



Appendix B

LTE-NB1 Band 13





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1 Effective (Isotropic) Radiated Power Output Data

1.1 Test Result for LTE NB1 Band 13

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	ERP (dBm)	limit (dBm)	Verdict
NB1 Band 13	BPSK	3.75	23181	1T0	23.12	22.08	34.77	PASS
NB1 Band 13	BPSK	3.75	23181	1T47	23.03	21.99	34.77	PASS
NB1 Band 13	BPSK	3.75	23230	1T0	22.80	21.76	34.77	PASS
NB1 Band 13	BPSK	3.75	23230	1T47	23.14	22.10	34.77	PASS
NB1 Band 13	BPSK	3.75	23279	1T0	22.81	21.77	34.77	PASS
NB1 Band 13	BPSK	3.75	23279	1T47	23.07	22.03	34.77	PASS
NB1 Band 13	QPSK	3.75	23181	1T0	23.17	22.13	34.77	PASS
NB1 Band 13	QPSK	3.75	23181	1T47	22.88	21.84	34.77	PASS
NB1 Band 13	QPSK	3.75	23230	1T0	23.08	22.04	34.77	PASS
NB1 Band 13	QPSK	3.75	23230	1T47	22.94	21.90	34.77	PASS
NB1 Band 13	QPSK	3.75	23279	1T0	22.92	21.88	34.77	PASS
NB1 Band 13	QPSK	3.75	23279	1T47	23.12	22.08	34.77	PASS

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	ERP (dBm)	limit (dBm)	Verdict
NB1 Band 13	BPSK	15	23181	1T0	22.98	21.94	34.77	PASS
NB1 Band 13	BPSK	15	23181	1T11	23.12	22.08	34.77	PASS
NB1 Band 13	BPSK	15	23230	1T0	22.95	21.91	34.77	PASS
NB1 Band 13	BPSK	15	23230	1T11	23.11	22.07	34.77	PASS
NB1 Band 13	BPSK	15	23279	1T0	23.02	21.98	34.77	PASS
NB1 Band 13	BPSK	15	23279	1T11	22.83	21.79	34.77	PASS
NB1 Band 13	QPSK	15	23181	1T0	22.96	21.92	34.77	PASS
NB1 Band 13	QPSK	15	23181	1T11	23.07	22.03	34.77	PASS
NB1 Band 13	QPSK	15	23181	12T0	21.60	20.56	34.77	PASS
NB1 Band 13	QPSK	15	23230	1T0	23.20	22.16	34.77	PASS
NB1 Band 13	QPSK	15	23230	1T11	23.15	22.11	34.77	PASS
NB1 Band 13	QPSK	15	23230	12T0	21.44	20.40	34.77	PASS
NB1 Band 13	QPSK	15	23279	1T0	22.97	21.93	34.77	PASS
NB1 Band 13	QPSK	15	23279	1T11	23.13	22.09	34.77	PASS
NB1 Band 13	QPSK	15	23279	12T0	21.44	20.40	34.77	PASS

Note:

a: For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$EIRP [dBm] = \text{Conducted Power} [dBm] + \text{Gain} [dBi]$

$ERP [dBm] = \text{Conducted Power} [dBm] + \text{Gain} [dBi] - 2.15$



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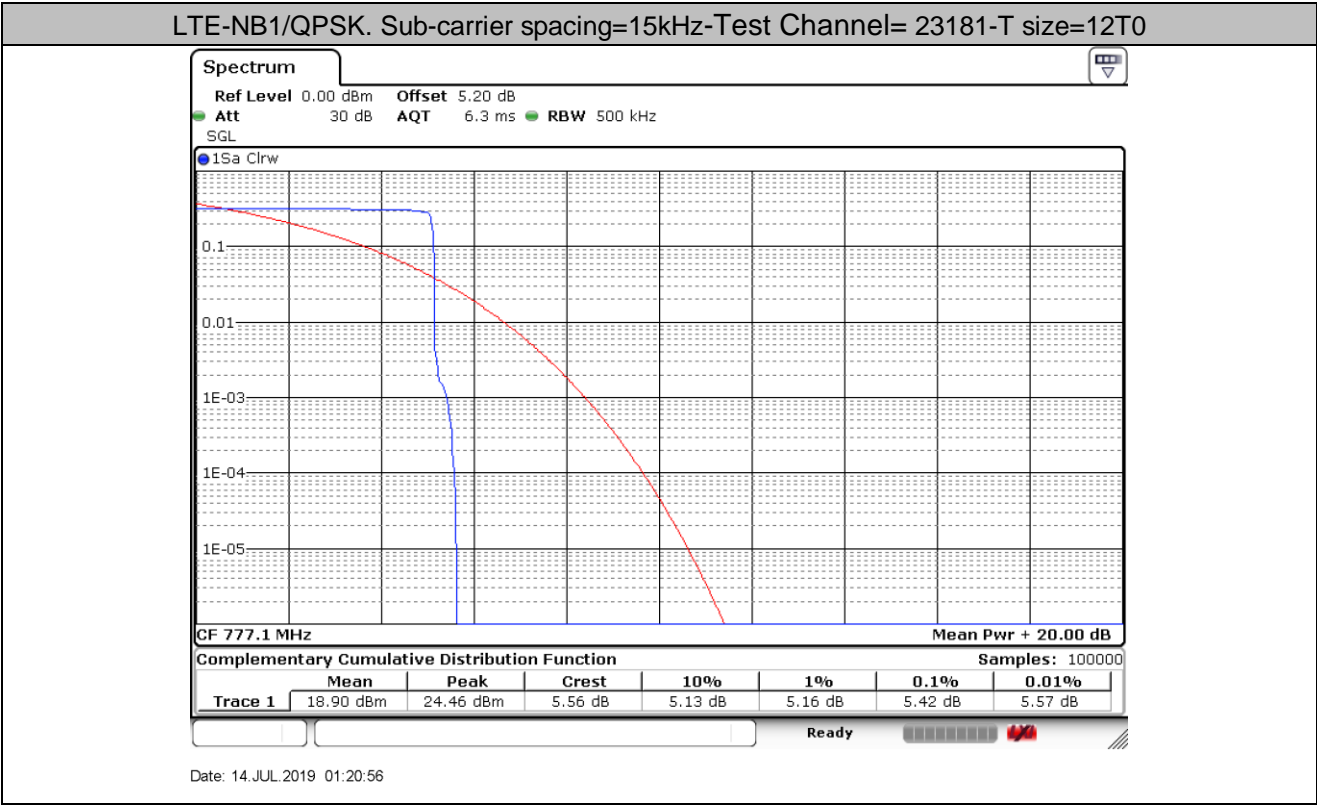
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2 Peak-to-Average Ratio

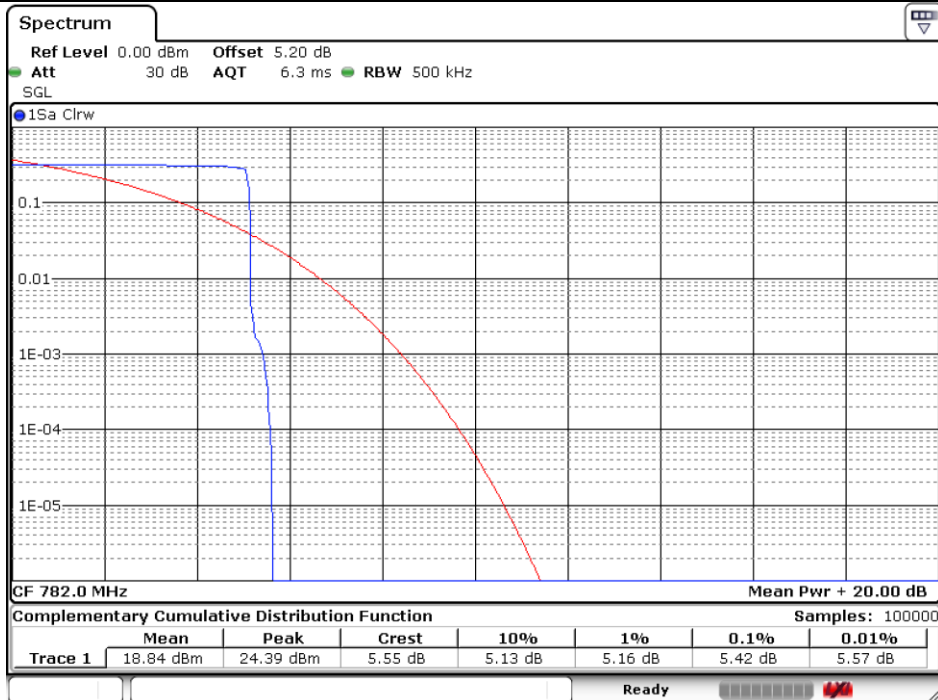
Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
NB1 Band 13	QPSK/12T0	23181	5.42	13	PASS
NB1 Band 13	QPSK/12T0	23230	5.42	13	PASS
NB1 Band 13	QPSK/12T0	23279	6.14	13	PASS

