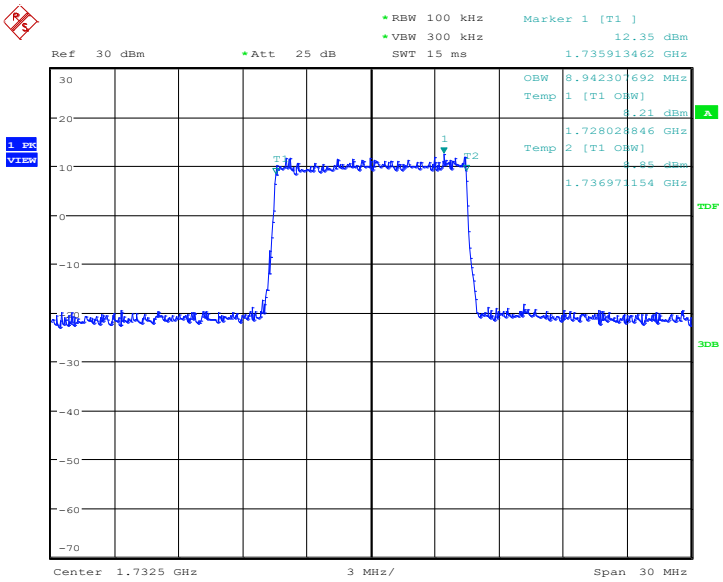
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1732.5	QPSK	16QAM	64QAM
	8942.31	8942.31	8990.38

LTE band 4, 10MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 14:23:24

LTE band 4, 10MHz Bandwidth, 16QAM (99% BW)



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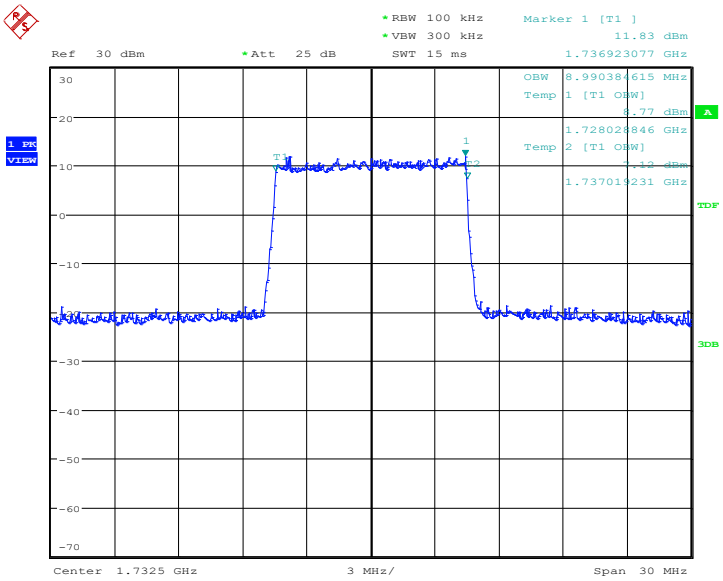
LTE band 4, 10MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:16:06

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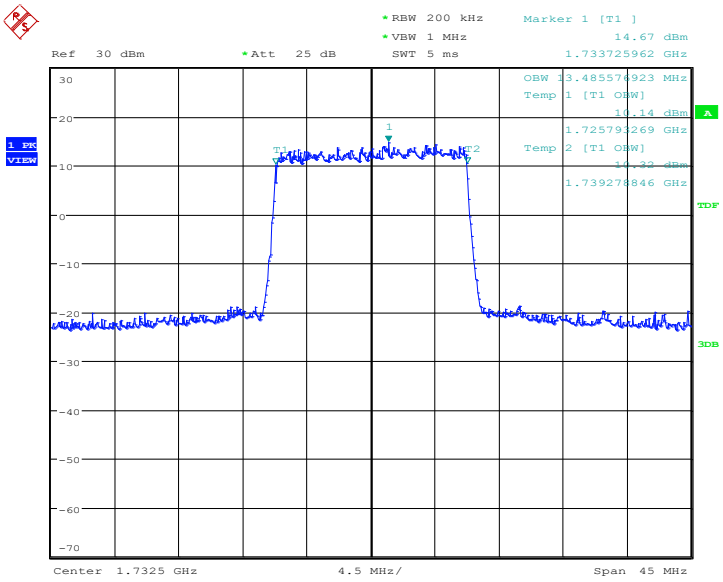
LTE band 4, 15MHz (99% BW)

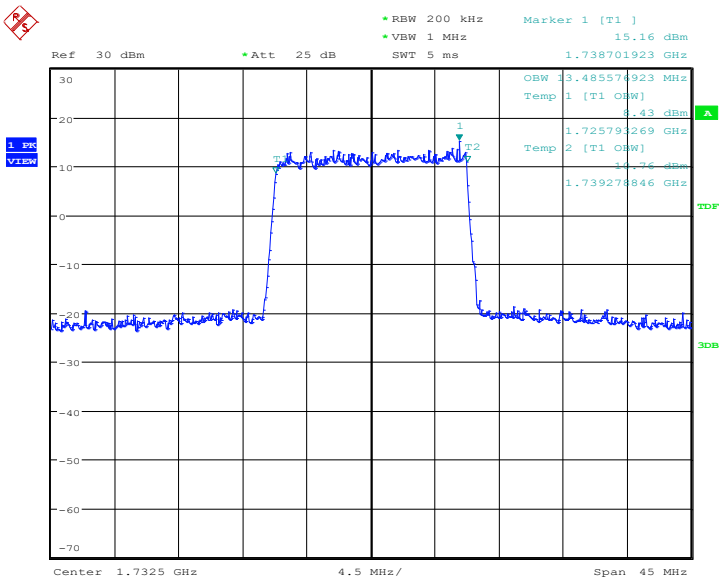
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1732.5	QPSK	16QAM	64QAM
	13485.58	13485.58	13485.58

LTE band 4, 15MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 14:28:44

LTE band 4, 15MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 14:28:58

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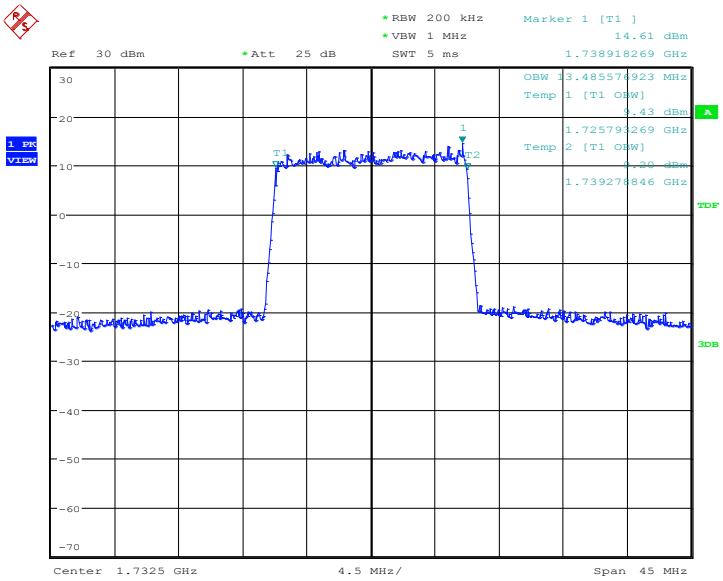
LTE band 4, 15MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:19:25

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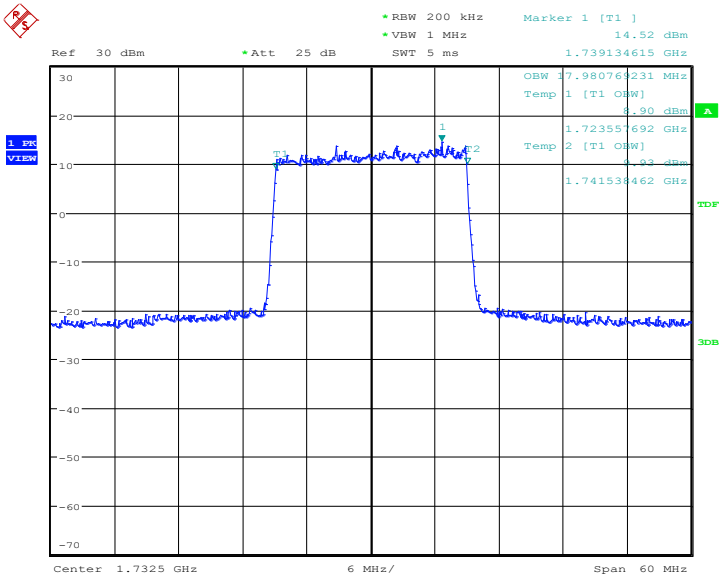
LTE band 4, 20MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1732.5	QPSK	16QAM	64QAM
	17980.77	17980.77	17980.77

LTE band 4, 20MHz Bandwidth, QPSK (99% BW)



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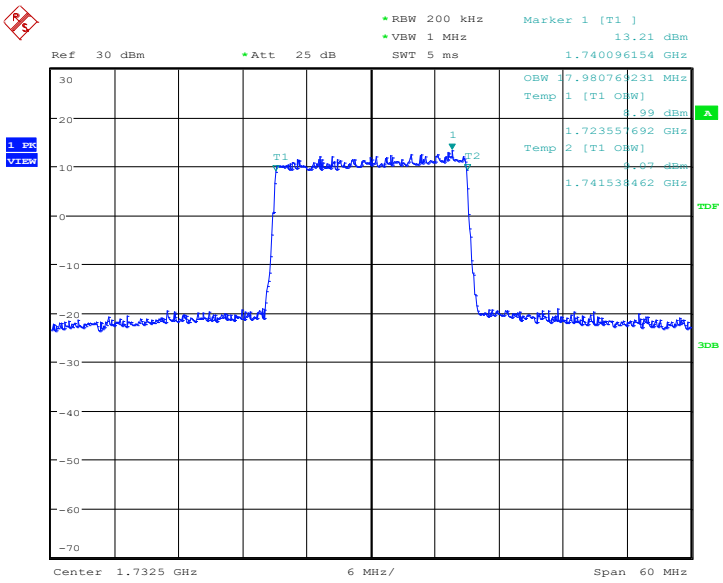
LTE band 4, 20MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 20:22:44

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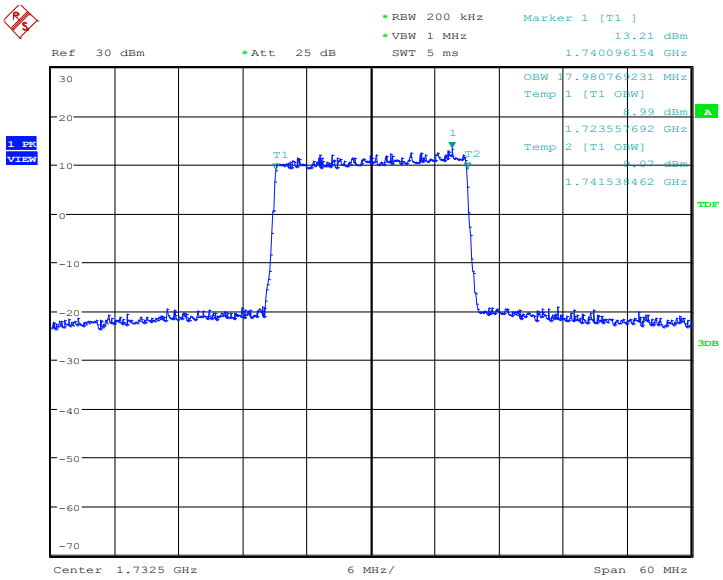
LTE band 4, 20MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:22:44

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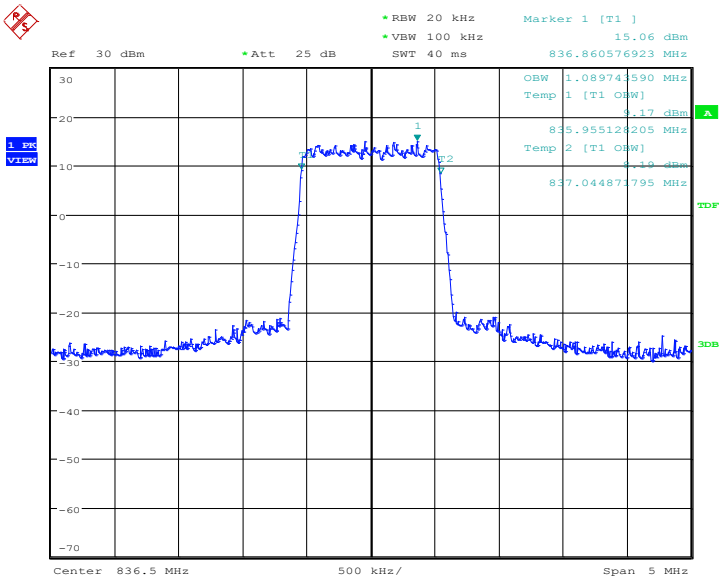
LTE band 5, 1.4MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	1089.74	1097.76	1089.74

LTE band 5, 1.4MHz Bandwidth, QPSK (99% BW)



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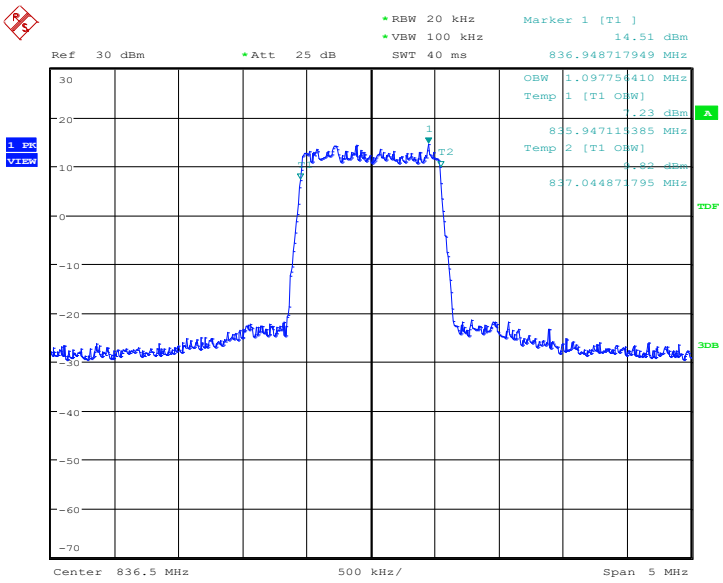
LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 13:14:57

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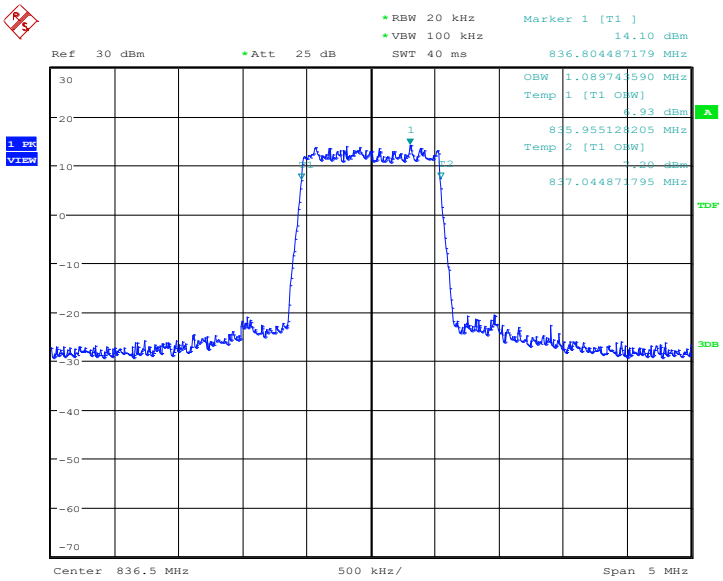
LTE band 5, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 19:32:55

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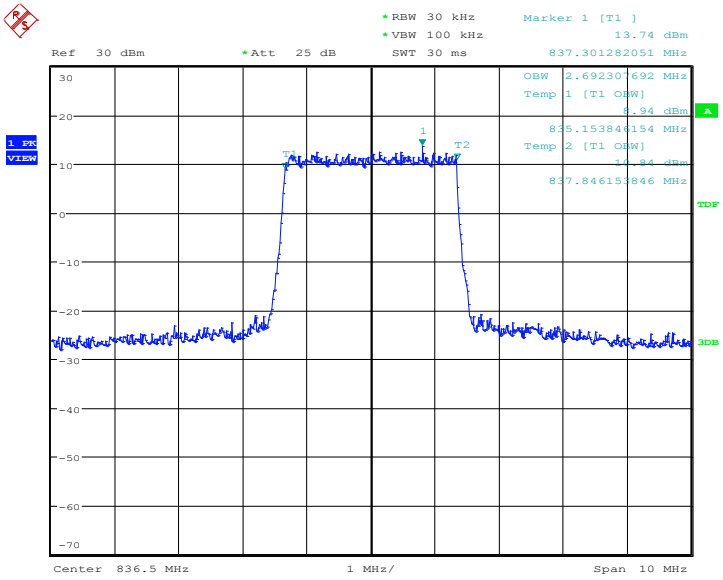
LTE band 5, 3MHz (99% BW)

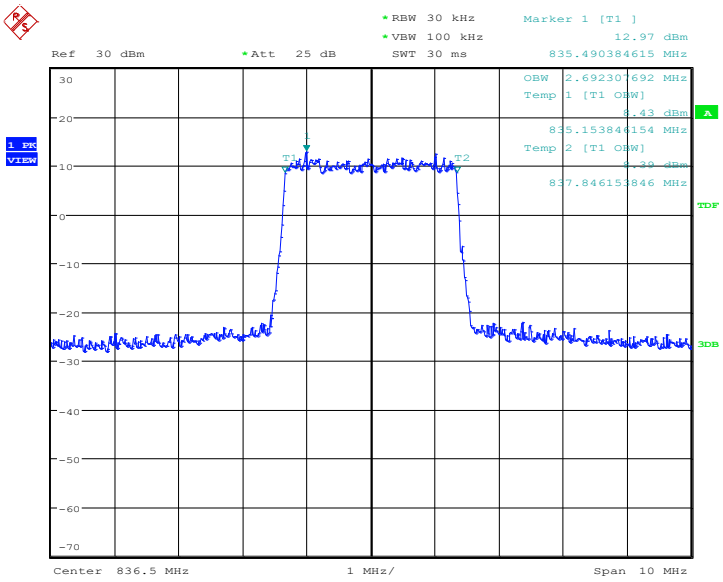
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

LTE band 5, 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 13:20:00

LTE band 5, 3MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 13:20:14

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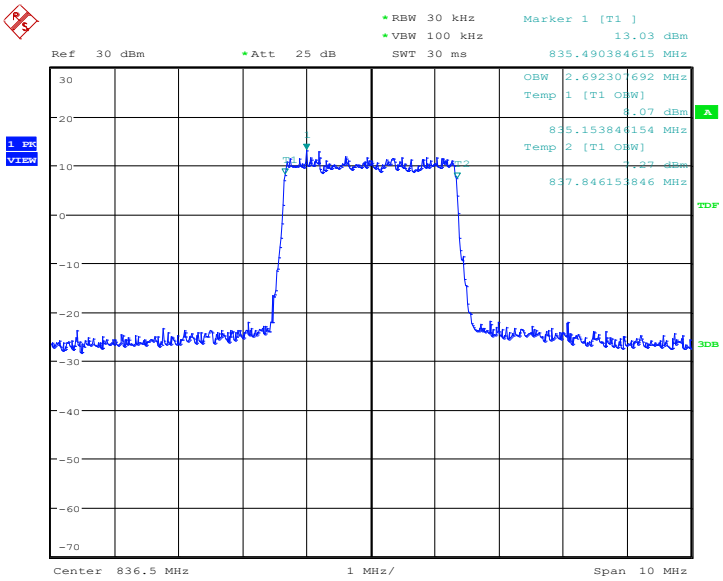
LTE band 5, 3MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 19:36:14

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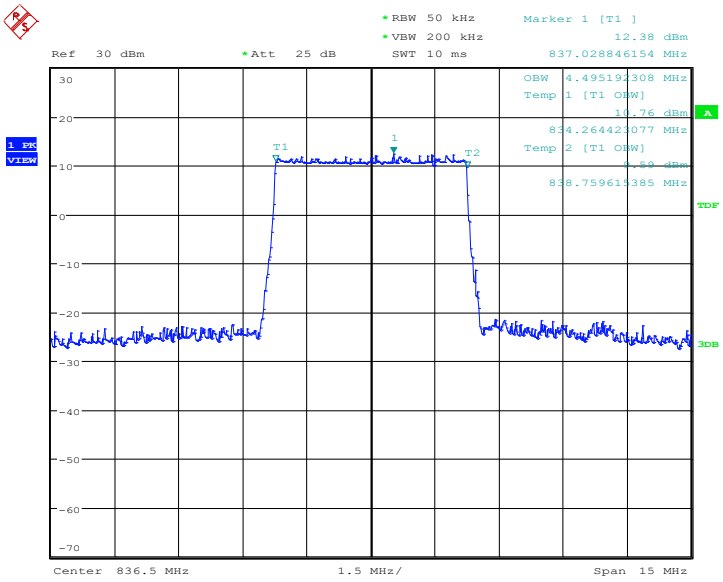
LTE band 5, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	4495.19	4471.15	4471.15

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



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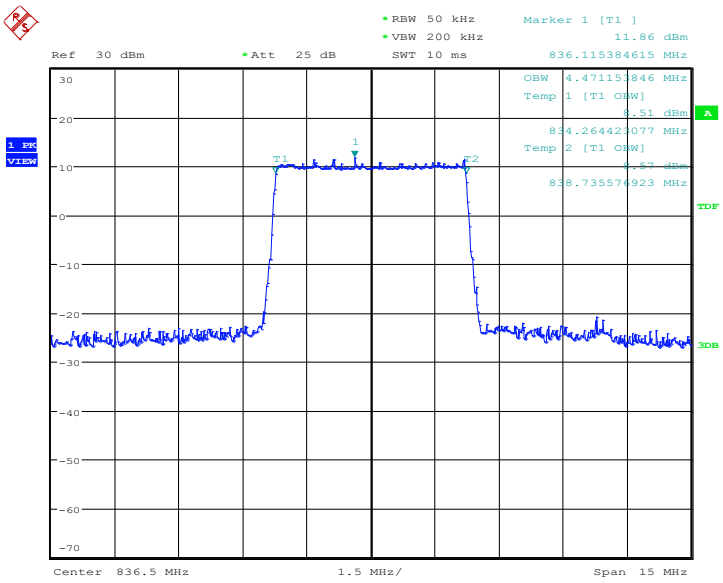
LTE band 5, 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 13:25:31

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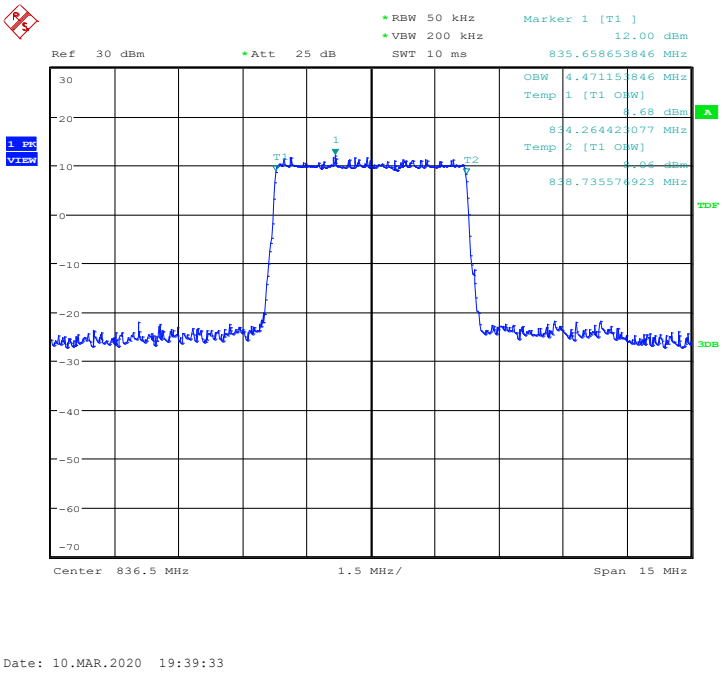
LTE band 5, 5MHz Bandwidth,64QAM (99% BW)



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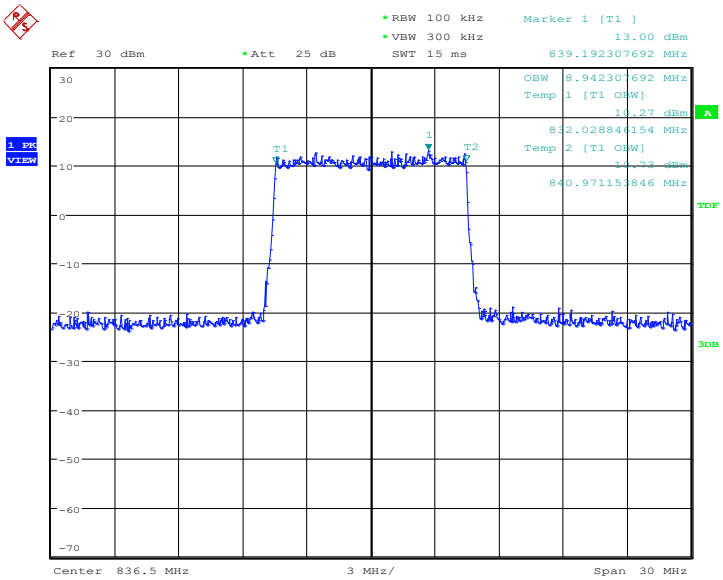
LTE band 5, 10MHz (99% BW)

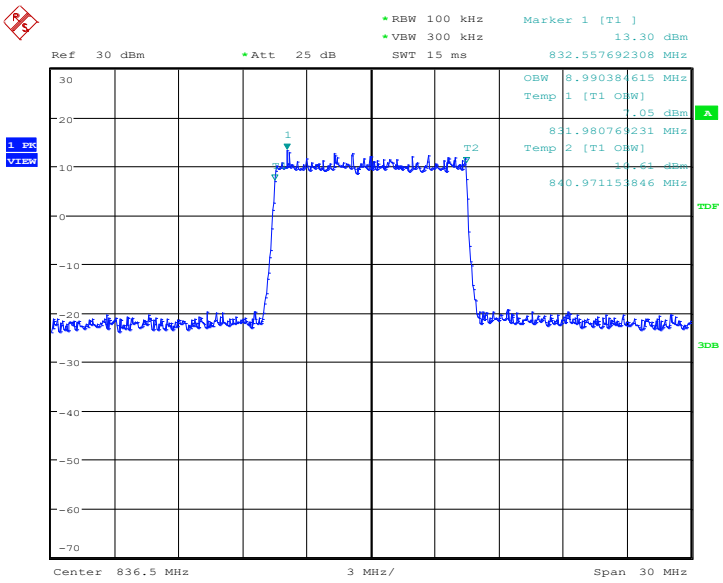
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	8942.31	8990.38	8942.31

LTE band 5, 10MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 13:30:33

LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 13:30:47

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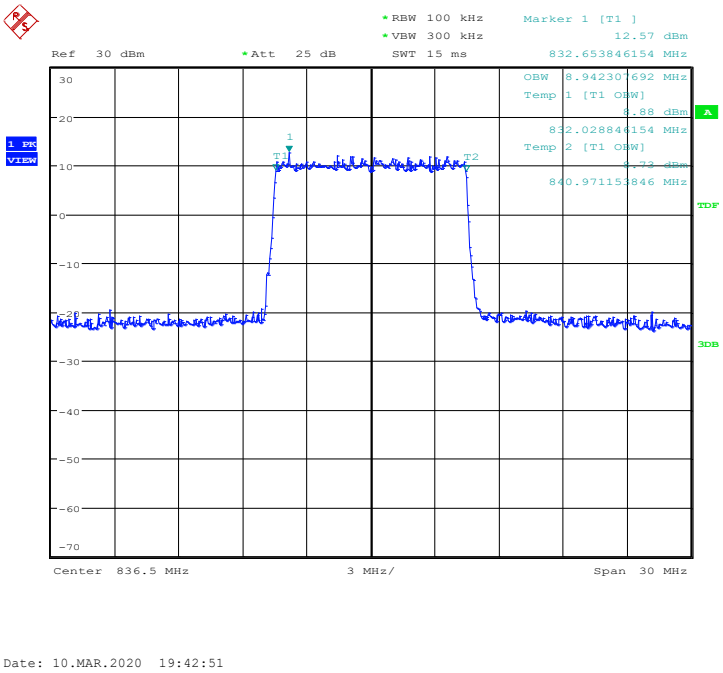
LTE band 5, 10MHz Bandwidth, 64QAM (99% BW)



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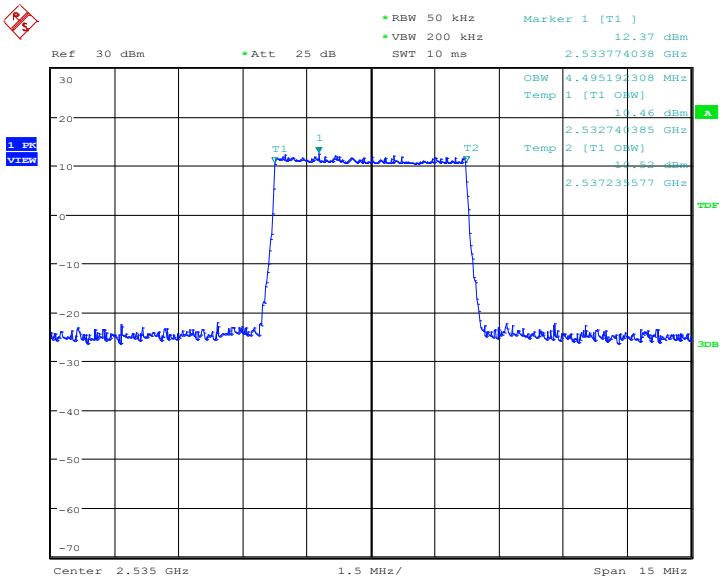
LTE band 7, 5MHz (99% BW)

