



Appendix B

LTE-NB1 Band 12





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1 Effective (Isotropic) Radiated Power Output Data

1.1 Test Result for LTE NB1 Band 12

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	ERP (dBm)	limit (dBm)	Verdict
NB1 Band 12	BPSK	3.75	23011	1T0	23.15	22.20	34.77	PASS
NB1 Band 12	BPSK	3.75	23011	1T47	22.84	21.89	34.77	PASS
NB1 Band 12	BPSK	3.75	23095	1T0	23.05	22.10	34.77	PASS
NB1 Band 12	BPSK	3.75	23095	1T47	22.86	21.91	34.77	PASS
NB1 Band 12	BPSK	3.75	23179	1T0	22.89	21.94	34.77	PASS
NB1 Band 12	BPSK	3.75	23179	1T47	23.10	22.15	34.77	PASS
NB1 Band 12	QPSK	3.75	23011	1T0	23.07	22.12	34.77	PASS
NB1 Band 12	QPSK	3.75	23011	1T47	22.88	21.93	34.77	PASS
NB1 Band 12	QPSK	3.75	23095	1T0	23.02	22.07	34.77	PASS
NB1 Band 12	QPSK	3.75	23095	1T47	22.95	22.00	34.77	PASS
NB1 Band 12	QPSK	3.75	23179	1T0	22.86	21.91	34.77	PASS
NB1 Band 12	QPSK	3.75	23179	1T47	23.07	22.12	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 12	BPSK	15	23011	1T0	22.94	21.99	34.77	PASS
NB1 Band 12	BPSK	15	23011	1T11	23.11	22.16	34.77	PASS
NB1 Band 12	BPSK	15	23095	1T0	23.07	22.12	34.77	PASS
NB1 Band 12	BPSK	15	23095	1T11	23.02	22.07	34.77	PASS
NB1 Band 12	BPSK	15	23179	1T0	23.07	22.12	34.77	PASS
NB1 Band 12	BPSK	15	23179	1T11	22.82	21.87	34.77	PASS
NB1 Band 12	QPSK	15	23011	1T0	23.13	22.18	34.77	PASS
NB1 Band 12	QPSK	15	23011	1T11	22.96	22.01	34.77	PASS
NB1 Band 12	QPSK	15	23011	12T0	20.74	19.79	34.77	PASS
NB1 Band 12	QPSK	15	23095	1T0	22.84	21.89	34.77	PASS
NB1 Band 12	QPSK	15	23095	1T11	22.84	21.89	34.77	PASS
NB1 Band 12	QPSK	15	23095	12T0	21.11	20.16	34.77	PASS
NB1 Band 12	QPSK	15	23179	1T0	23.15	22.20	34.77	PASS
NB1 Band 12	QPSK	15	23179	1T11	22.88	21.93	34.77	PASS
NB1 Band 12	QPSK	15	23179	12T0	21.32	20.37	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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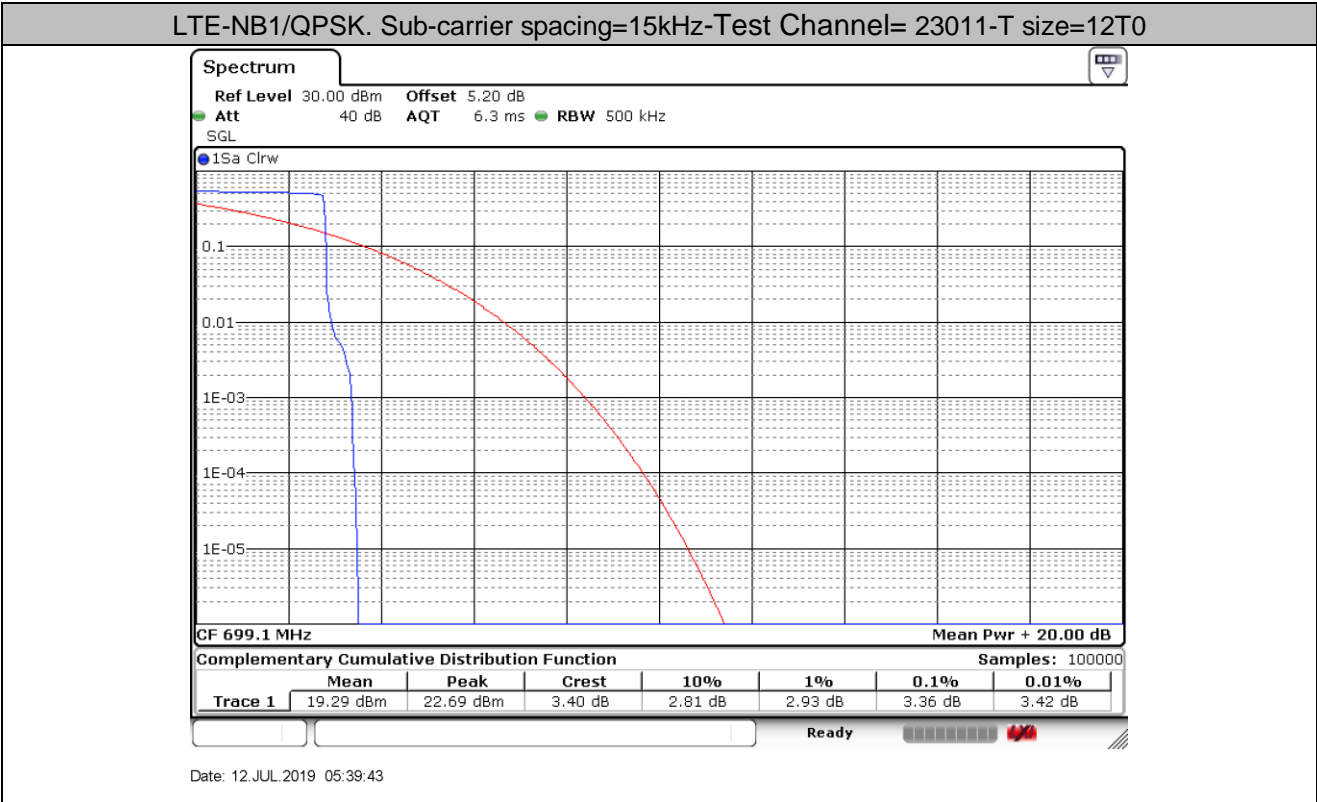
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2 Peak-to-Average Ratio