2.1 For LTE-NB1

2.1.1 Test Band = LTE-NB1 Band 13



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23230-T size=12T0



Date: 14.JUL.2019 01:34:23

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23279-T size=12T0



Date: 14.JUL.2019 01:42:12



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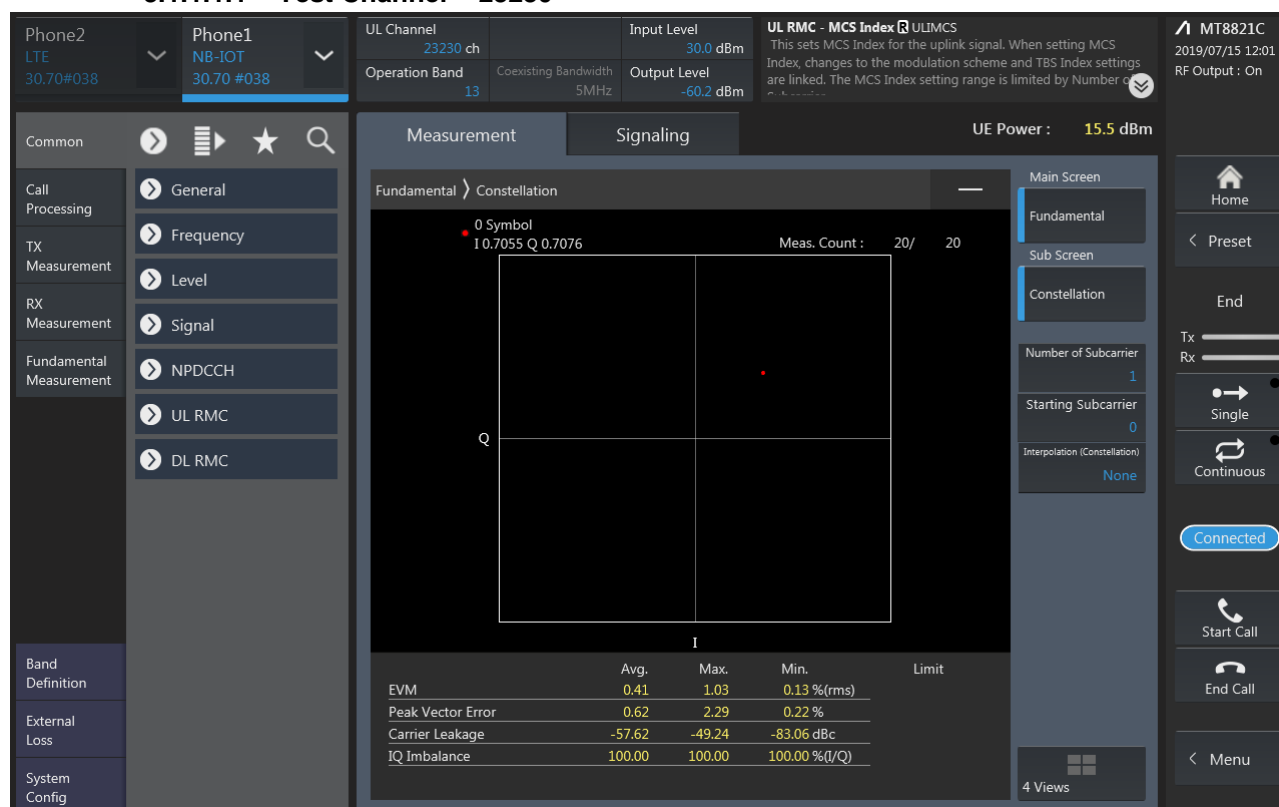
3 Modulation Characteristics

3.1 For LTE-NB1

3.1.1 Test Band = LTE-NB1 Band 13

3.1.1.1 Test Mode = LTE-NB1/BPSK. Sub-carrier spacing=15kHz.T size=12T0

3.1.1.1.1 Test Channel = 23230

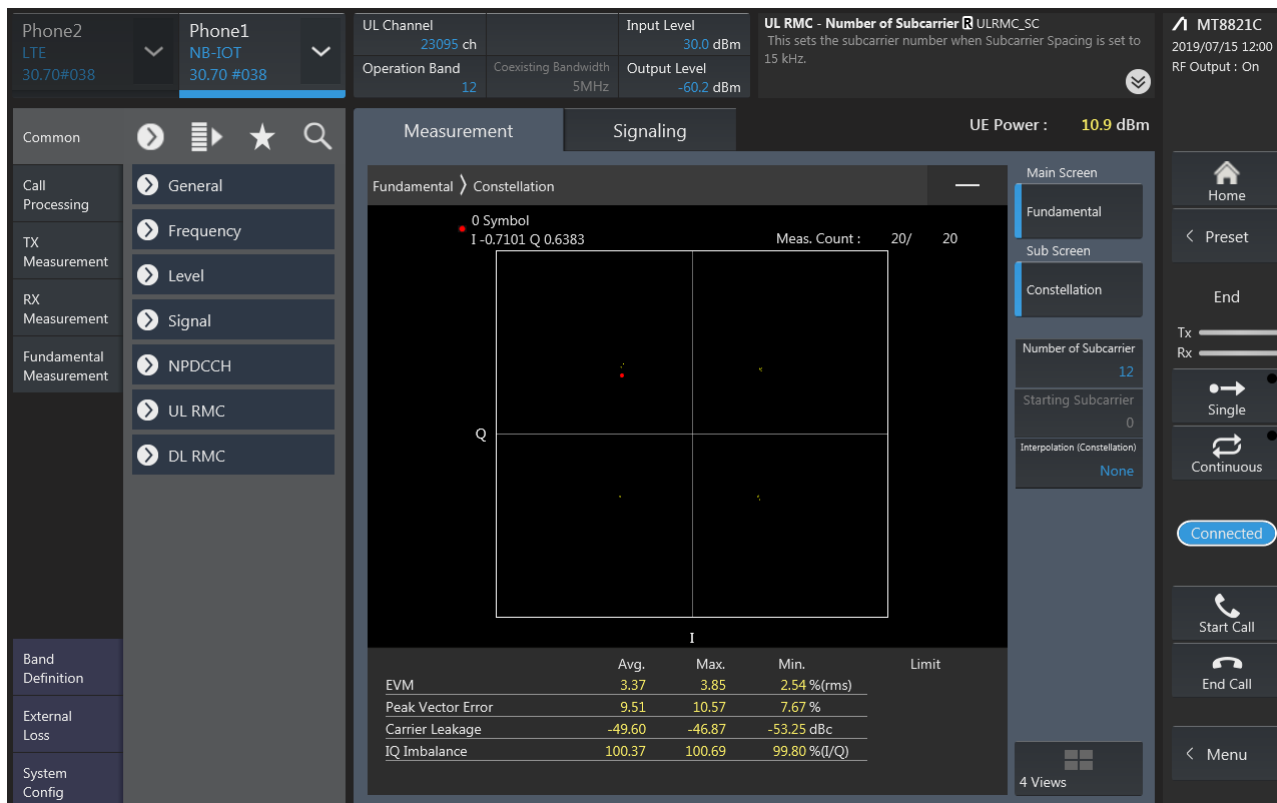


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3.1.1.2 Test Mode = LTE-NB1/QPSK. Sub-carrier spacing=15kHz.T size=12T0