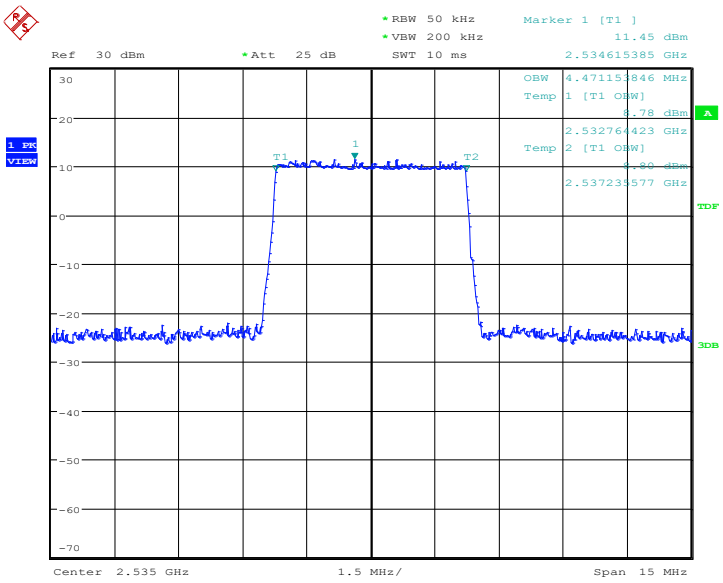
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	4495.19	4471.15	4519.23

LTE band 7, 5MHz Bandwidth, QPSK (99% BW)



Date: 16.MAR.2020 20:14:23

LTE band 7, 5MHz Bandwidth,16QAM (99% BW)



Date: 16.MAR.2020 20:14:37

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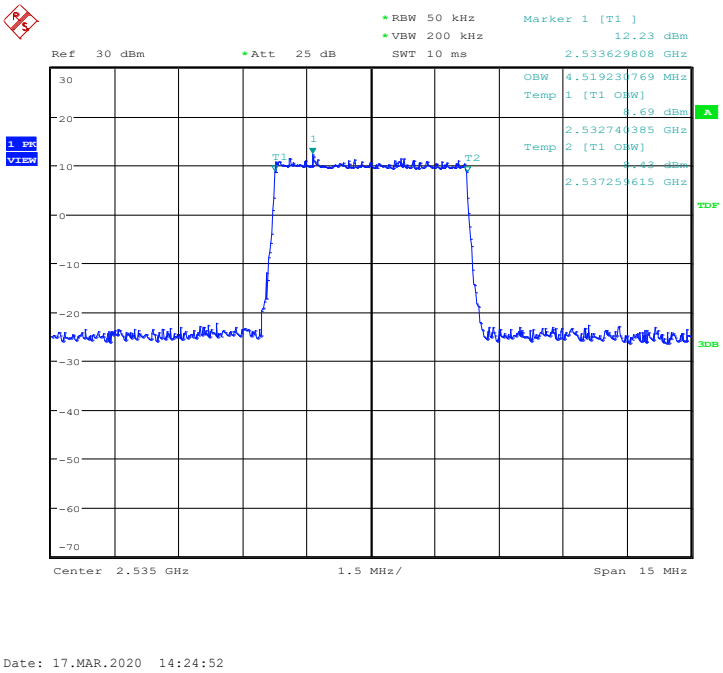
LTE band 7, 5MHz Bandwidth,64QAM (99% BW)



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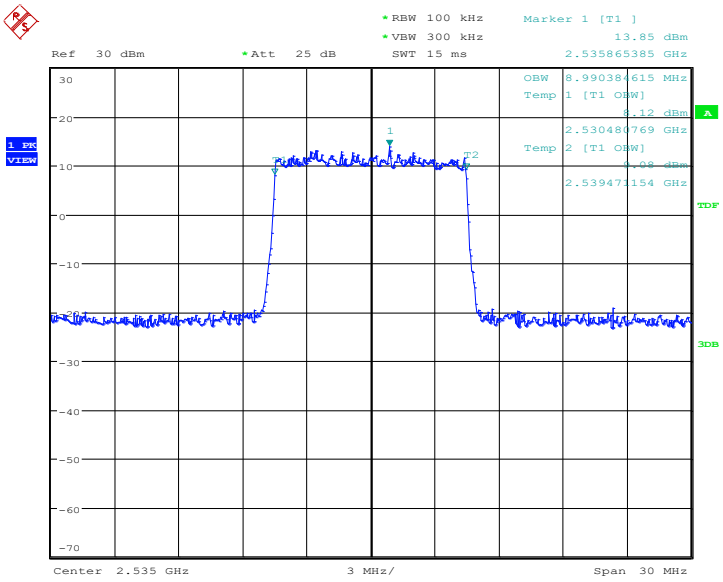
LTE band 7, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	8990.38	8942.31	8990.38

LTE band 7, 10MHz Bandwidth, QPSK (99% BW)



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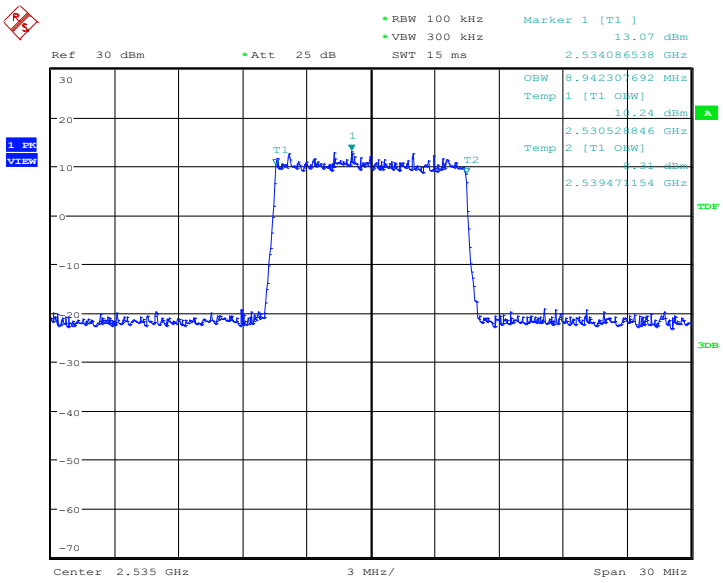
LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)



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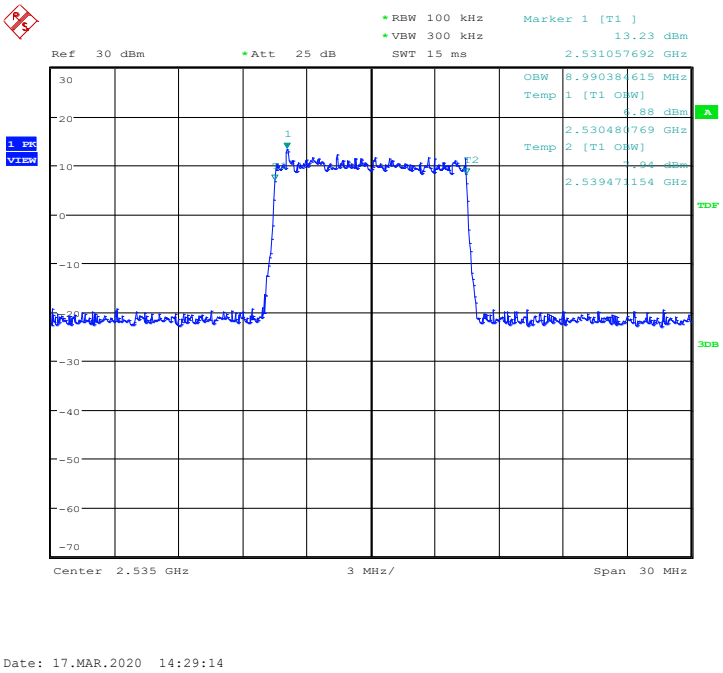
LTE band 7, 10MHz Bandwidth, 64QAM (99% BW)



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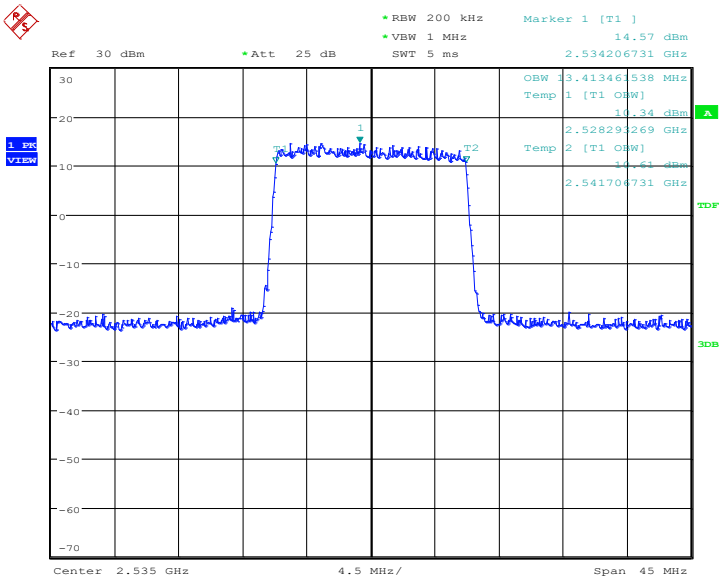
LTE band 7, 15MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	13413.46	13485.58	13485.58

LTE band 7, 15MHz Bandwidth, QPSK (99% BW)



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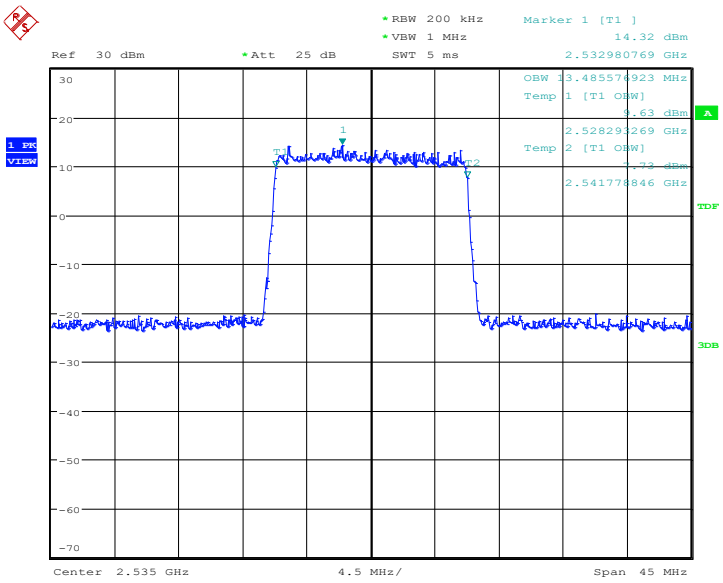
LTE band 7, 15MHz Bandwidth, 16QAM (99% BW)



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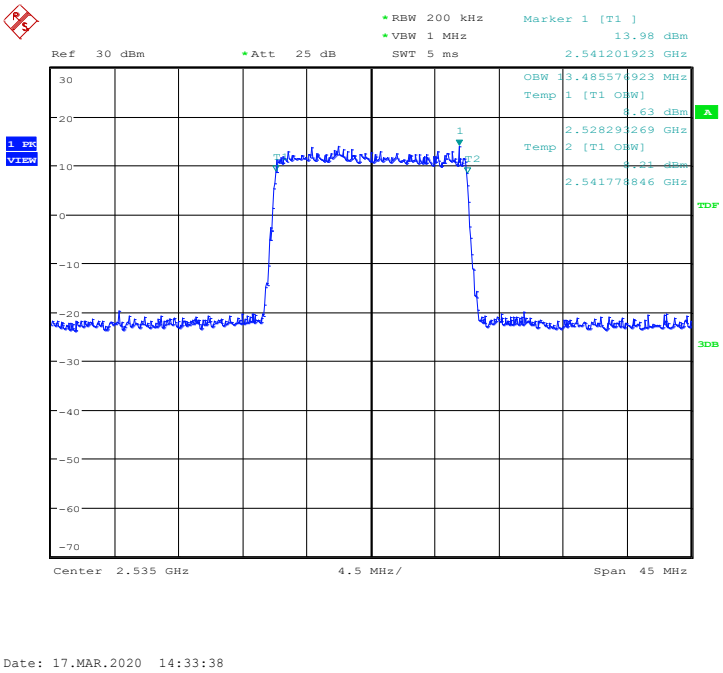
LTE band 7, 15MHz Bandwidth, 64QAM (99% BW)



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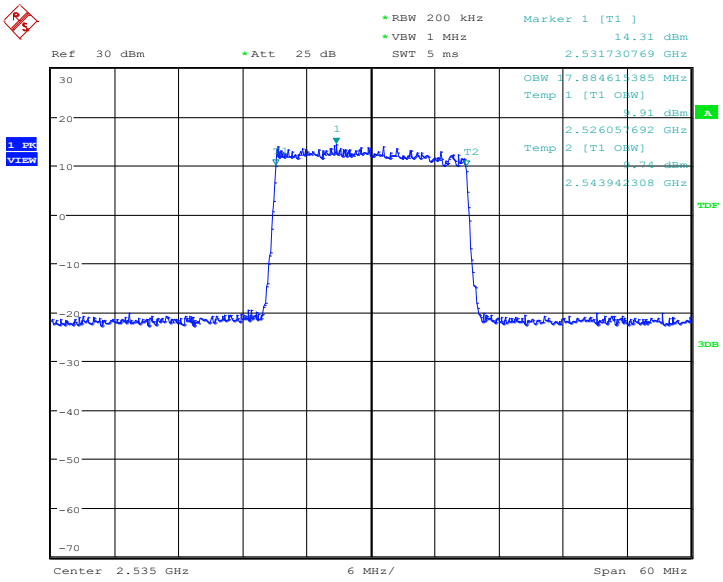
LTE band 7, 20MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	17884.62	17884.62	17884.62

LTE band 7, 20MHz Bandwidth, QPSK (99% BW)



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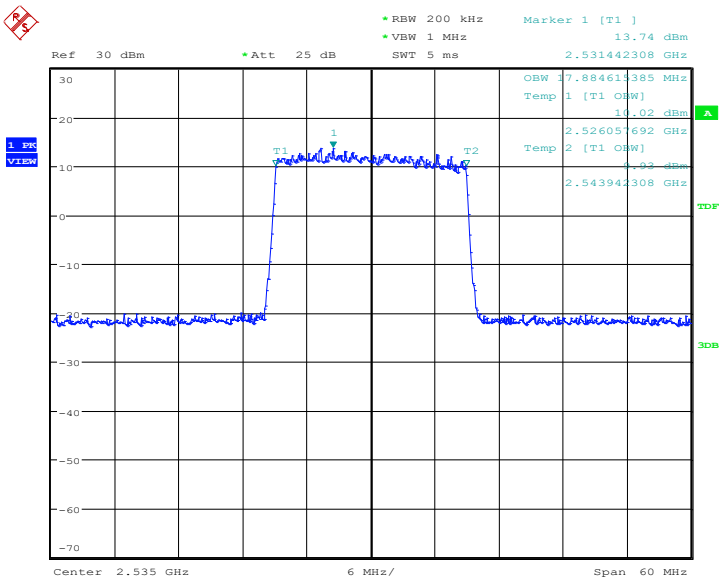
LTE band 7, 20MHz Bandwidth, 16QAM (99% BW)



Date: 16.MAR.2020 20:30:57

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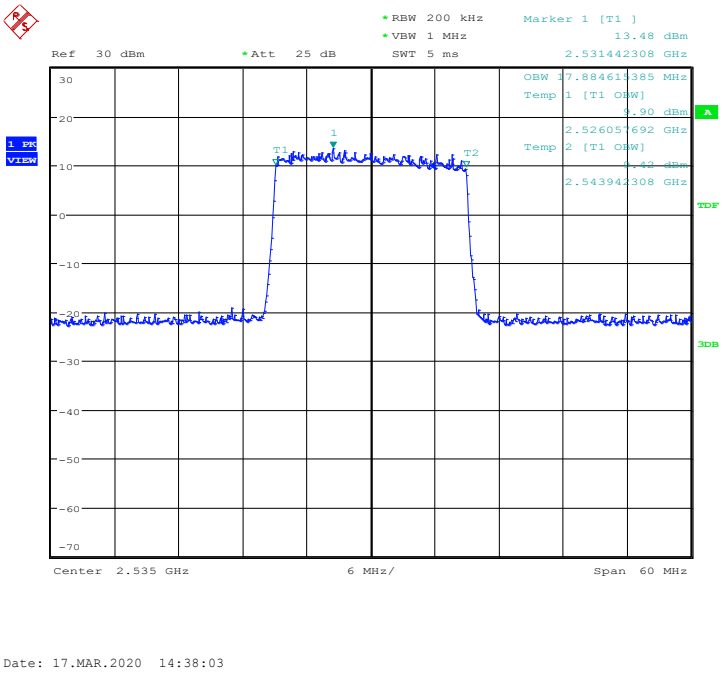
LTE band 7, 20MHz Bandwidth, 64QAM (99% BW)



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

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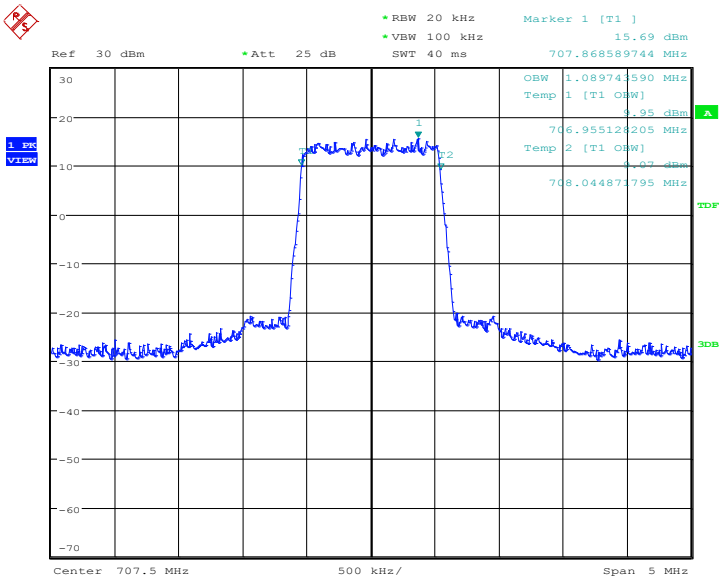
LTE band 12, 1.4MHz (99% BW)

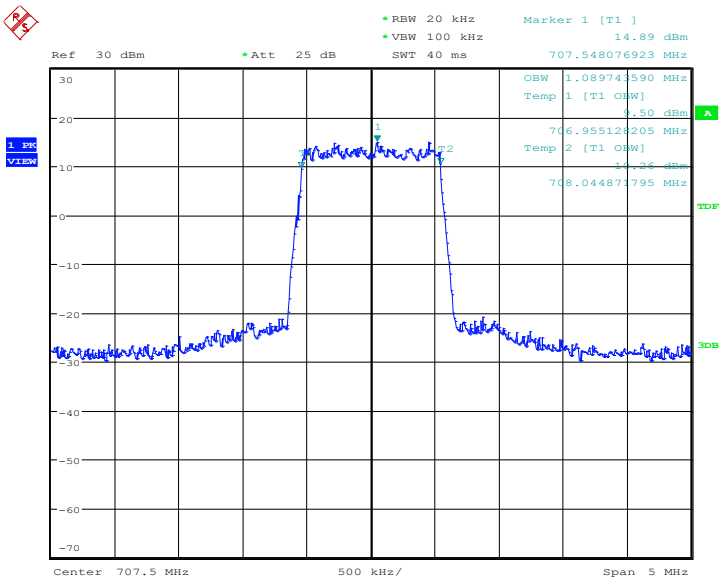
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
707.5	QPSK	16QAM	64QAM
	1089.74	1089.74	1089.74

LTE band 12, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 15:02:21

LTE band 12, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 15:02:35

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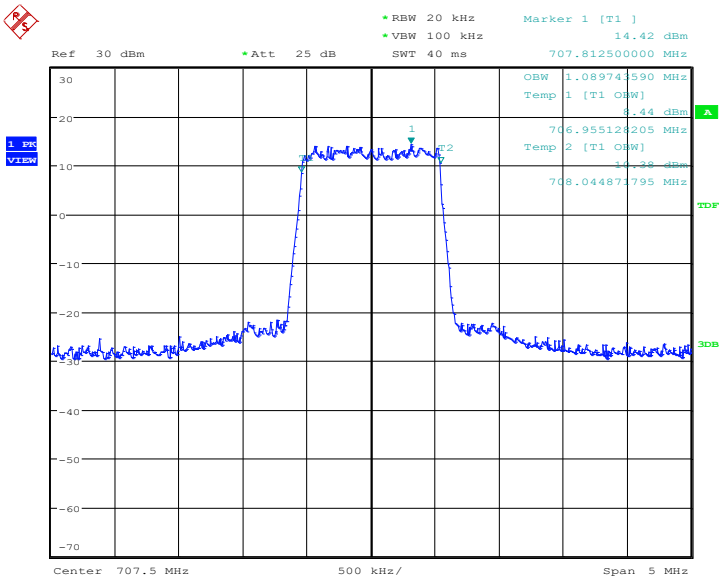
LTE band 12, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 18.MAR.2020 16:29:16

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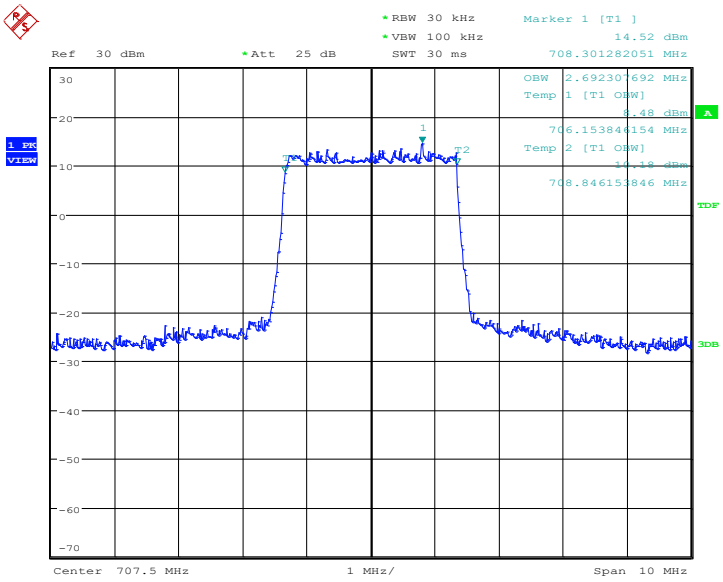
LTE band 12, 3MHz (99% BW)

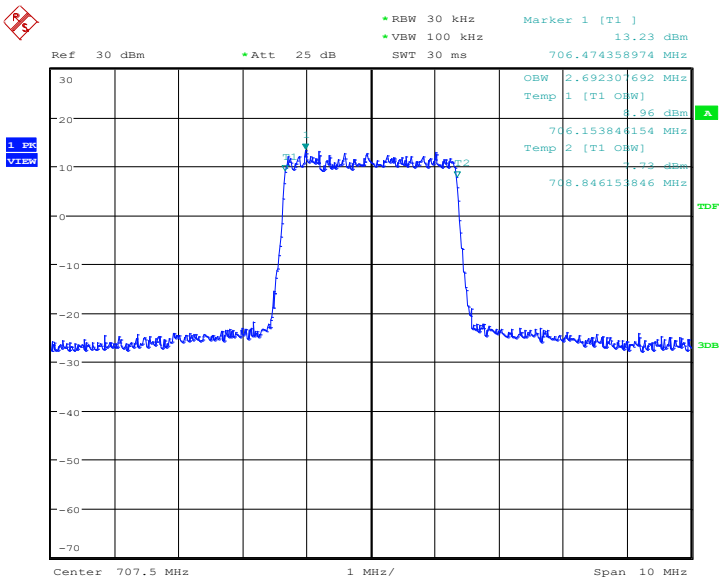
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
707.5	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

LTE band 12, 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 15:07:37

LTE band 12, 3MHz Bandwidth, 16QAM (99% BW)



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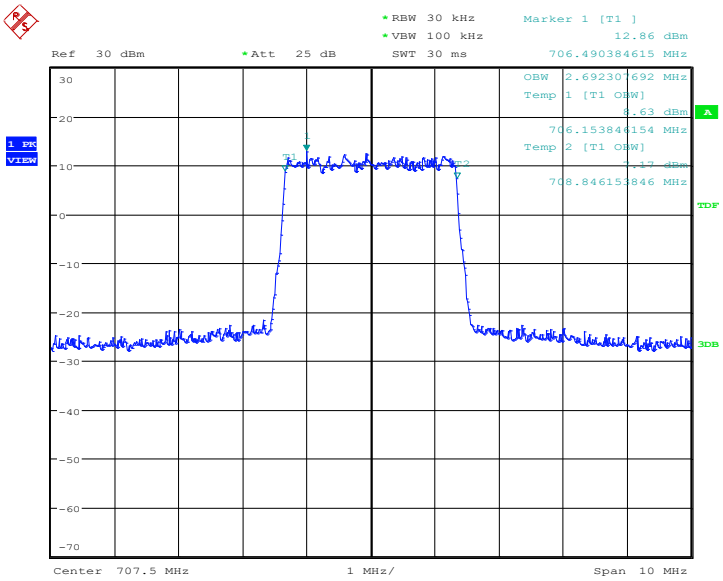
LTE band 12, 3MHz Bandwidth, 64QAM (99% BW)



Date: 18.MAR.2020 16:33:37

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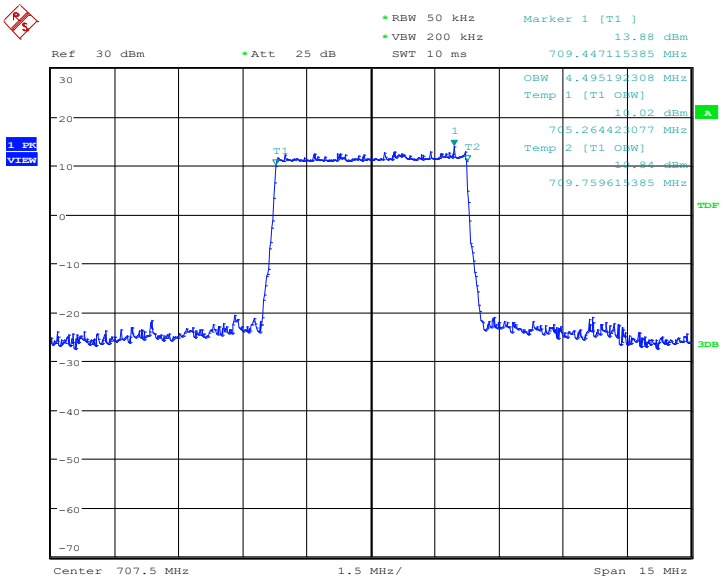
LTE band 12, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
707.5	QPSK	16QAM	64QAM
	4495.19	4495.19	4495.19

LTE band 12, 5MHz Bandwidth, QPSK (99% BW)



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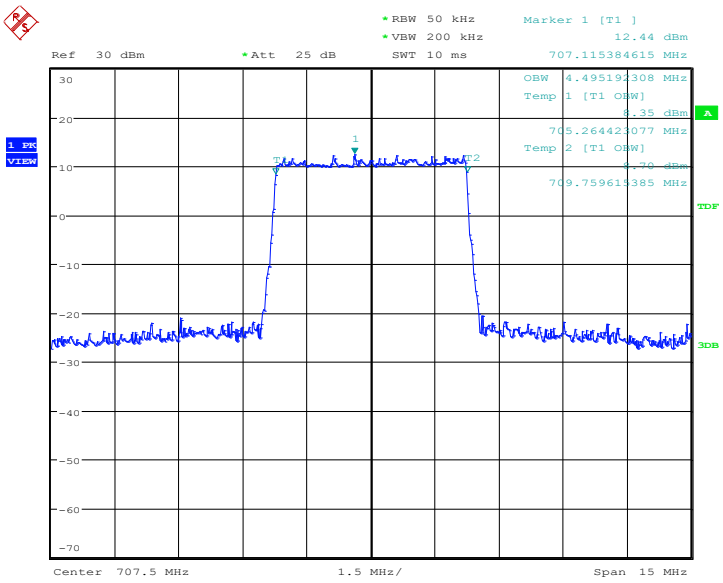
LTE band 12, 5MHz Bandwidth,16QAM (99% BW)



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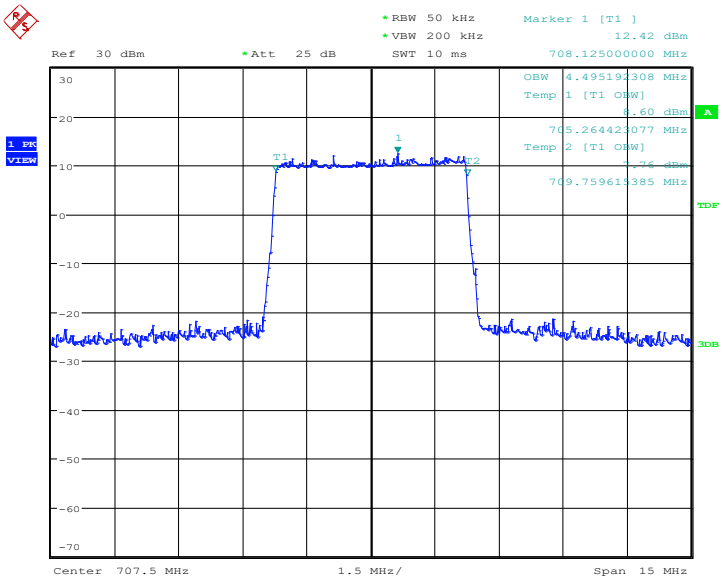
LTE band 12, 5MHz Bandwidth,64QAM (99% BW)



