



Appendix B

LTE-NB1 Band 66





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1 Effective (Isotropic) Radiated Power Output Data

1.1 Test Result for LTE NB1 Band 66

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	EIRP (dBm)	limit (dBm)	Verdict
NB1 Band 66	BPSK	3.75	131973	1T0	23.13	25.77	30.00	PASS
NB1 Band 66	BPSK	3.75	131973	1T47	23.03	25.67	30.00	PASS
NB1 Band 66	BPSK	3.75	132322	1T0	23.13	25.77	30.00	PASS
NB1 Band 66	BPSK	3.75	132322	1T47	23.12	25.76	30.00	PASS
NB1 Band 66	BPSK	3.75	132671	1T0	22.92	25.56	30.00	PASS
NB1 Band 66	BPSK	3.75	132671	1T47	22.83	25.47	30.00	PASS
NB1 Band 66	QPSK	3.75	131973	1T0	23.10	25.74	30.00	PASS
NB1 Band 66	QPSK	3.75	131973	1T47	23.14	25.78	30.00	PASS
NB1 Band 66	QPSK	3.75	132322	1T0	22.92	25.56	30.00	PASS
NB1 Band 66	QPSK	3.75	132322	1T47	22.90	25.54	30.00	PASS
NB1 Band 66	QPSK	3.75	132671	1T0	22.85	25.49	30.00	PASS
NB1 Band 66	QPSK	3.75	132671	1T47	22.98	25.62	30.00	PASS

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	EIRP (dBm)	limit (dBm)	Verdict
NB1 Band 66	BPSK	15	131973	1T0	22.91	25.55	30.00	PASS
NB1 Band 66	BPSK	15	131973	1T11	22.96	25.60	30.00	PASS
NB1 Band 66	BPSK	15	132322	1T0	22.98	25.62	30.00	PASS
NB1 Band 66	BPSK	15	132322	1T11	22.97	25.61	30.00	PASS
NB1 Band 66	BPSK	15	132671	1T0	23.08	25.72	30.00	PASS
NB1 Band 66	BPSK	15	132671	1T11	23.17	25.81	30.00	PASS
NB1 Band 66	QPSK	15	131973	1T0	22.97	25.61	30.00	PASS
NB1 Band 66	QPSK	15	131973	1T11	23.05	25.69	30.00	PASS
NB1 Band 66	QPSK	15	131973	12T0	21.40	24.04	30.00	PASS
NB1 Band 66	QPSK	15	132322	1T0	22.95	25.59	30.00	PASS
NB1 Band 66	QPSK	15	132322	1T11	23.06	25.70	30.00	PASS
NB1 Band 66	QPSK	15	132322	12T0	21.69	24.33	30.00	PASS
NB1 Band 66	QPSK	15	132671	1T0	23.05	25.69	30.00	PASS
NB1 Band 66	QPSK	15	132671	1T11	22.85	25.49	30.00	PASS
NB1 Band 66	QPSK	15	132671	12T0	21.54	24.18	30.00	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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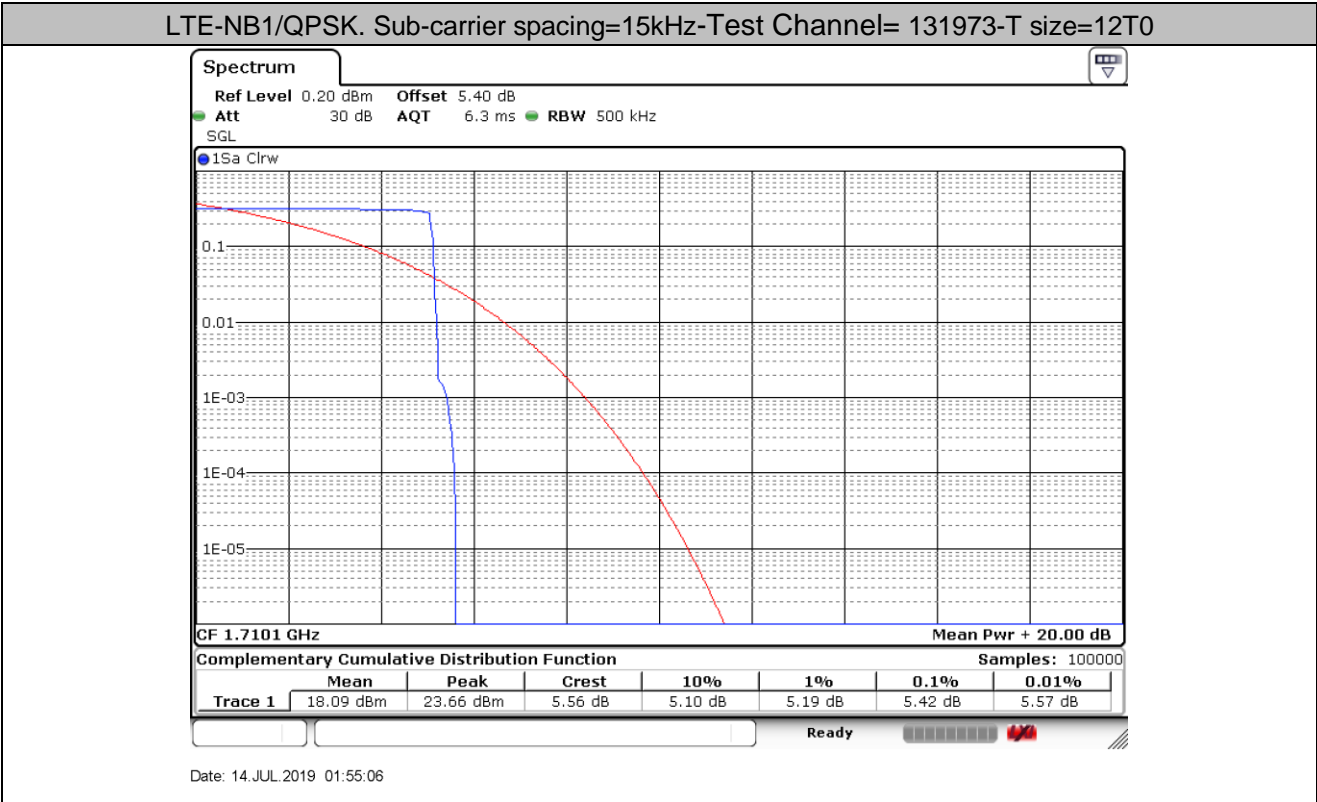
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2 Peak-to-Average Ratio

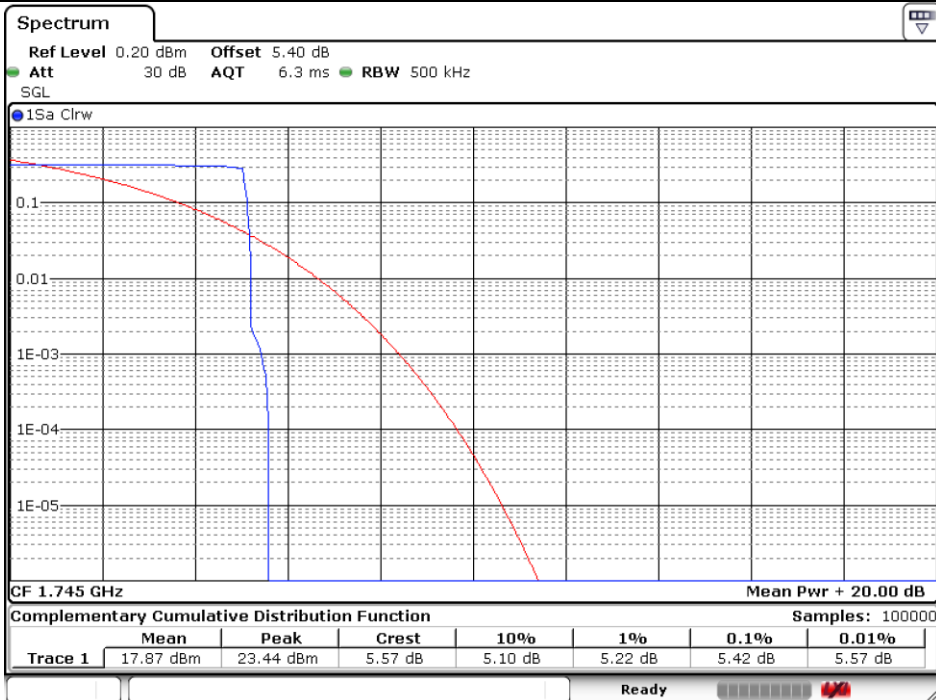
Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
NB1 Band 66	QPSK/12T0	131973	5.42	13	PASS
NB1 Band 66	QPSK/12T0	132322	5.42	13	PASS
NB1 Band 66	QPSK/12T0	132671	5.45	13	PASS