3.1.1.2.1 Test Channel = 23230

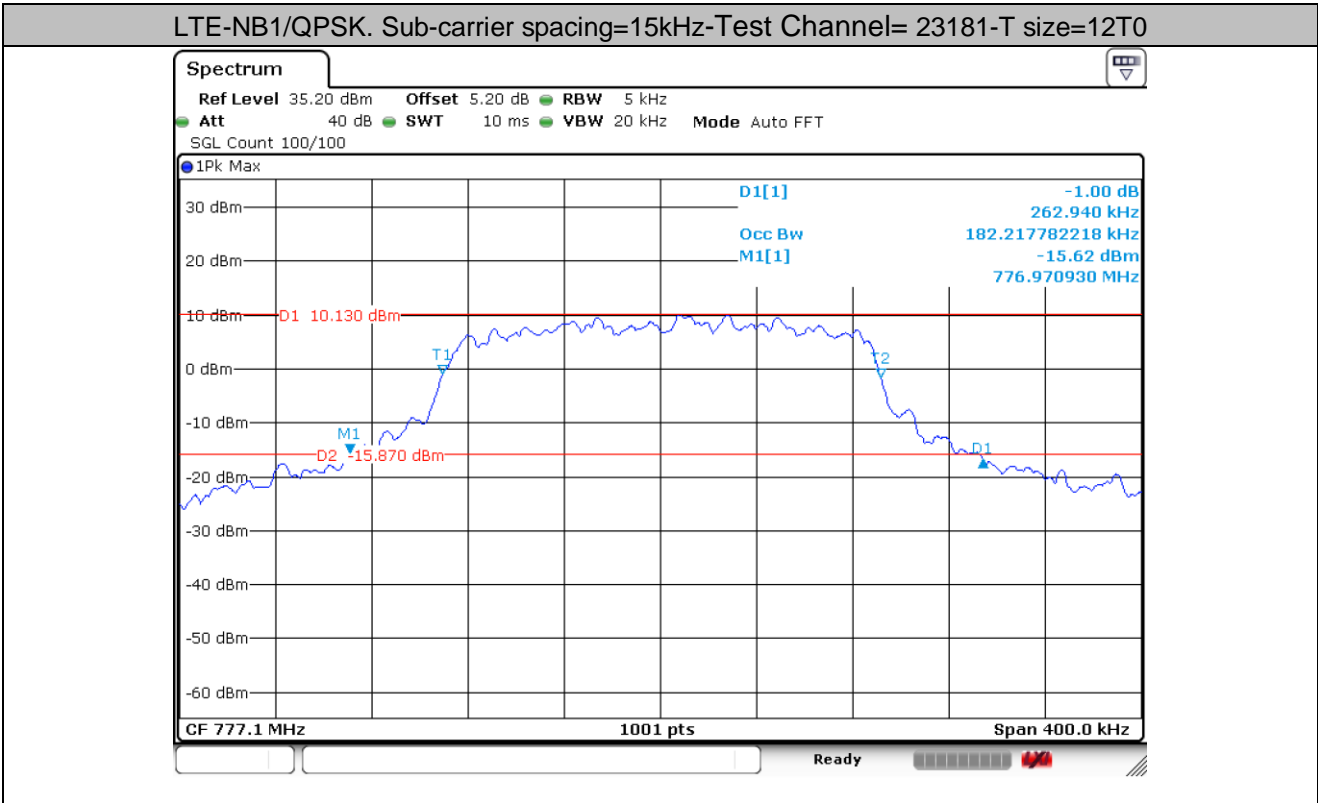


4 Bandwidth

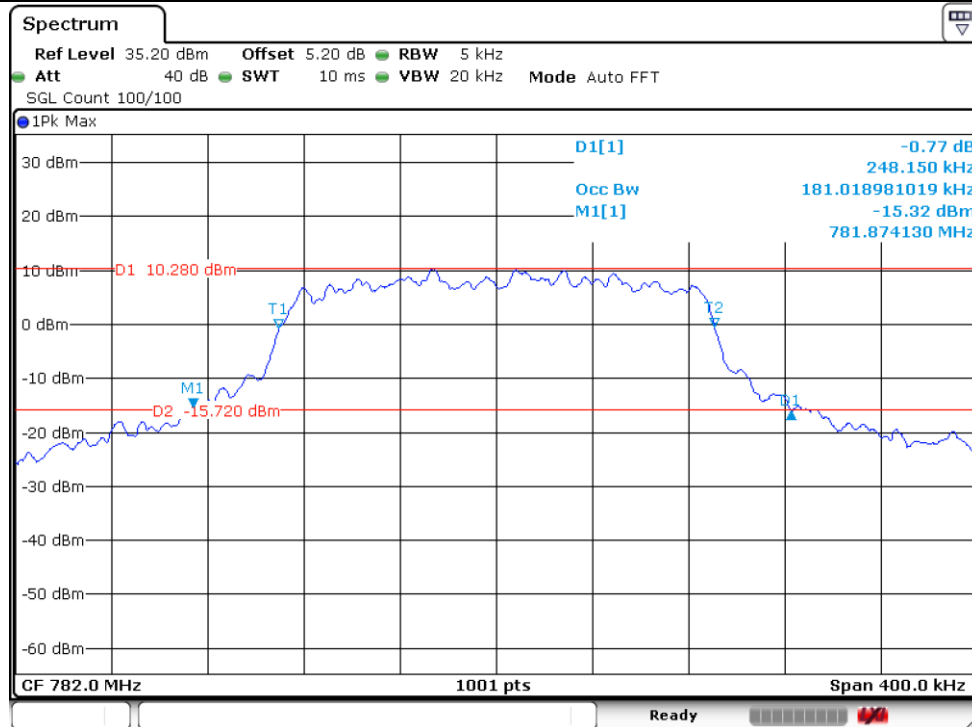
Test Band	Test Mode	T size	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
NB1 Band 13	QPSK/15kHz	12T0	23181	182.22	262.94	PASS
NB1 Band 13	QPSK/15kHz	12T0	23230	181.02	248.15	PASS
NB1 Band 13	QPSK/15kHz	12T0	23279	181.02	248.15	PASS