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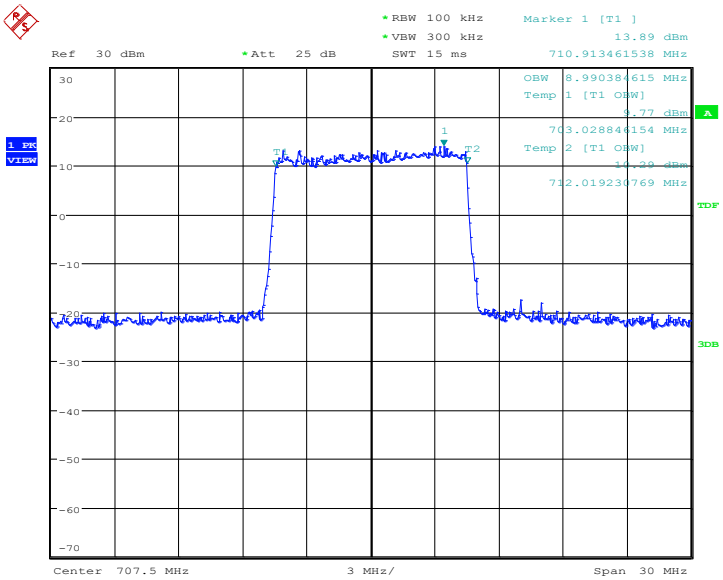
LTE band 12, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
707.5	QPSK	16QAM	64QAM
	8990.38	8990.38	8990.38

LTE band 12, 10MHz Bandwidth, QPSK (99% BW)



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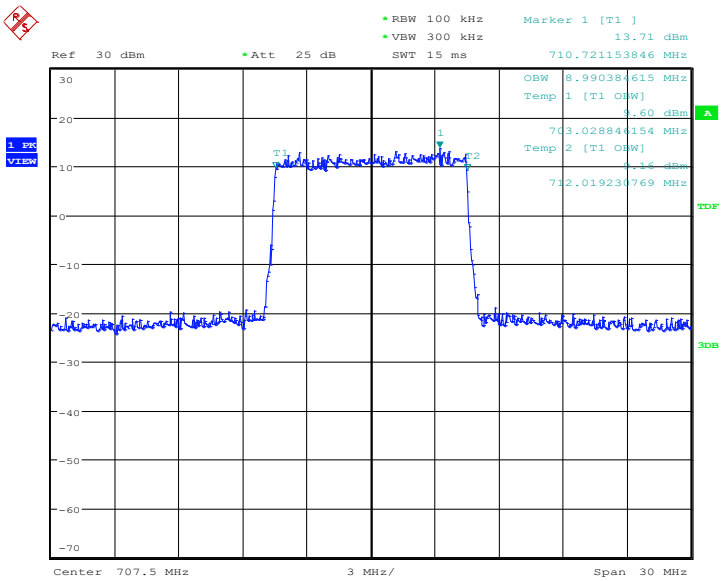
LTE band 12, 10MHz Bandwidth, 16QAM (99% BW)



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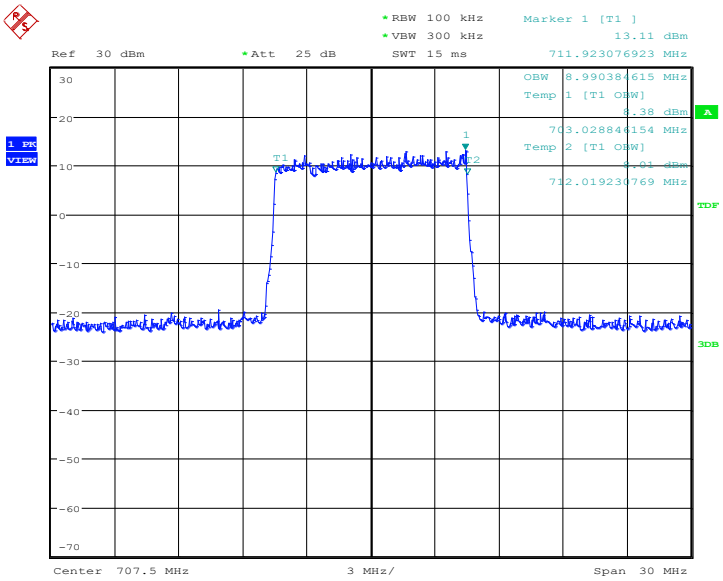
LTE band 12, 10MHz Bandwidth, 64QAM (99% BW)



Date: 19.MAR.2020 17:49:45

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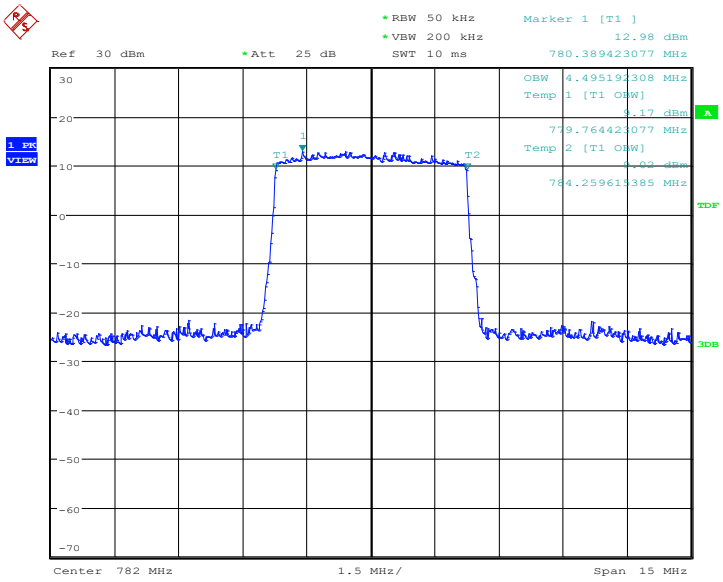
LTE band 13, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
782.0	QPSK	16QAM	64QAM
	4495.19	4471.15	4471.15

LTE band 13, 5MHz Bandwidth, QPSK (99% BW)



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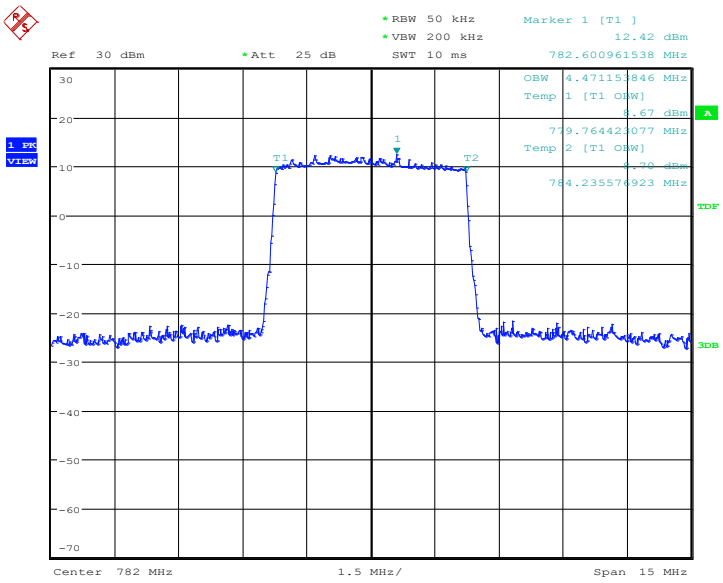
LTE band 13, 5MHz Bandwidth,16QAM (99% BW)



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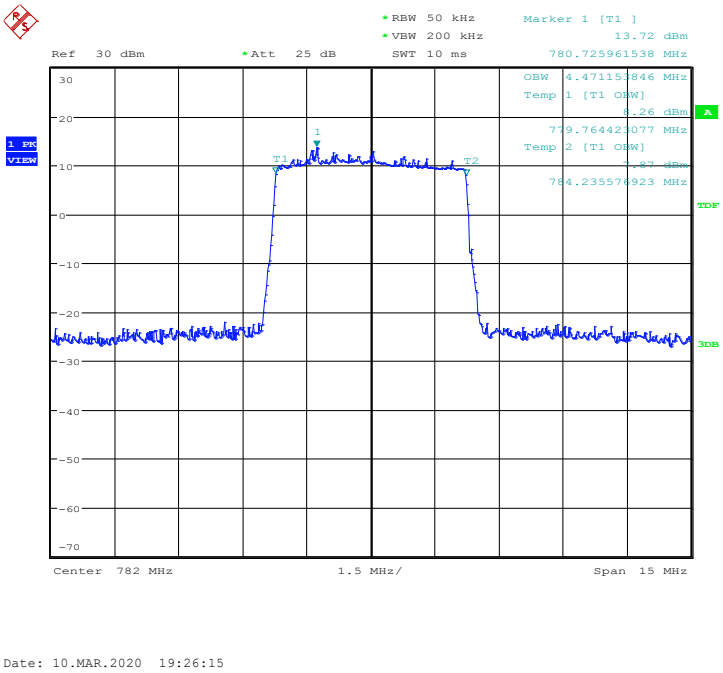
LTE band 13, 5MHz Bandwidth,64QAM (99% BW)



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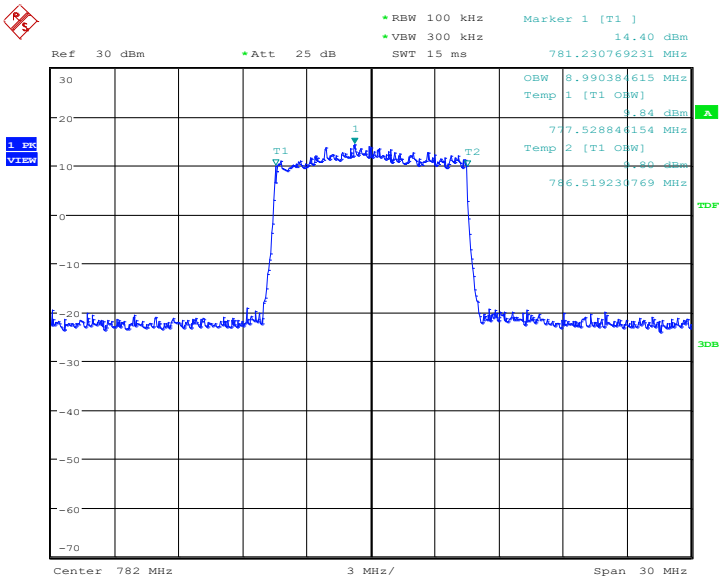
LTE band 13, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
782.0	QPSK	16QAM	64QAM
	8990.38	8942.31	8942.31

LTE band 13, 10MHz Bandwidth, QPSK (99% BW)



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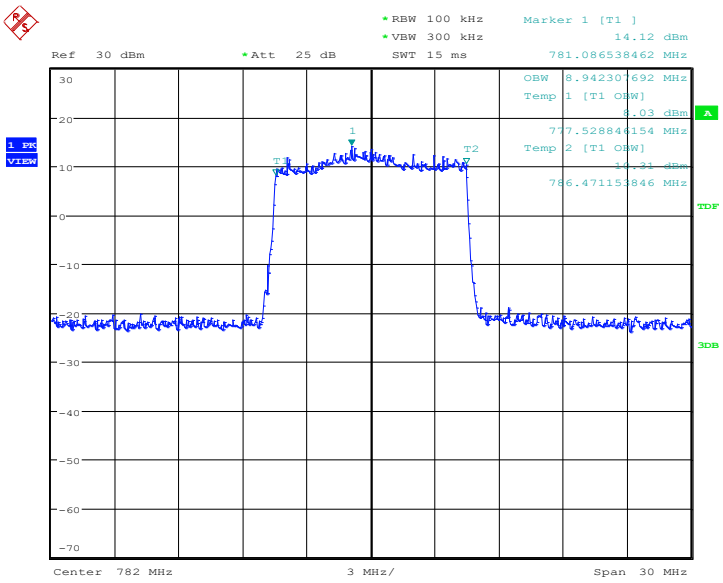
LTE band 13, 10MHz Bandwidth, 16QAM (99% BW)



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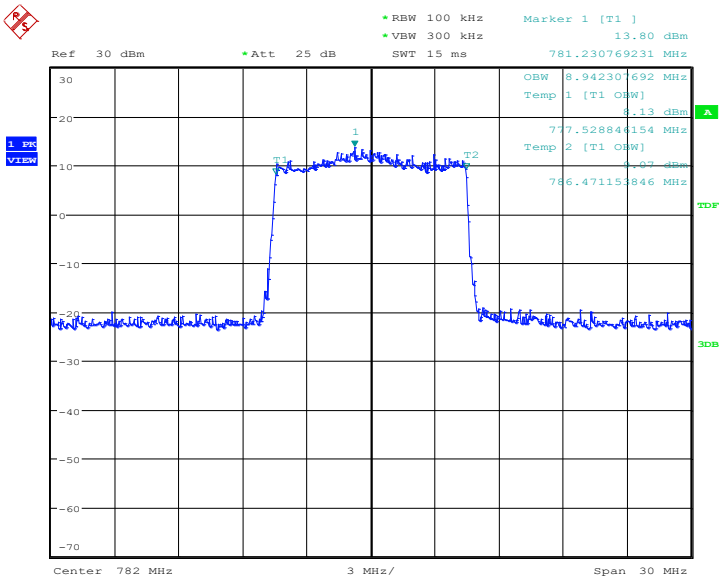
LTE band 13, 10MHz Bandwidth, 64QAM (99% BW)



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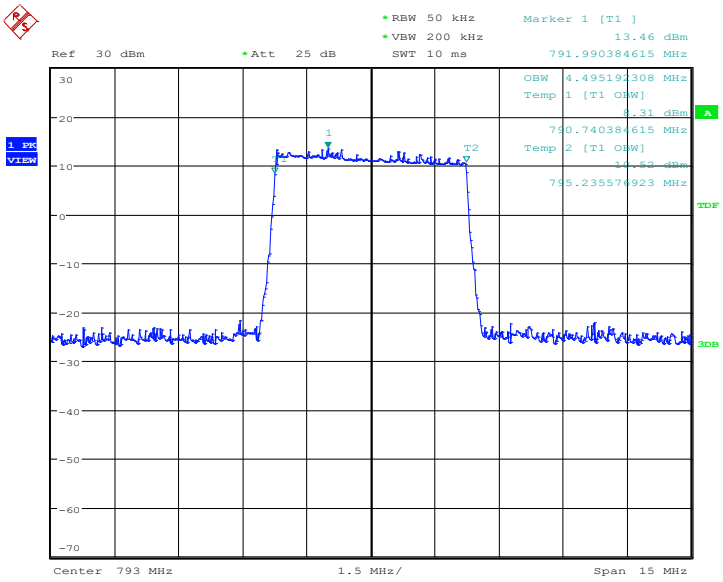
LTE band 14, 5MHz (99% BW)

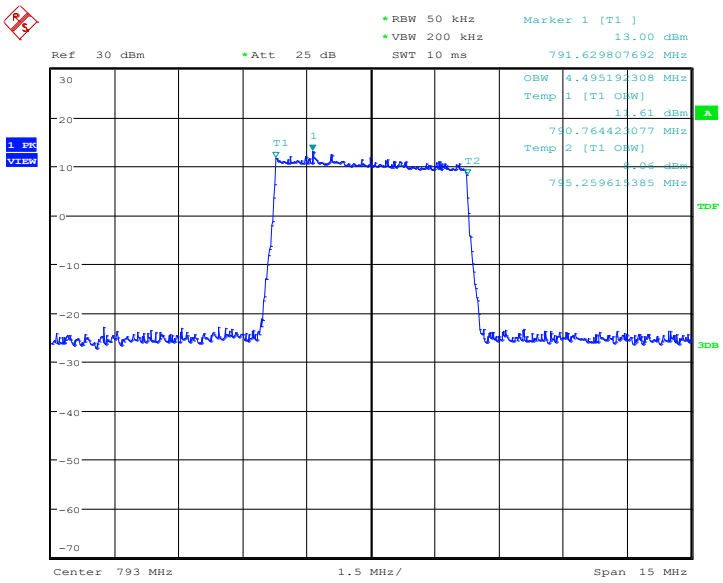
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
793.0	QPSK	16QAM	64QAM
	4495.19	4495.19	4519.23

LTE band 14, 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 15:51:15

LTE band 14, 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 15:51:29

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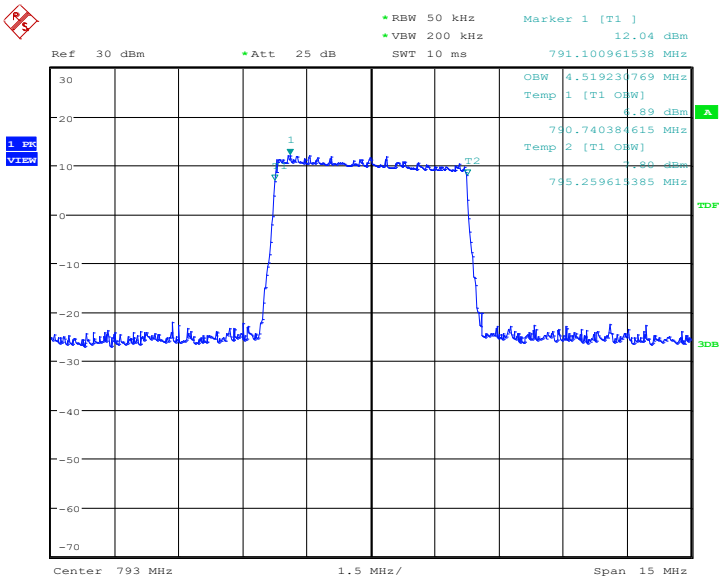
LTE band 14, 5MHz Bandwidth,64QAM (99% BW)



Date: 10.MAR.2020 20:26:09

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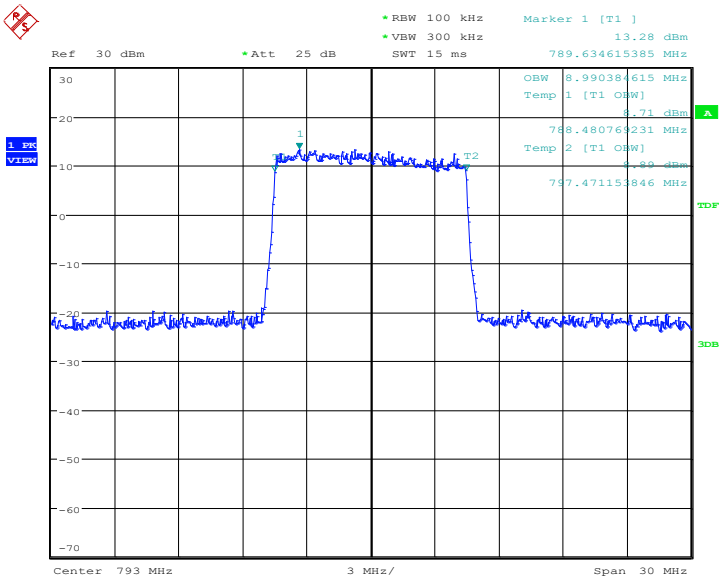
LTE band 14, 10MHz (99% BW)

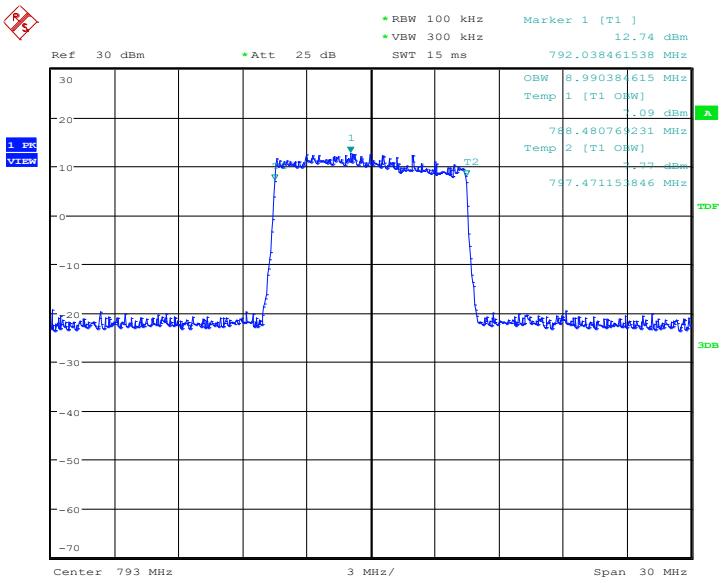
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
793.0	QPSK	16QAM	64QAM
	8990.38	8990.38	8942.31

LTE band 14, 10MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 15:56:31

LTE band 14, 10MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 15:56:44

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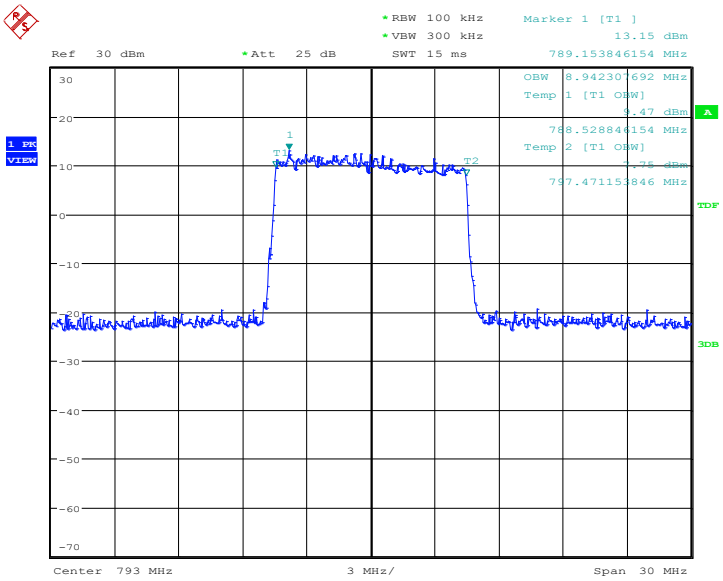
LTE band 14, 10MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:29:28

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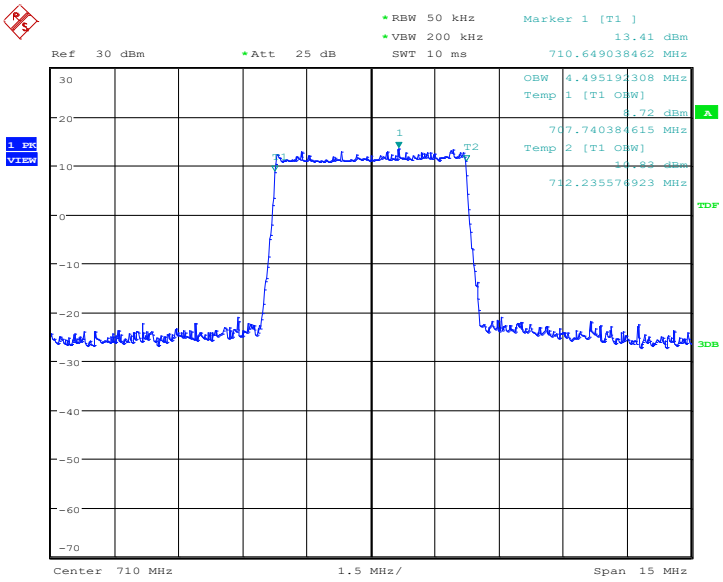
LTE band 17, 5MHz (99% BW)

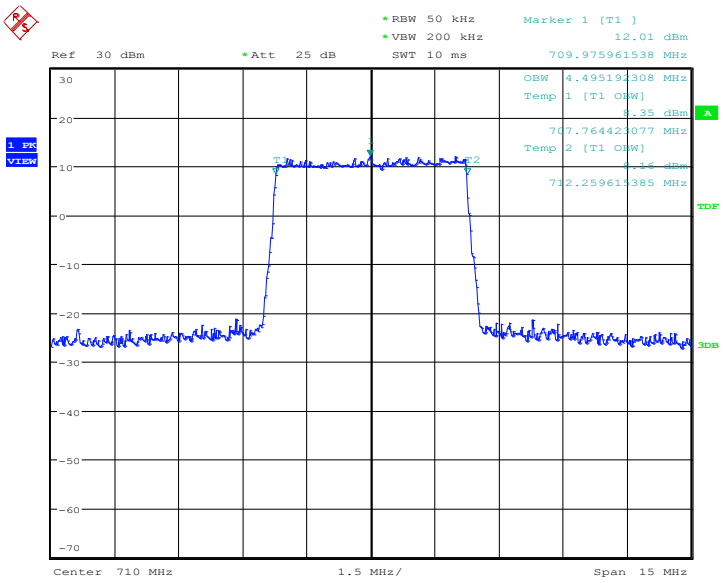
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
710.0	QPSK	16QAM	64QAM
	4495.19	4495.19	4495.19

LTE band 17, 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 16:01:53

LTE band 17, 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 16:02:07

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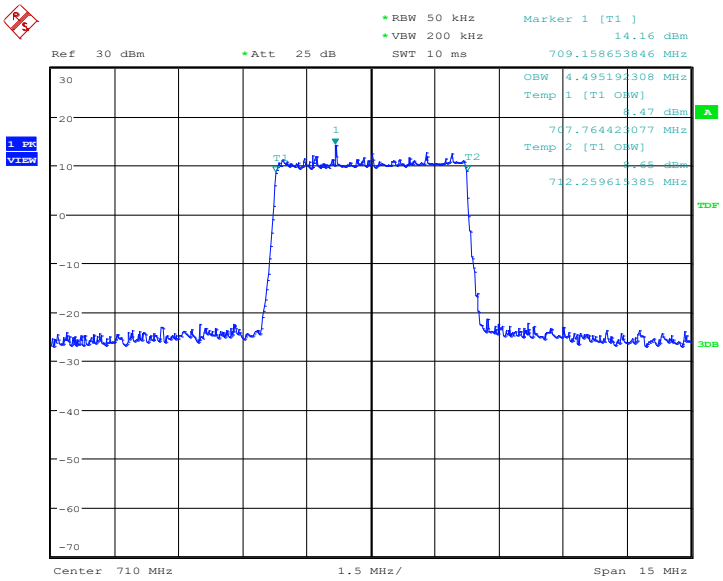
LTE band 17, 5MHz Bandwidth,64QAM (99% BW)



Date: 18.MAR.2020 15:47:49

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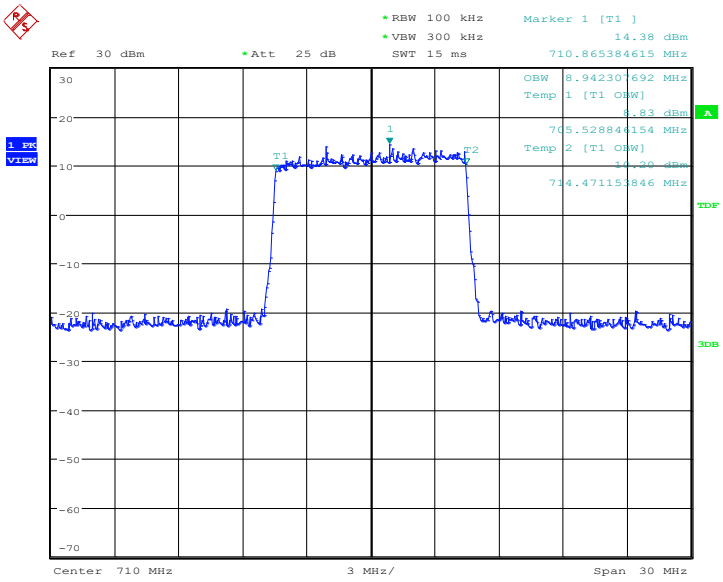
LTE band 17, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
710.0	QPSK	16QAM	64QAM
	8942.31	8942.31	8942.31

LTE band 17, 10MHz Bandwidth, QPSK (99% BW)



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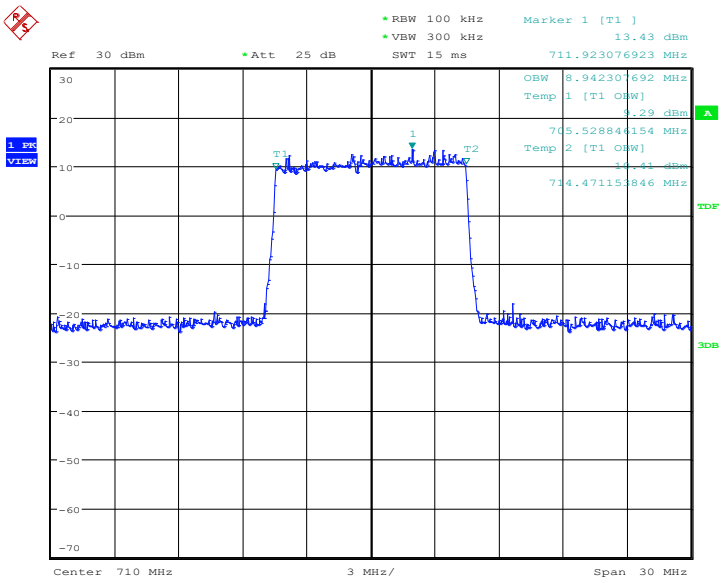
LTE band 17, 10MHz Bandwidth, 16QAM (99% BW)



Date: 18.MAR.2020 15:38:47

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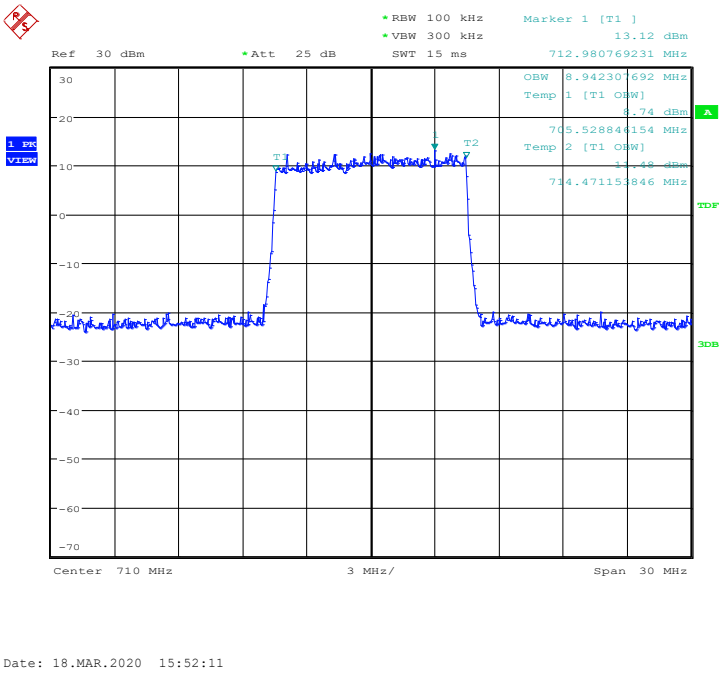
LTE band 17, 10MHz Bandwidth, 64QAM (99% BW)