2.1 For LTE-NB1

2.1.1 Test Band = LTE-NB1 Band 66

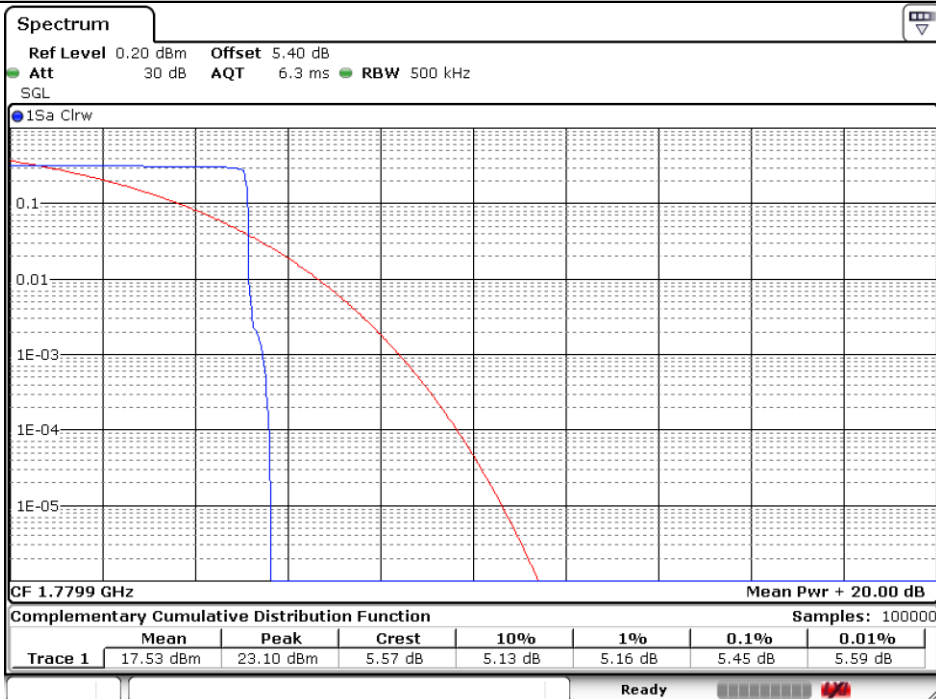


LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 132322-T size=12T0



Date: 14.JUL.2019 01:56:51

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 132671-T size=12T0



Date: 14.JUL.2019 01:57:45



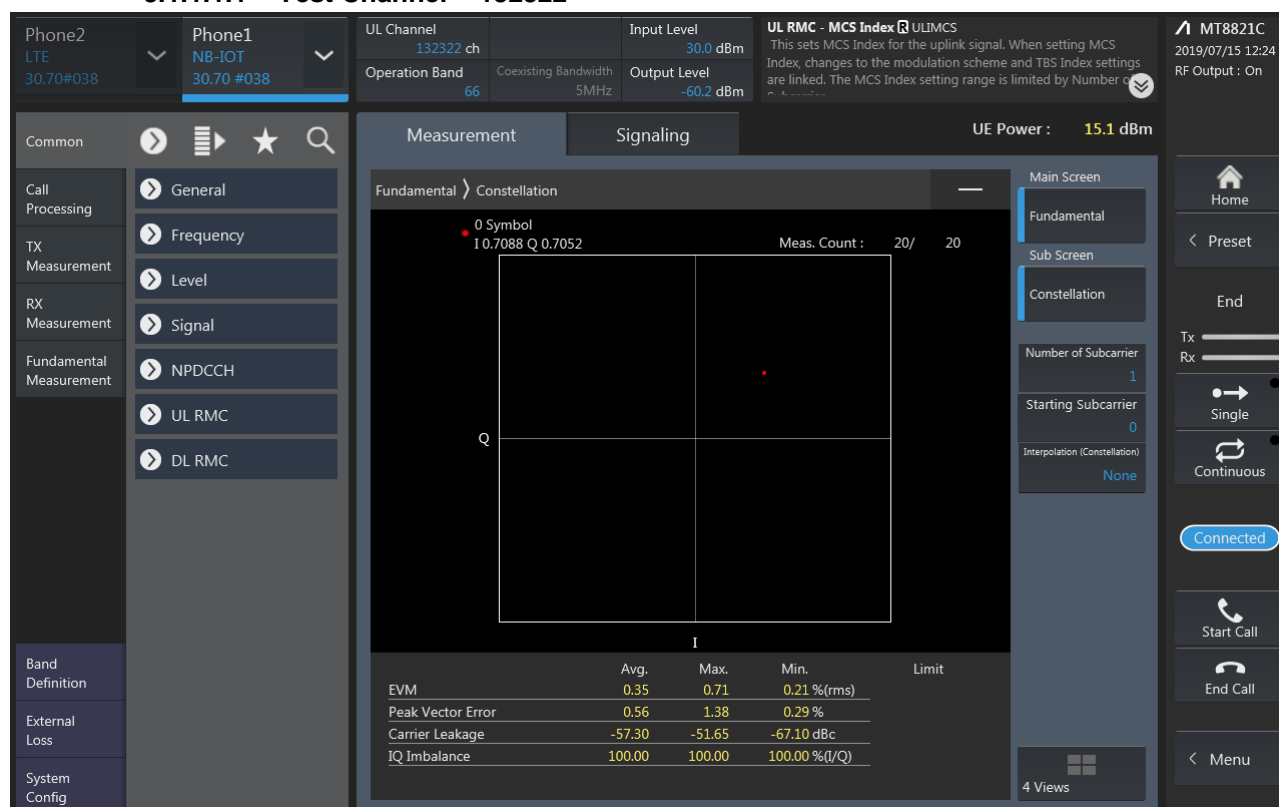
3 Modulation Characteristics

3.1 For LTE-NB1

3.1.1 Test Band = LTE-NB1 Band 66

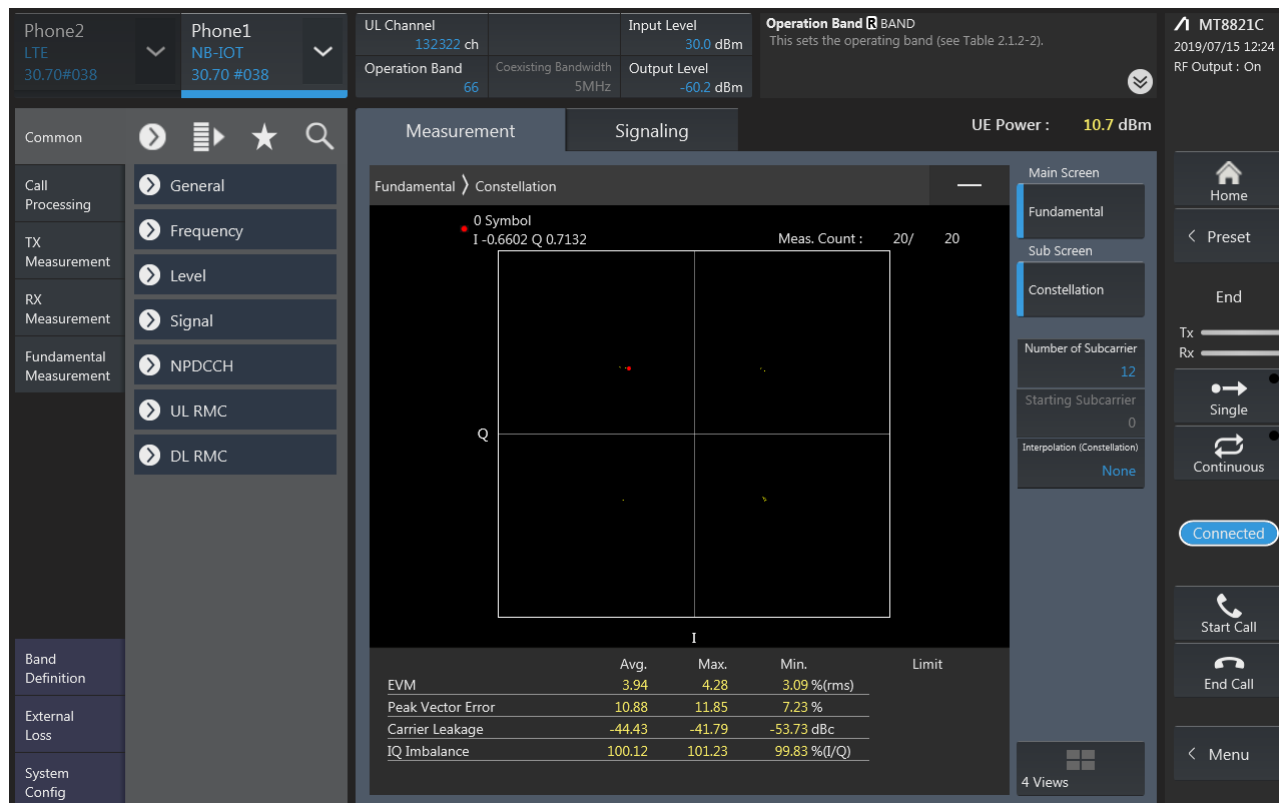
3.1.1.1 Test Mode = LTE-NB1/BPSK. Sub-carrier spacing=15kHz.T size=12T0

3.1.1.1.1 Test Channel = 132322



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

3.1.1.2.1 Test Channel = 132322



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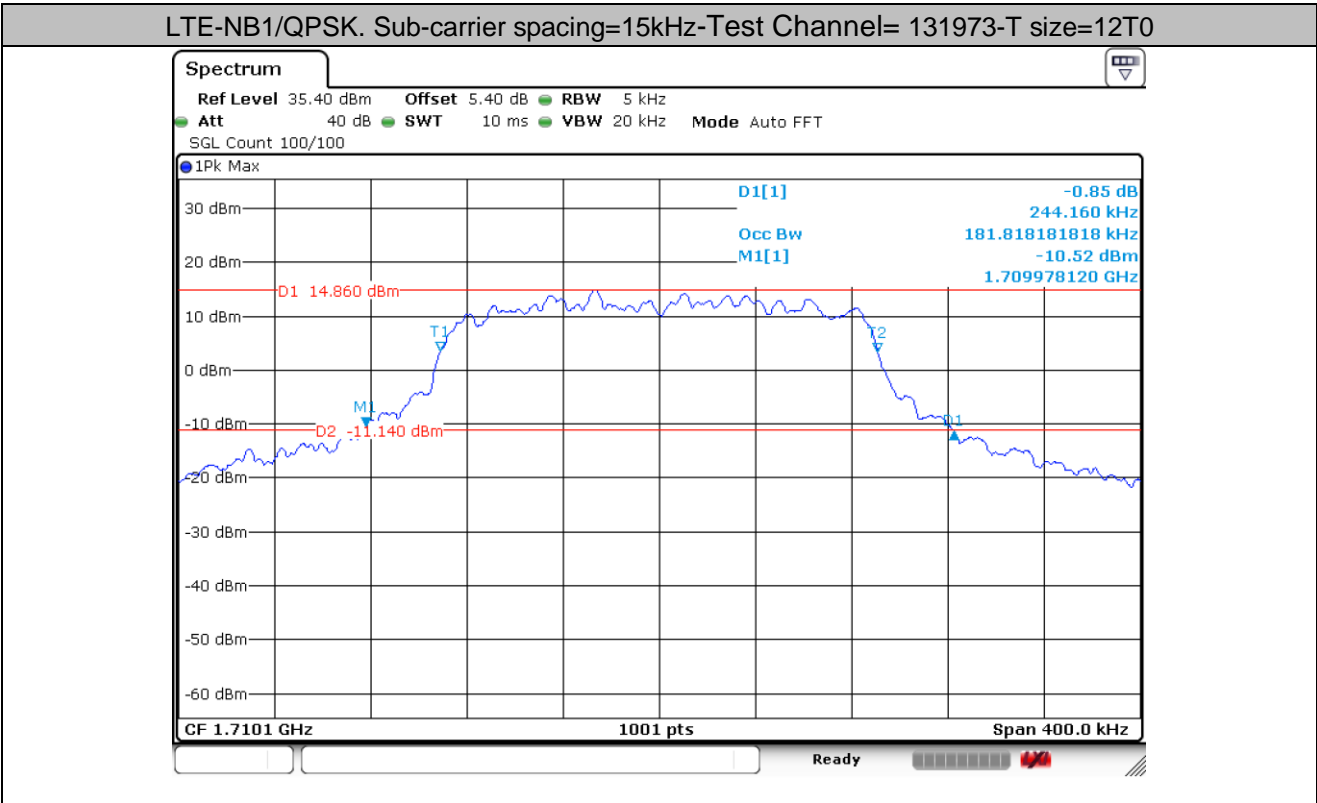
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4 Bandwidth