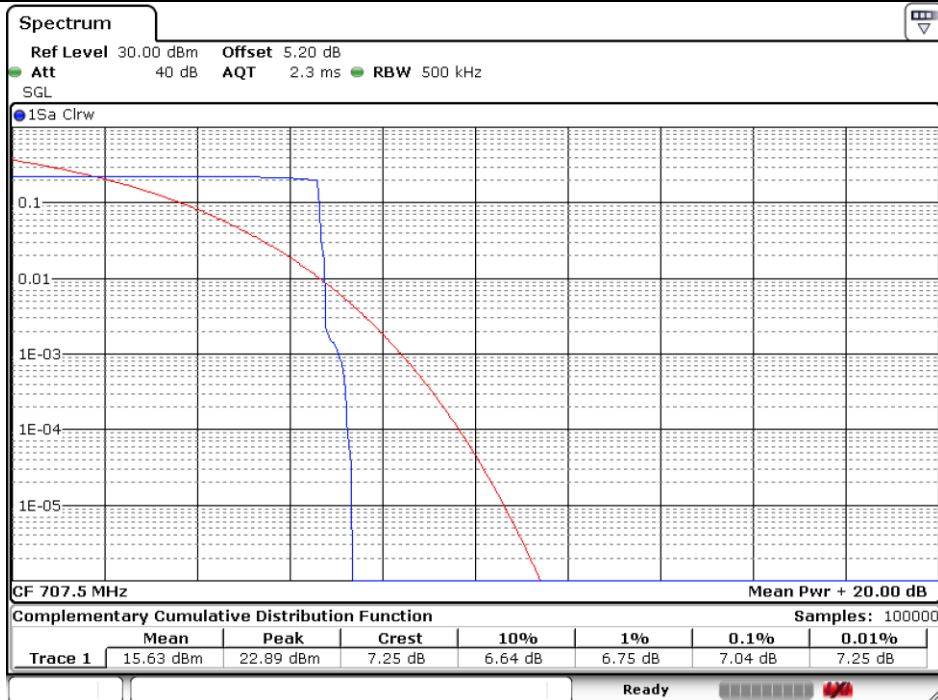
Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
NB1 Band 12	QPSK/12T0	23011	3.36	13	PASS
NB1 Band 12	QPSK/12T0	23095	7.04	13	PASS
NB1 Band 12	QPSK/12T0	23179	5.59	13	PASS