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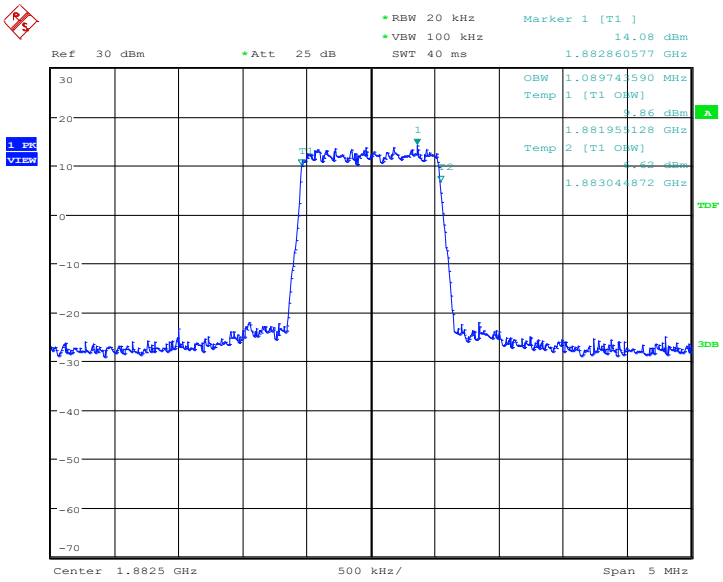
LTE band 25, 1.4MHz (99% BW)

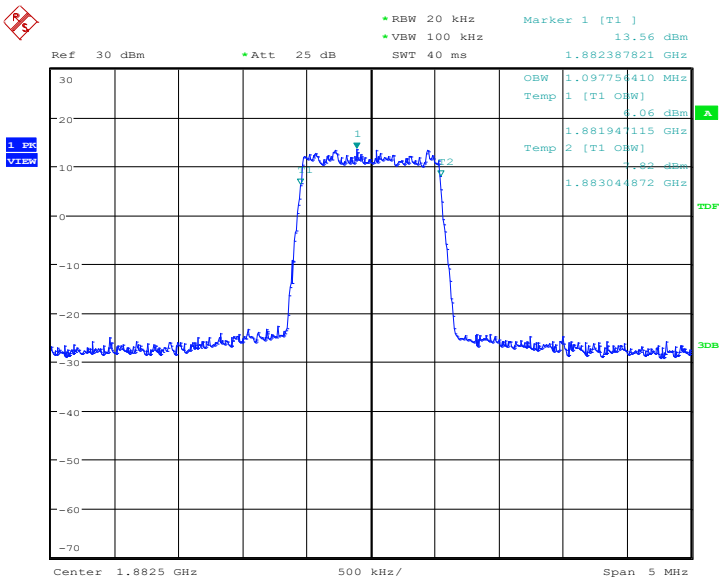
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1882.5	QPSK	16QAM	64QAM
	1089.74	1097.76	1097.76

LTE band 25, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 16:44:05

LTE band 25, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 16:44:19

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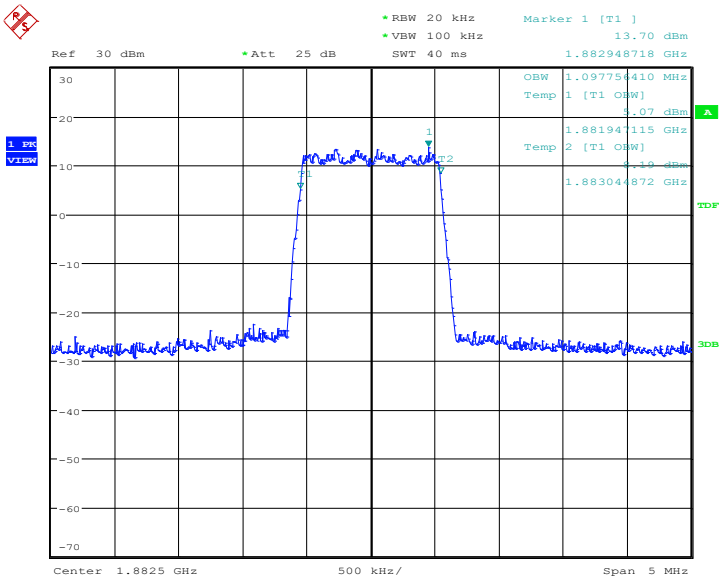
LTE band 25, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:32:53

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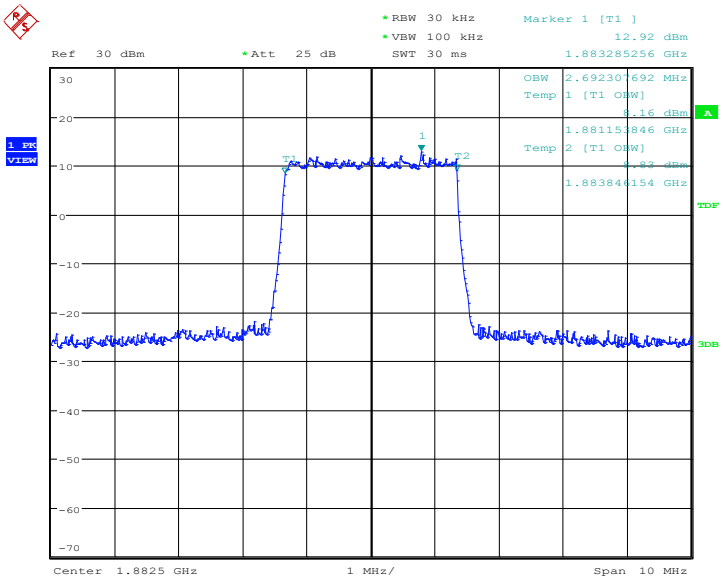
LTE band25, 3MHz (99% BW)

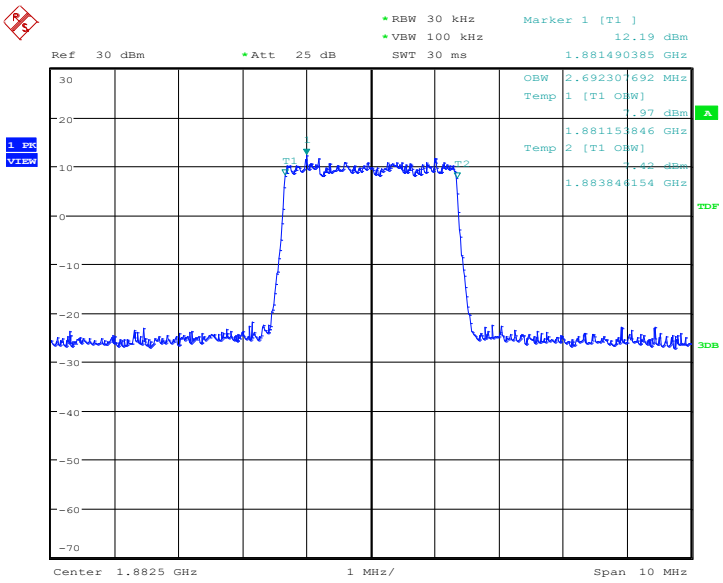
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1882.5	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

LTE band 25, 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 16:49:23

LTE band 25, 3MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 16:49:36

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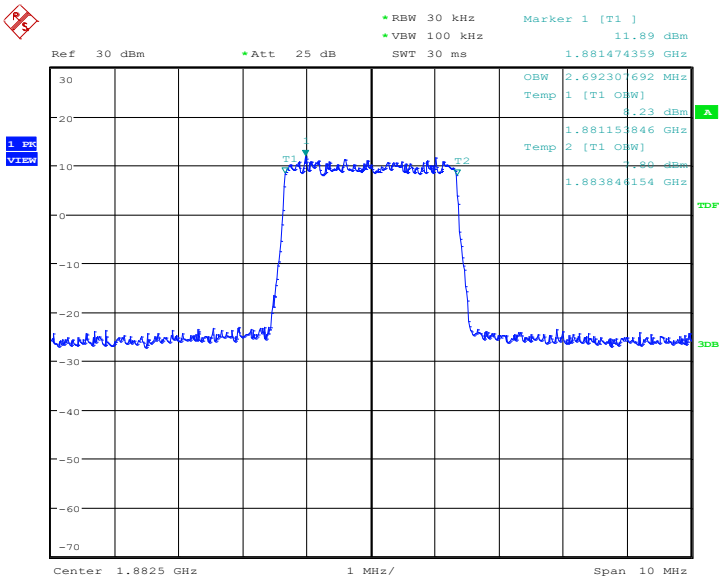
LTE band 25, 3MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:36:11

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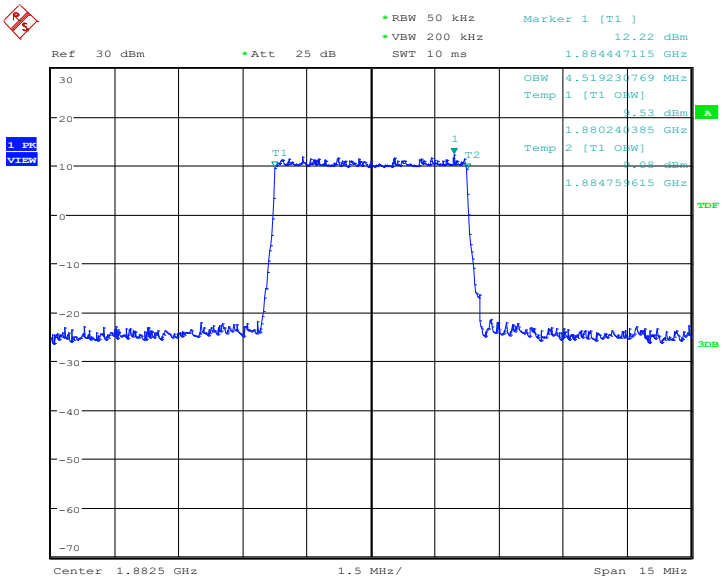
LTE band 25, 5MHz (99% BW)

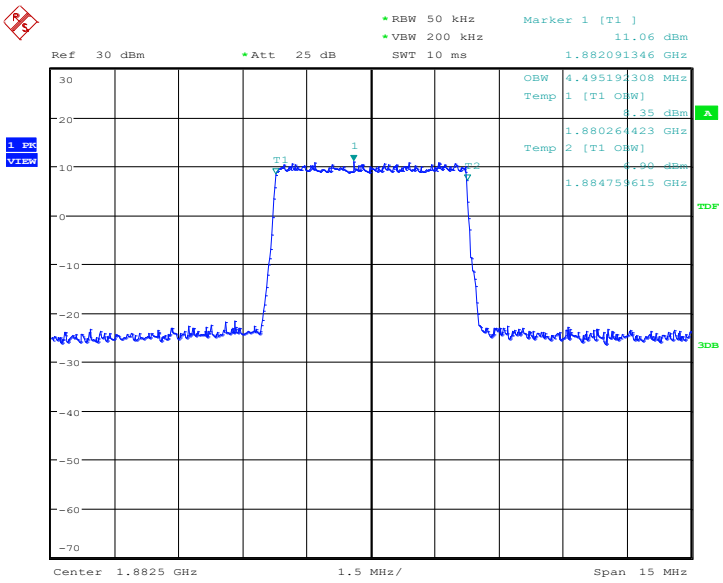
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1882.5	QPSK	16QAM	64QAM
	4519.23	4495.19	4471.15

LTE band 25, 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 16:54:38

LTE band 25, 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 16:54:52

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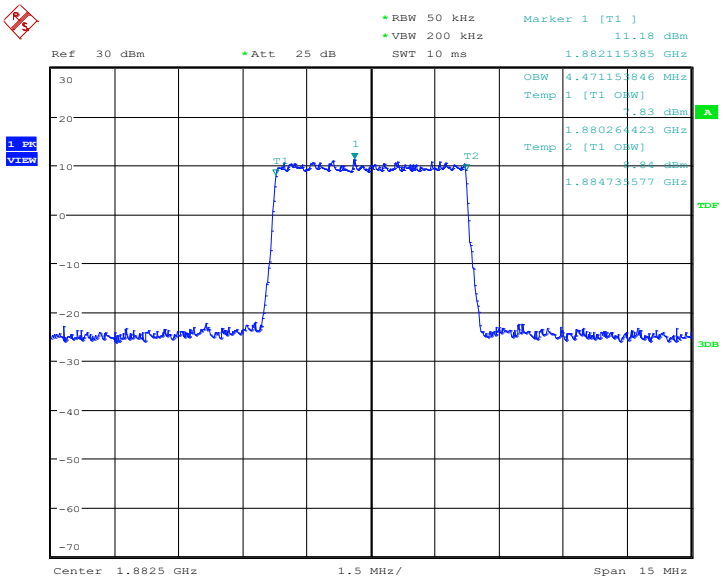
LTE band 25, 5MHz Bandwidth,64QAM (99% BW)



Date: 10.MAR.2020 20:39:30

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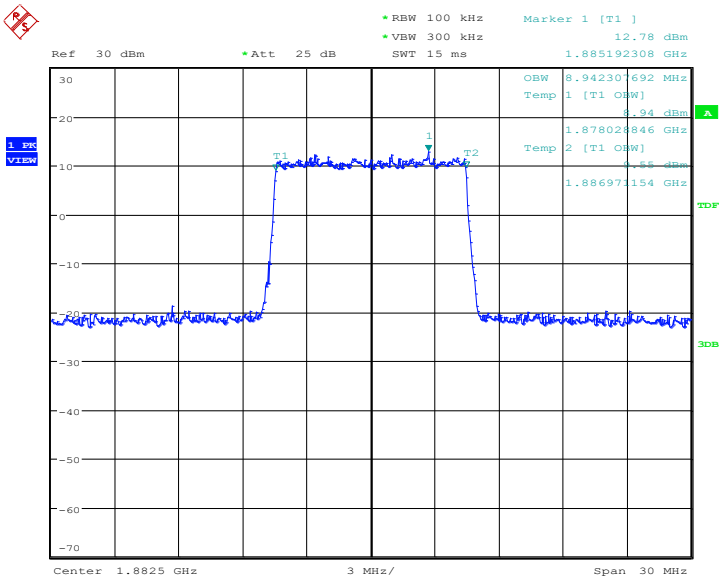
LTE band 25, 10MHz (99% BW)

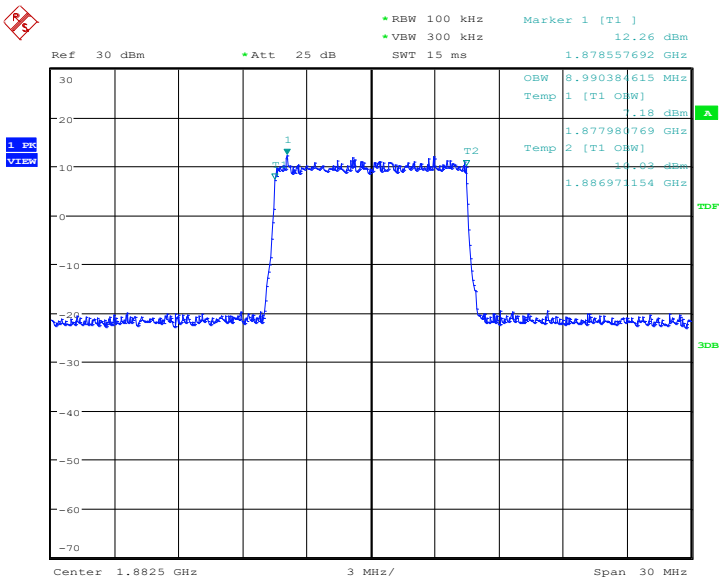
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1882.5	QPSK	16QAM	64QAM
	8942.31	8990.38	8942.31

LTE band 25, 10MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 16:59:58

LTE band 25, 10MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 17:00:12

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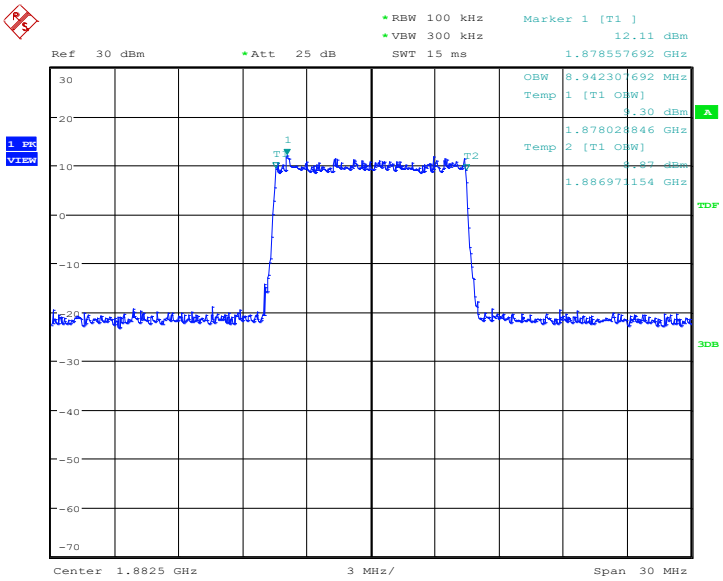
LTE band 25, 10MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:42:49

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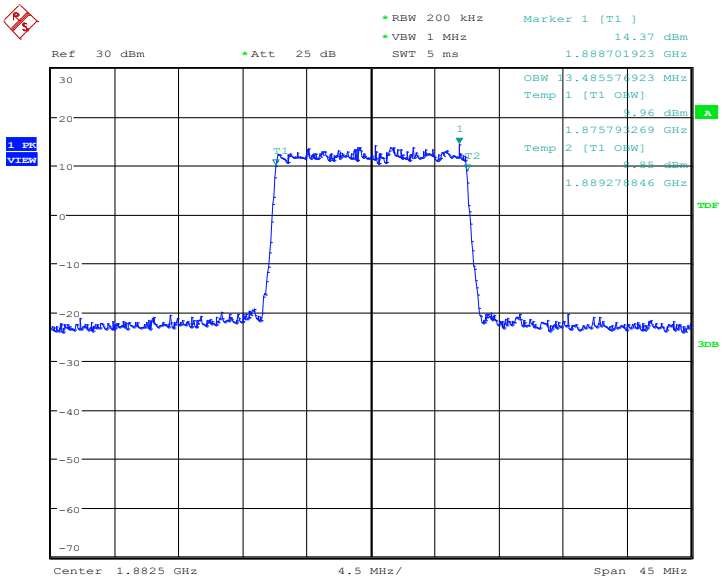
LTE band 25, 15MHz (99% BW)

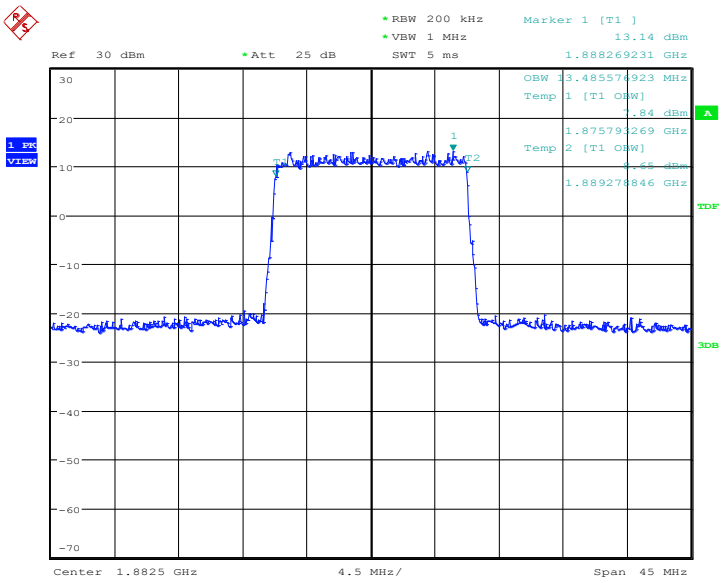
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1882.5	QPSK	16QAM	64QAM
	13485.58	13485.58	13557.69

LTE band 25, 15MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 17:08:44

LTE band 25, 15MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 17:08:58

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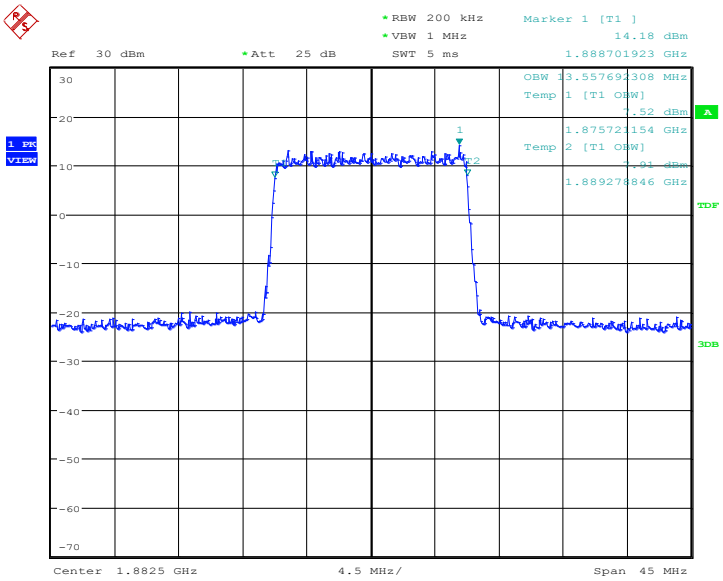
LTE band 25, 15MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:46:08

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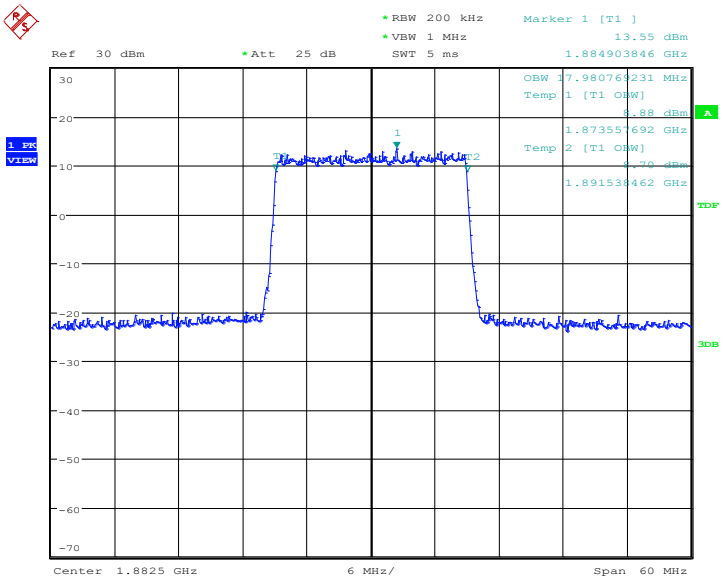
LTE band 25, 20MHz (99% BW)

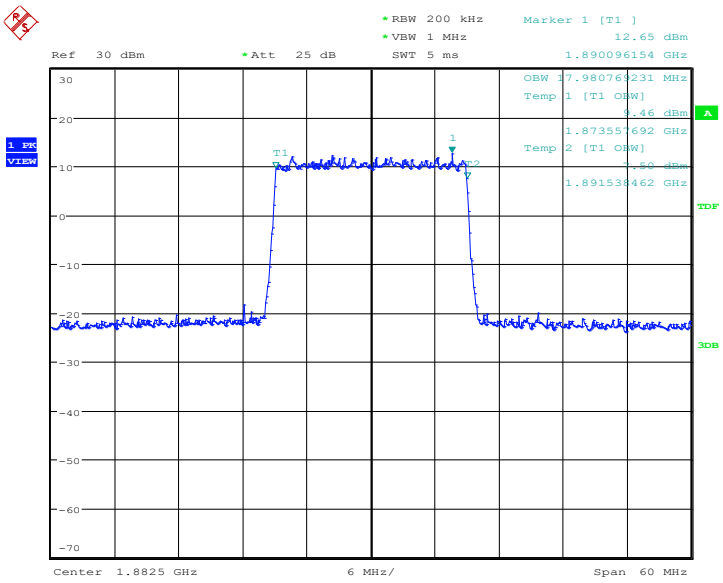
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1882.5	QPSK	16QAM	64QAM
	17980.77	17980.77	17980.77

LTE band 25, 20MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 17:24:37

LTE band 25, 20MHz Bandwidth, 16QAM (99% BW)



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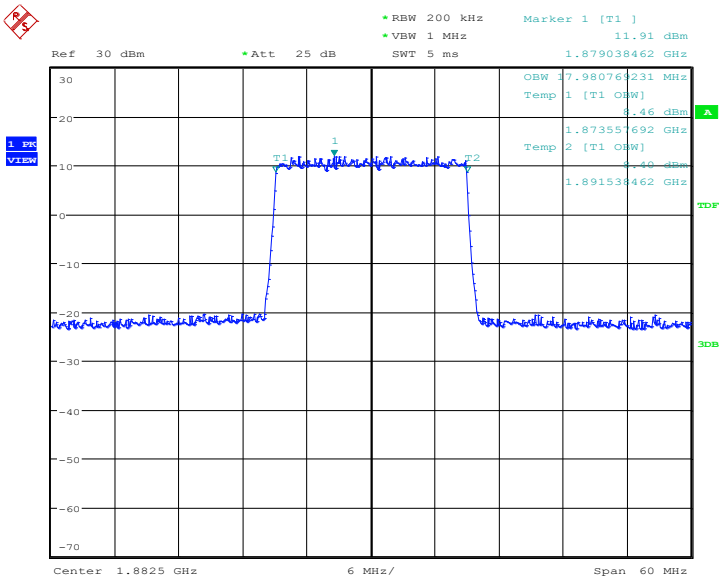
LTE band 25, 20MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:49:28

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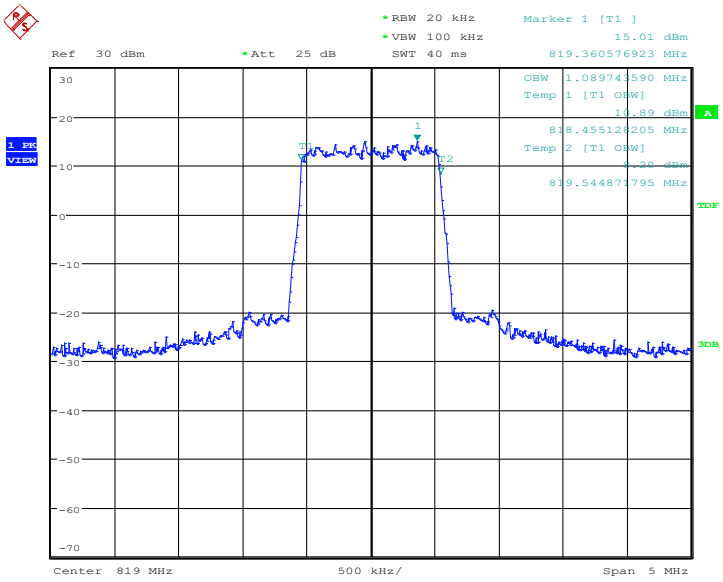
LTE band 26(814MHz-824MHz), 1.4MHz (99% BW)

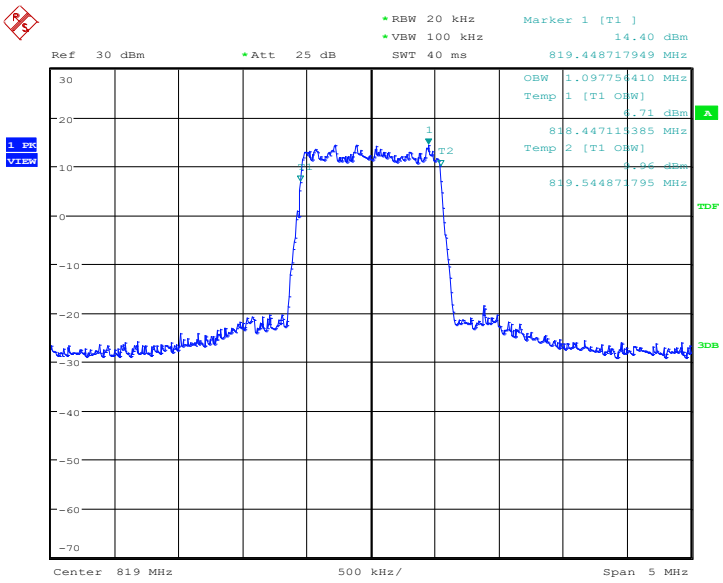
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
819.0	QPSK	16QAM	64QAM
	1089.74	1097.76	1089.74

LTE band 26(814MHz-824MHz), 1.4MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:17:03

LTE band 26(814MHz-824MHz), 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 18:17:17

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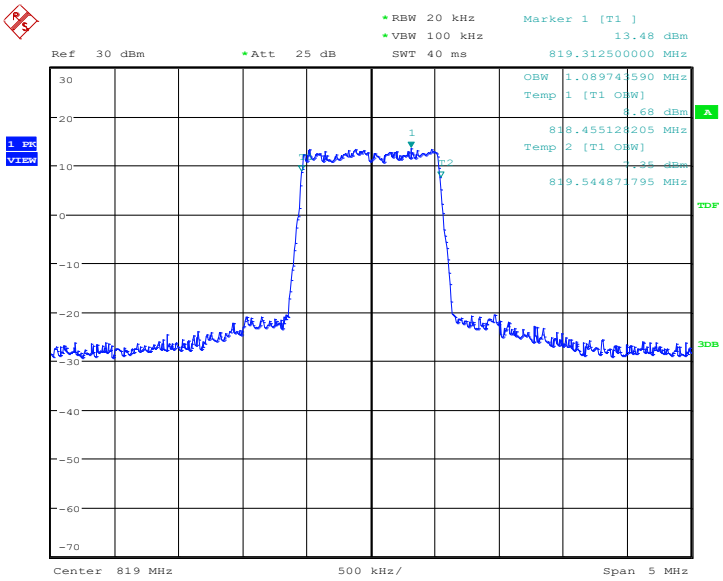
LTE band 26(814MHz-824MHz), 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:09:32