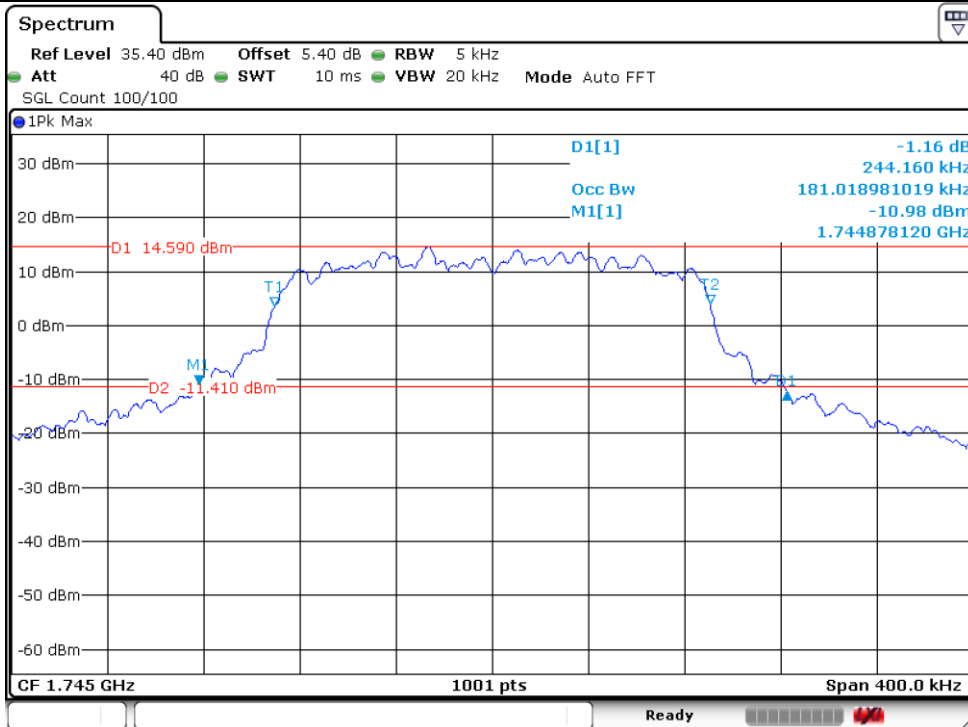
Test Band	Test Mode	T size	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
NB1 Band 66	QPSK/15kHz	12T0	131973	181.82	244.16	PASS
NB1 Band 66	QPSK/15kHz	12T0	132322	181.02	244.16	PASS
NB1 Band 66	QPSK/15kHz	12T0	132671	184.22	252.95	PASS

4.1 For LTE-NB1

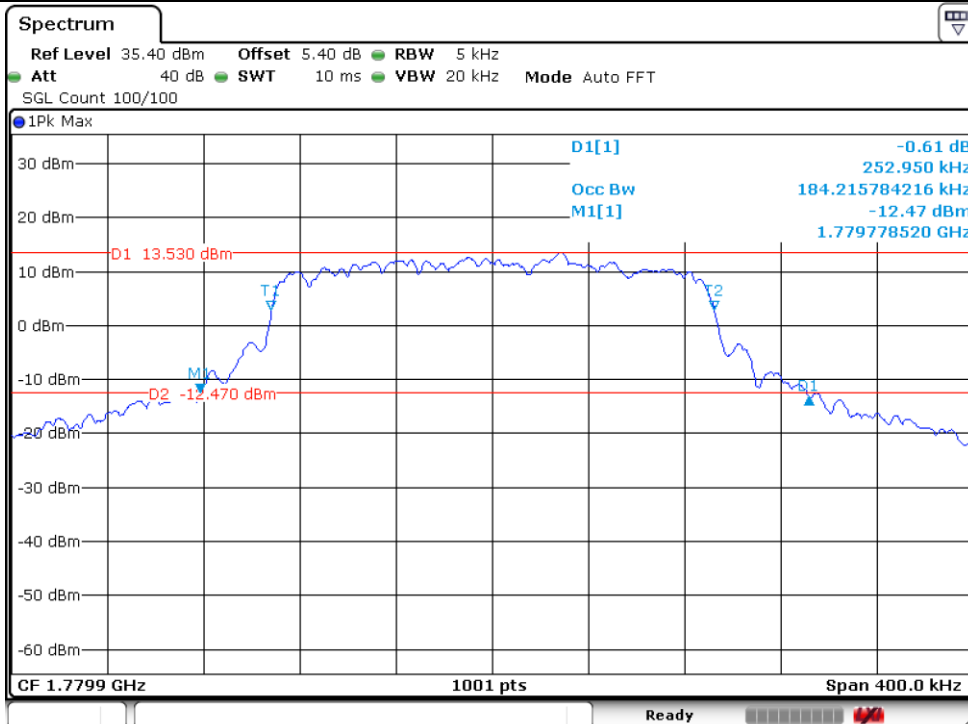
4.1.1 Test Band = LTE-NB1 Band 66



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 132322-T size=12T0



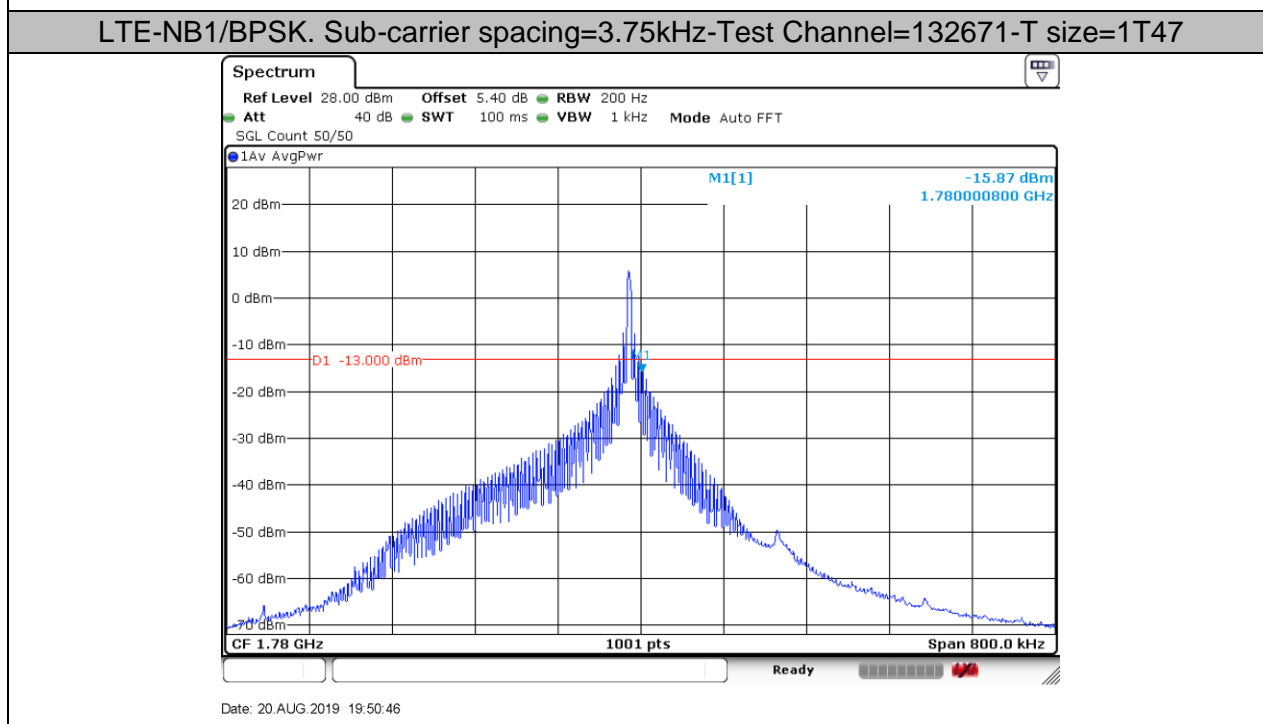
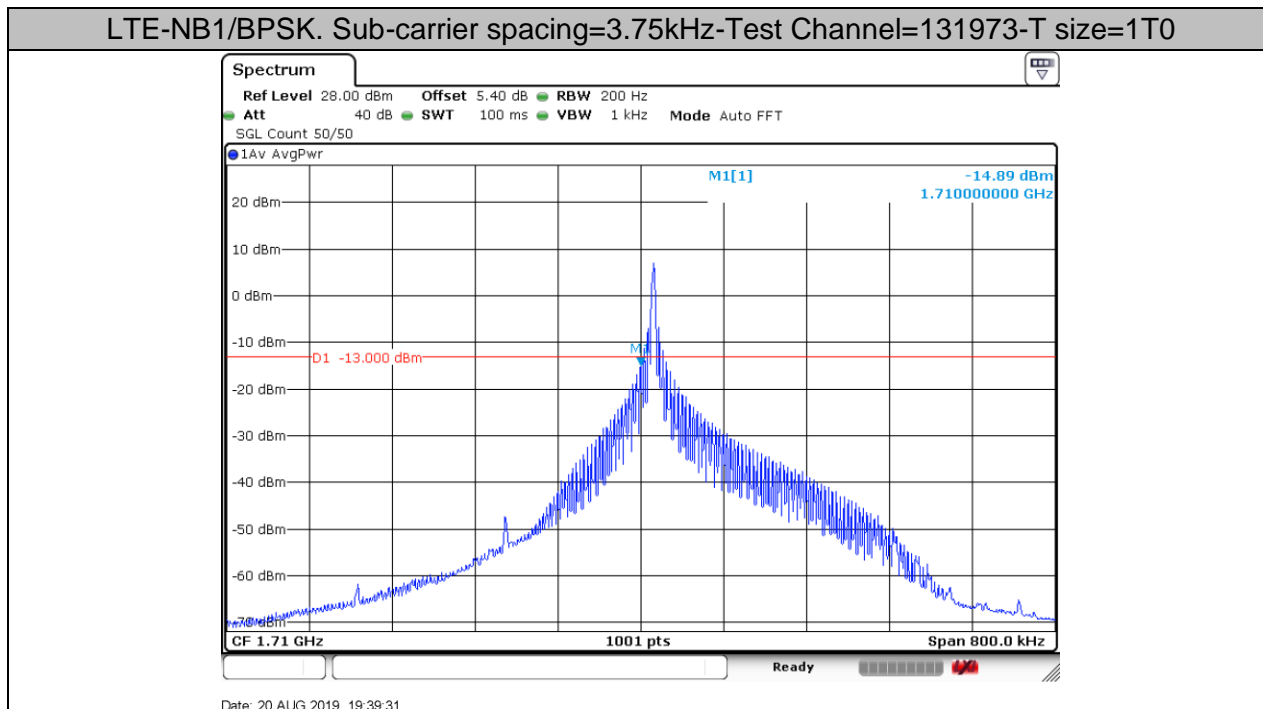
LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 132671-T size=12T0