2.1 For LTE-NB1

2.1.1 Test Band = LTE-NB1 Band 12

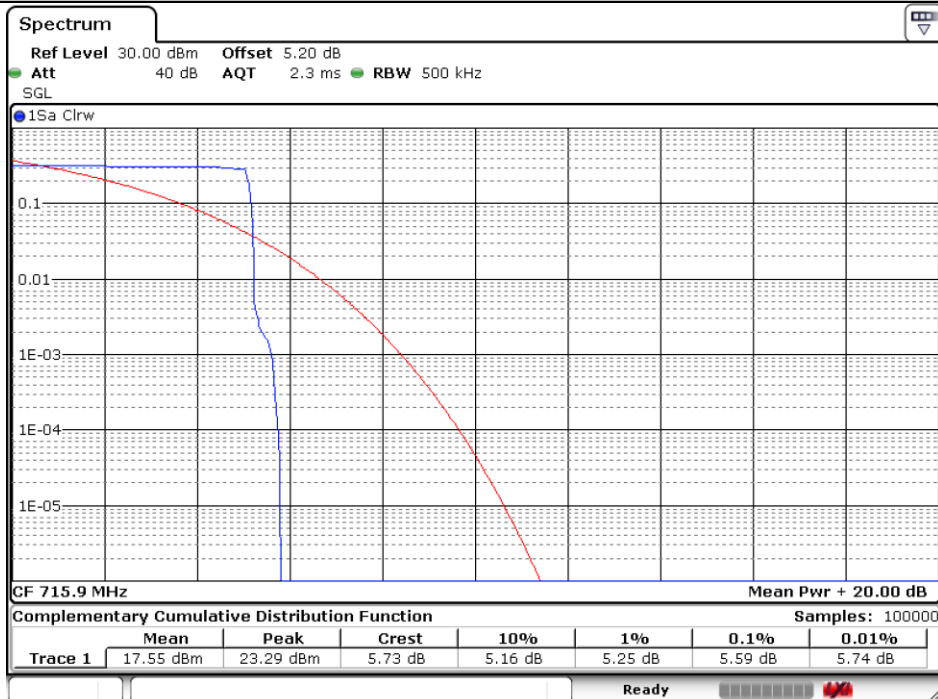


LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23095-T size=12T0



Date: 13 JUL 2019 04:07:46

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23179-T size=12T0



Date: 13 JUL 2019 03:55:58



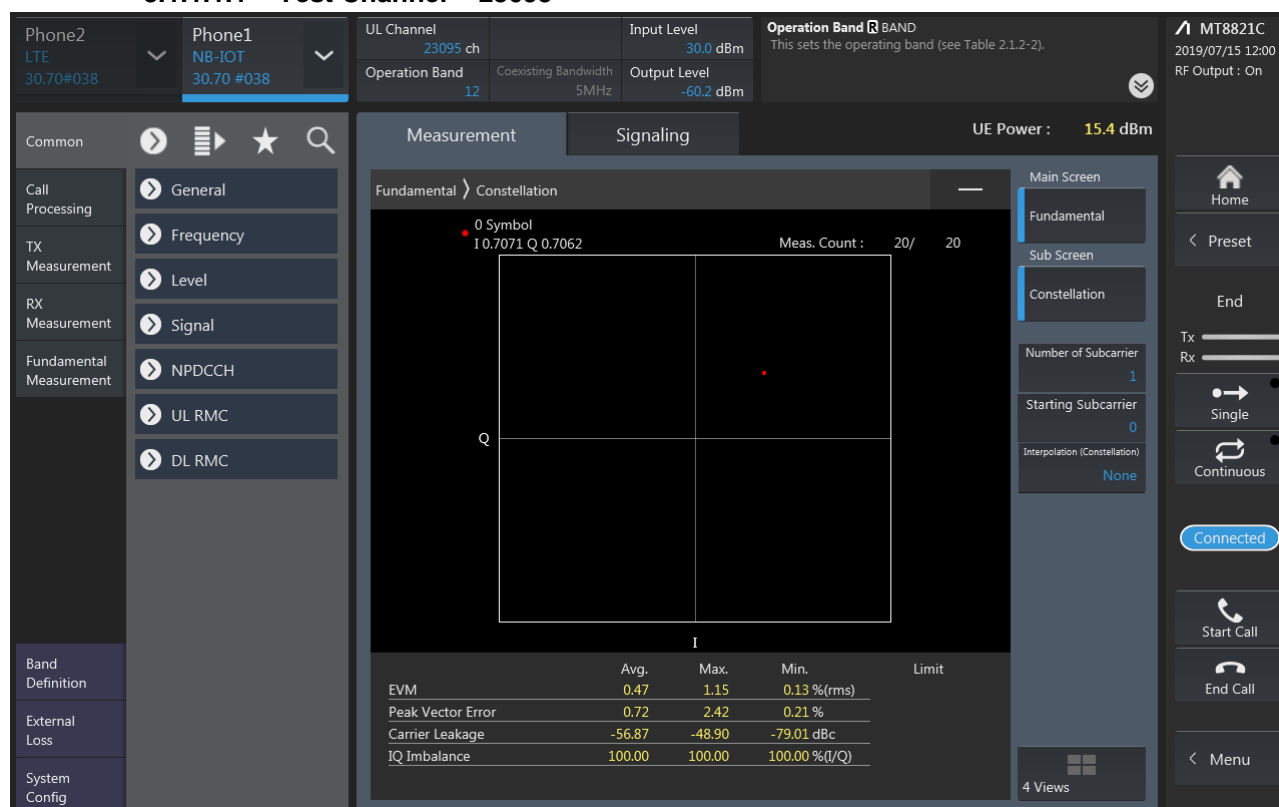