4.1 For LTE-NB1

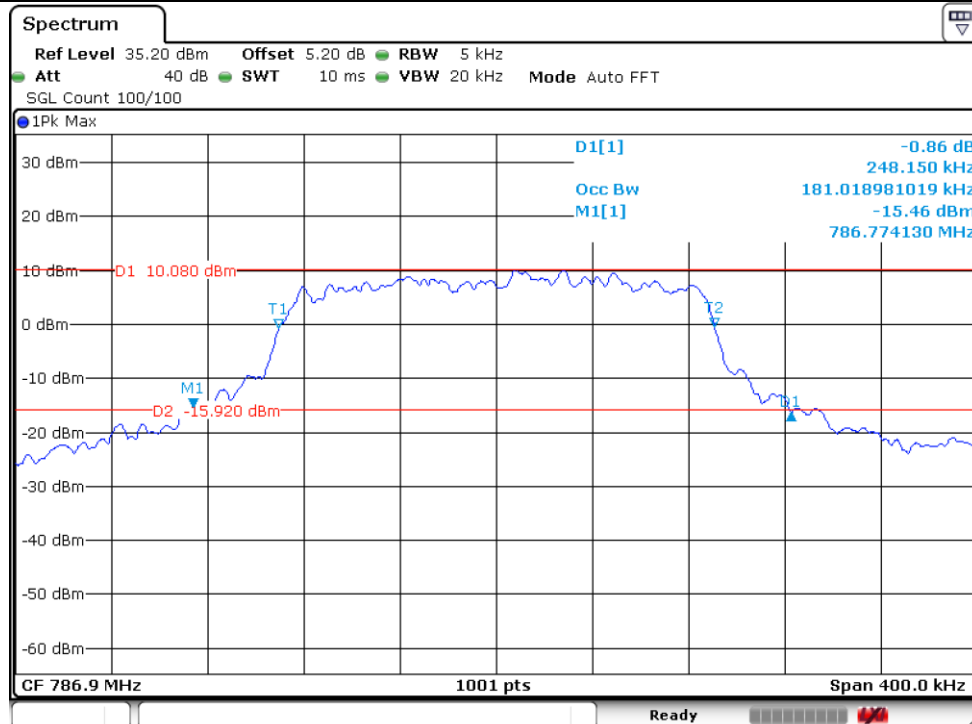
4.1.1 Test Band = LTE-NB1 Band 13



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23230-T size=12T0



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23279-T size=12T0

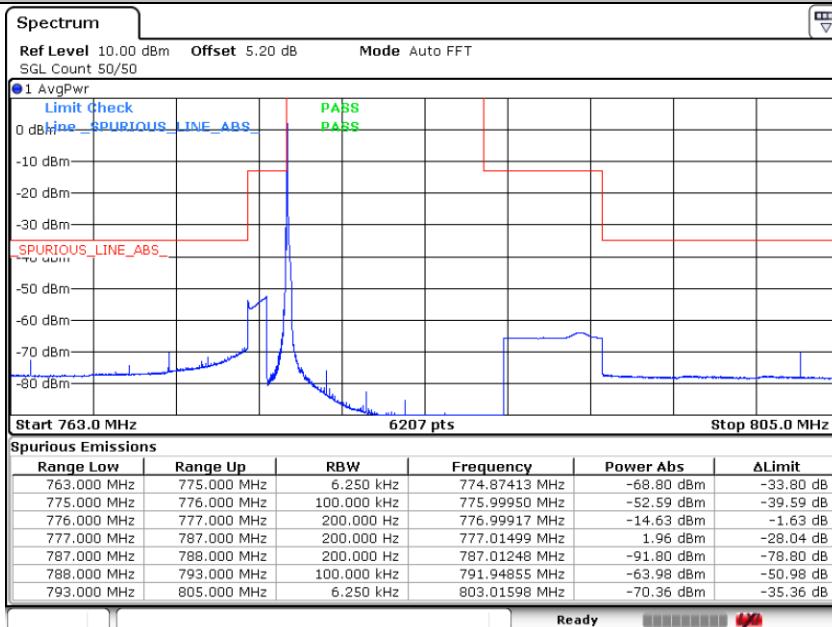


5 Band Edges Compliance

5.1 For LTE-NB1

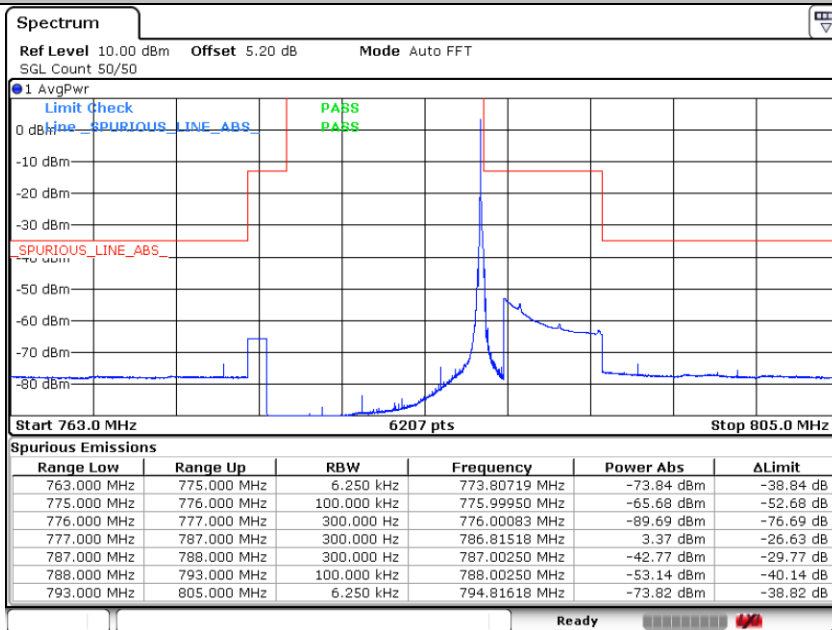
5.1.1 Test Band = LTE-NB1 Band 13

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23181-T size=1T0



Date: 20.AUG.2019 20:30:05

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23279-T size=1T47



Date: 20.AUG.2019 20:41:57



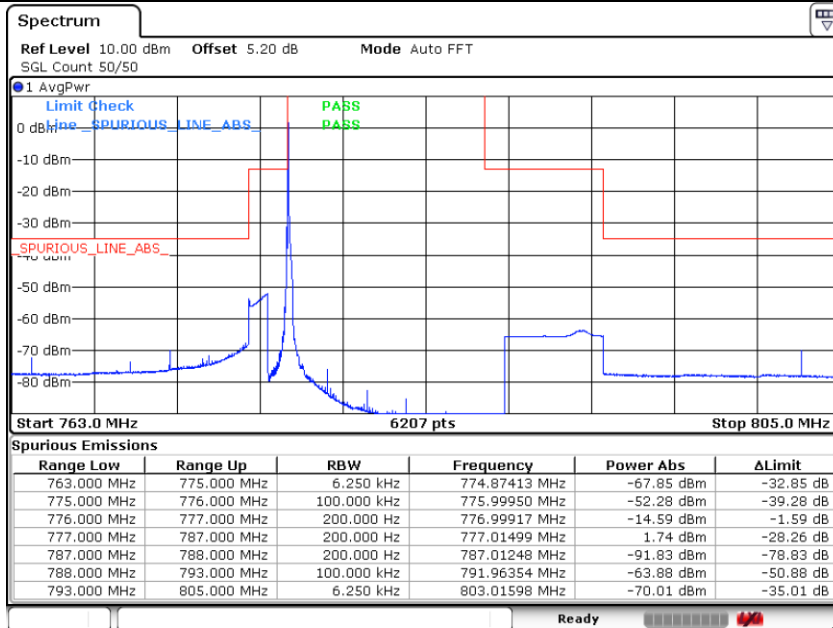
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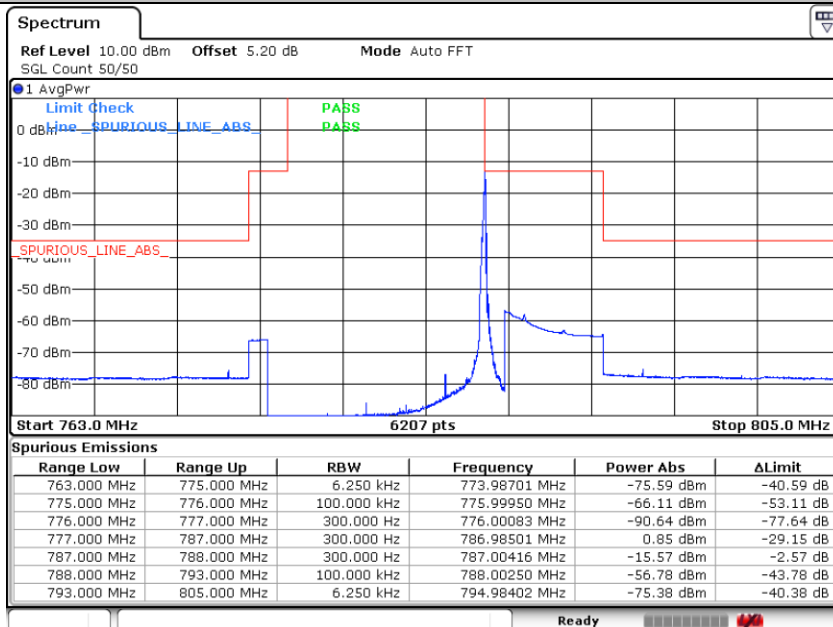
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23181-T size=1T0



Date: 20.AUG.2019 20:32:10

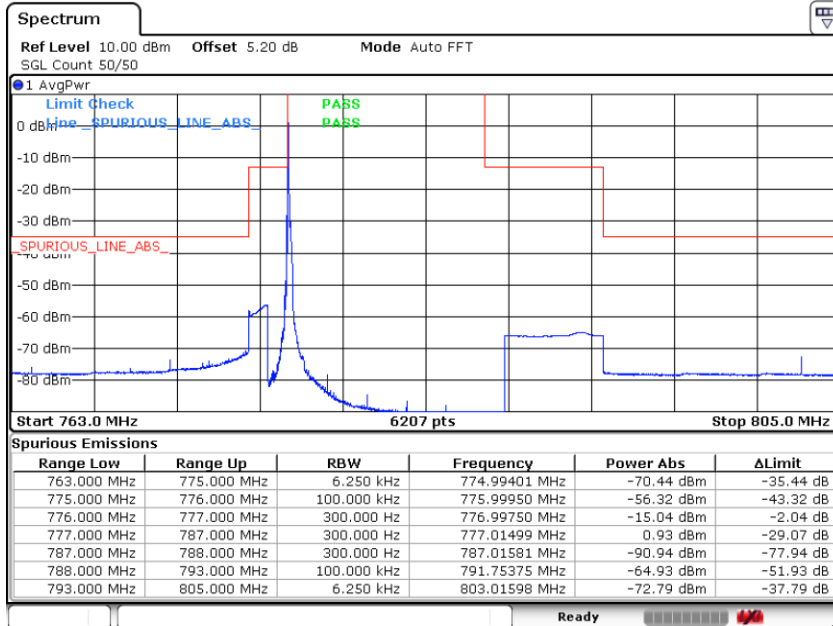
LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23279-T size=1T47



Date: 20.AUG.2019 20:40:40

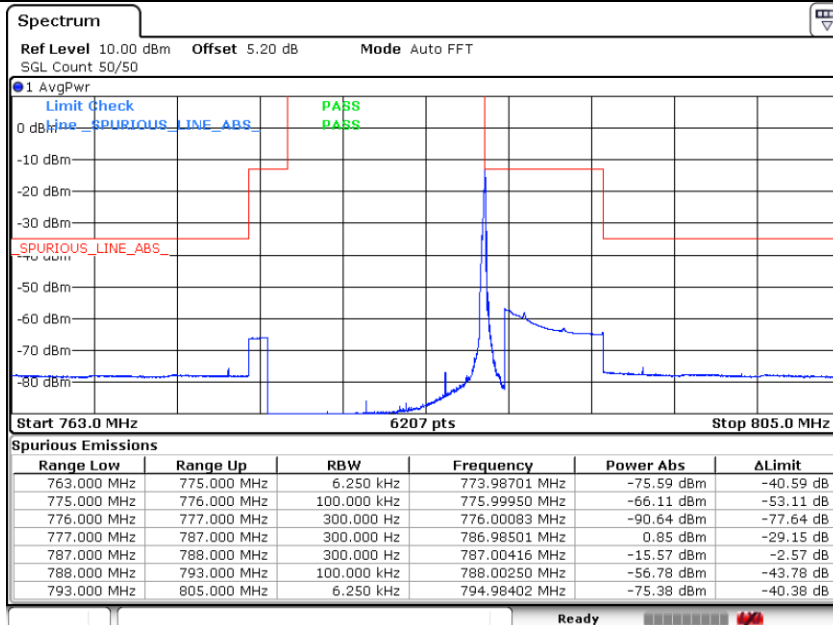


LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23181-T size=1T0



Date: 20.AUG.2019 20:35:01

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23279-T size=1T11



Date: 20.AUG.2019 20:39:14

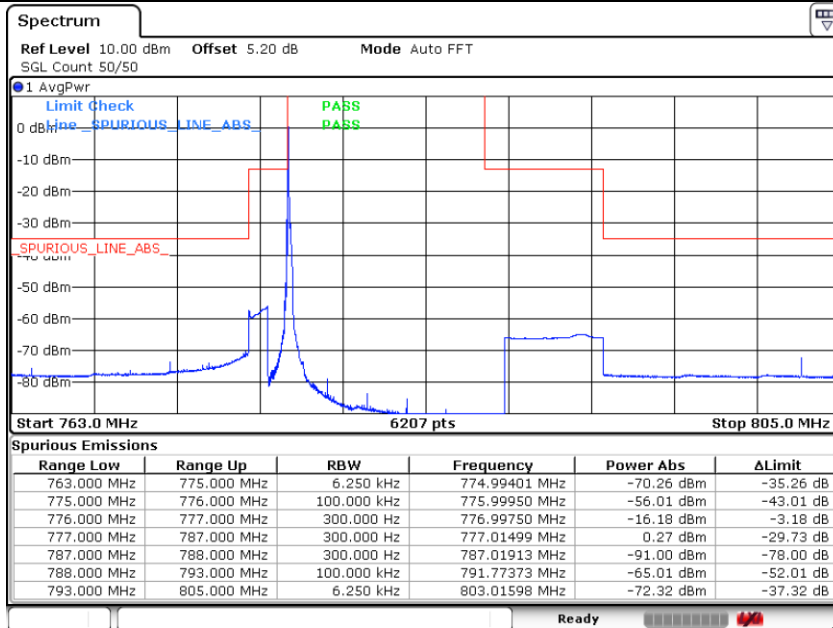


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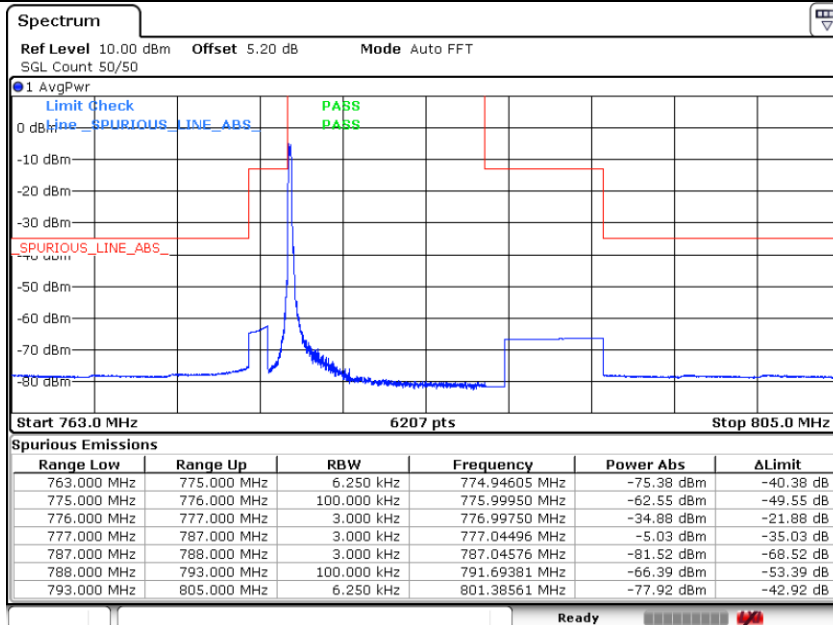
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23181-T size=1T0