5 Band Edges Compliance

5.1 For LTE-NB1

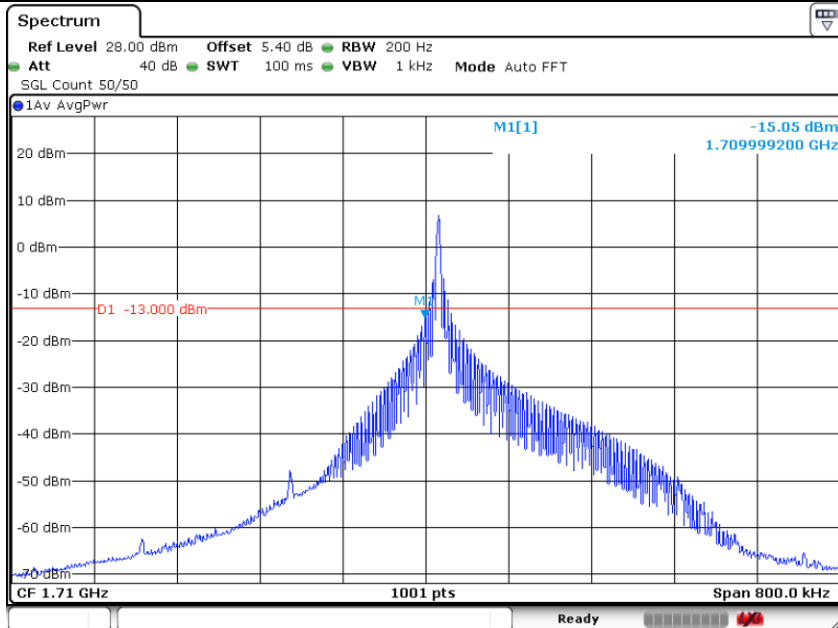
5.1.1 Test Band = LTE-NB1 Band 66



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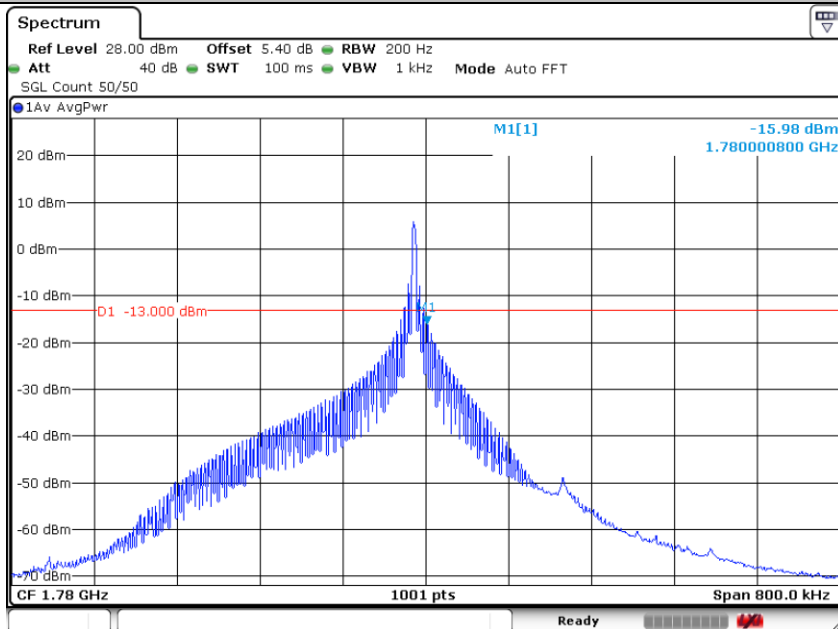
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=131973-T size=1T0



Date: 20.AUG.2019 19:43:54

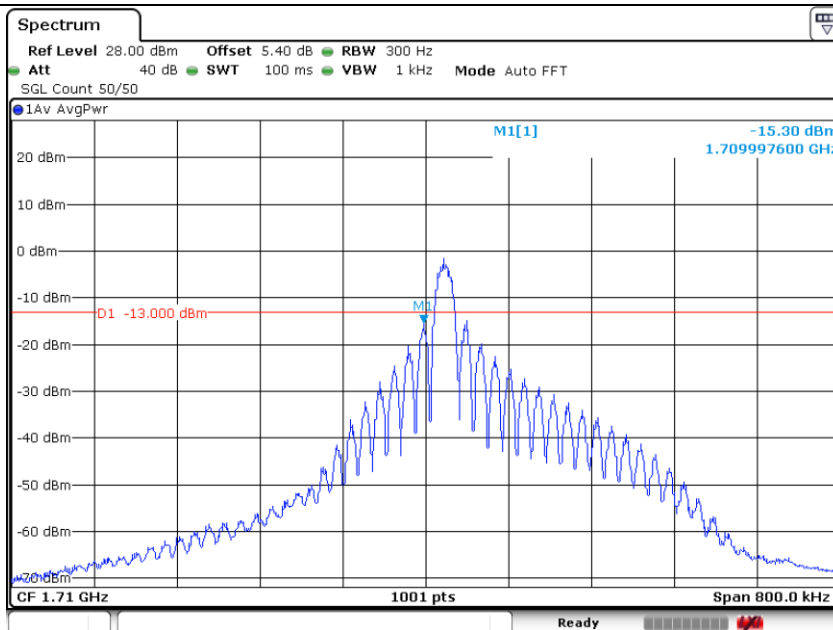
LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=132671-T size=1T47



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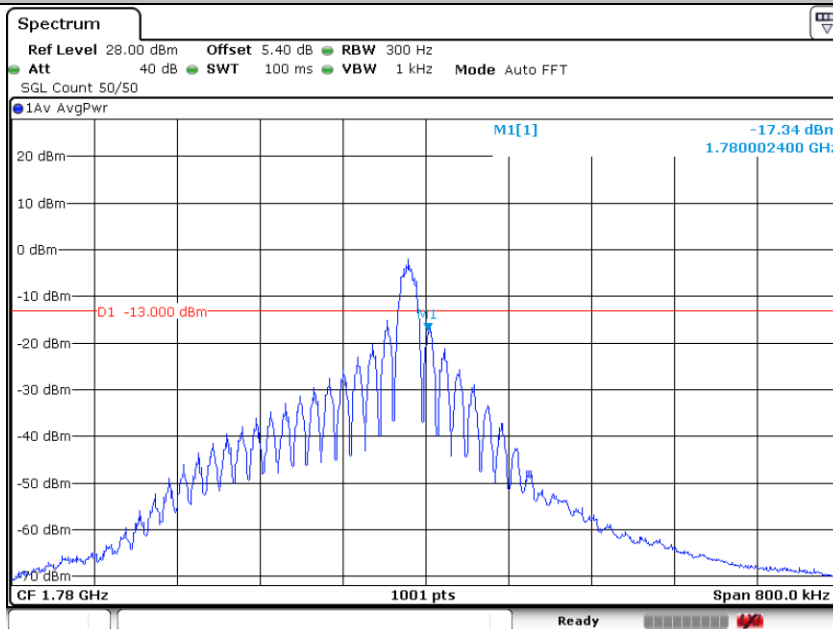
LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=131973-T size=1T0





Date: 20.AUG.2019 19:45:03

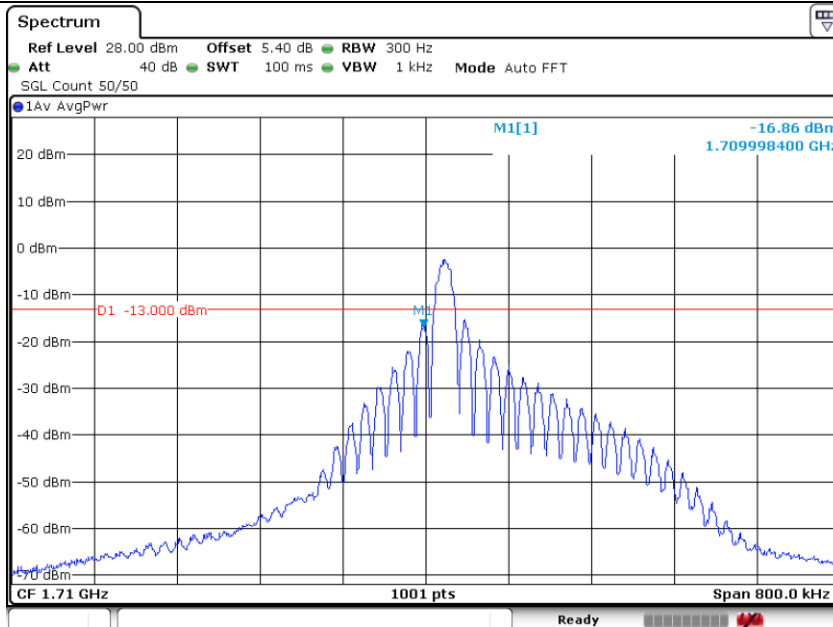
LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=132671-T size=1T11