3 Modulation Characteristics

3.1 For LTE-NB1

3.1.1 Test Band = LTE-NB1 Band 12

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

3.1.1.1.1 Test Channel = 23095

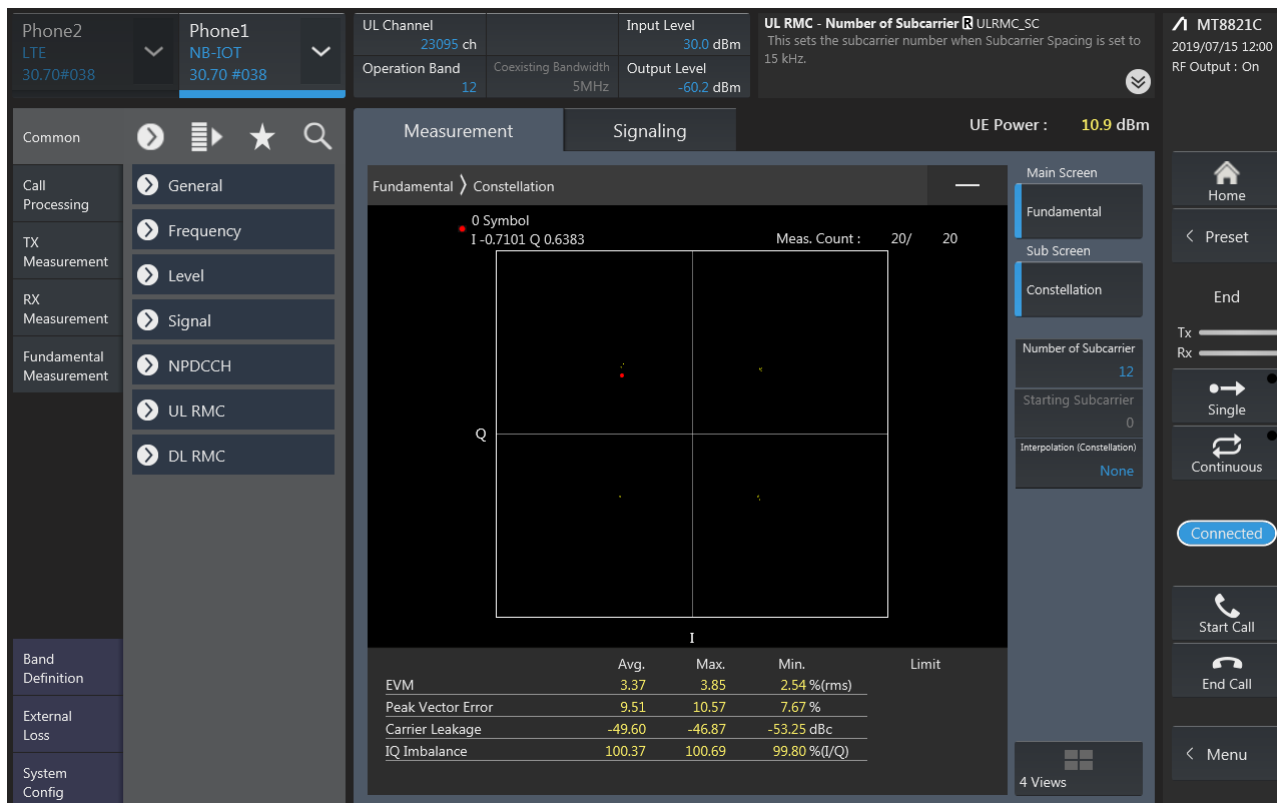


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3.1.1.2 Test Mode = LTE-NB1/QPSK. Sub-carrier spacing=15kHz.T size=12T0