Date: 20.AUG.2019 20:33:53

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23181-T size=12T0



Date: 20.AUG.2019 20:35:46

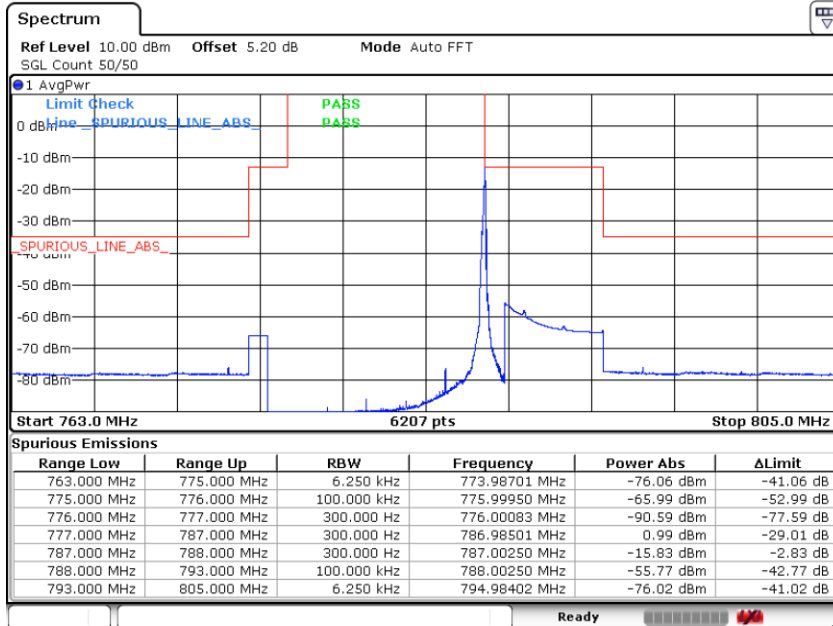


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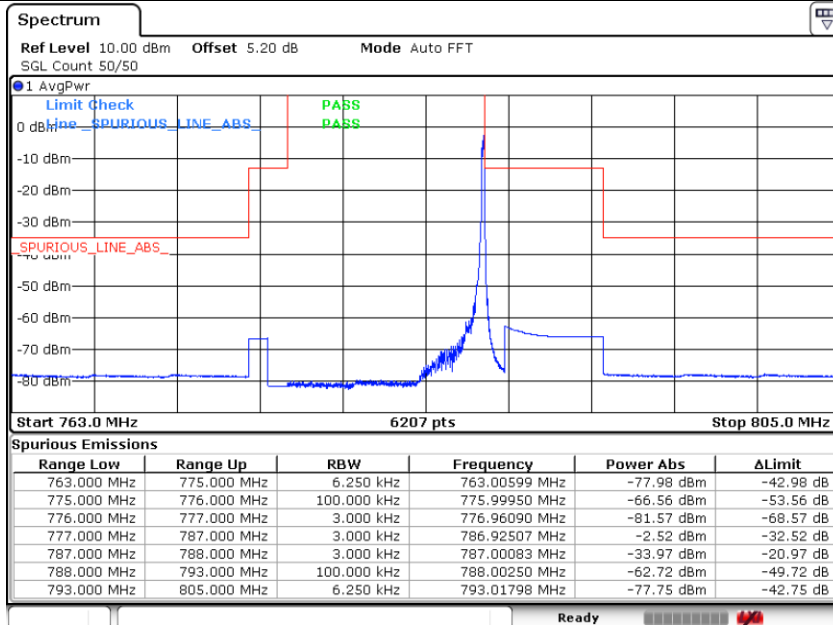
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23279-T size=1T11



Date: 20.AUG.2019 20:38:30

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23279-T size=12T0



Date: 20.AUG.2019 20:37:24



6 Spurious Emission at Antenna Terminal

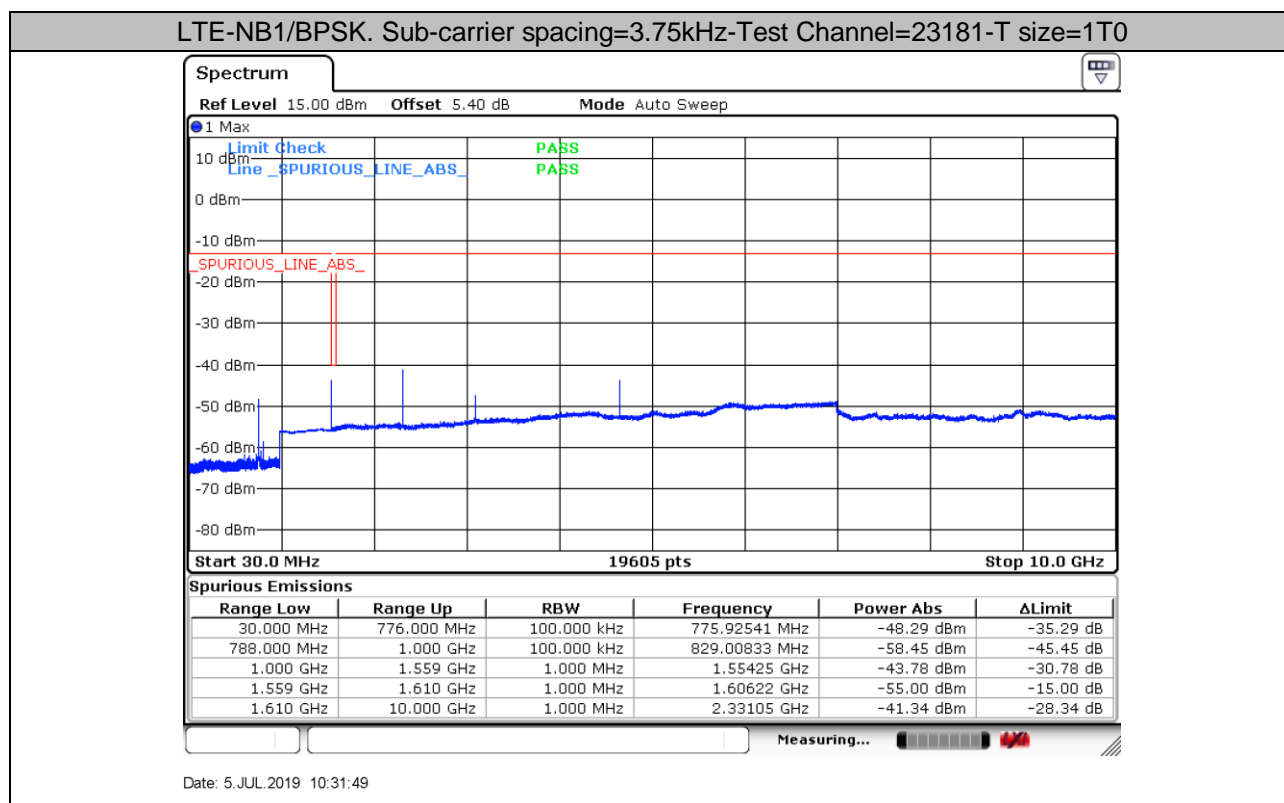
NOTE1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k \cdot (\text{Span} / \text{RBW})$ " with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

NOTE2: only the worst case data displayed in this report.