Date: 20.AUG.2019 19:49:20

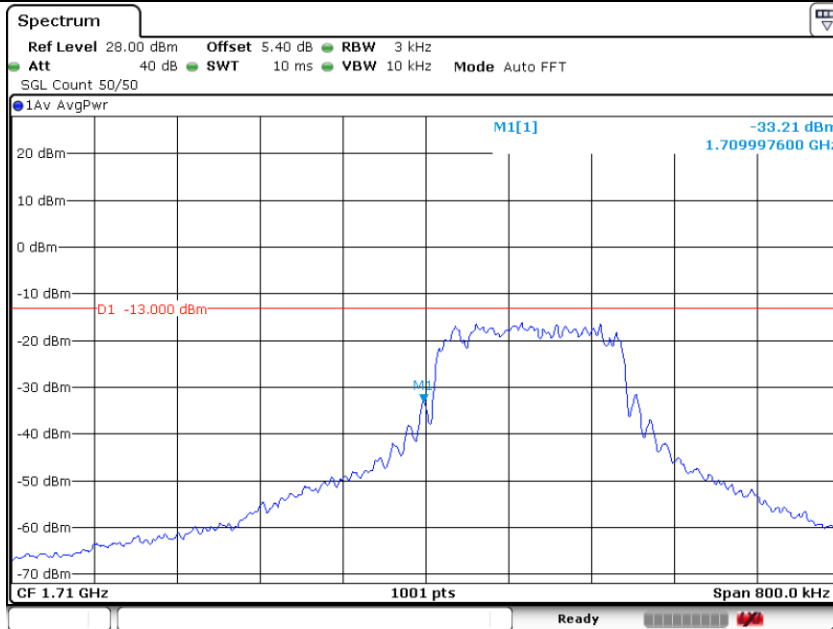
LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=131973-T size=1T0





Date: 20.AUG.2019 19:44:41

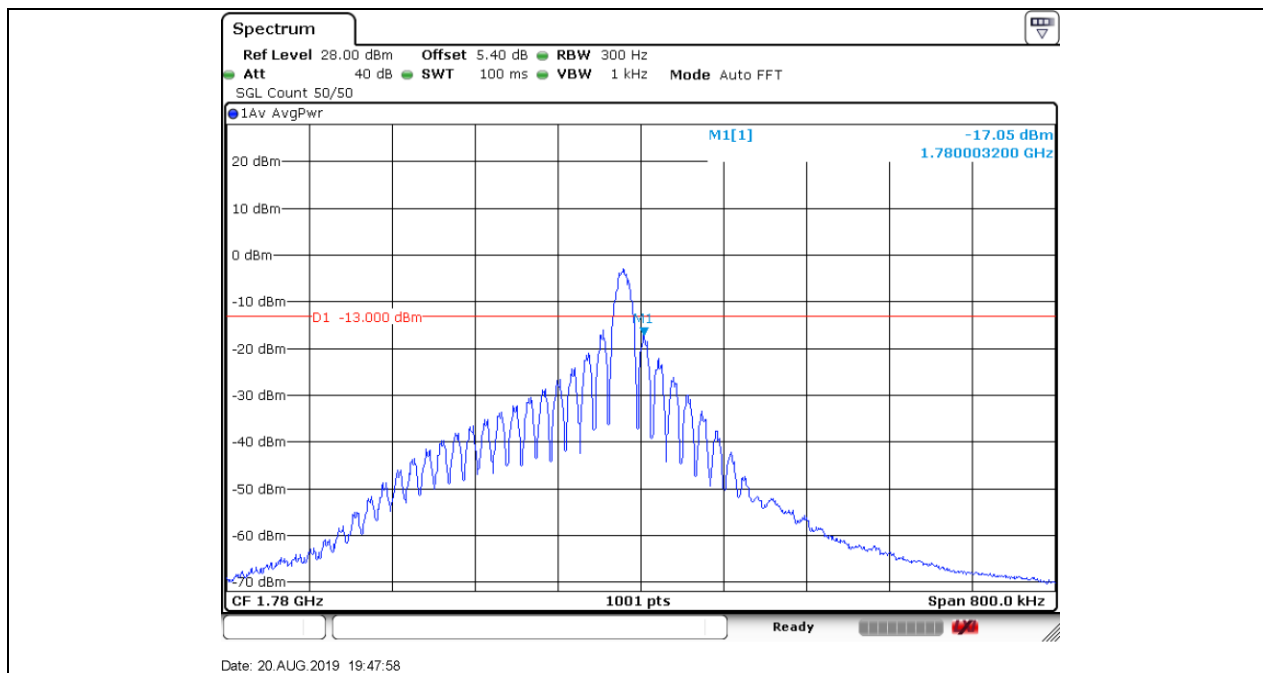
LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=131973-T size=12T0



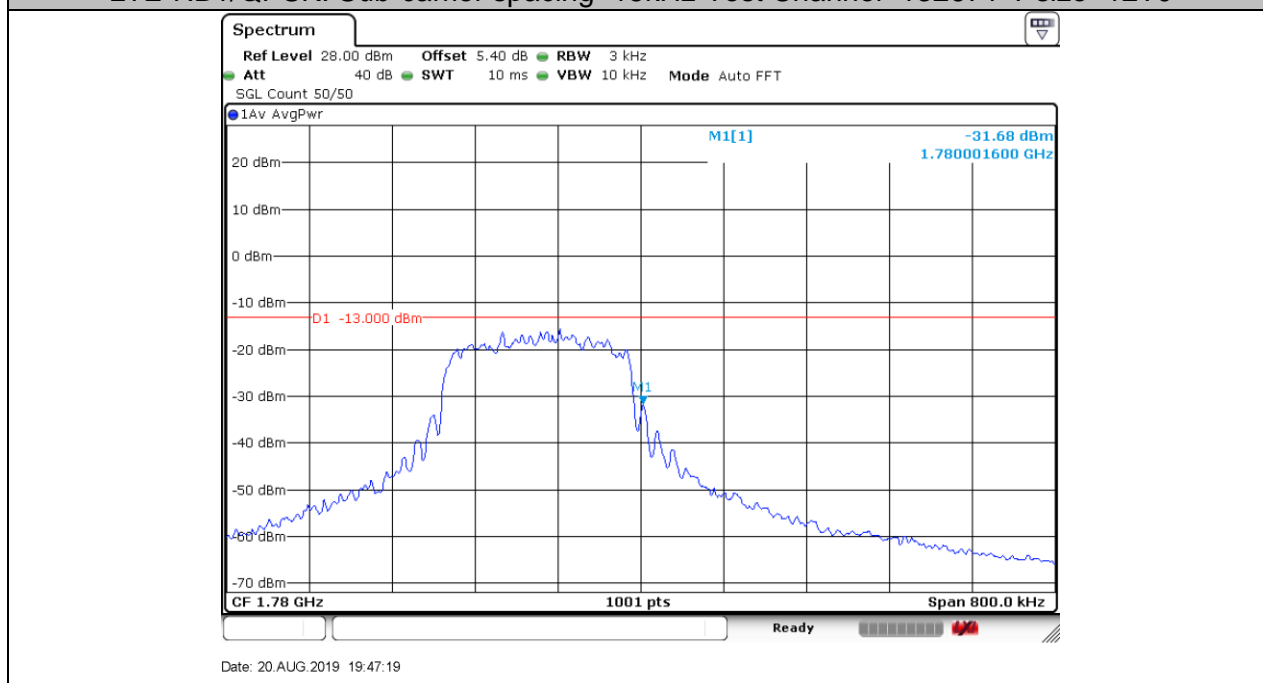
Date: 20.AUG.2019 19:45:29

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=132671-T size=1T11





LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=132671-T size=12T0



6 Spurious Emission at Antenna Terminal

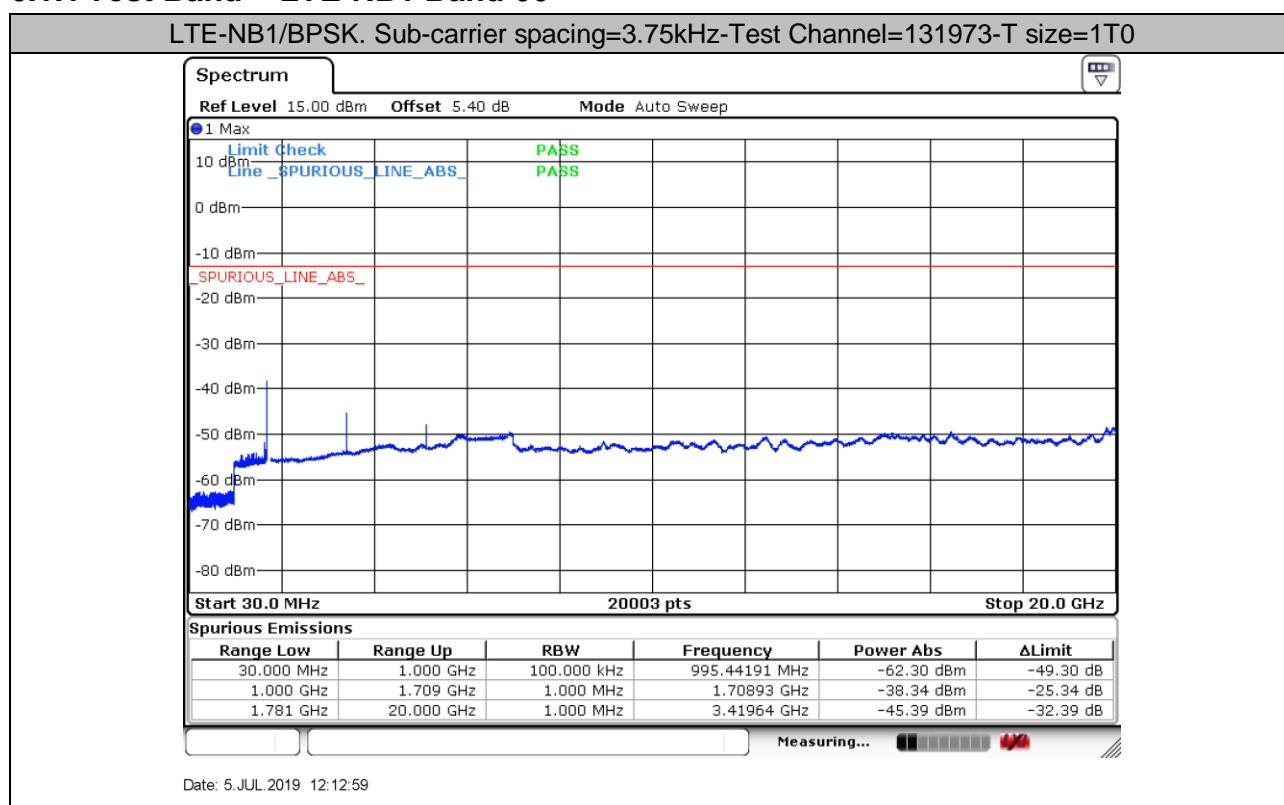
NOTE1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k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