3.1.1.2.1 Test Channel = 23095

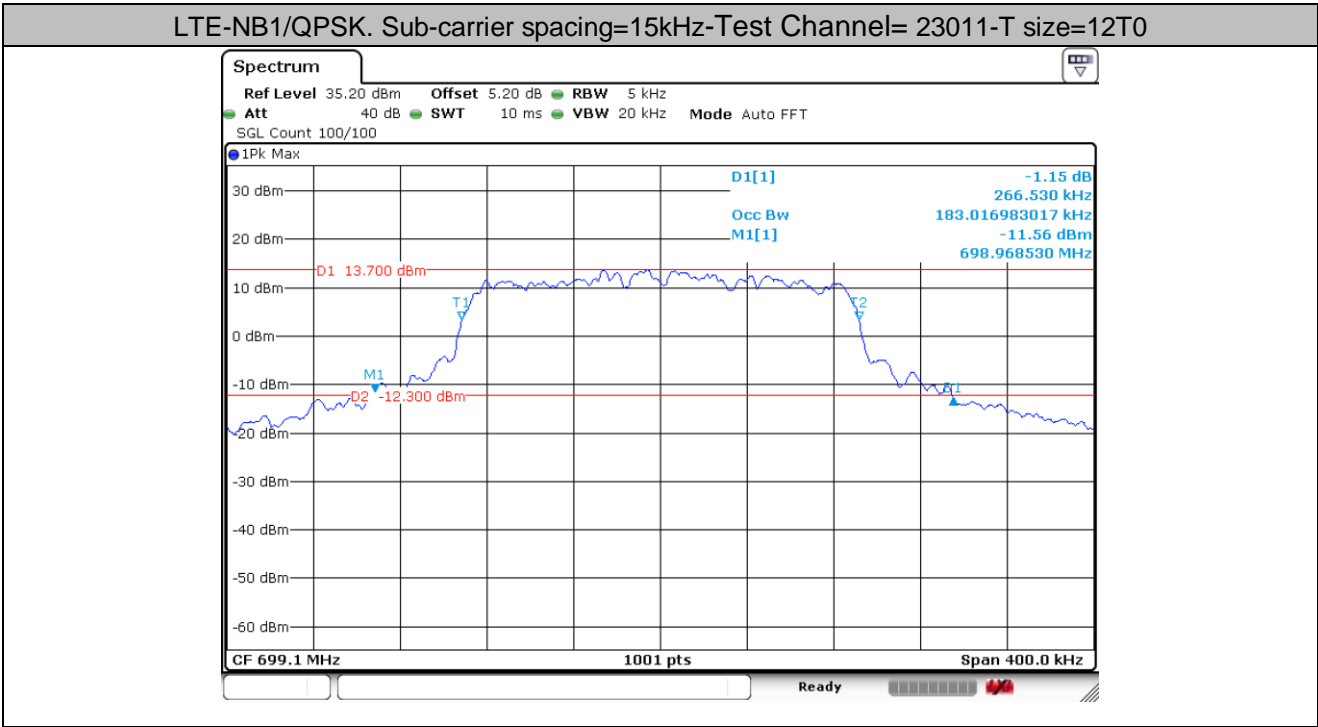


4 Bandwidth

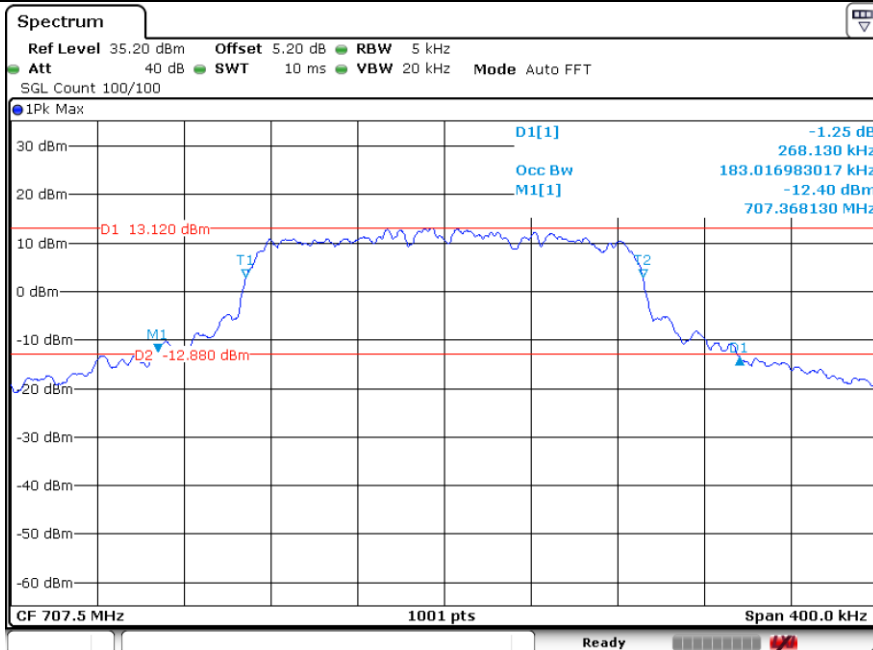
Test Band	Test Mode	T size	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
NB1 Band 12	QPSK/15kHz	12T0	23011	183.02	266.53	PASS
NB1 Band 12	QPSK/15kHz	12T0	23095	183.02	268.13	PASS
NB1 Band 12	QPSK/15kHz	12T0	23179	182.62	260.54	PASS