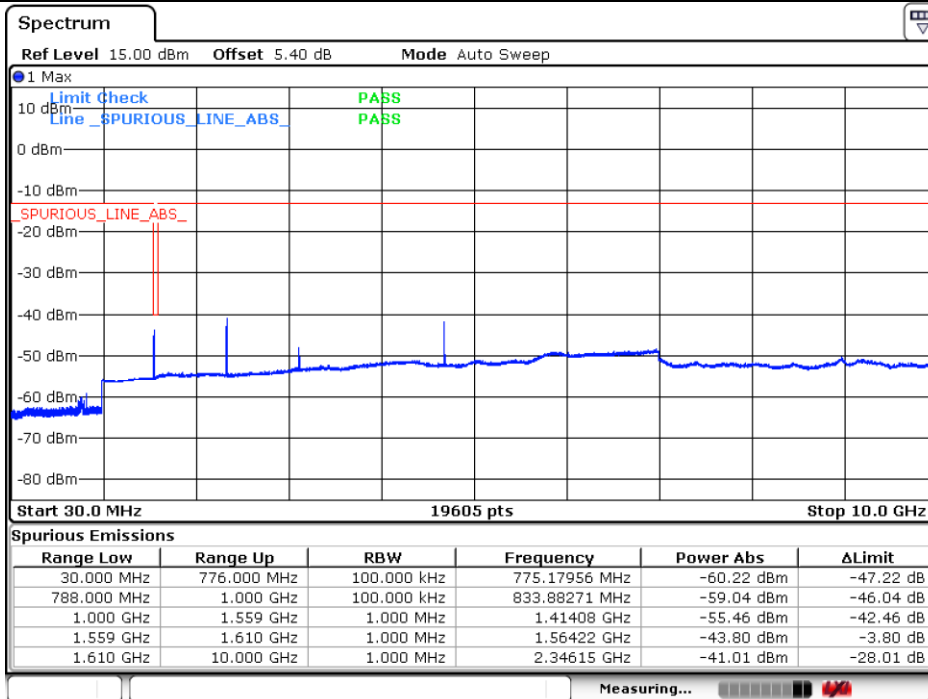
Part I - Test Plots

6.1 For LTE-NB1

6.1.1 Test Band = LTE-NB1 Band 13

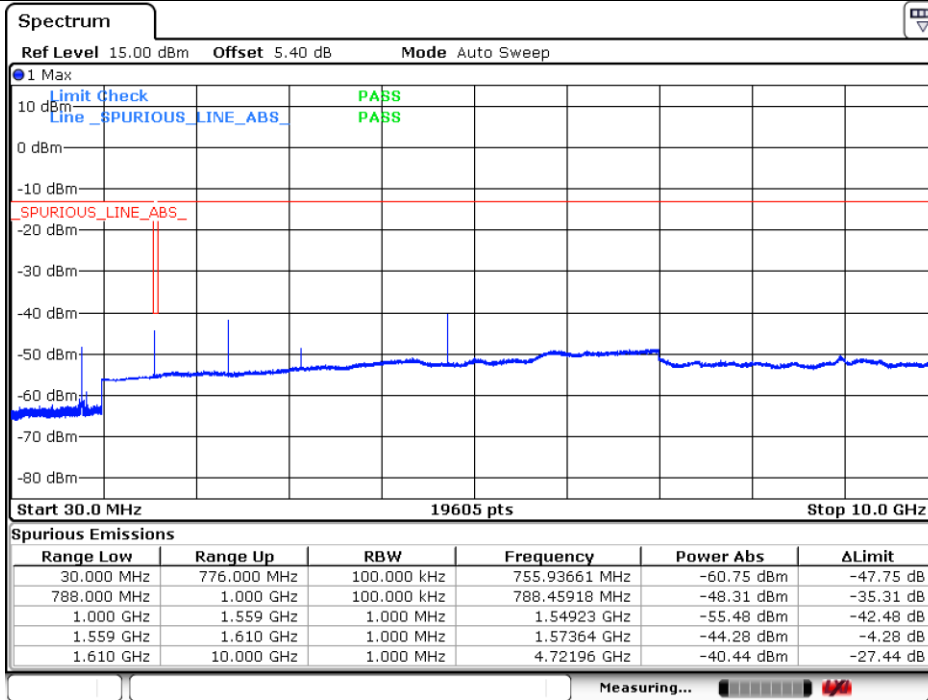


LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23230-T size=1T0



Date: 5 JUL 2019 10:42:57

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23279-T size=1T0



Date: 5 JUL 2019 10:45:06



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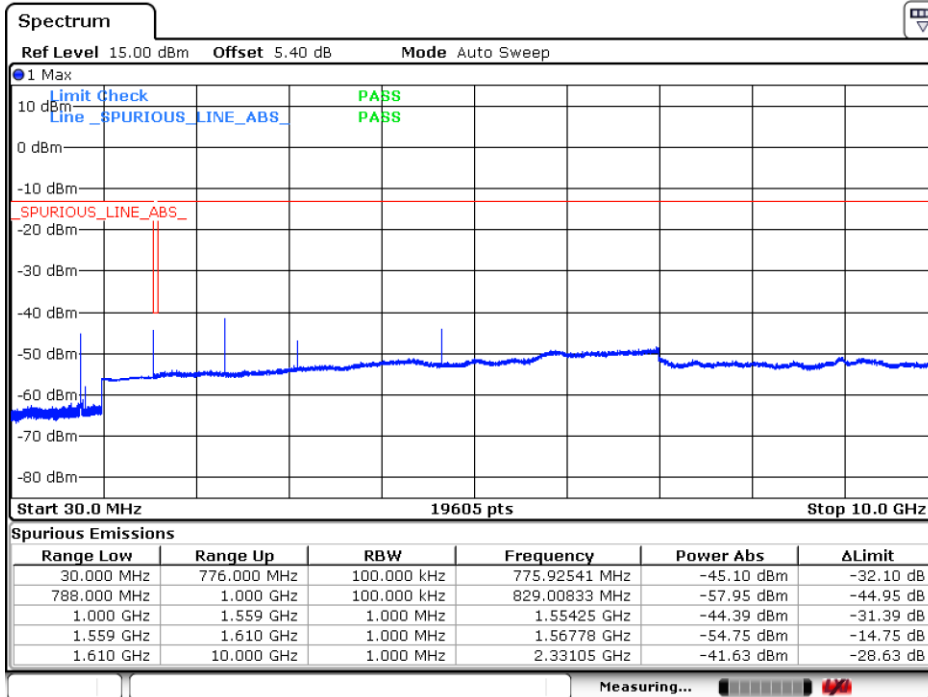
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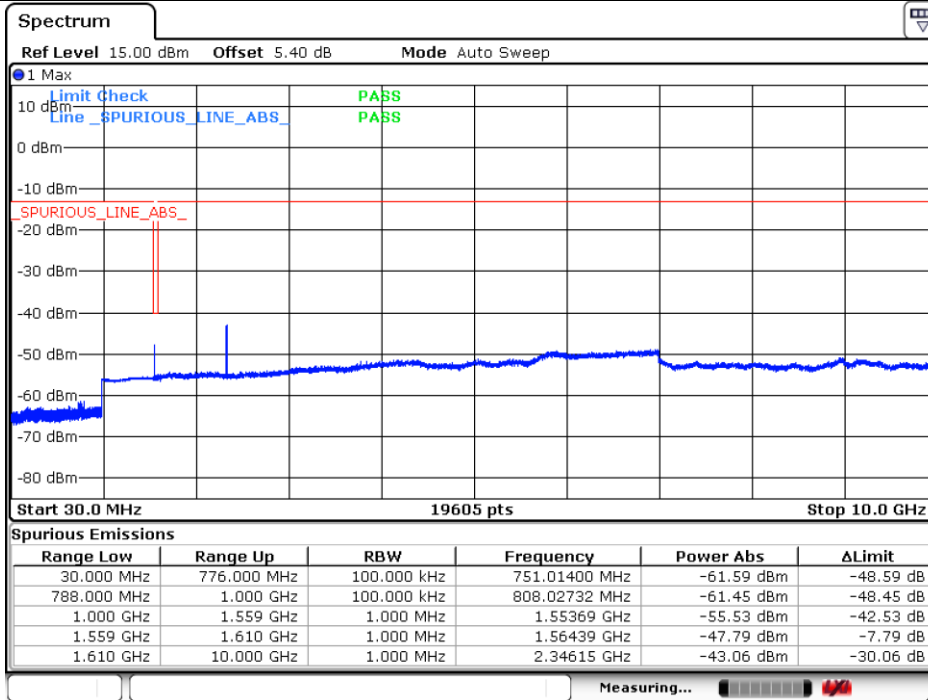
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Date: 5 JUL 2019 10:32:47

LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23230-T size=1T0



Date: 5 JUL 2019 10:39:49

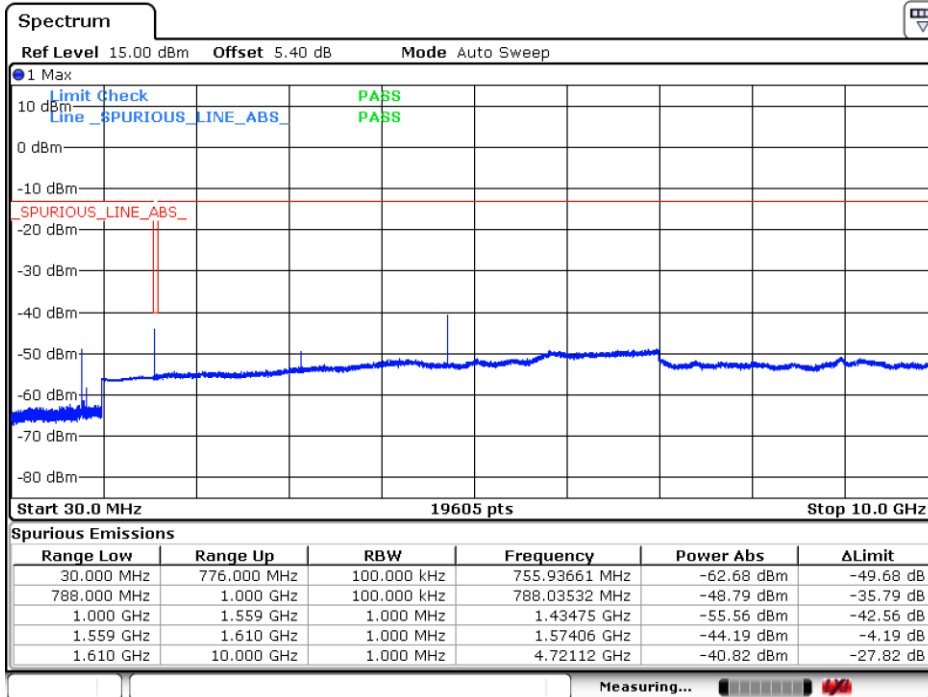
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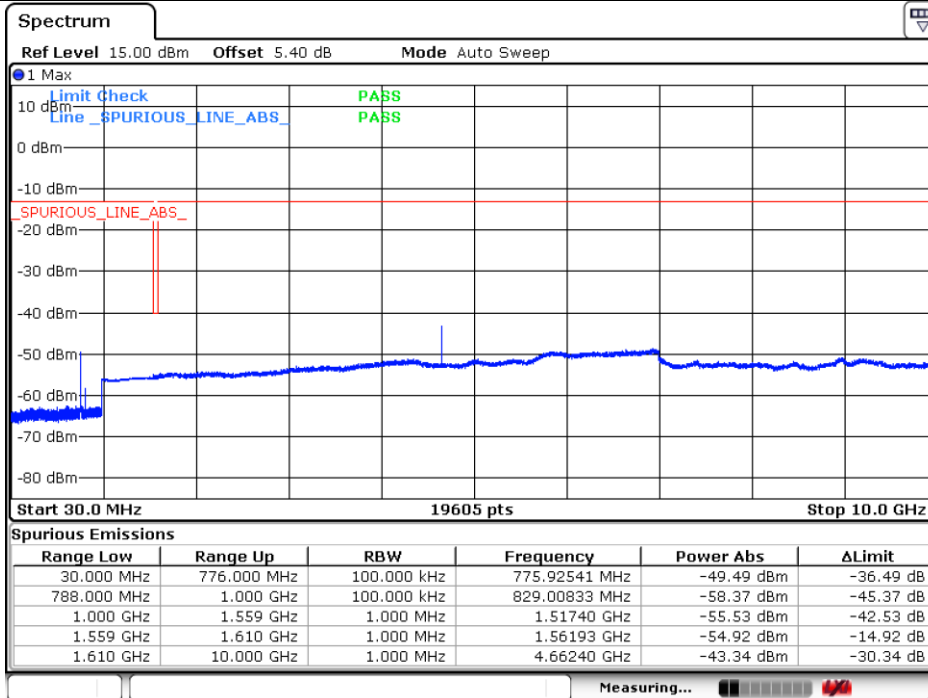
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23279-T size=1T0



Date: 5 JUL 2019 10:45:58

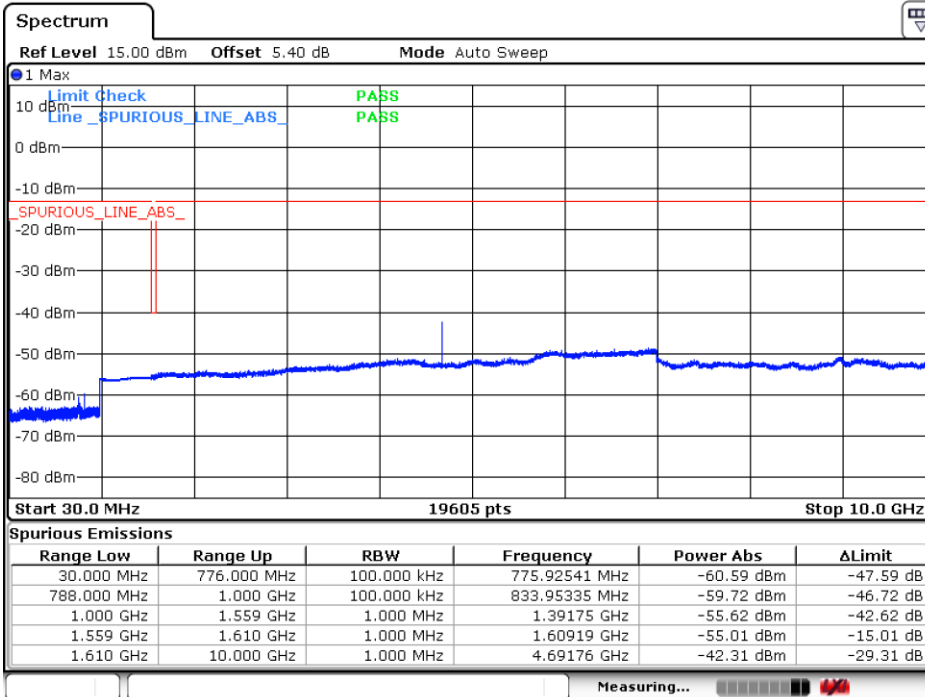
LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23181-T size=1T0



Date: 5 JUL 2019 10:35:14

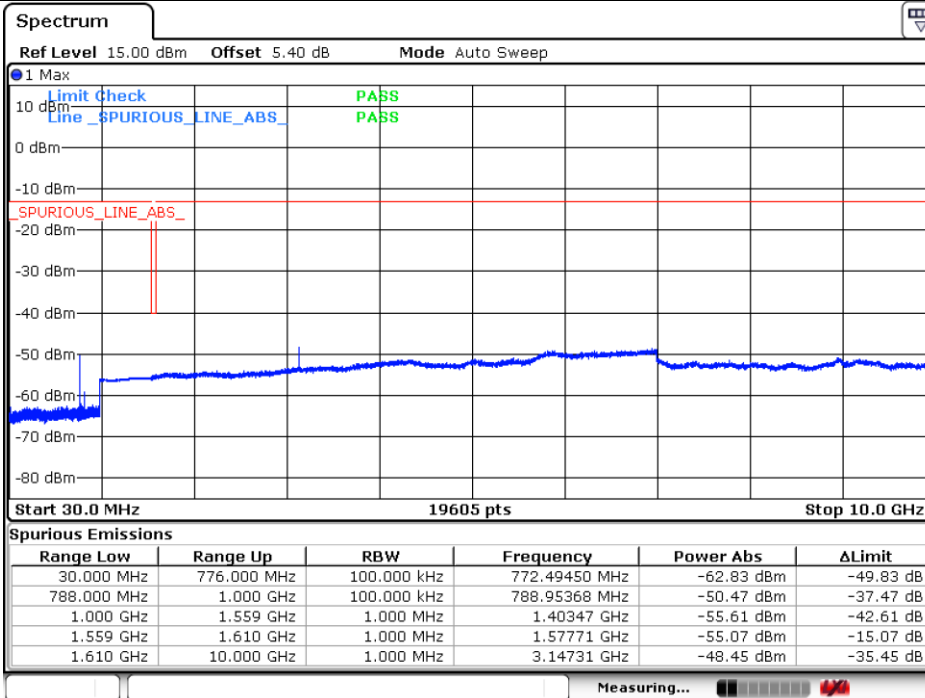


LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23230-T size=1T0



Date: 5 JUL 2019 10:37:01

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23279-T size=1T0



Date: 5 JUL 2019 10:48:38



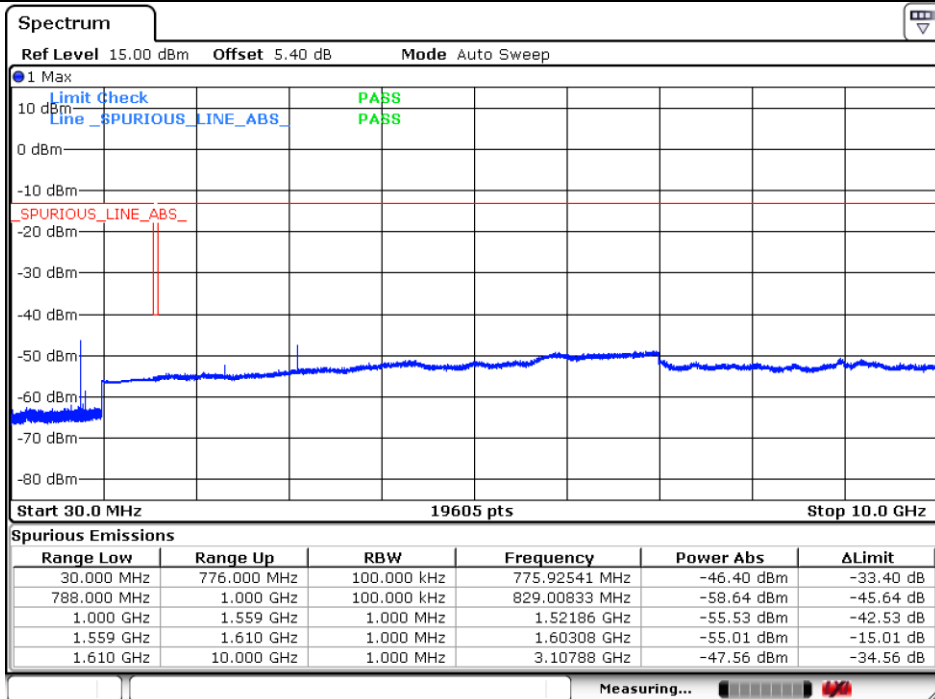
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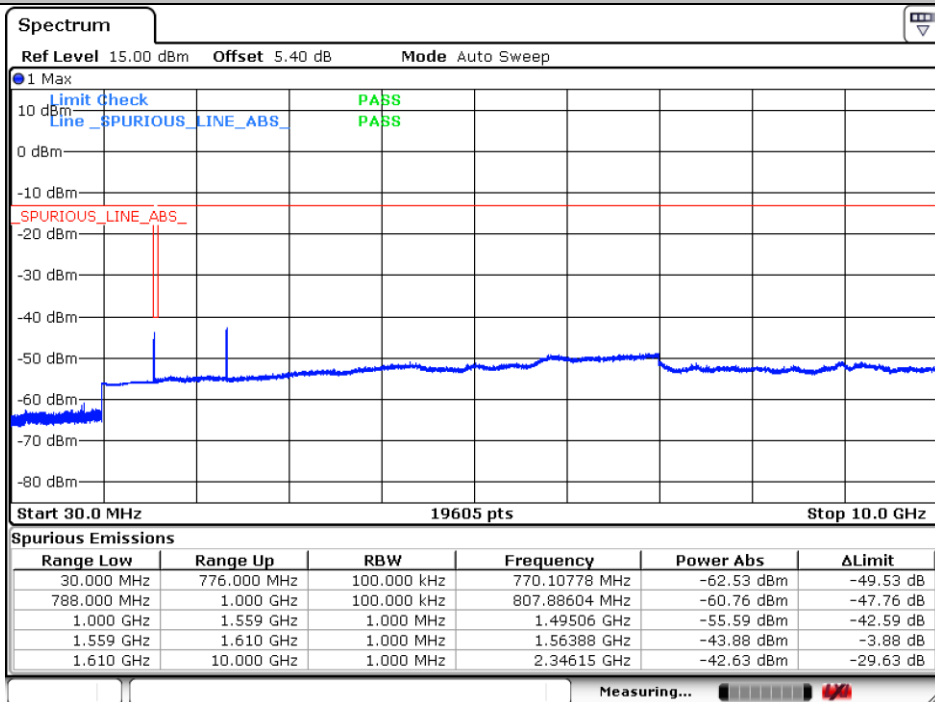
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23181-T size=1T0