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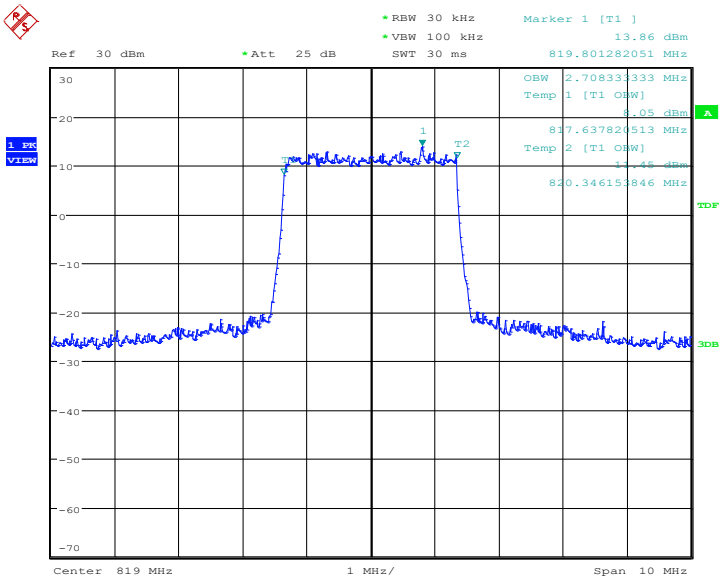
LTE band 26(814MHz-824MHz), 3MHz (99% BW)

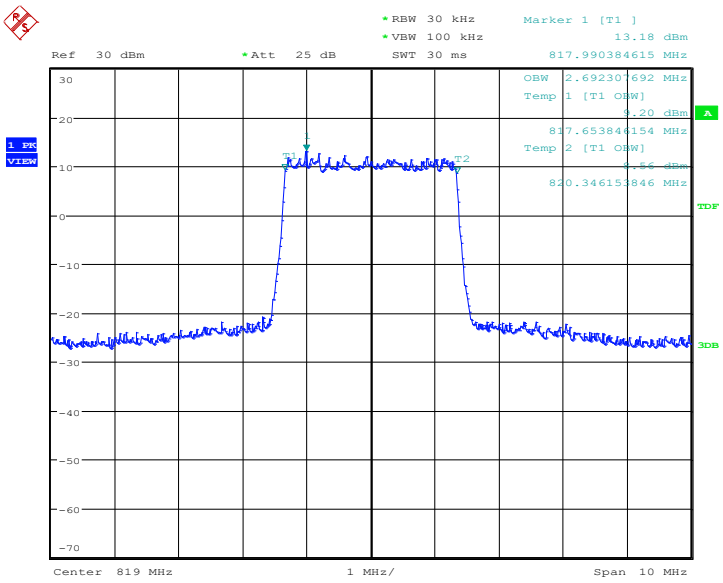
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
819.0	QPSK	16QAM	64QAM
	2708.33	2692.31	2692.31

LTE band 26(814MHz-824MHz), 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:22:18

LTE band 26(814MHz-824MHz), 3MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 18:22:32

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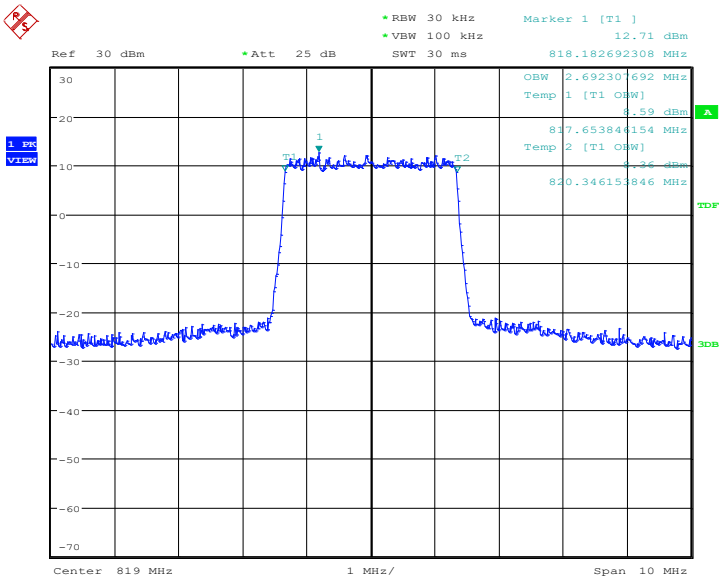
LTE band 26(814MHz-824MHz), 3MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:12:51

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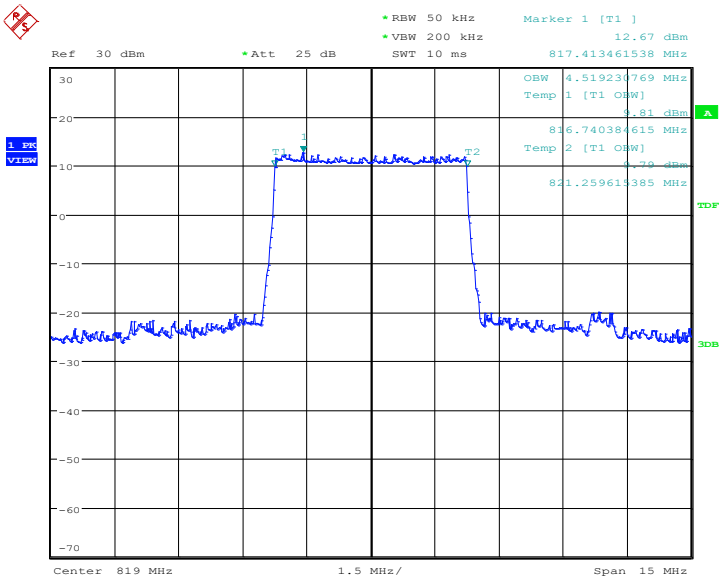
LTE band 26(814MHz-824MHz), 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
819.0	QPSK	16QAM	64QAM
	4519.23	4519.23	4519.23

LTE band 26(814MHz-824MHz), 5MHz Bandwidth, QPSK (99% BW)



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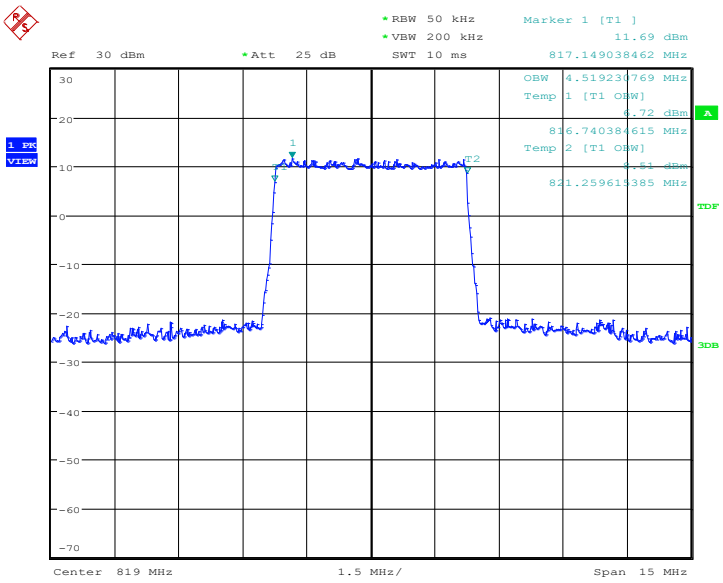
LTE band 26(814MHz-824MHz), 5MHz Bandwidth,16QAM (99% BW)



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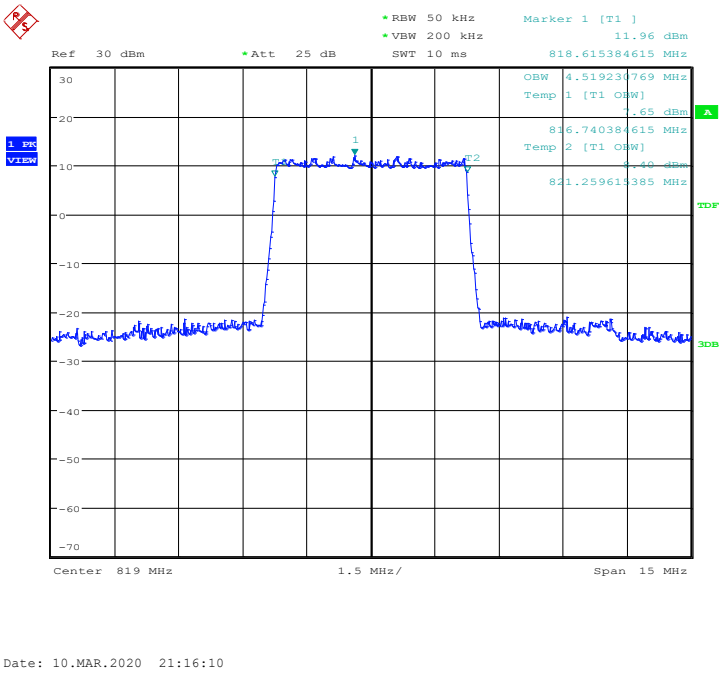
LTE band 26(814MHz-824MHz), 5MHz Bandwidth,64QAM (99% BW)



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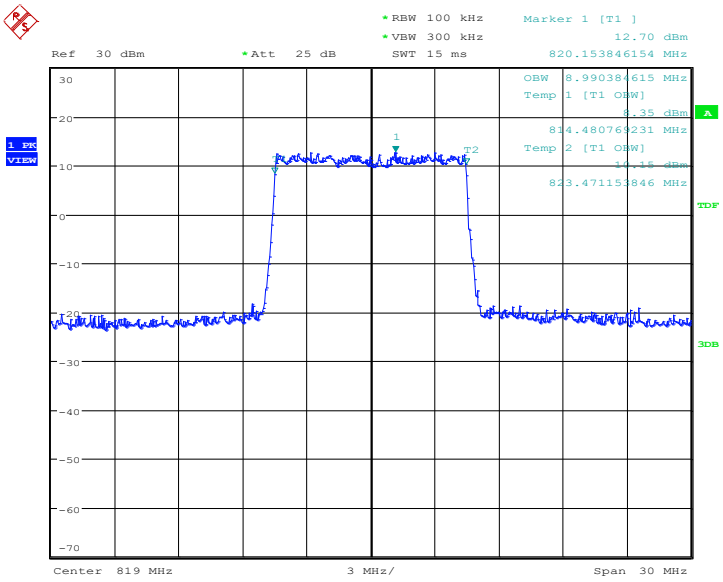
LTE band 26(814MHz-824MHz), 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
819.0	QPSK	16QAM	64QAM
	8990.38	8990.38	8990.38

LTE band 26(814MHz-824MHz), 10MHz Bandwidth, QPSK (99% BW)



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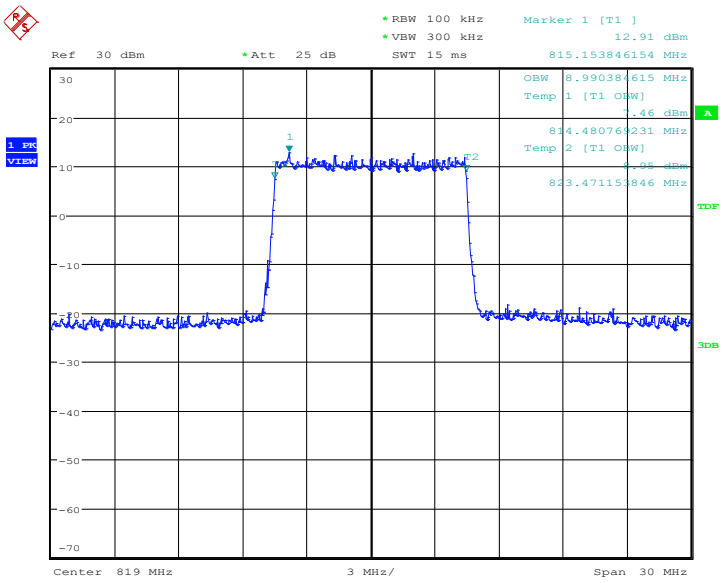
LTE band 26(814MHz-824MHz), 10MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 18:33:03

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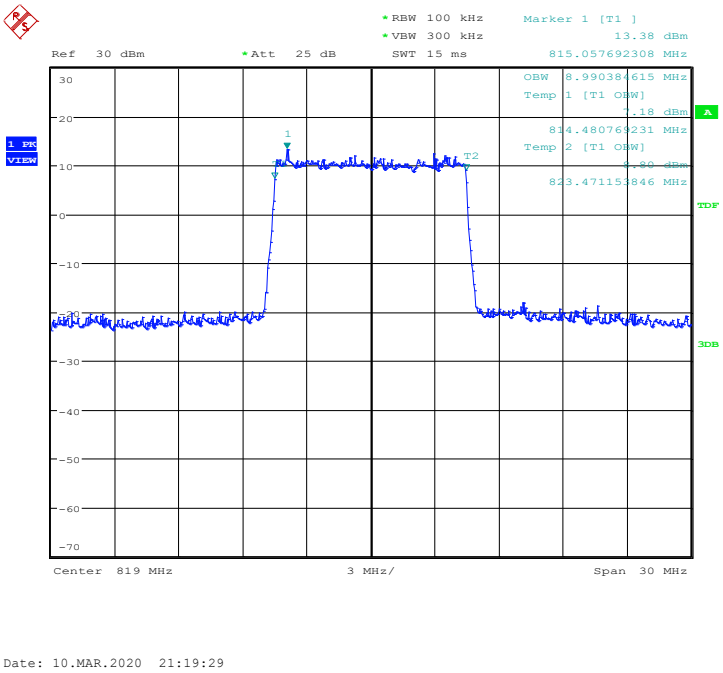
LTE band 26(814MHz-824MHz), 10MHz Bandwidth, 64QAM (99% BW)



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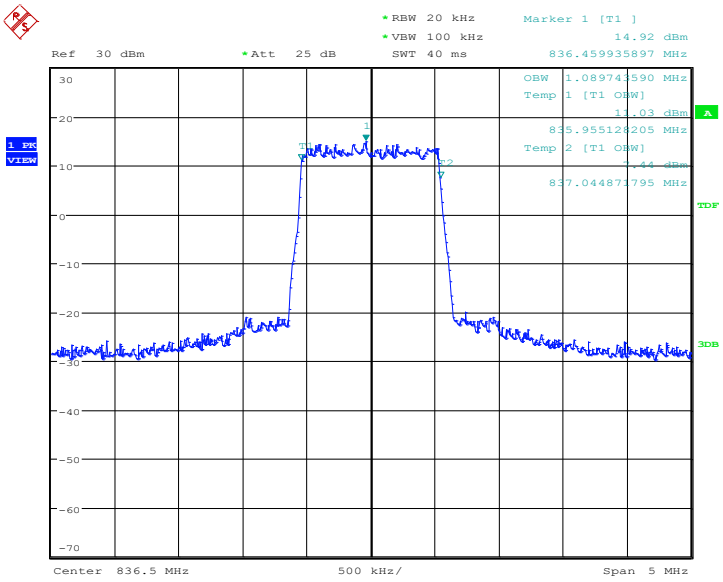
LTE band 26(824MHz-849MHz), 1.4MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	1089.74	1097.76	1089.74

LTE band 26(824MHz-849MHz), 1.4MHz Bandwidth, QPSK (99% BW)



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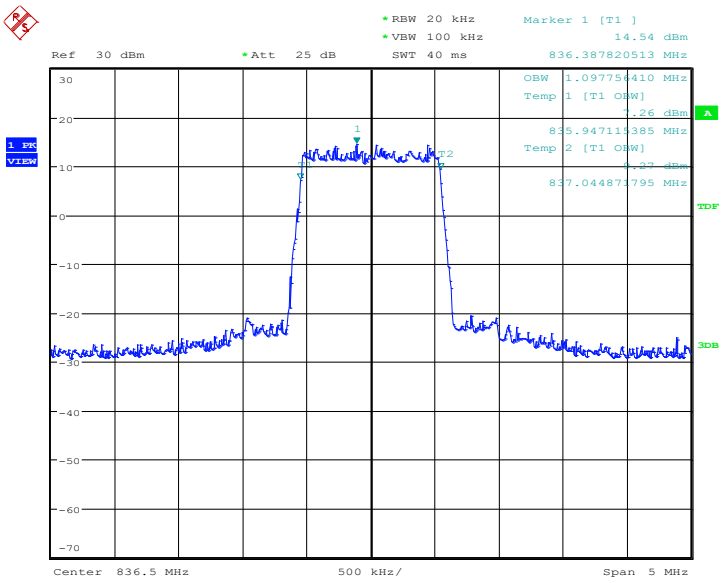
LTE band 26(824MHz-849MHz), 1.4MHz Bandwidth, 16QAM (99% BW)



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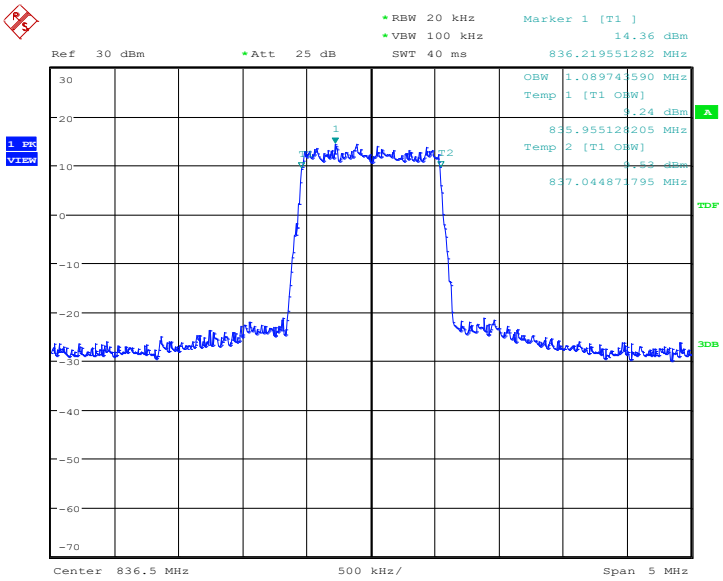
LTE band 26(824MHz-849MHz), 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:52:51

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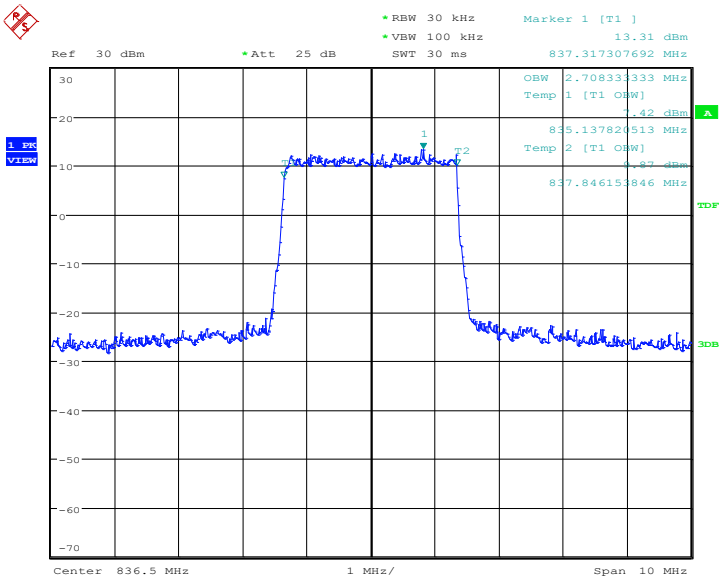
LTE band 26(824MHz-849MHz), 3MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	2708.33	2692.31	2692.31

LTE band 26(824MHz-849MHz), 3MHz Bandwidth, QPSK (99% BW)



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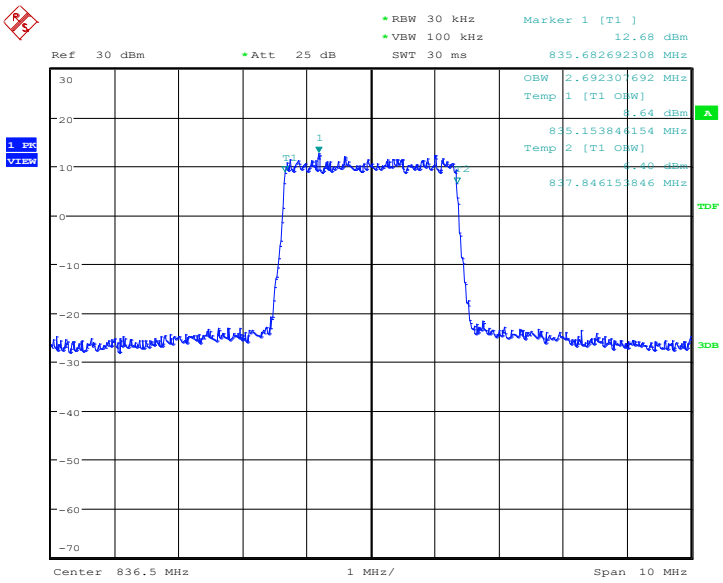
LTE band 26(824MHz-849MHz), 3MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 17:56:02

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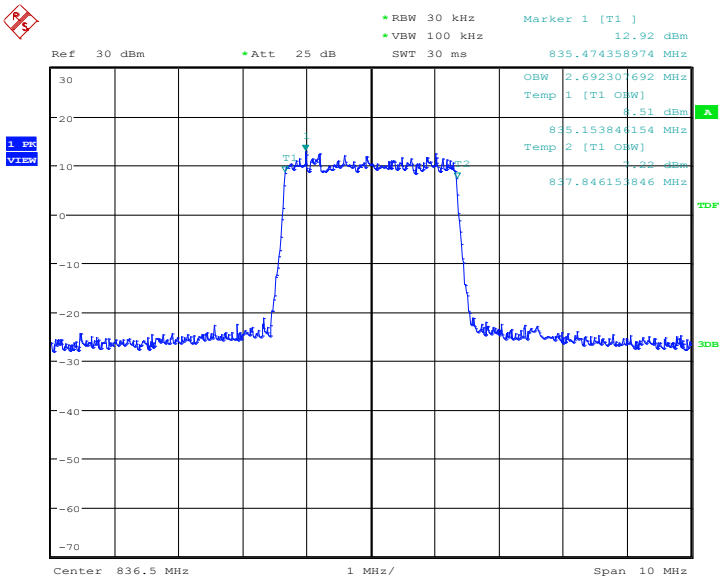
LTE band 26(824MHz-849MHz), 3MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 20:56:10

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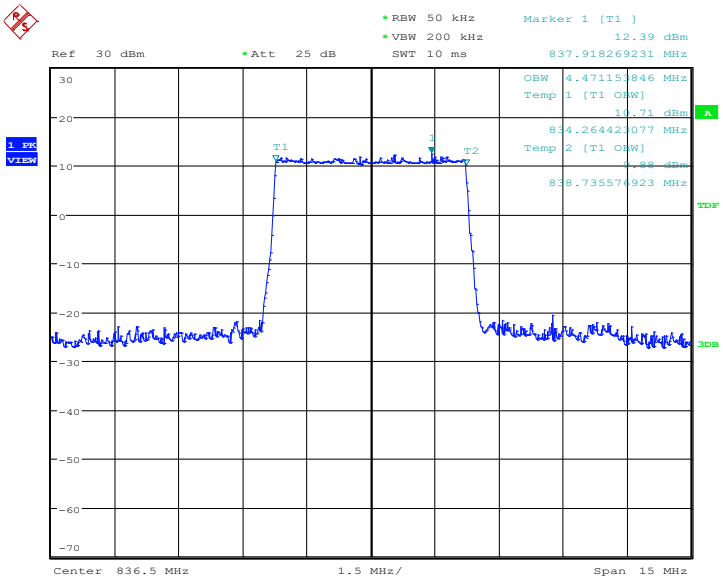
LTE band 26(824MHz-849MHz), 5MHz (99% BW)

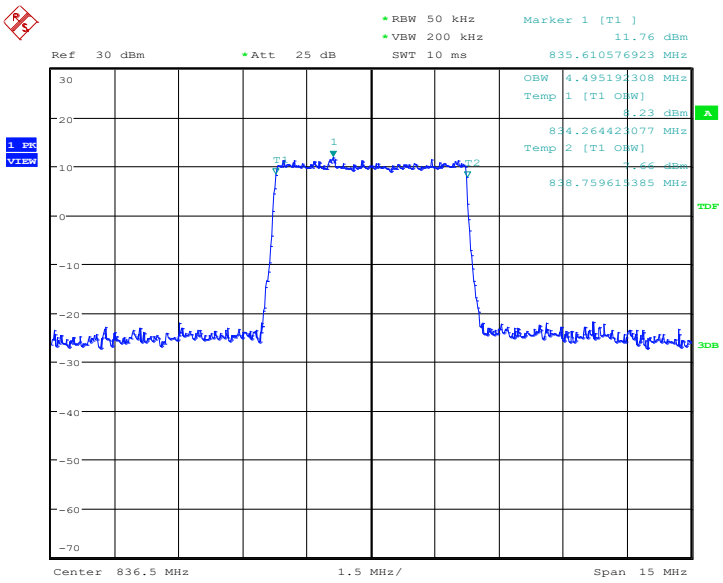
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	4471.15	4495.19	4495.19

LTE band 26(824MHz-849MHz), 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:01:03

LTE band 26(824MHz-849MHz), 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 18:01:17

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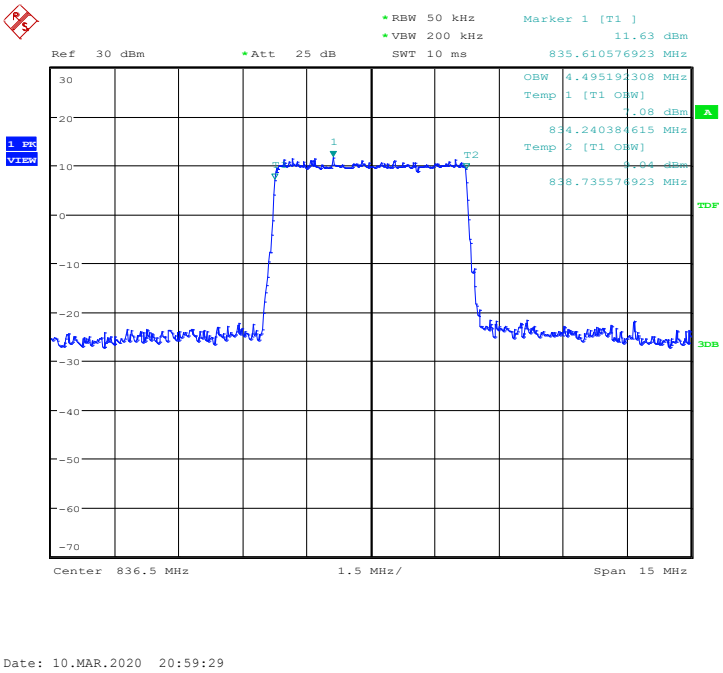
LTE band 26(824MHz-849MHz), 5MHz Bandwidth,64QAM (99% BW)



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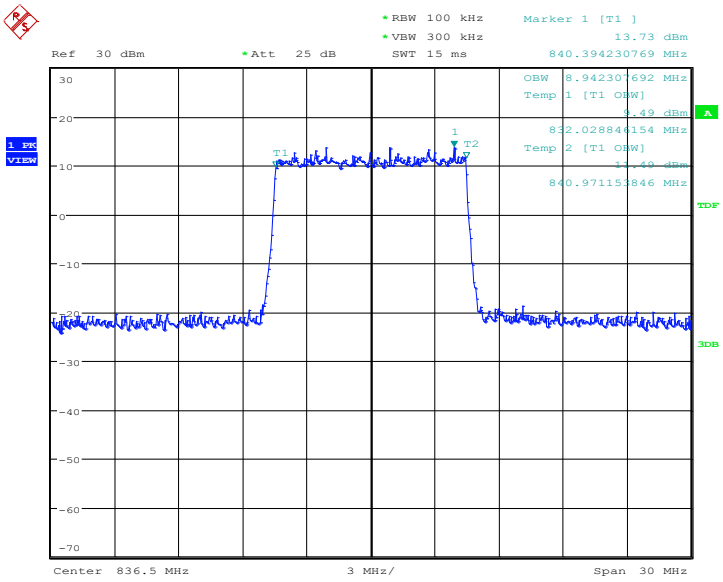
LTE band 26(824MHz-849MHz), 10MHz (99% BW)

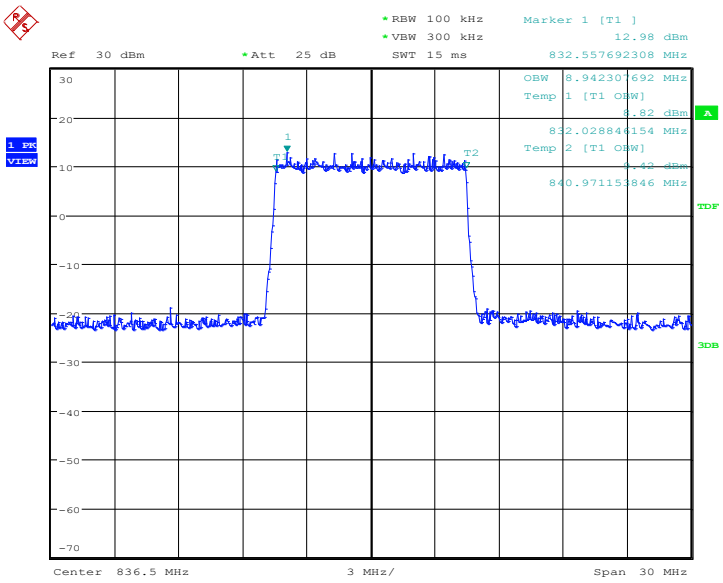
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	8942.31	8942.31	8942.31

LTE band 26(824MHz-849MHz), 10MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:06:19