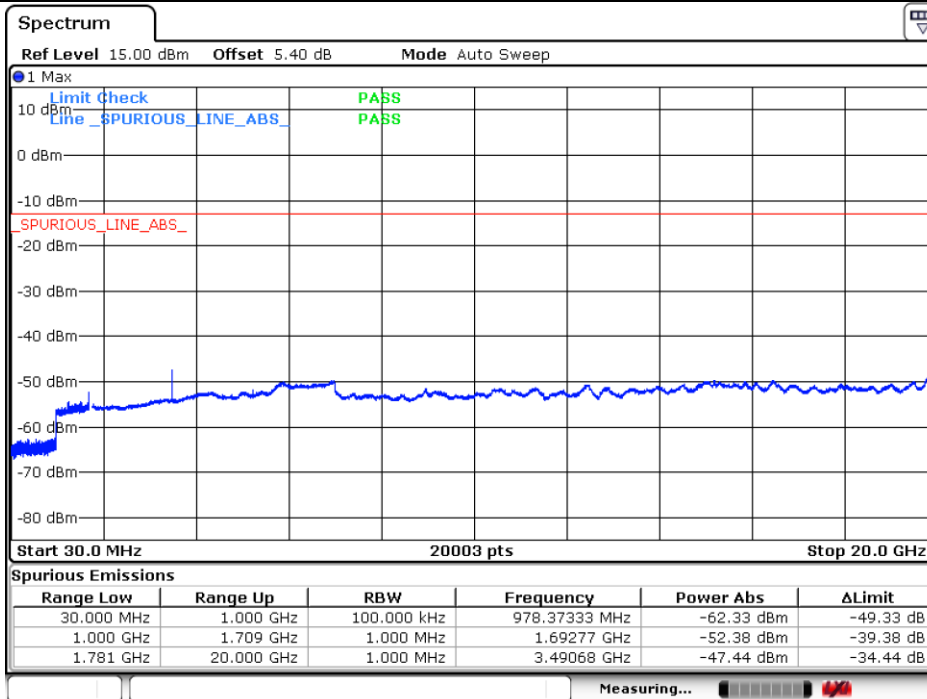
Part I - Test Plots

6.1 For LTE-NB1

6.1.1 Test Band = LTE-NB1 Band 66

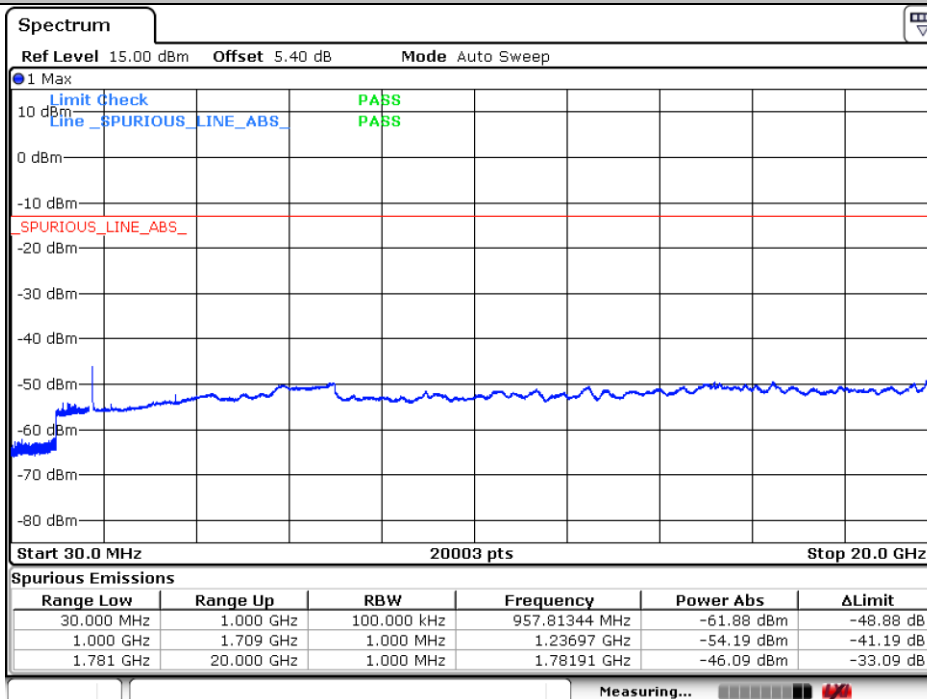


LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=132322-T size=1T0



Date: 5 JUL 2019 12:19:49

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=132671-T size=1T0



Date: 5 JUL 2019 12:21:30

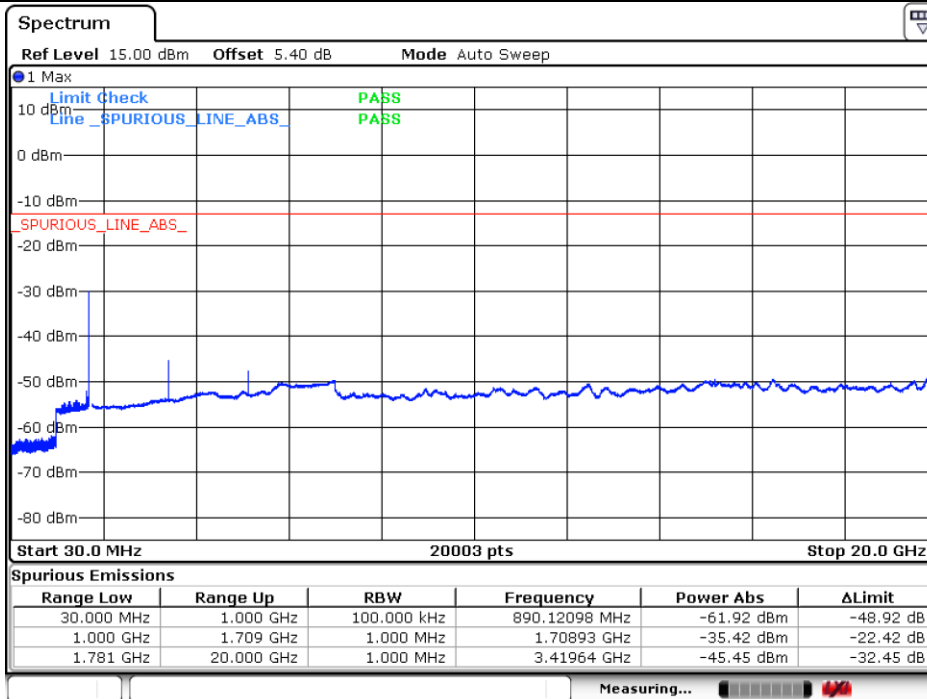


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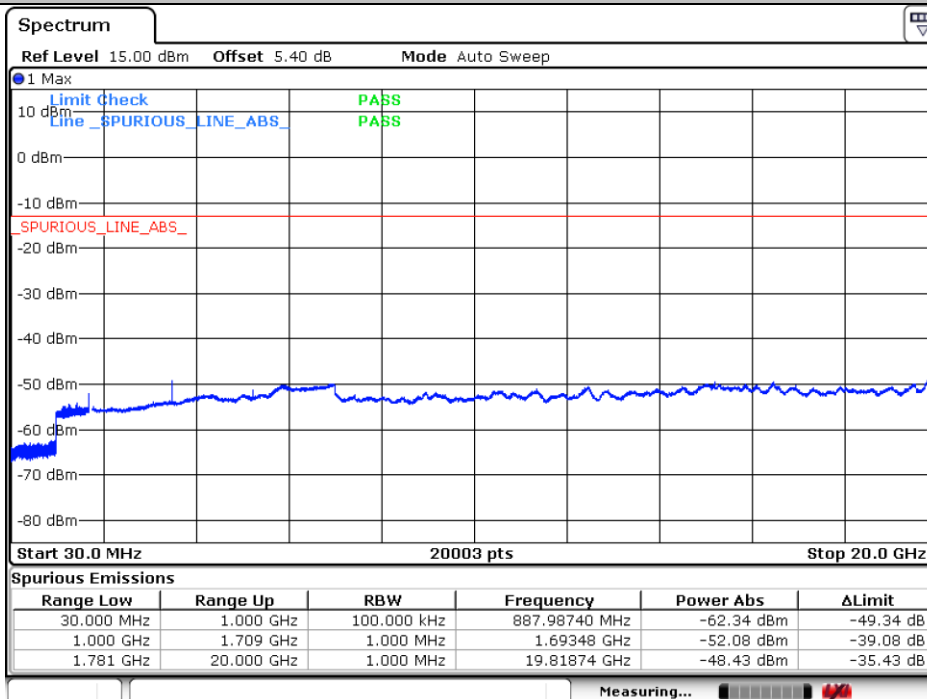
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=131973-T size=1T0