4.1 For LTE-NB1

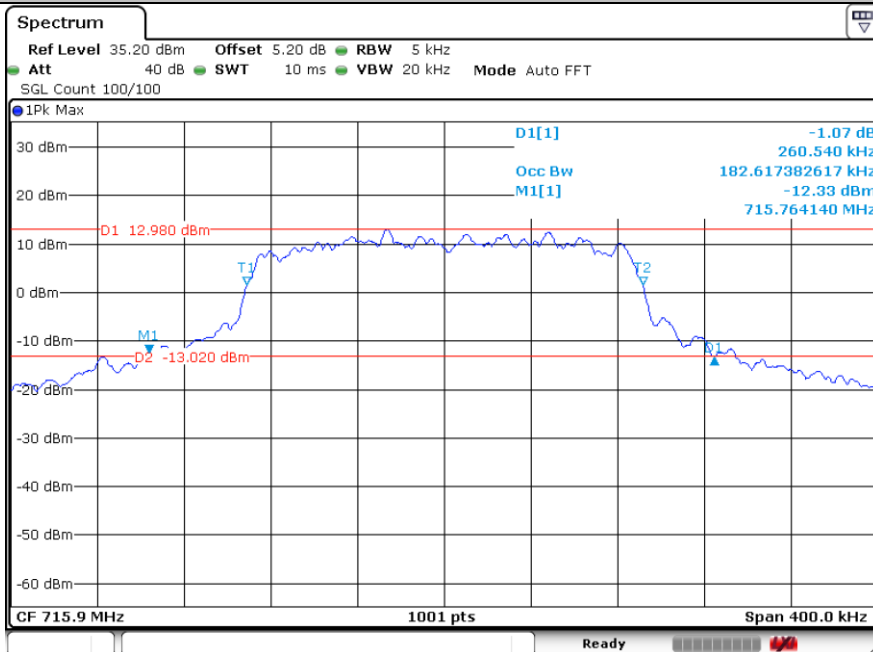
4.1.1 Test Band = LTE-NB1 Band 12



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23095-T size=12T0



LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23179-T size=12T0

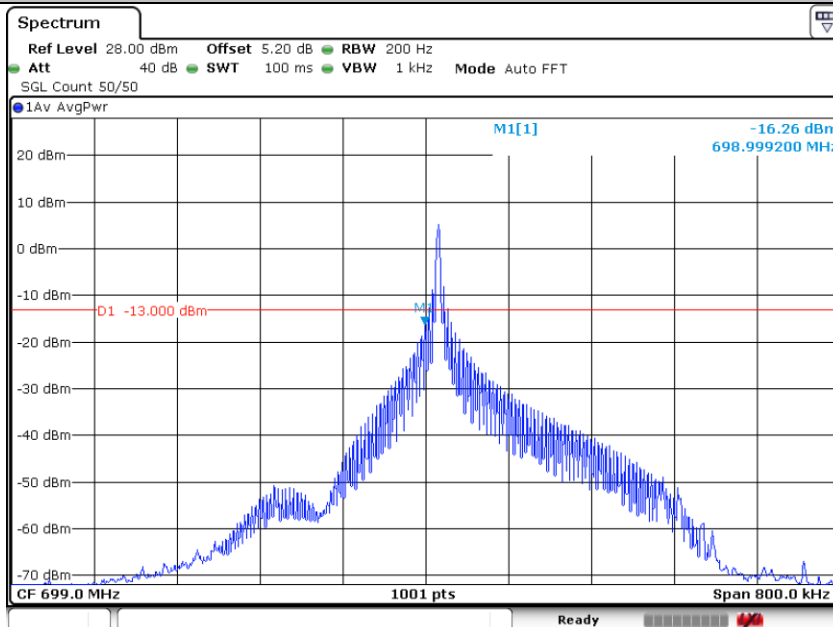


5 Band Edges Compliance

5.1 For LTE-NB1

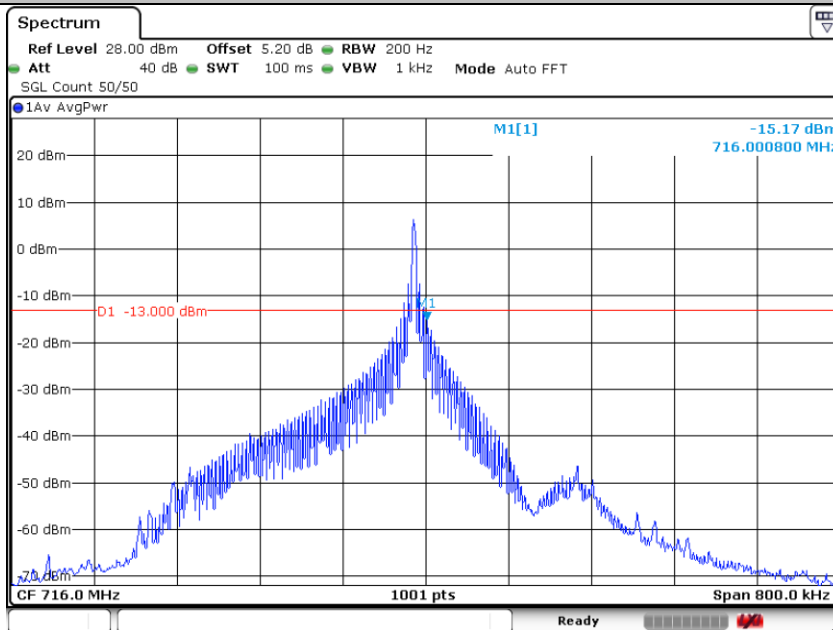
5.1.1 Test Band = LTE-NB1 Band 12