LTE band 26(824MHz-849MHz), 10MHz Bandwidth, 16QAM (99% BW)



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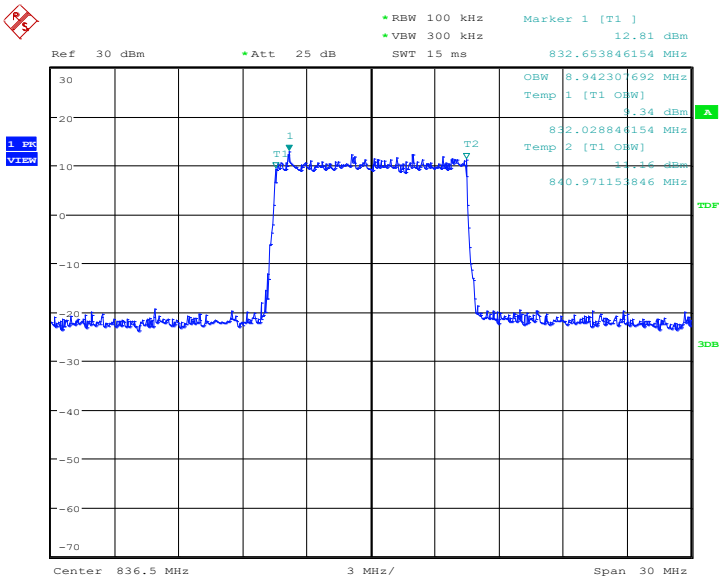
LTE band 26(824MHz-849MHz), 10MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:02:48

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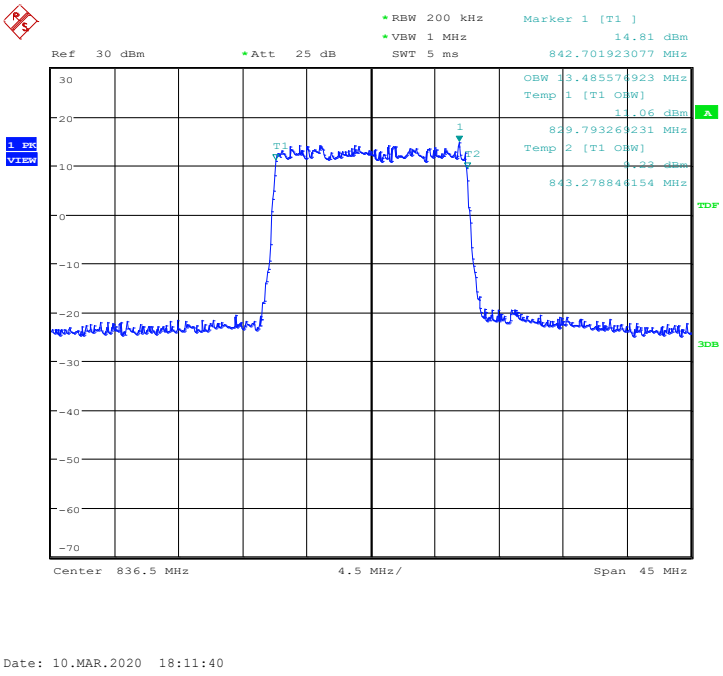
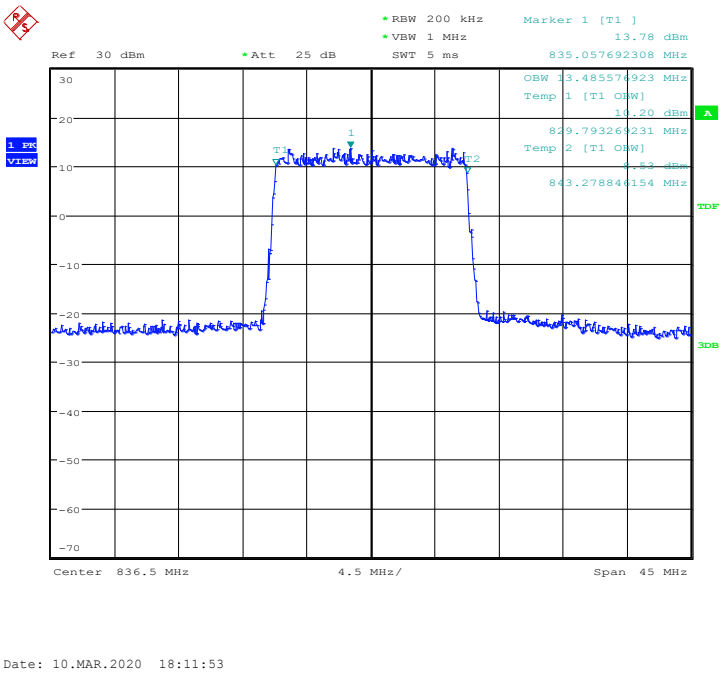
LTE band 26(824MHz-849MHz), 15MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	13485.58	13485.58	13557.69

LTE band 26(824MHz-849MHz), 15MHz Bandwidth, QPSK (99% BW)



LTE band 26(824MHz-849MHz), 15MHz Bandwidth, 16QAM (99% BW)



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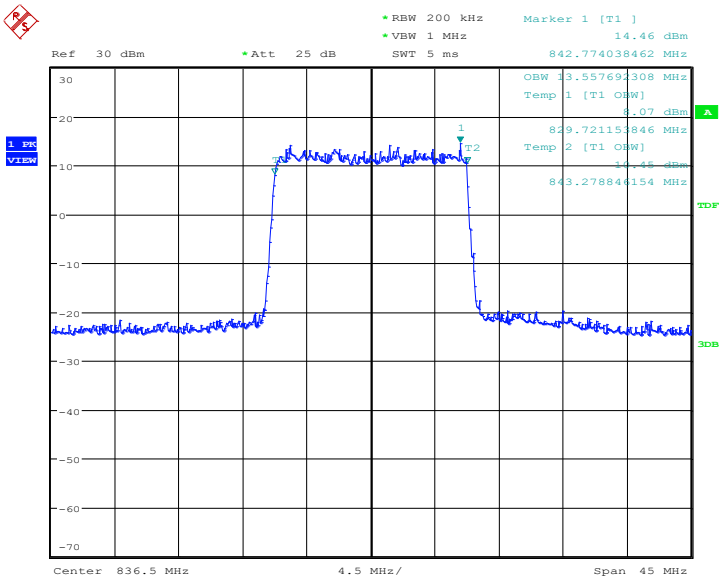
LTE band 26(824MHz-849MHz), 15MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:06:07

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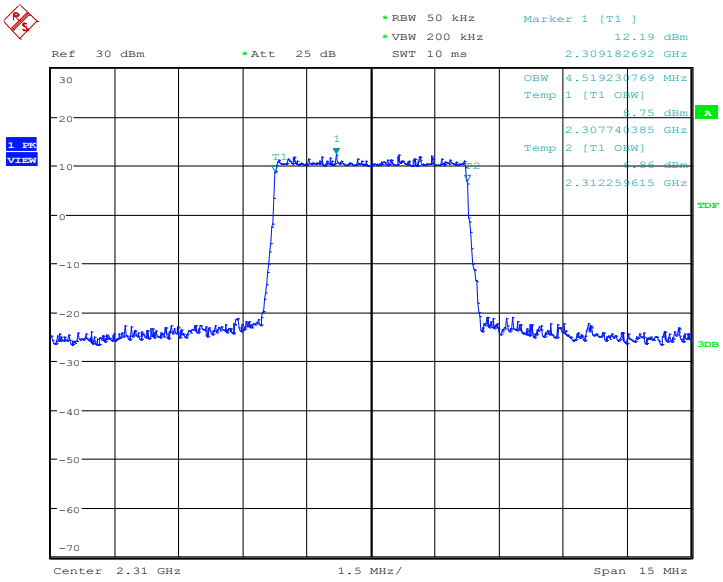
LTE band 30, 5MHz (99% BW)

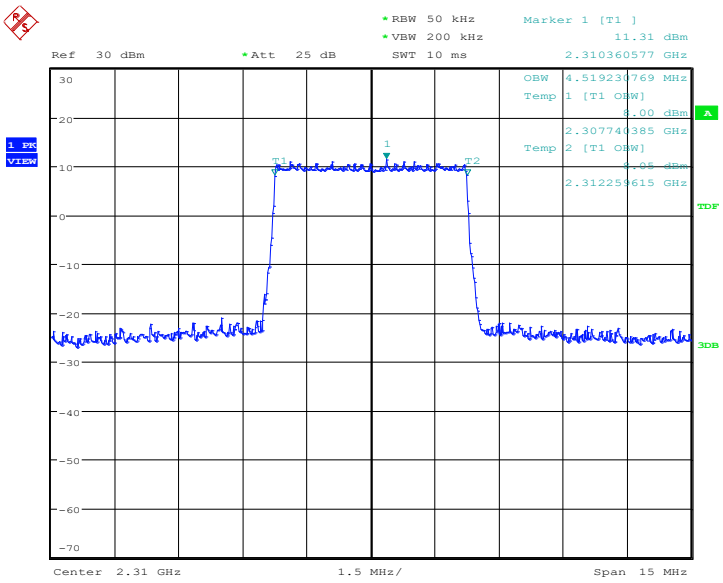
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2310.0	QPSK	16QAM	64QAM
	4519.23	4519.23	4495.19

LTE band 30, 5MHz Bandwidth, QPSK (99% BW)



Date: 17.MAR.2020 14:06:38

LTE band 30, 5MHz Bandwidth,16QAM (99% BW)



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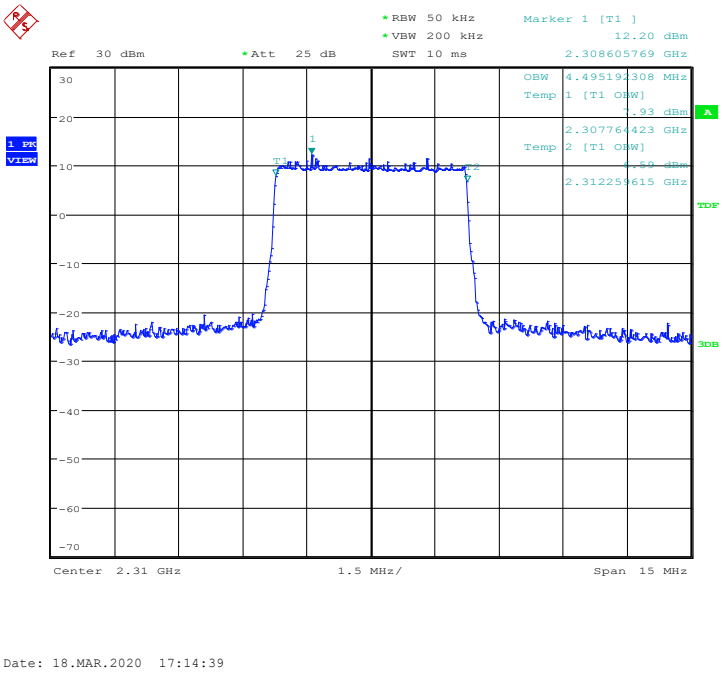
LTE band 30, 5MHz Bandwidth,64QAM (99% BW)



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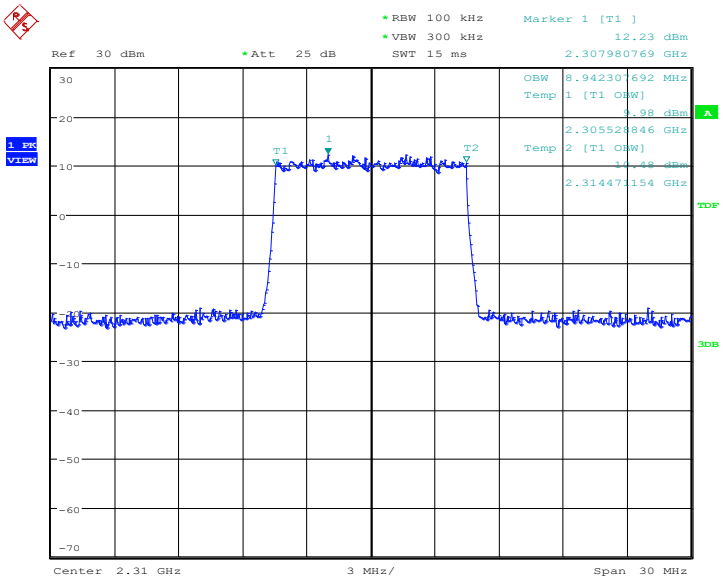
LTE band 30, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2310.0	QPSK	16QAM	64QAM
	8942.31	8990.38	8942.31

LTE band 30, 10MHz Bandwidth, QPSK (99% BW)



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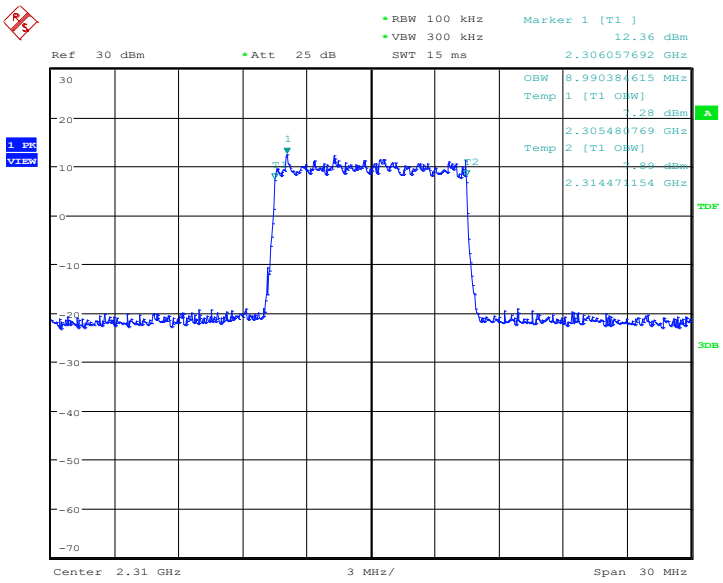
LTE band 30, 10MHz Bandwidth, 16QAM (99% BW)



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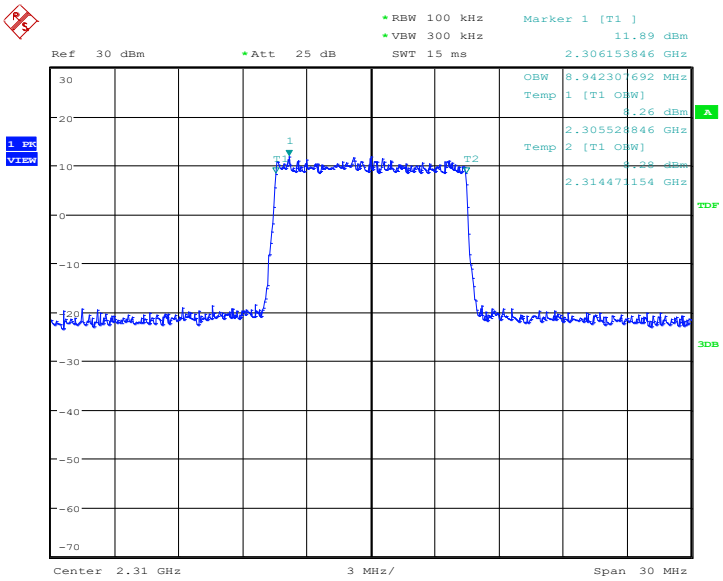
LTE band 30, 10MHz Bandwidth, 64QAM (99% BW)



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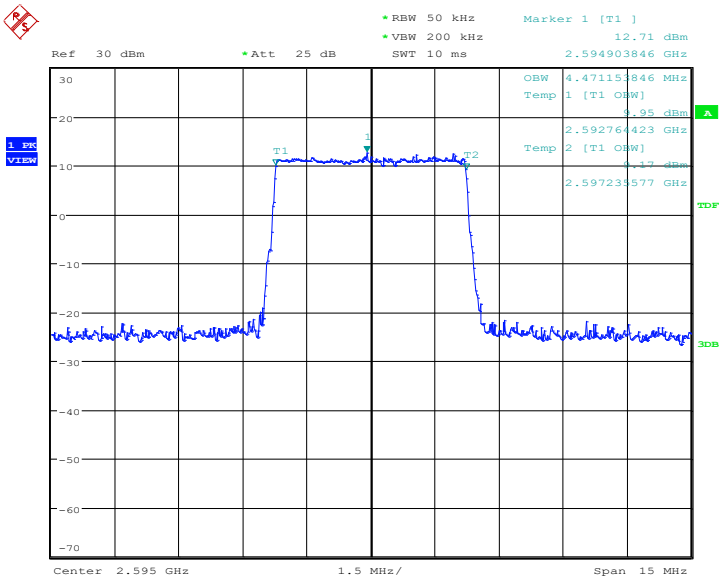
LTE band 38, 5MHz (99% BW)

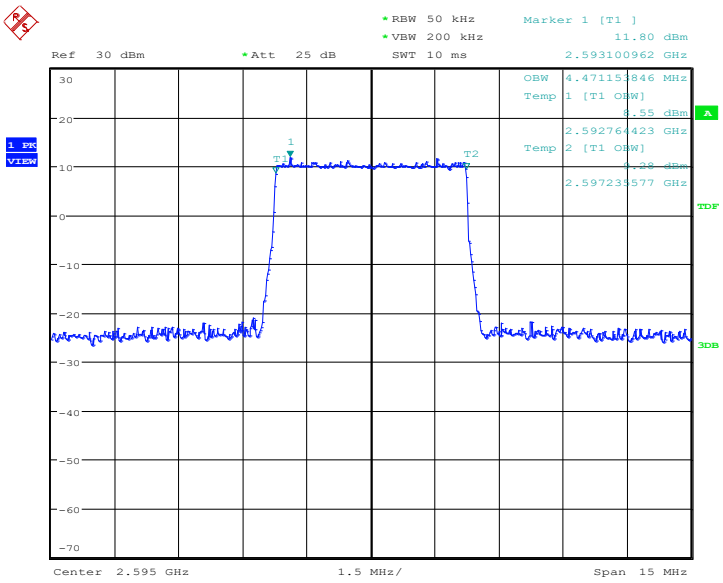
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2598.0	QPSK	16QAM	64QAM
	4471.15	4471.15	4471.15

LTE band 38, 5MHz Bandwidth, QPSK (99% BW)



Date: 16.MAR.2020 20:36:19

LTE band 38, 5MHz Bandwidth,16QAM (99% BW)



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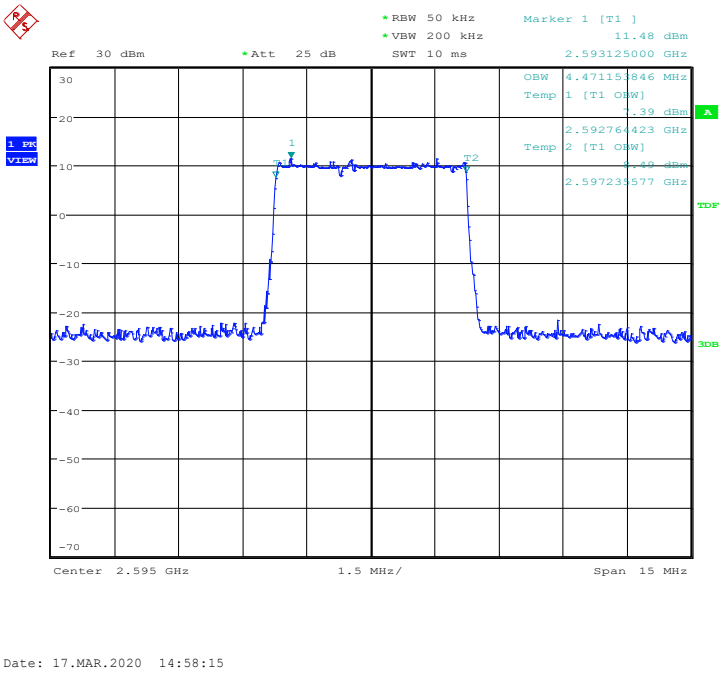
LTE band 38, 5MHz Bandwidth,64QAM (99% BW)



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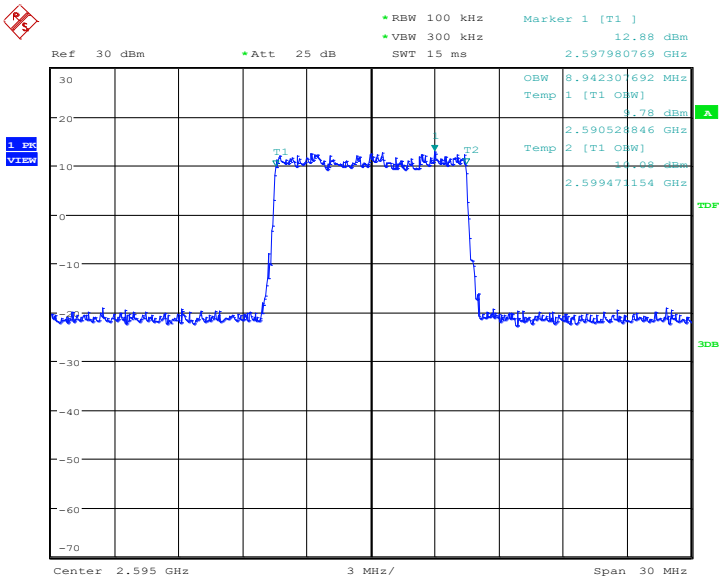
LTE band 38, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2595.0	QPSK	16QAM	64QAM
	8942.31	8990.38	8942.31

LTE band 38, 10MHz Bandwidth, QPSK (99% BW)



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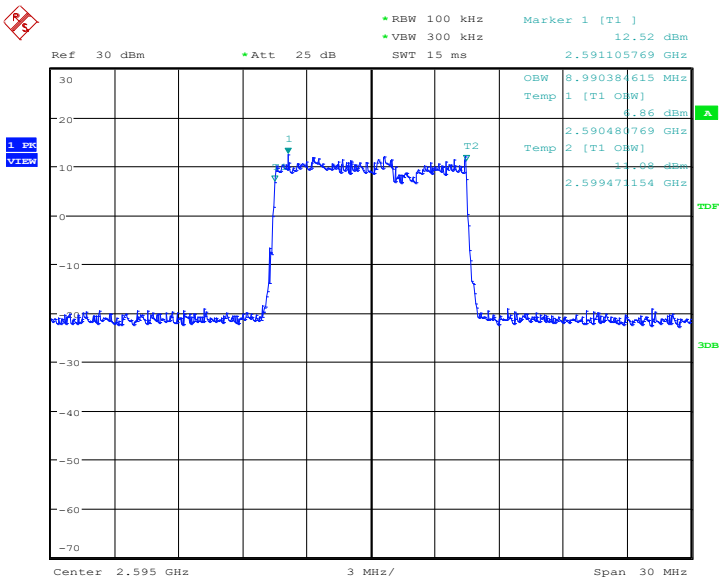
LTE band 38, 10MHz Bandwidth, 16QAM (99% BW)



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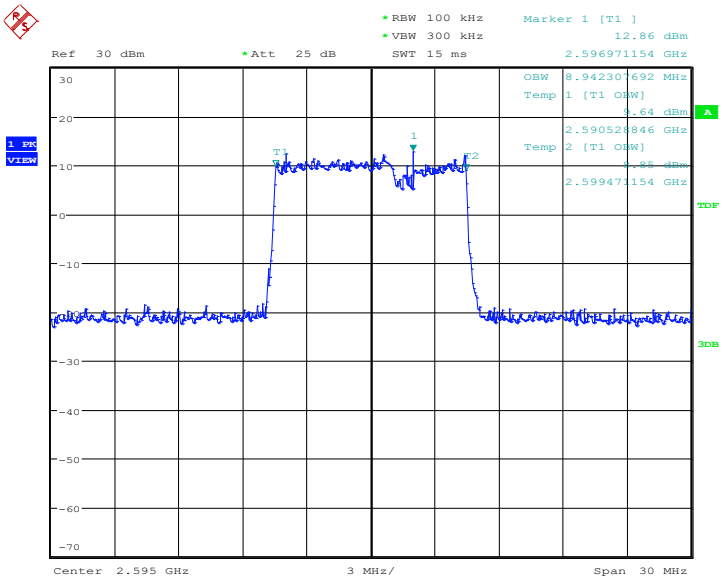
LTE band 38, 10MHz Bandwidth, 64QAM (99% BW)



Date: 17.MAR.2020 15:14:32

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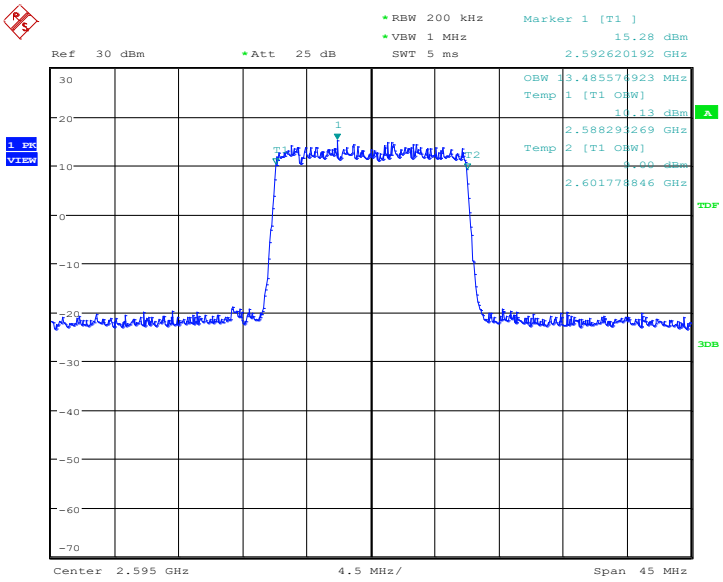
LTE band 38, 15MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2595.0	QPSK	16QAM	64QAM
	13485.58	13485.58	13485.58

LTE band 38, 15MHz Bandwidth, QPSK (99% BW)



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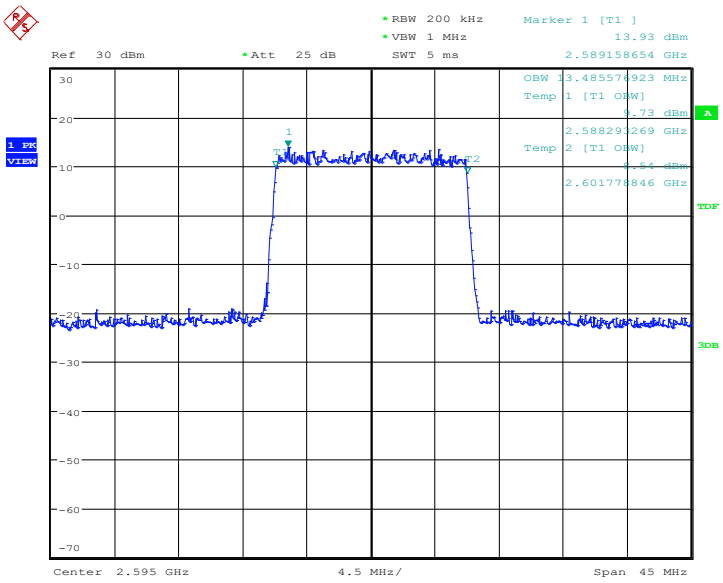
LTE band 38, 15MHz Bandwidth, 16QAM (99% BW)



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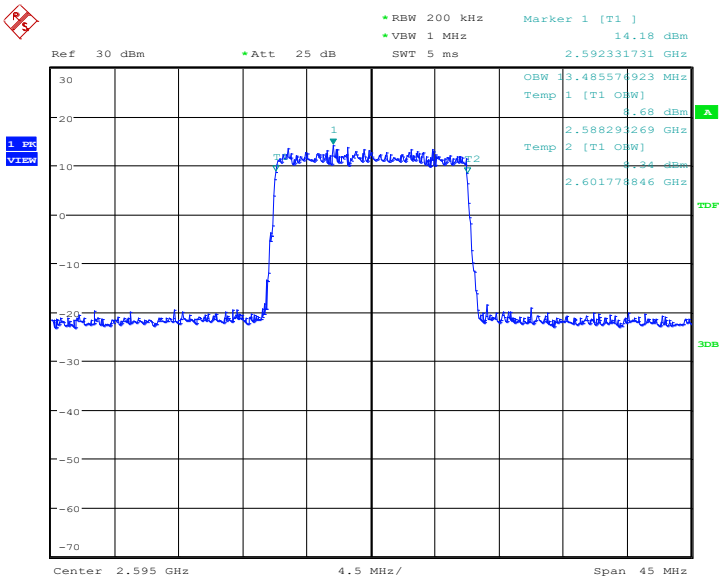
LTE band 38, 15MHz Bandwidth, 64QAM (99% BW)



Date: 17.MAR.2020 15:17:59

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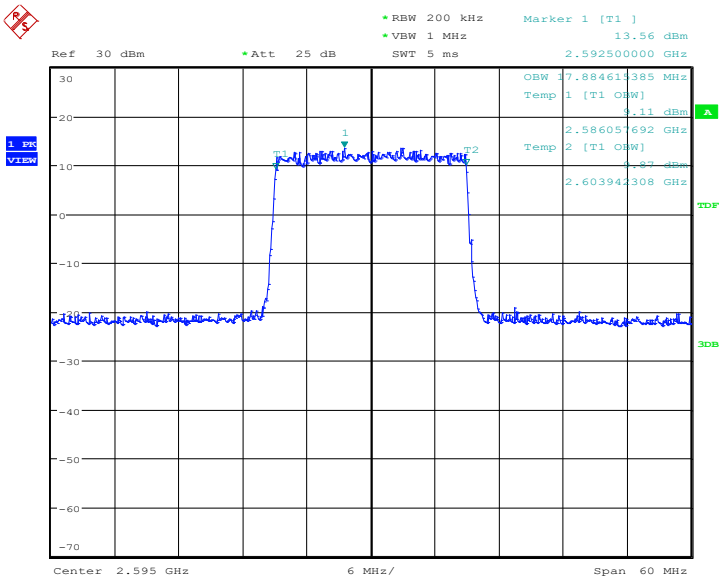
LTE band 38, 20MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2595.0	QPSK	16QAM	64QAM
	17884.62	17884.62	17884.62