Date: 5 JUL 2019 12:14:22

LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=132322-T size=1T0



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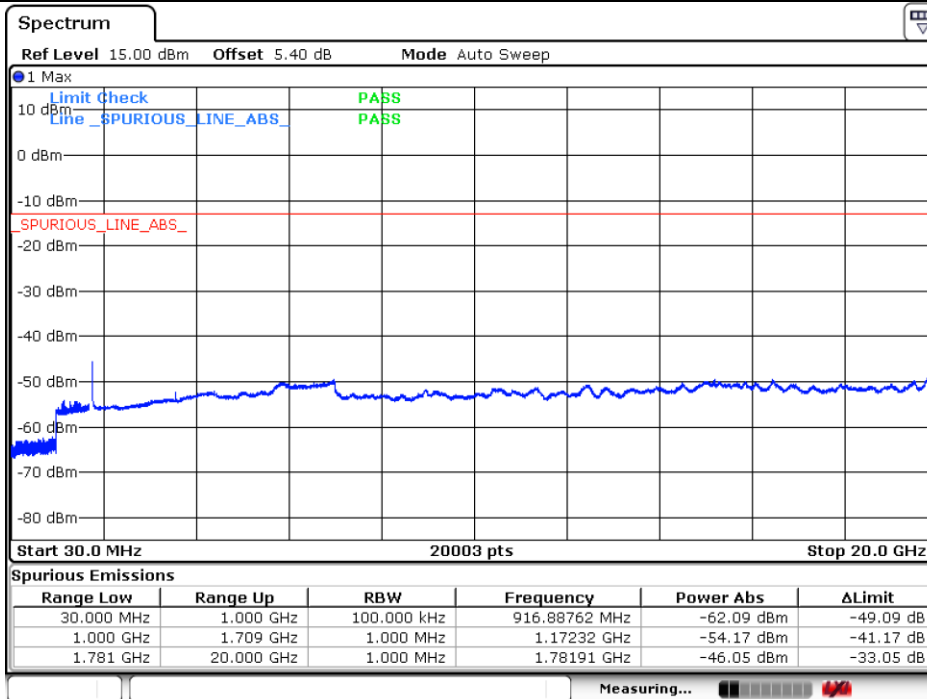
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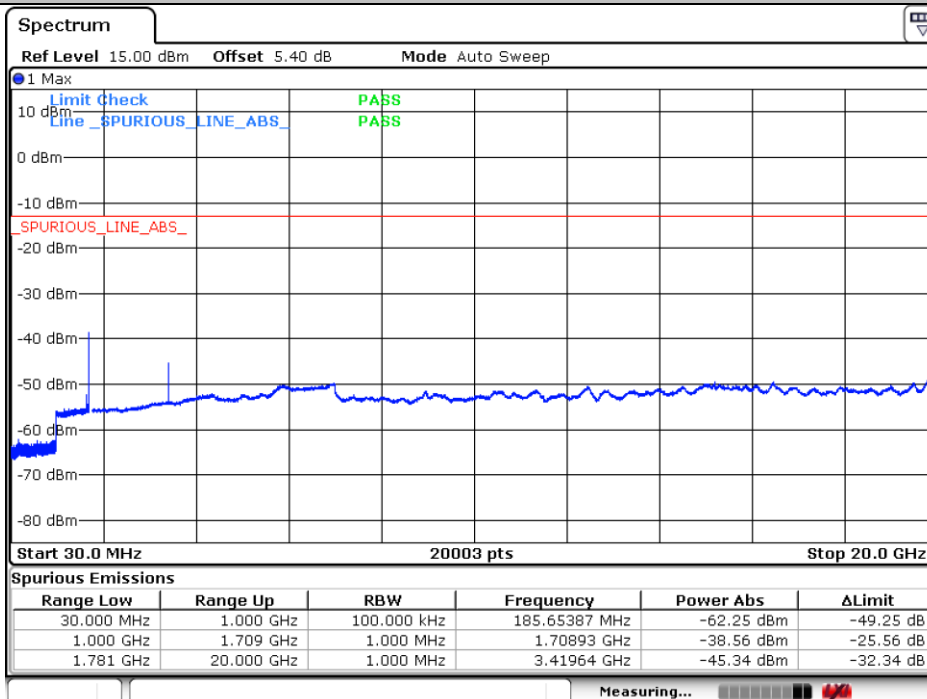
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=132671-T size=1T0



Date: 5 JUL 2019 12:22:05

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=131973-T size=1T0



Date: 5 JUL 2019 12:16:03

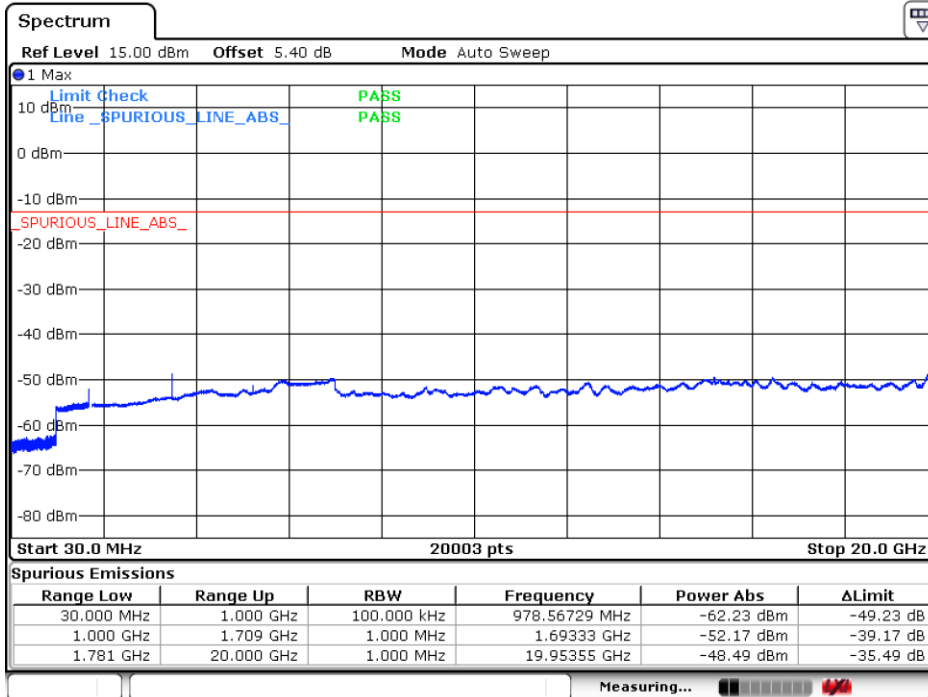


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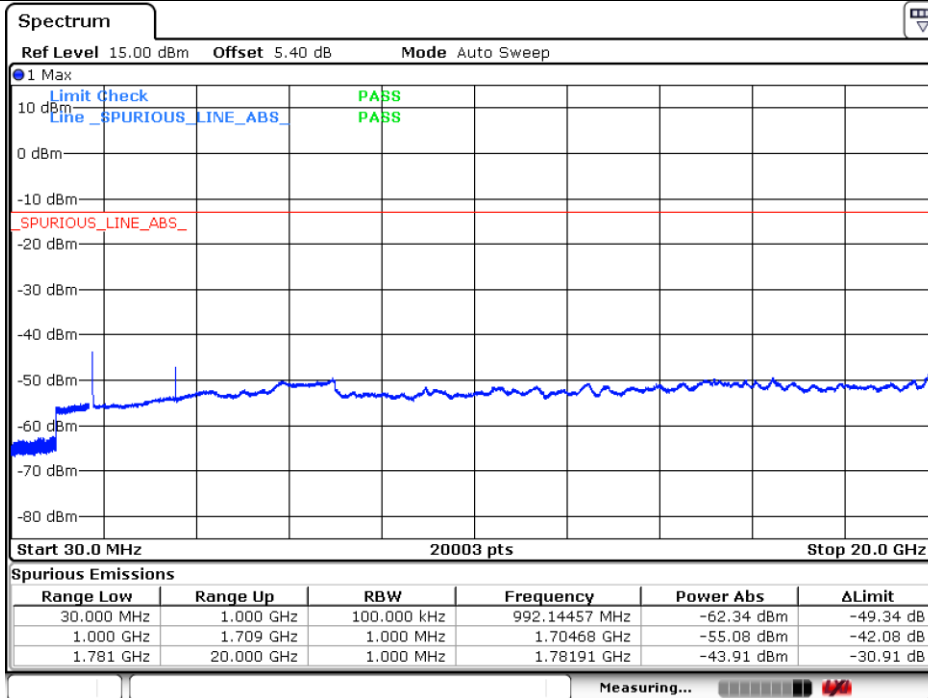
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LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=132322-T size=1T0



Date: 5 JUL 2019 12:17:50

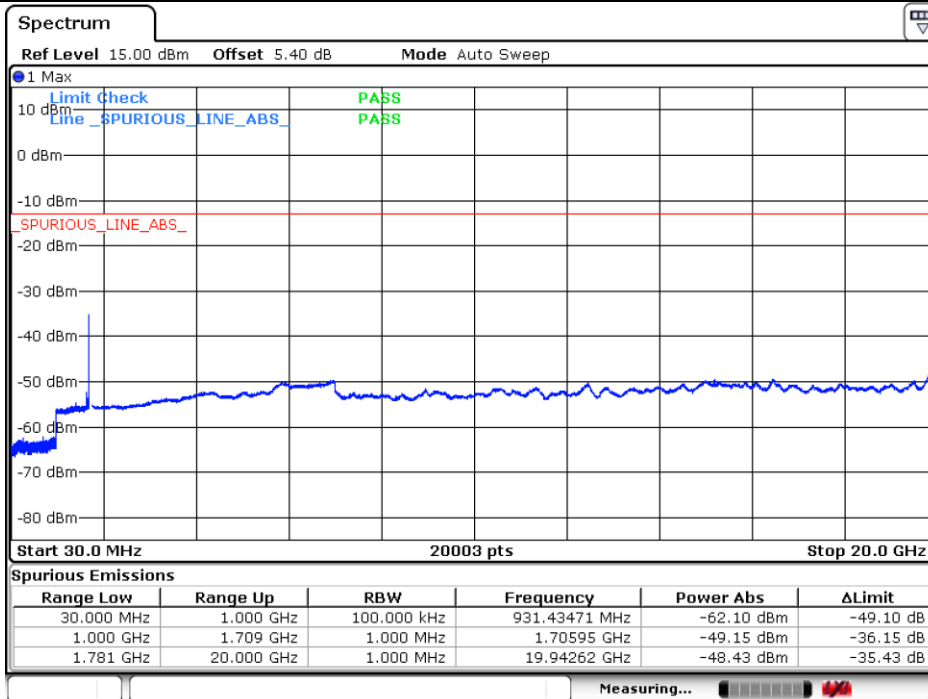
LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=132671-T size=1T0