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23011-T size=1T0



Date: 20.AUG.2019 05:42:19

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23179-T size=1T47



Date: 20.AUG.2019 05:53:52

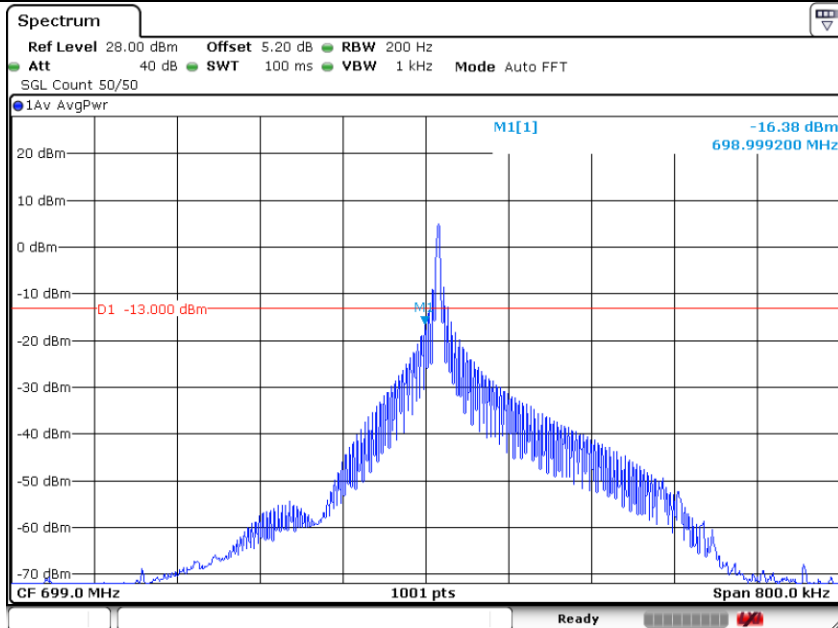


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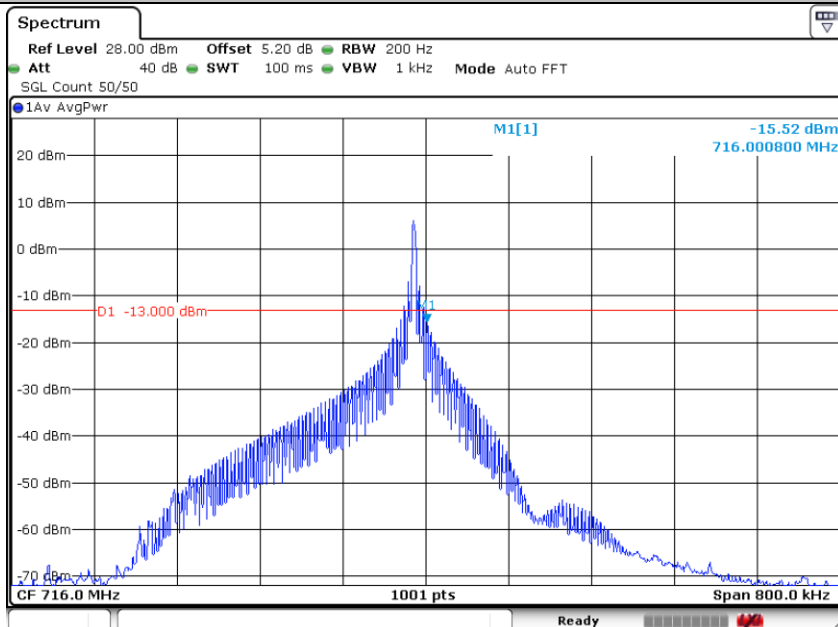
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23011-T size=1T0