LTE band 38, 20MHz Bandwidth, QPSK (99% BW)



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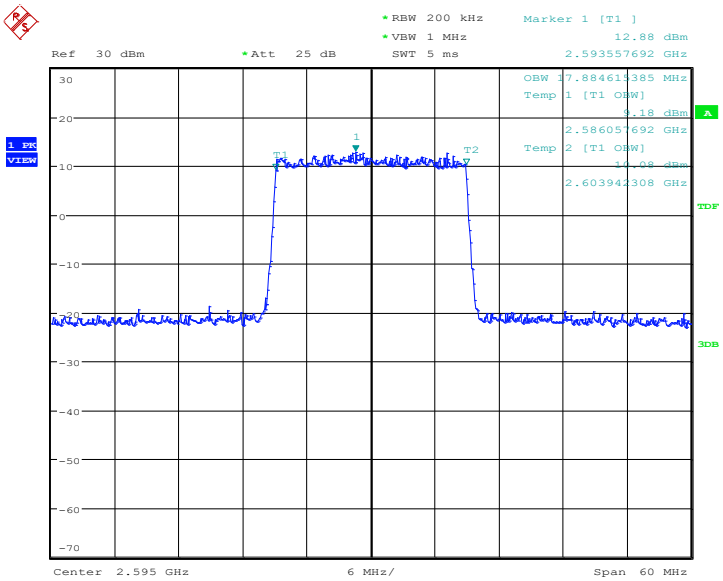
LTE band 38, 20MHz Bandwidth, 16QAM (99% BW)



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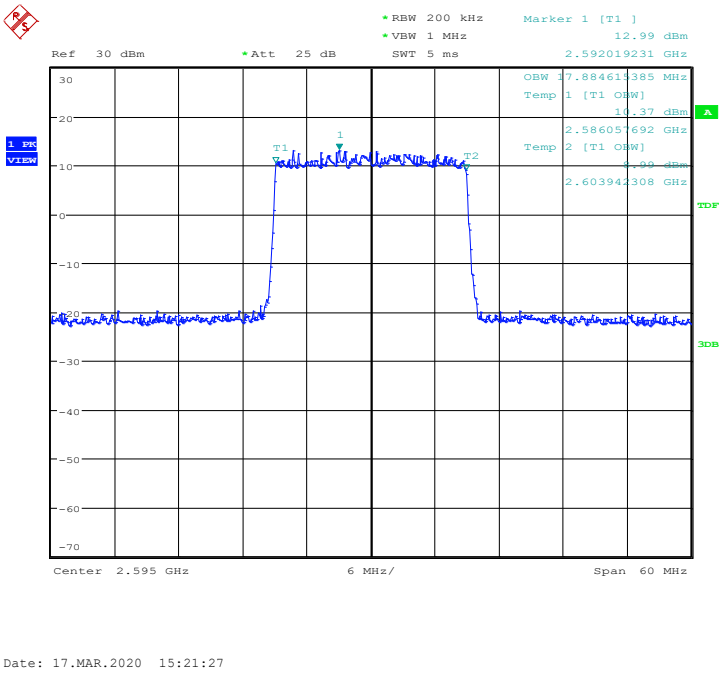
LTE band 38, 20MHz Bandwidth, 64QAM (99% BW)



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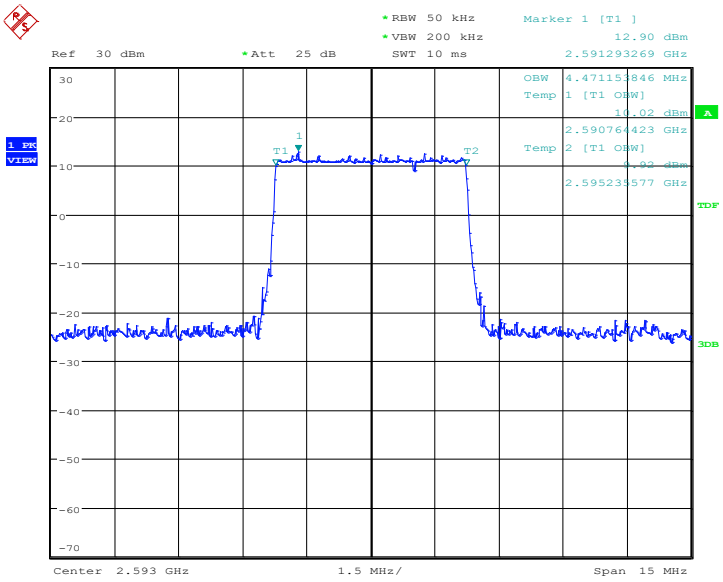
LTE band 41, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	4471.15	4495.19	4495.19

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



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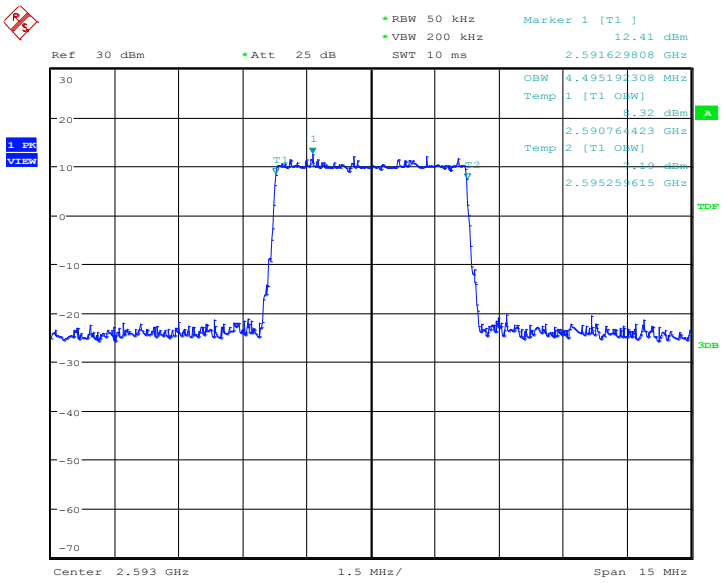
LTE band 41, 5MHz Bandwidth,16QAM (99% BW)



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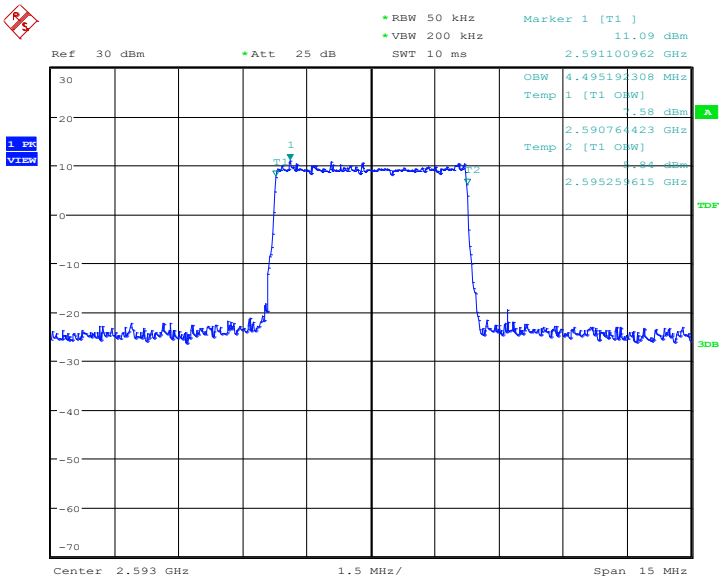
LTE band 41, 5MHz Bandwidth,64QAM (99% BW)



Date: 18.MAR.2020 16:46:57

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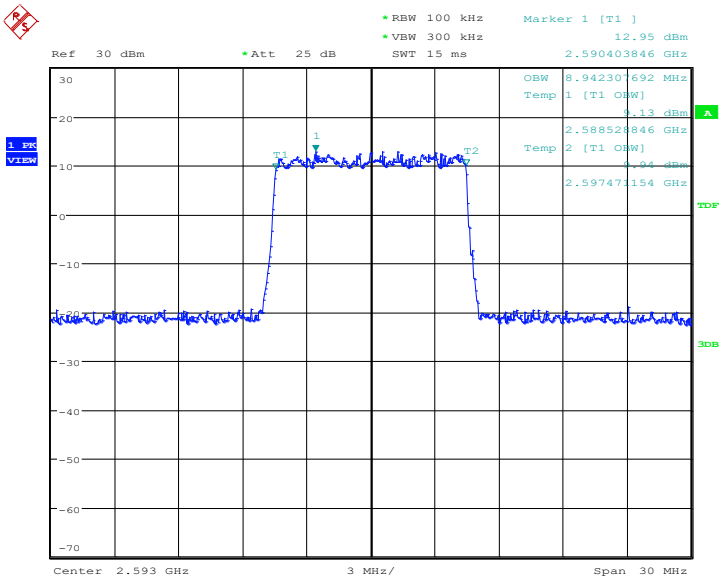
LTE band 41, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	8942.31	8942.31	8942.31

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



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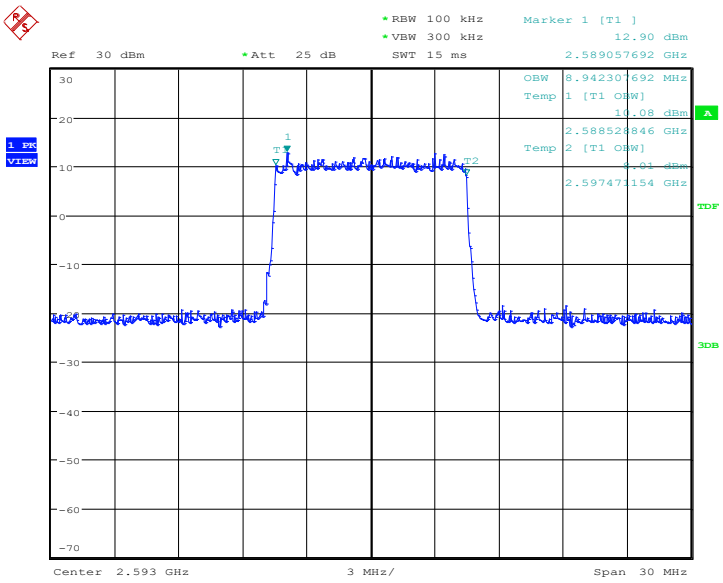
LTE band 41, 10MHz Bandwidth, 16QAM (99% BW)



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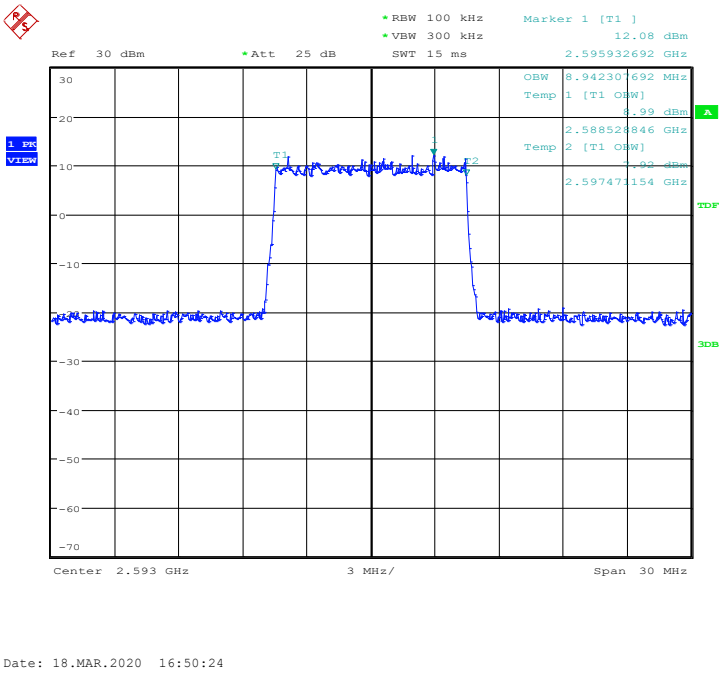
LTE band 41, 10MHz Bandwidth, 64QAM (99% BW)



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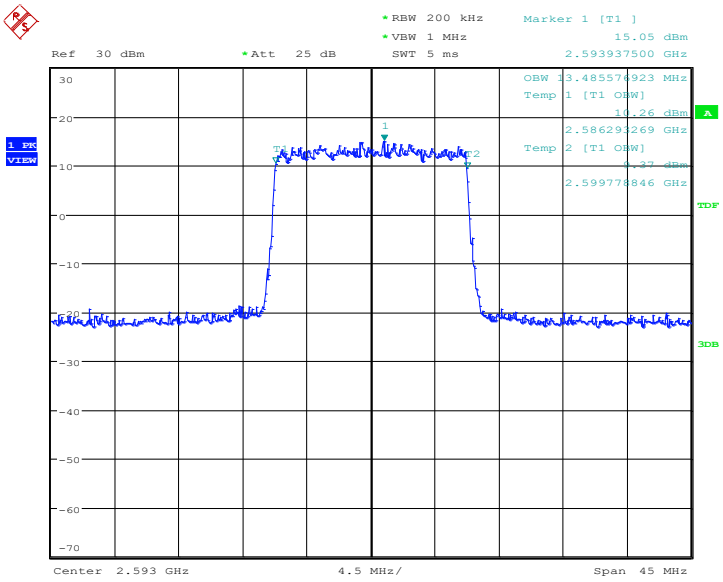
LTE band 41, 15MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	13485.58	13485.58	13485.58

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



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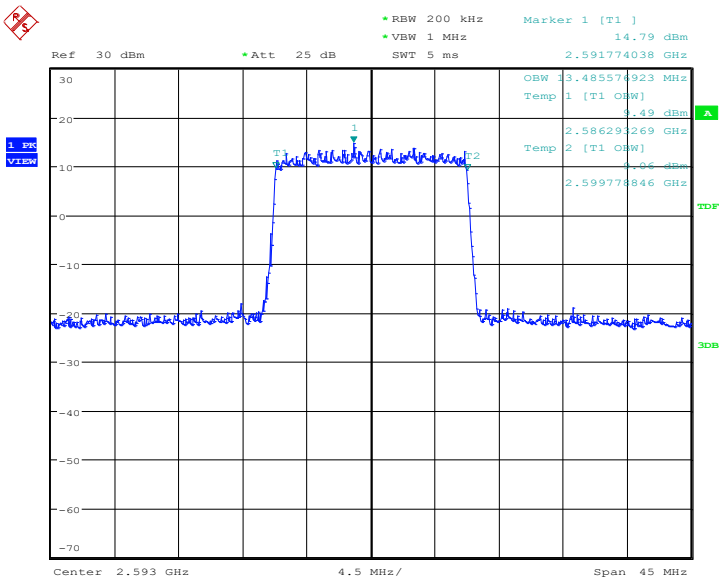
LTE band 41, 15MHz Bandwidth, 16QAM (99% BW)



Date: 16.MAR.2020 21:10:54

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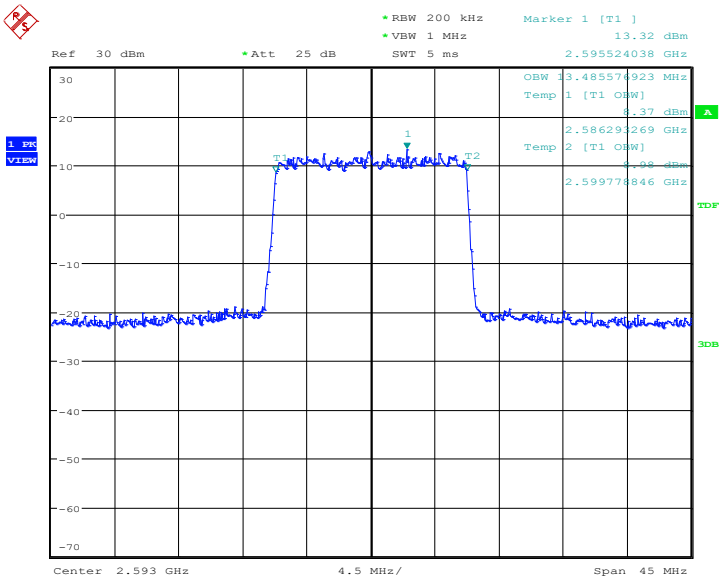
LTE band 41, 15MHz Bandwidth, 64QAM (99% BW)



Date: 18.MAR.2020 16:53:51

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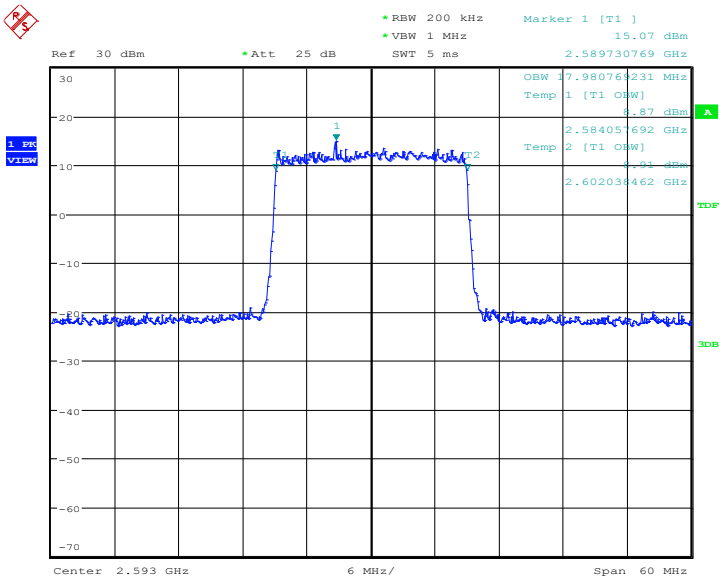
LTE band 41, 20MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	17980.77	17980.77	17980.77

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



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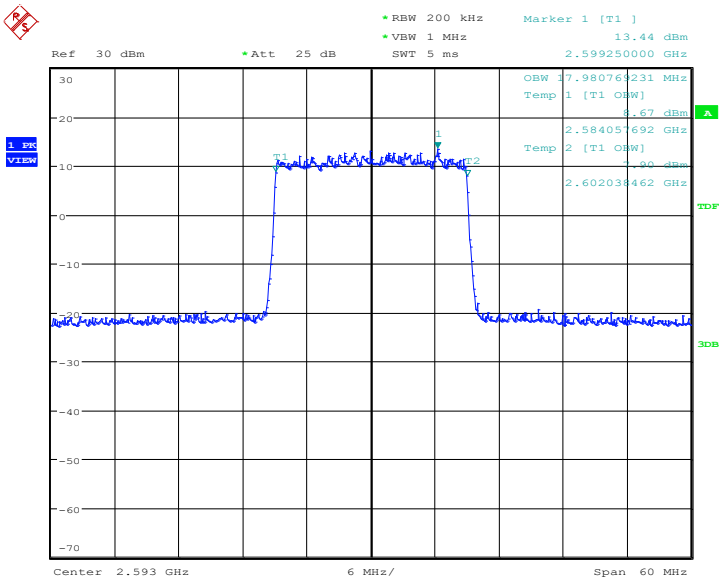
LTE band 41, 20MHz Bandwidth, 16QAM (99% BW)



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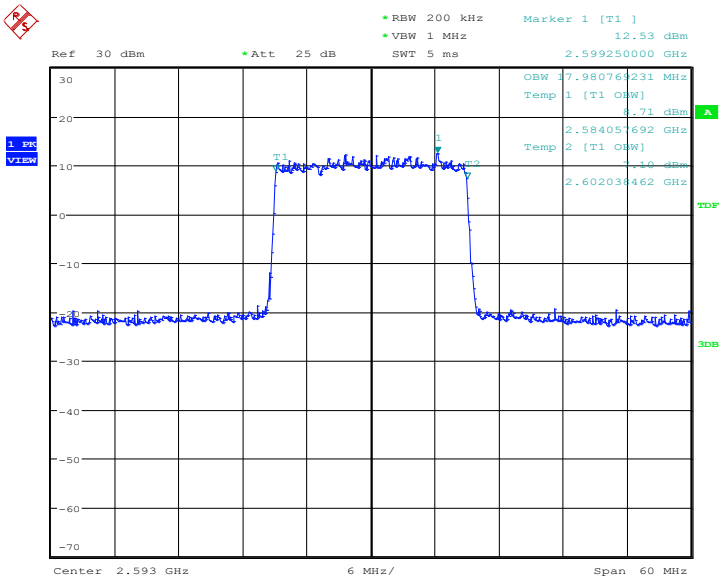
LTE band 41, 20MHz Bandwidth, 64QAM (99% BW)



Date: 18.MAR.2020 16:57:19

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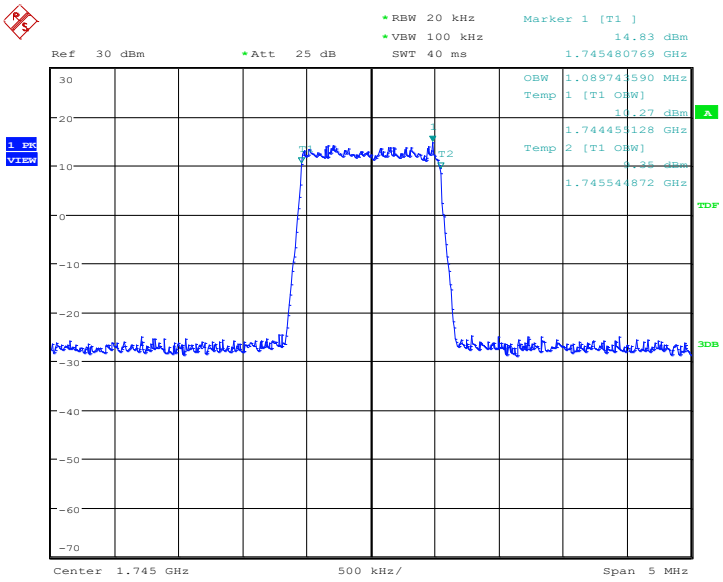
LTE band 66, 1.4MHz (99% BW)

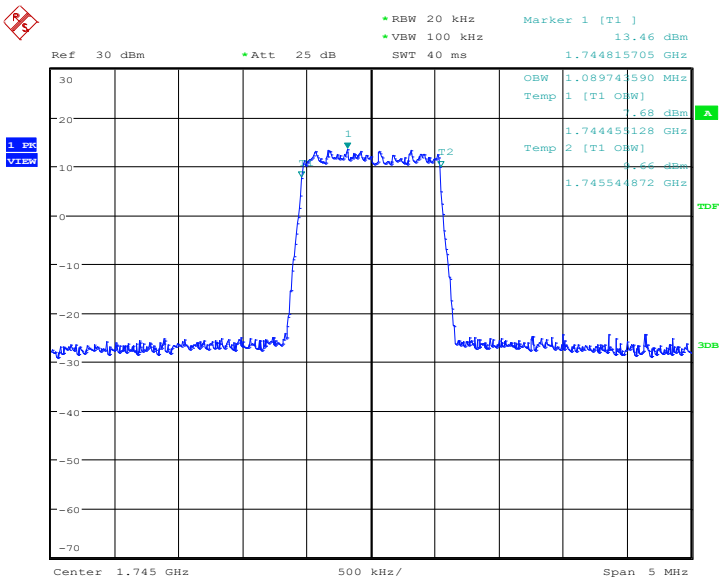
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1745.0	QPSK	16QAM	64QAM
	1089.74	1089.74	1089.74

LTE band 66, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:38:10

LTE band 66, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 18:38:24

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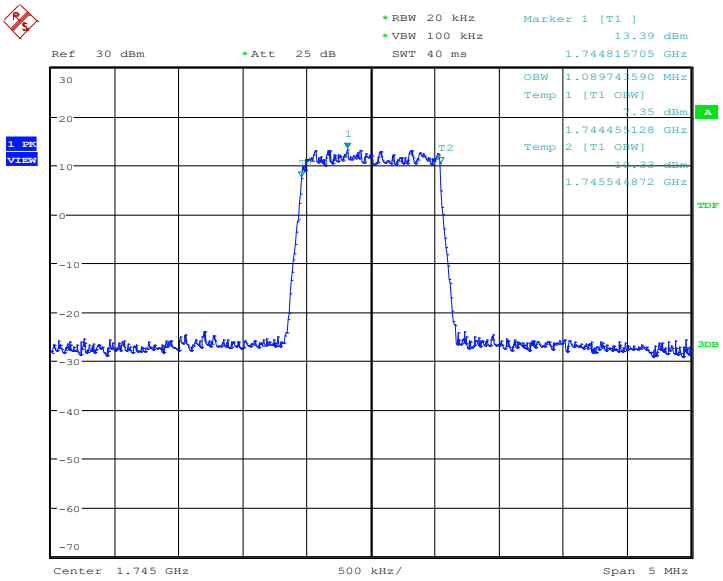
LTE band 66, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:22:50

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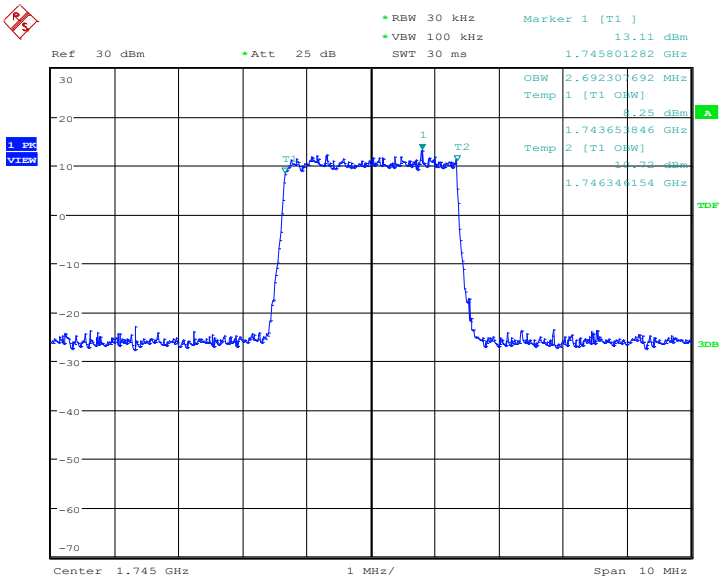
LTE band 66, 3MHz (99% BW)

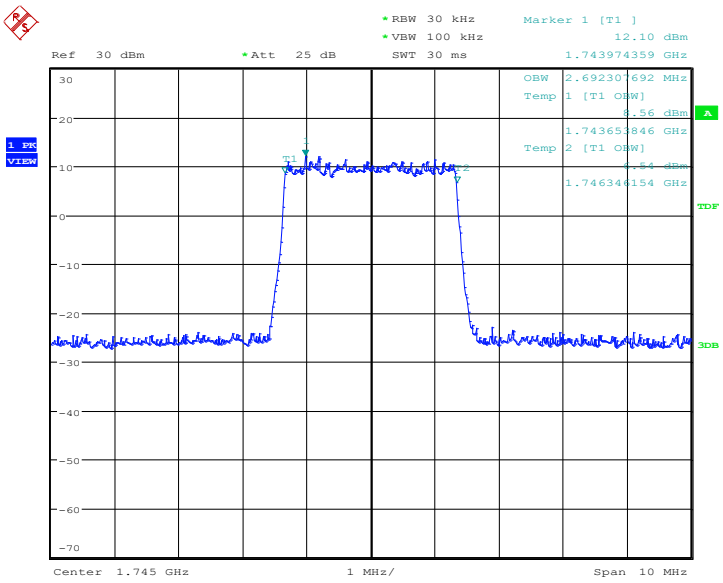
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1745.0	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

LTE band 66, 3MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:43:26

LTE band 66, 3MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 18:43:40

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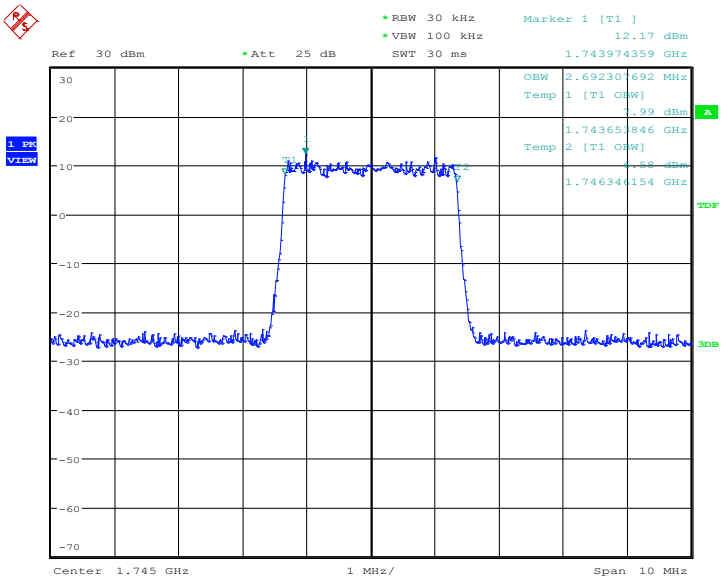
LTE band 66, 3MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:26:09

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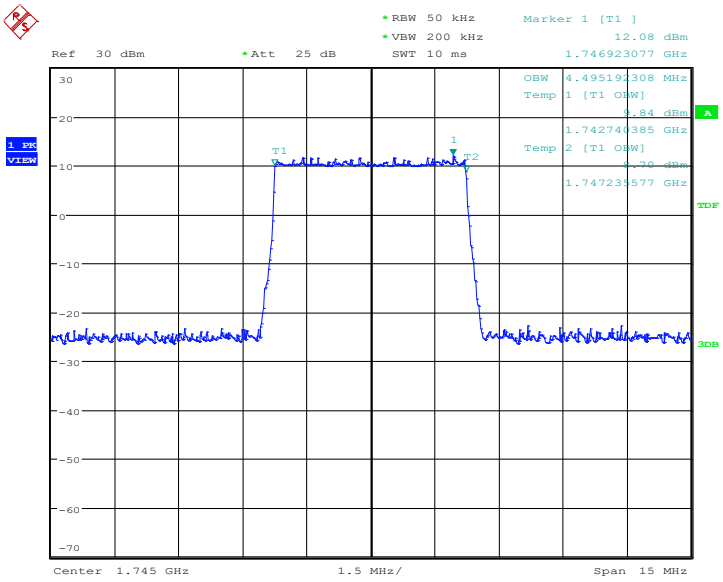
LTE band 66, 5MHz (99% BW)