Date: 5 JUL 2019 10:34:15

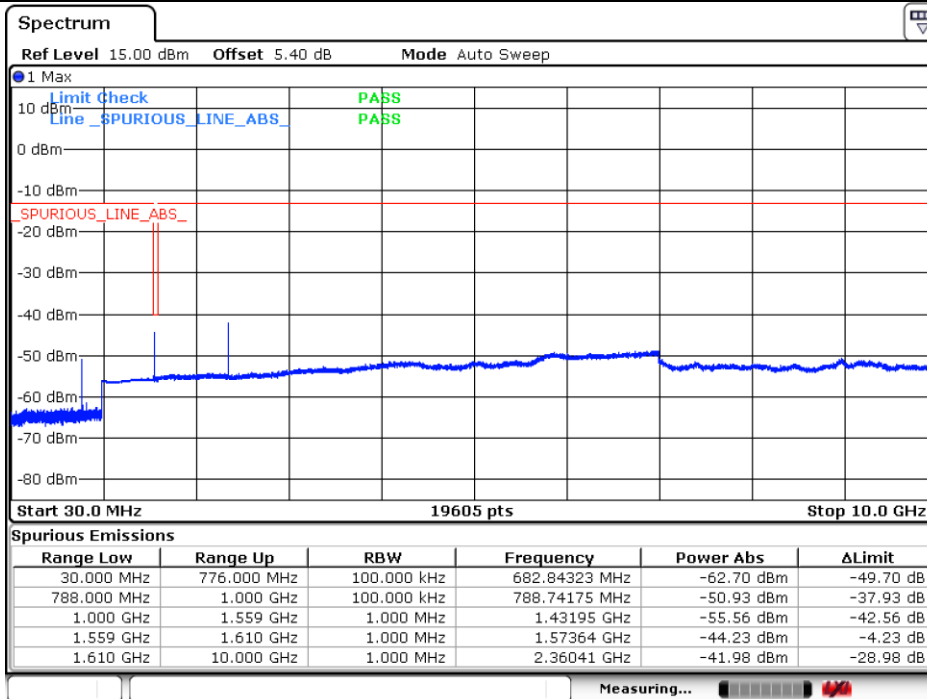
LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23230-T size=1T0



Date: 5 JUL 2019 10:37:38



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23279-T size=1T0



Date: 5 JUL 2019 10:48:09



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7 Field Strength of Spurious Radiation

7.1 For LTE-NB1

7.1.1 Test Band = LTE-NB1 Band 13

7.1.1.1 Test Mode = LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz

7.1.1.1.1 Test Channel = 23181

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
65.000000	-81.01	-13.00	68.01	Vertical
347.146667	-85.27	-13.00	72.27	Vertical
1570.500000	-66.38	-40.00	26.38	Vertical
2261.000000	-59.23	-13.00	46.23	Vertical
3451.912500	-67.81	-13.00	54.81	Vertical
6490.012500	-63.94	-13.00	50.94	Vertical
62.760000	-76.41	-13.00	63.41	Horizontal
274.393333	-86.09	-13.00	73.09	Horizontal
1559.000000	-61.97	-40.00	21.97	Horizontal
2783.000000	-57.25	-13.00	44.25	Horizontal
3764.887500	-67.37	-13.00	54.37	Horizontal
6824.437500	-64.19	-13.00	51.19	Horizontal

7.1.1.1.2 Test Channel = 23230

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.673333	-79.69	-13.00	66.69	Vertical
332.726667	-85.14	-13.00	72.14	Vertical
1570.000000	-66.45	-40.00	26.45	Vertical
2389.000000	-59.27	-13.00	46.27	Vertical
3203.287500	-67.61	-13.00	54.61	Vertical
5962.537500	-64.37	-13.00	51.37	Vertical
63.086667	-76.02	-13.00	63.02	Horizontal
283.493333	-86.86	-13.00	73.86	Horizontal
1564.000000	-62.50	-40.00	22.50	Horizontal
2367.000000	-59.26	-13.00	46.26	Horizontal
3096.525000	-67.48	-13.00	54.48	Horizontal
6054.675000	-63.75	-13.00	50.75	Horizontal



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7.1.1.1.3 Test Channel = 23279

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.113333	-80.32	-13.00	67.32	Vertical
319.660000	-85.40	-13.00	72.40	Vertical
1570.500000	-66.43	-40.00	26.43	Vertical
2248.000000	-59.28	-13.00	46.28	Vertical
3276.900000	-68.13	-13.00	55.13	Vertical
6453.450000	-64.31	-13.00	51.31	Vertical
62.433333	-76.33	-13.00	63.33	Horizontal
264.920000	-86.04	-13.00	73.04	Horizontal
1569.000000	-62.35	-40.00	22.35	Horizontal
2362.000000	-59.25	-13.00	46.25	Horizontal
4315.275000	-65.46	-13.00	52.46	Horizontal
7870.612500	-62.67	-13.00	49.67	Horizontal

NOTE:

- 1) The disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
- 2) only the worst case data presented in this report.



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8 Frequency Stability

8.1 Frequency Error VS. Voltage

BAND	Band width	Modulation	Channel	Number of T	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	VL	TN	-14.67	-0.018878	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	VN	TN	2.62	0.003371	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	VH	TN	-4.43	-0.005698	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	VL	TN	14.87	0.019018	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	VN	TN	3.01	0.003852	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	VH	TN	9.08	0.011611	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	VL	TN	-5.61	-0.007135	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	VN	TN	-4.63	-0.005879	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	VH	TN	-14.84	-0.018862	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	VL	TN	7.59	0.009766	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	VN	TN	2.36	0.003041	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	VH	TN	3.88	0.004997	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	VL	TN	-8.00	-0.010232	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	VN	TN	1.48	0.001897	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	VH	TN	-5.36	-0.006852	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	VL	TN	-2.88	-0.003664	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	VN	TN	-3.91	-0.004965	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	VH	TN	-12.14	-0.015422	±2.5	PASS

8.2 Frequency Error VS. Temperature

BAND	Band width	Modulation	Channel	Number of T	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	-30	-3.96	-0.005100	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	-20	7.91	0.010184	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	0	1.95	0.002512	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	10	14.10	0.018149	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	20	-7.16	-0.009213	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	30	14.60	0.018789	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	40	10.45	0.013446	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23181	12T0	NV	50	12.99	0.016718	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	-30	-9.99	-0.012781	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	-20	-5.49	-0.007026	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	0	-0.34	-0.000434	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	10	1.50	0.001917	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	20	5.39	0.006896	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	30	7.36	0.009407	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	40	-1.56	-0.001998	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23230	12T0	NV	50	-3.63	-0.004648	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	-30	0.16	0.000209	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	-20	-2.77	-0.003523	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	0	-0.69	-0.000873	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	10	13.18	0.016753	±2.5	PASS



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NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	20	-5.75	-0.007310	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	30	-3.80	-0.004831	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	40	-9.14	-0.011621	±2.5	PASS
NB1 Band 13	180KHz	BPSK/15KHz	23279	12T0	NV	50	-11.93	-0.015164	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	-30	-0.37	-0.000470	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	-20	13.69	0.017611	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	0	7.03	0.009047	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	10	7.68	0.009889	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	20	-3.88	-0.004990	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	30	-2.81	-0.003611	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	40	2.41	0.003107	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23181	12T0	NV	50	-5.21	-0.006708	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	-30	-1.74	-0.002230	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	-20	-14.51	-0.018559	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	0	7.31	0.009348	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	10	0.01	0.000014	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	20	2.91	0.003726	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	30	2.61	0.003338	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	40	-5.44	-0.006951	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23230	12T0	NV	50	-4.64	-0.005940	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	-30	4.43	0.005625	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	-20	6.77	0.008604	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	0	-9.21	-0.011705	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	10	7.34	0.009334	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	20	14.22	0.018074	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	30	10.67	0.013564	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	40	-5.33	-0.006768	±2.5	PASS
NB1 Band 13	180KHz	QPSK/15KHz	23279	12T0	NV	50	6.99	0.008878	±2.5	PASS

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