Date: 5 JUL 2019 12:23:26

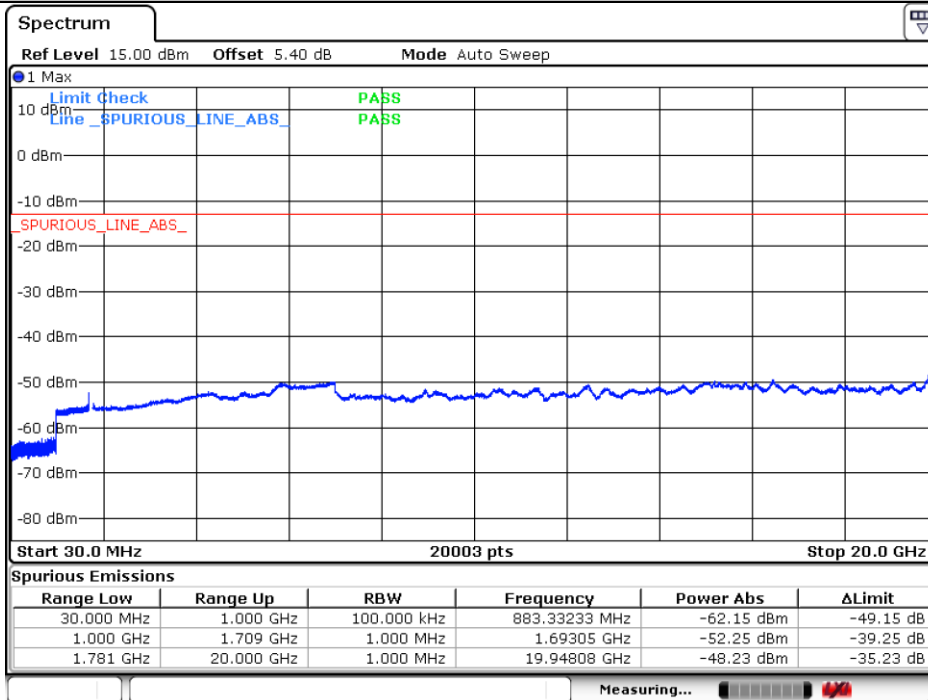


LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=131973-T size=1T0



Date: 5 JUL 2019 12:15:24

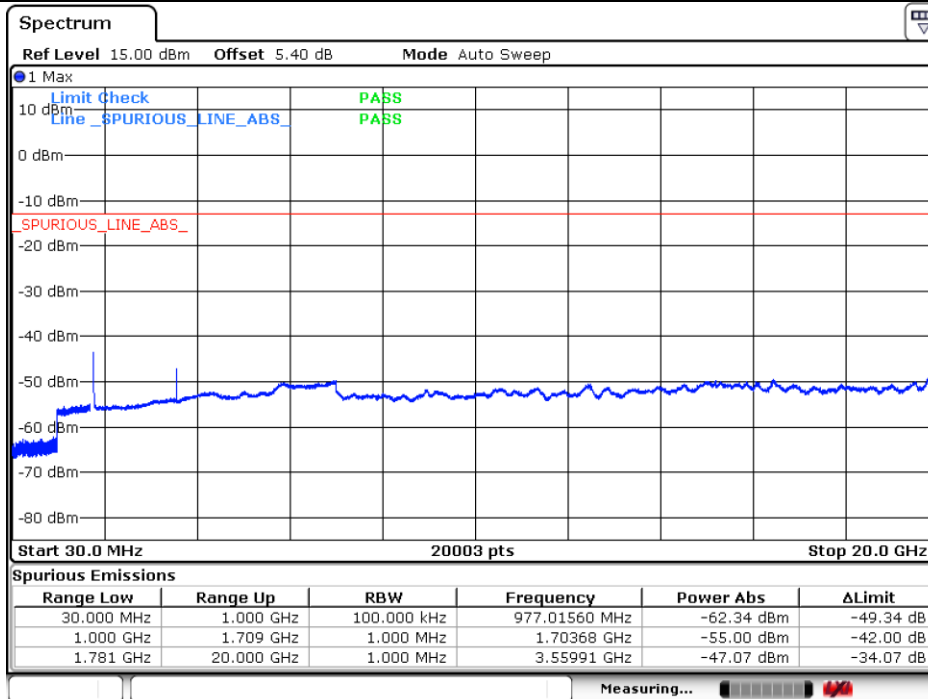
LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=132322-T size=1T0



Date: 5 JUL 2019 12:18:21



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=132671-T size=1T0



Date: 5 JUL 2019 12:22:54



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7 Field Strength of Spurious Radiation

7.1 For LTE-NB1

7.1.1 Test Band = LTE-NB1 Band 66

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

7.1.1.1.1 Test Channel = 131973

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
65.350000	-80.33	-13.00	67.33	Vertical
340.600000	-85.02	-13.00	72.02	Vertical
789.716667	-78.22	-13.00	65.22	Vertical
3424.450000	-60.72	-13.00	47.72	Vertical
5136.875000	-61.86	-13.00	48.86	Vertical
6849.625000	-56.30	-13.00	43.30	Vertical
63.850000	-77.18	-13.00	64.18	Horizontal
261.100000	-86.04	-13.00	73.04	Horizontal
916.995833	-73.56	-13.00	60.56	Horizontal
3424.775000	-52.17	-13.00	39.17	Horizontal
5137.525000	-51.57	-13.00	38.57	Horizontal
6849.625000	-56.92	-13.00	43.92	Horizontal

7.1.1.1.2 Test Channel = 132322

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.550000	-80.34	-13.00	67.34	Vertical
356.950000	-84.79	-13.00	71.79	Vertical
947.795833	-75.40	-13.00	62.40	Vertical
3490.100000	-62.70	-13.00	49.70	Vertical
5235.025000	-64.71	-13.00	51.71	Vertical
6979.625000	-56.52	-13.00	43.52	Vertical
63.550000	-76.82	-13.00	63.82	Horizontal
271.000000	-86.46	-13.00	73.46	Horizontal
621.920833	-81.03	-13.00	68.03	Horizontal
3490.100000	-49.84	-13.00	36.84	Horizontal
5234.700000	-57.66	-13.00	44.66	Horizontal
6980.275000	-56.39	-13.00	43.39	Horizontal



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7.1.1.1.3 Test Channel = 132671

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.450000	-80.26	-13.00	67.26	Vertical
336.200000	-84.87	-13.00	71.87	Vertical
792.695833	-77.81	-13.00	64.81	Vertical
3554.775000	-64.36	-13.00	51.36	Vertical
5331.875000	-64.86	-13.00	51.86	Vertical
7109.625000	-52.98	-13.00	39.98	Vertical
62.200000	-76.62	-13.00	63.62	Horizontal
275.600000	-86.47	-13.00	73.47	Horizontal
917.866667	-73.40	-13.00	60.40	Horizontal
3554.775000	-54.86	-13.00	41.86	Horizontal
5332.200000	-61.55	-13.00	48.55	Horizontal
7109.625000	-55.72	-13.00	42.72	Horizontal

NOTE:

- 1) The disturbance above 13GHz and 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 66	180KHz	BPSK/15KHz	131973	12T0	VL	TN	-3.58	-0.002093	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	VN	TN	0.74	0.000434	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	VH	TN	8.55	0.005001	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	VL	TN	-7.86	-0.004505	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	VN	TN	5.64	0.003232	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	VH	TN	-8.74	-0.005006	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	VL	TN	12.64	0.007103	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	VN	TN	-3.24	-0.001821	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	VH	TN	0.61	0.000345	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	VL	TN	-6.58	-0.003847	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	VN	TN	14.96	0.008749	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	VH	TN	-1.34	-0.000784	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	VL	TN	9.68	0.005547	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	VN	TN	-7.56	-0.004331	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	VH	TN	-6.14	-0.003518	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	VL	TN	-0.26	-0.000144	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	VN	TN	-10.34	-0.005807	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	VH	TN	-11.98	-0.006733	±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 66	180KHz	BPSK/15KHz	131973	12T0	NV	-30	-5.62	-0.003287	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	-20	4.76	0.002784	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	0	8.63	0.005047	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	10	-13.59	-0.007949	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	20	3.58	0.002092	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	30	10.94	0.006395	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	40	4.45	0.002600	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	131973	12T0	NV	50	2.18	0.001273	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	-30	-13.48	-0.007722	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	-20	-6.27	-0.003594	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	0	1.30	0.000742	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	10	13.92	0.007974	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	20	6.33	0.003629	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	30	-13.07	-0.007492	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	40	2.35	0.001344	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132322	12T0	NV	50	-13.07	-0.007490	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	-30	4.76	0.002676	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	-20	-3.23	-0.001815	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	0	12.17	0.006840	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	10	-8.69	-0.004883	±2.5	PASS



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NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	20	-9.06	-0.005088	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	30	-3.28	-0.001842	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	40	-0.18	-0.000099	±2.5	PASS
NB1 Band 66	180KHz	BPSK/15KHz	132671	12T0	NV	50	-3.88	-0.002182	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	-30	-0.21	-0.000124	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	-20	-4.50	-0.002629	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	0	-6.94	-0.004059	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	10	-0.47	-0.000276	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	20	-10.23	-0.005982	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	30	11.03	0.006449	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	40	-13.95	-0.008159	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	131973	12T0	NV	50	6.00	0.003508	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	-30	-7.82	-0.004479	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	-20	-9.05	-0.005186	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	0	2.57	0.001473	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	10	7.19	0.004120	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	20	12.31	0.007055	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	30	13.29	0.007617	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	40	8.55	0.004899	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132322	12T0	NV	50	-1.54	-0.000882	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	-30	-0.43	-0.000241	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	-20	5.86	0.003293	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	0	3.80	0.002132	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	10	-0.06	-0.000036	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	20	-10.72	-0.006022	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	30	7.23	0.004059	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	40	14.71	0.008267	±2.5	PASS
NB1 Band 66	180KHz	QPSK/15KHz	132671	12T0	NV	50	-9.32	-0.005238	±2.5	PASS

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