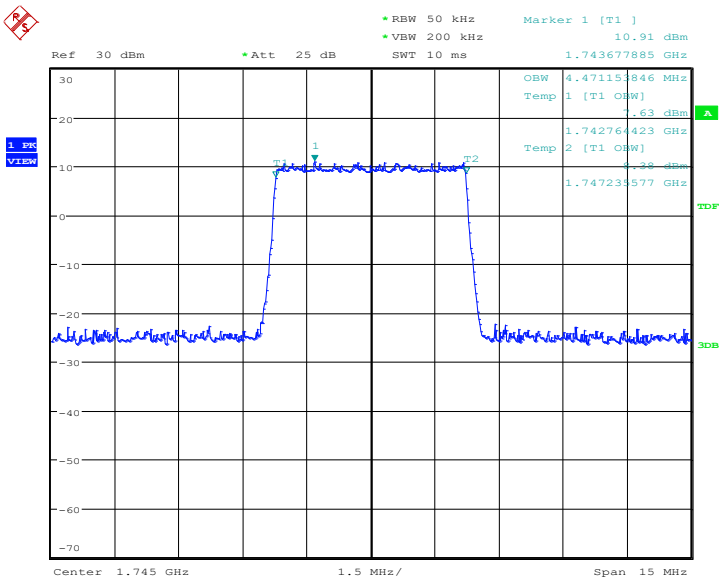
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1745.0	QPSK	16QAM	64QAM
	4495.19	4471.15	4495.19

LTE band 66, 5MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:48:41

LTE band 66, 5MHz Bandwidth,16QAM (99% BW)



Date: 10.MAR.2020 18:48:55

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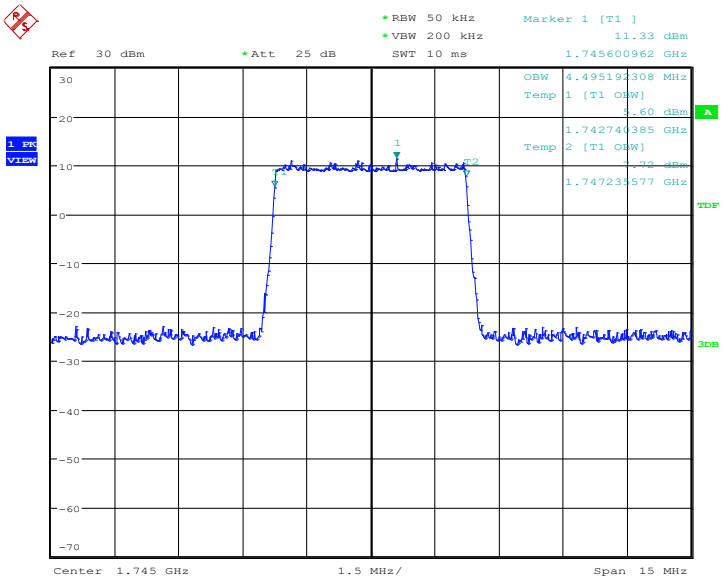
LTE band 66, 5MHz Bandwidth,64QAM (99% BW)



Date: 10.MAR.2020 21:29:28

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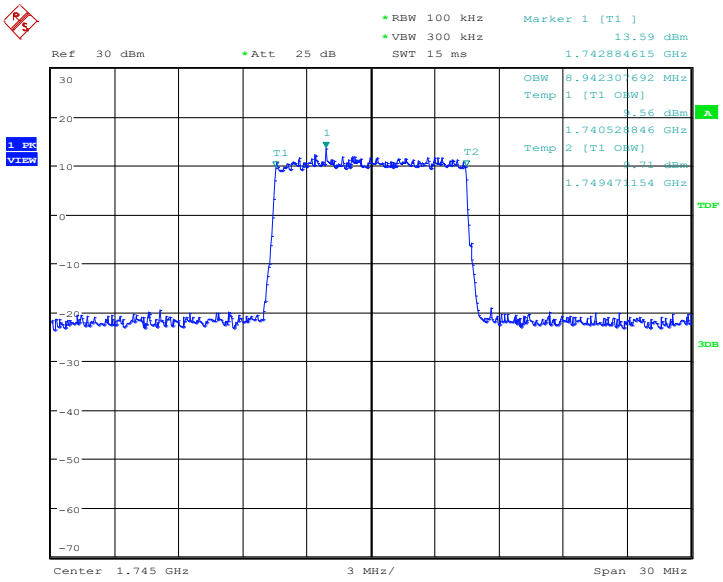
LTE band 66, 10MHz (99% BW)

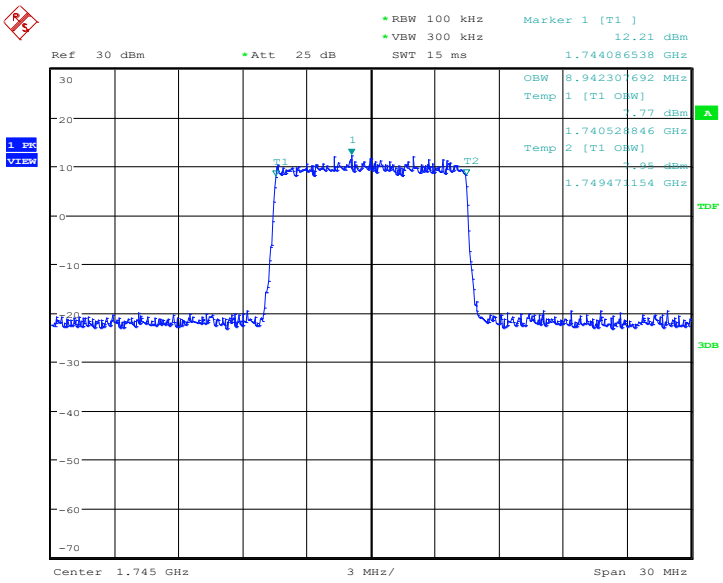
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1745.0	QPSK	16QAM	64QAM
	8942.31	8942.31	8942.31

LTE band 66, 10MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:53:57

LTE band 66, 10MHz Bandwidth, 16QAM (99% BW)



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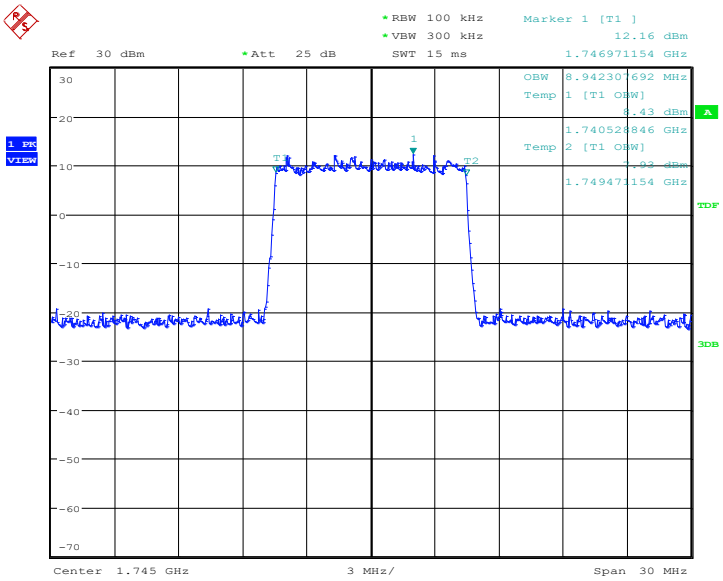
LTE band 66, 10MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:32:47

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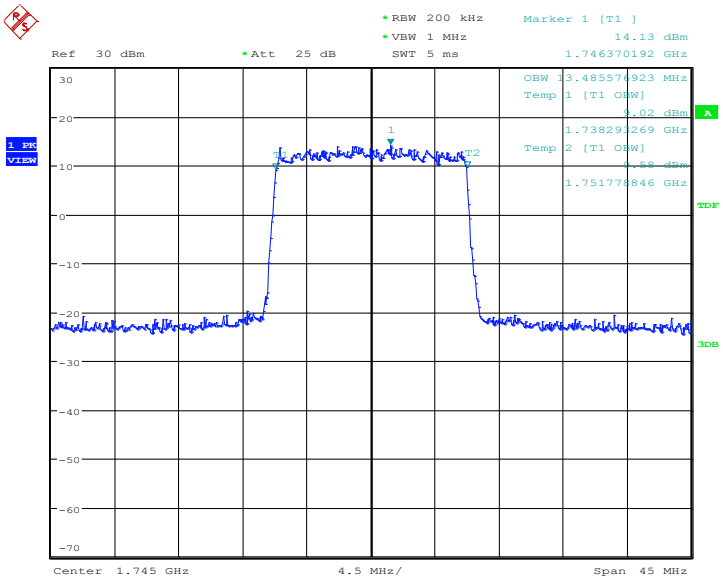
LTE band 66, 15MHz (99% BW)

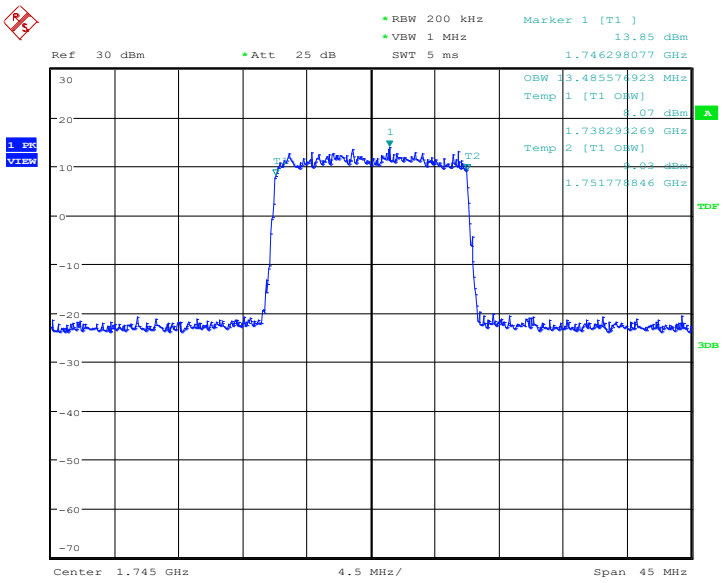
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1745.0	QPSK	16QAM	64QAM
	13485.58	13485.58	13485.58

LTE band 66, 15MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 18:59:13

LTE band 66, 15MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 18:59:26

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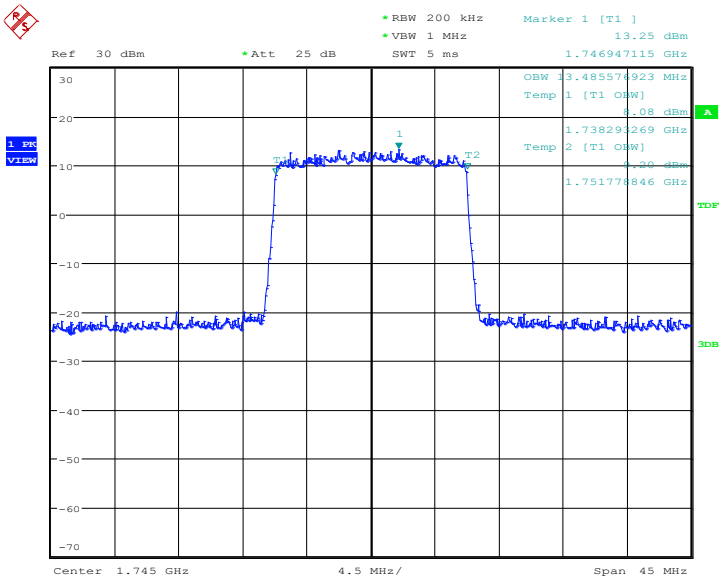
LTE band 66, 15MHz Bandwidth, 64QAM (99% BW)



Date: 10.MAR.2020 21:36:06

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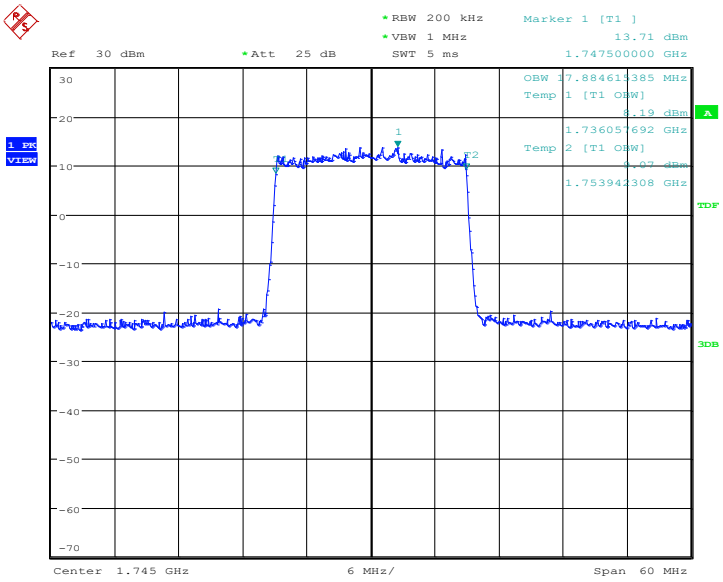
LTE band 66, 20MHz (99% BW)

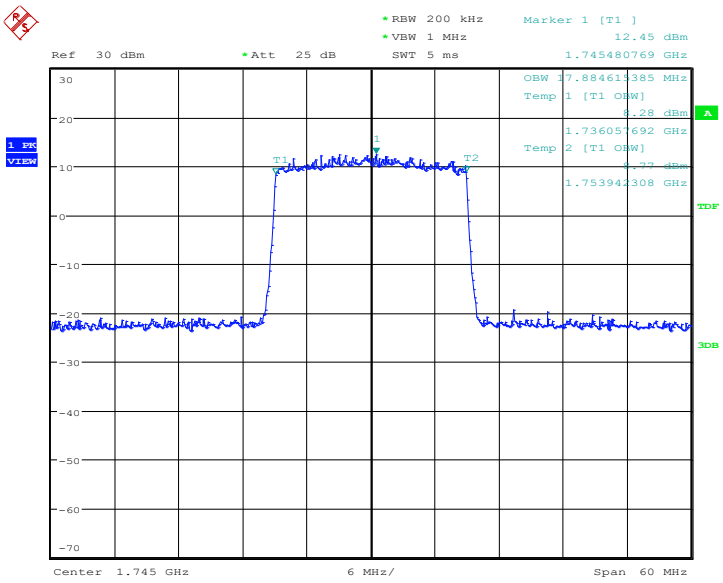
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
1745.0	QPSK	16QAM	64QAM
	17884.62	17884.62	17884.62

LTE band 66, 20MHz Bandwidth, QPSK (99% BW)



Date: 10.MAR.2020 19:04:33

LTE band 66, 20MHz Bandwidth, 16QAM (99% BW)



Date: 10.MAR.2020 19:04:47

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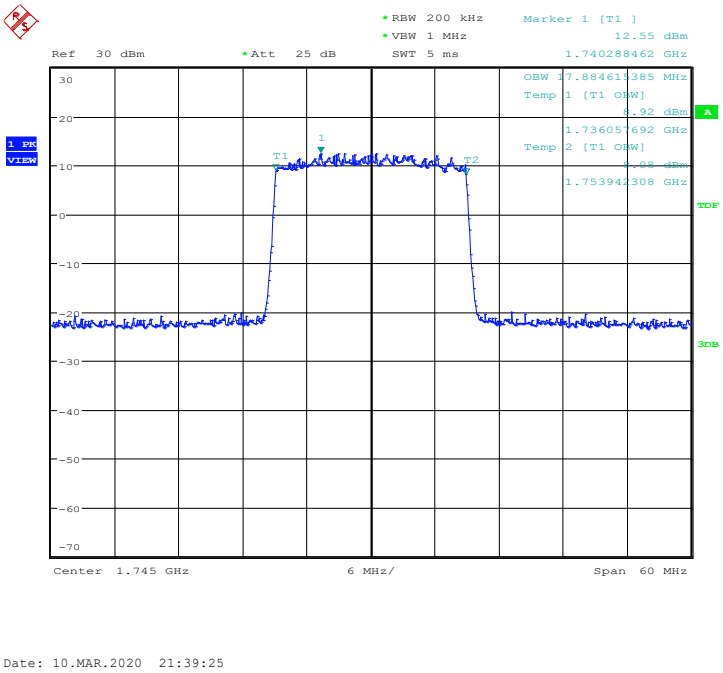
LTE band 66, 20MHz Bandwidth, 64QAM (99% BW)



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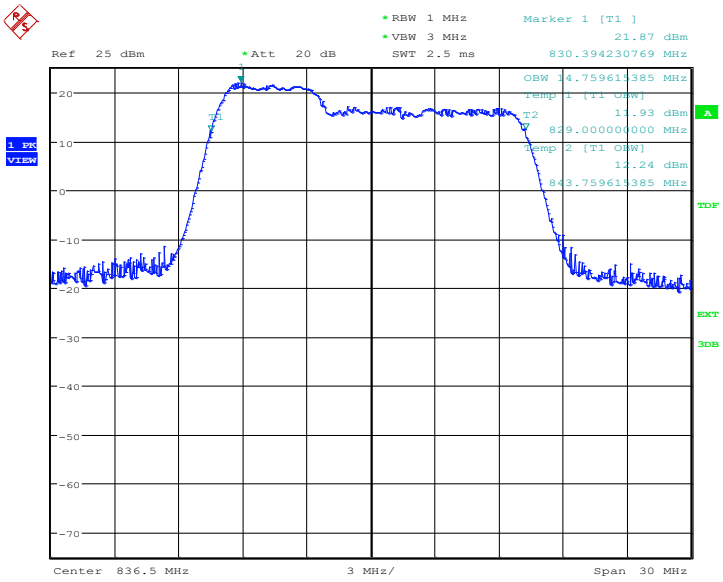
LTE Band CA_5B, 5MHz+10MHz (99% BW)

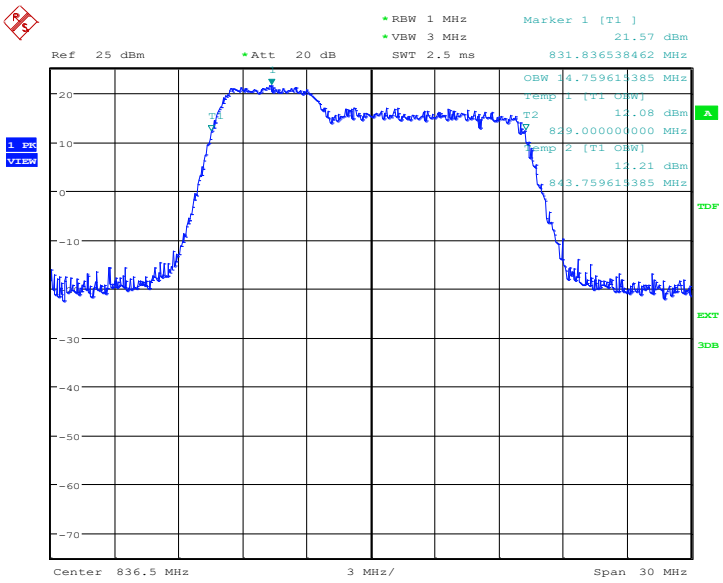
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.6	QPSK	16QAM	64QAM
	14759.62	14759.62	14807.69

LTE Band CA_5B, 5MHz+10MHz Bandwidth, QPSK (99% BW)



Date: 5.APR.2020 11:25:34

LTE Band CA_5B, 5MHz+10MHz Bandwidth, 16QAM (99% BW)



Date: 5.APR.2020 11:28:01

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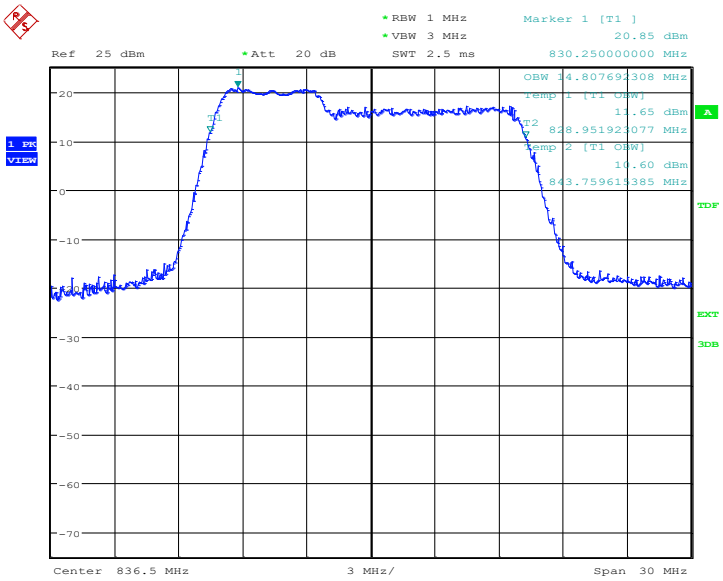
LTE Band CA_5B, 5MHz+10MHz Bandwidth, 64QAM (99% BW)



Date: 5.APR.2020 11:28:31

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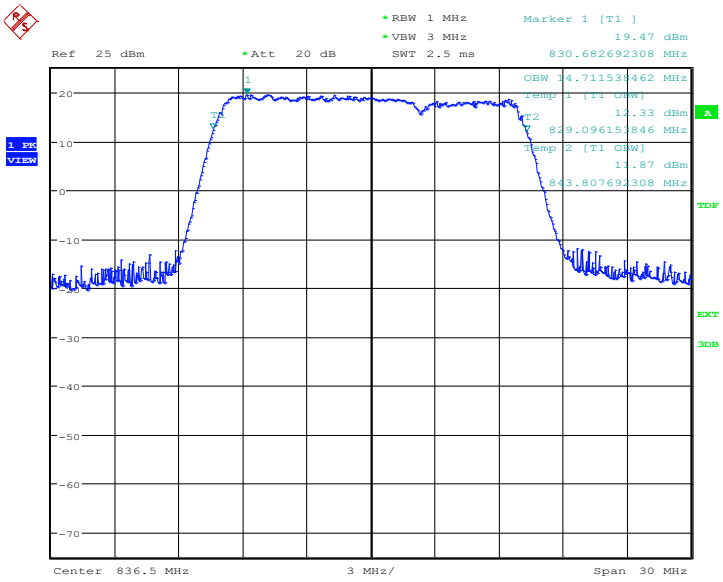
LTE Band CA_5B, 10MHz+5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.6	QPSK	16QAM	64QAM
	14711.54	14663.46	14759.62

LTE Band CA_5B, 10MHz+5MHz Bandwidth, QPSK (99% BW)



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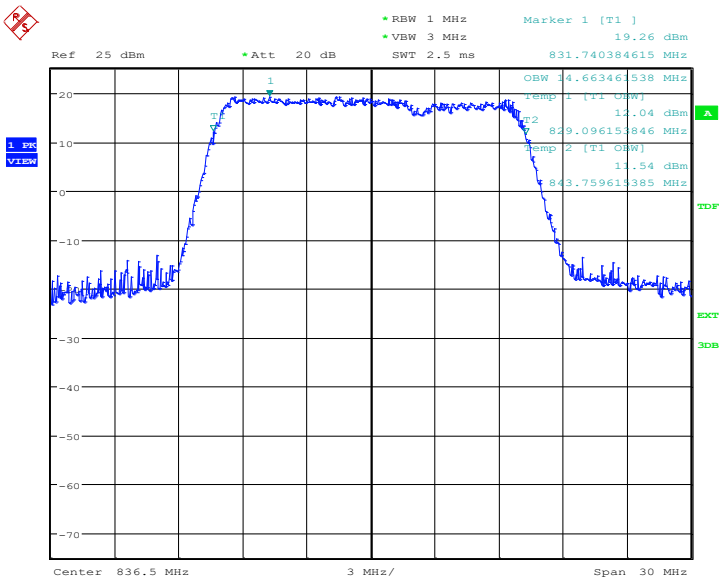
LTE Band CA_5B, 10MHz+5MHz Bandwidth, 16QAM (99% BW)



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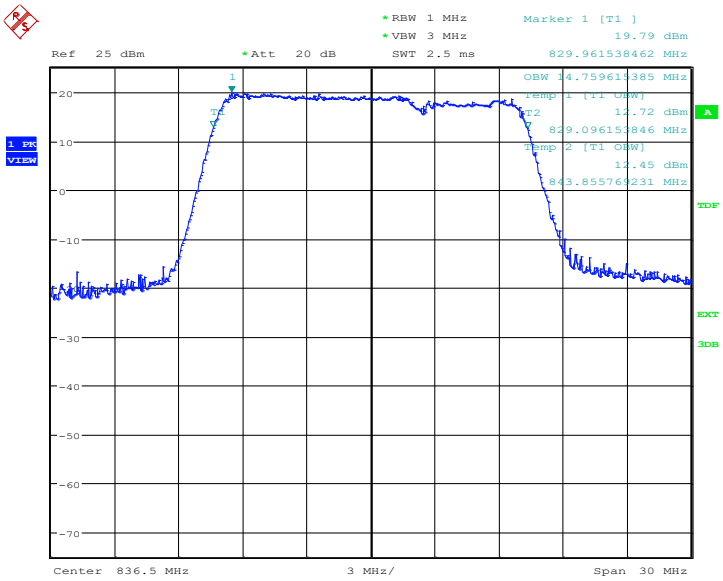
LTE Band CA_5B, 10MHz+5MHz Bandwidth, 64QAM (99% BW)



Date: 5.APR.2020 11:34:28

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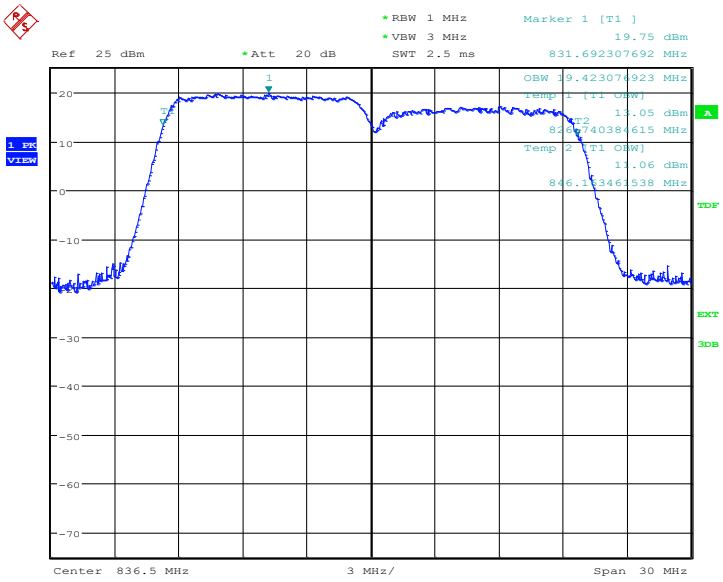
LTE Band CA_5B, 10MHz+10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.6	QPSK	16QAM	64QAM
	19423.08	19423.08	19375.00

LTE Band CA_5B, 10MHz+10MHz Bandwidth, QPSK (99% BW)



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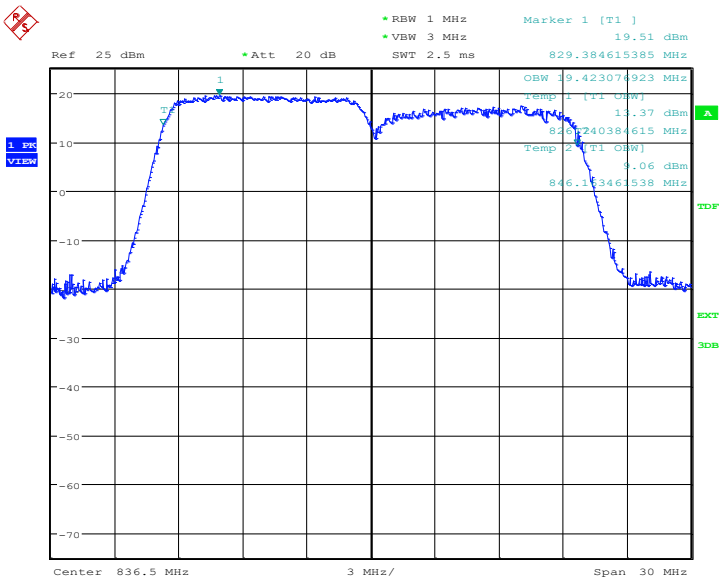
LTE Band CA_5B, 10MHz+10MHz Bandwidth, 16QAM (99% BW)



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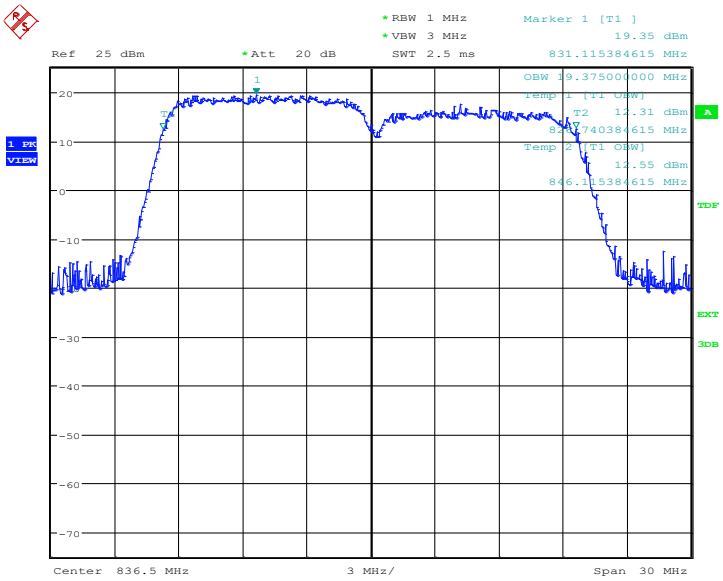
LTE Band CA_5B, 10MHz+10MHz Bandwidth, 64QAM (99% BW)



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