Date: 20.AUG.2019 05:42:58

LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23179-T size=1T47



Date: 20.AUG.2019 05:53:21

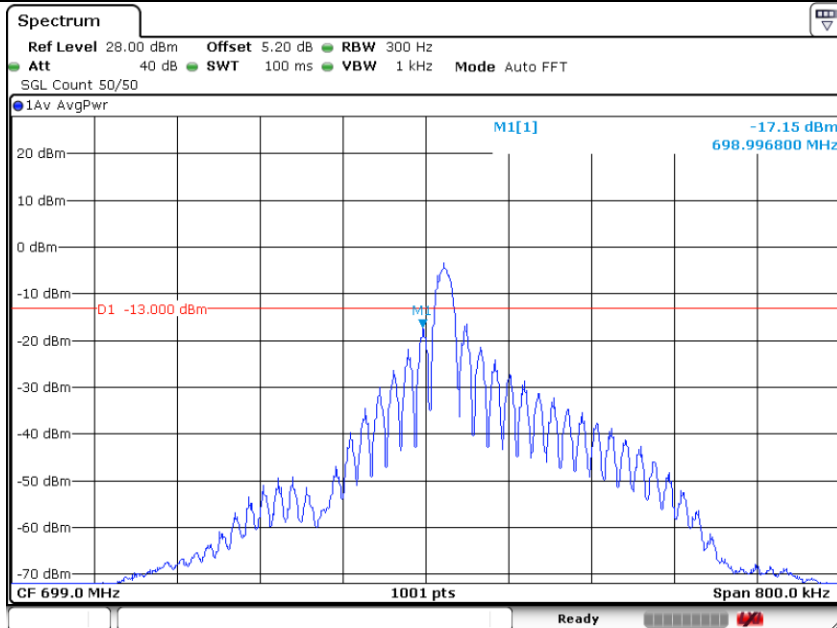


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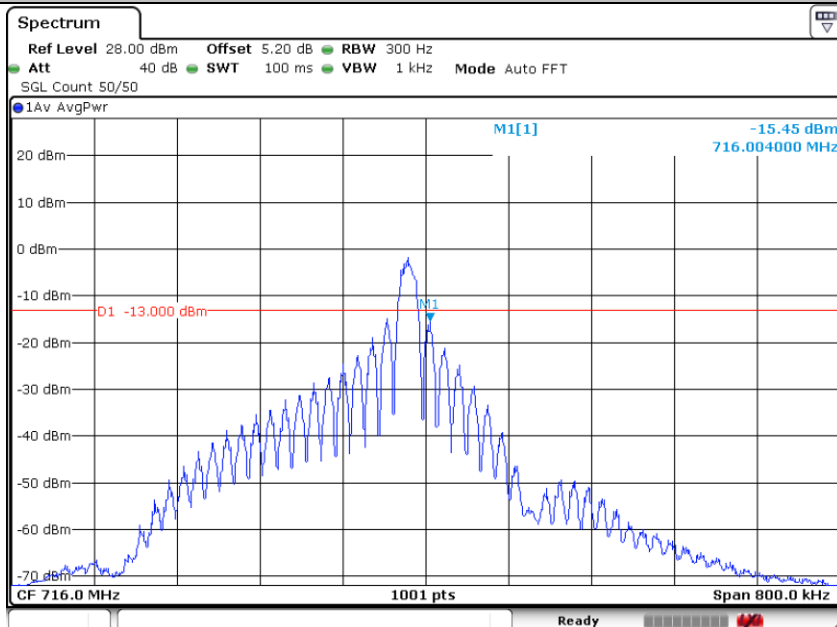
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LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23011-T size=1T0



Date: 20.AUG.2019 05:44:15

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23179-T size=1T11



Date: 20.AUG.2019 05:51:03



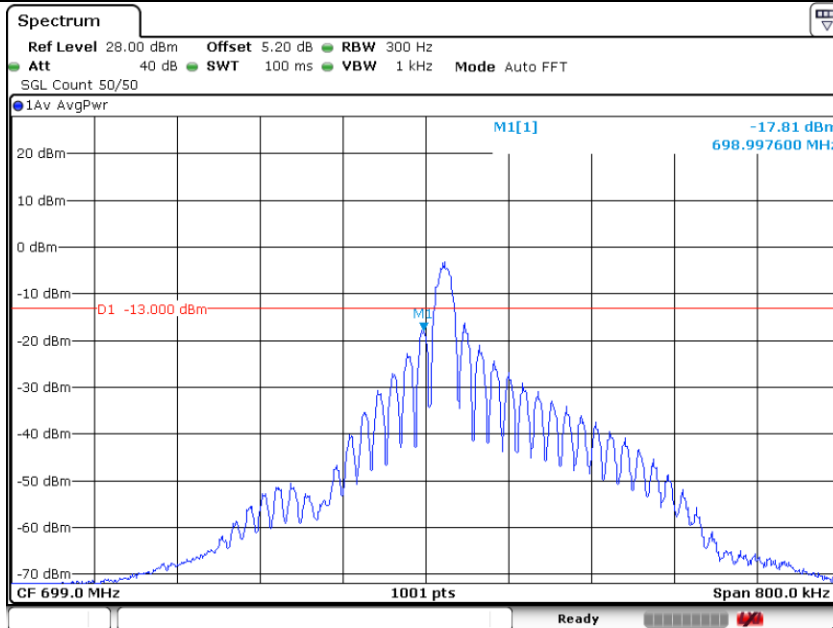
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23011-T size=1T0



Date: 20.AUG.2019 05:43:55

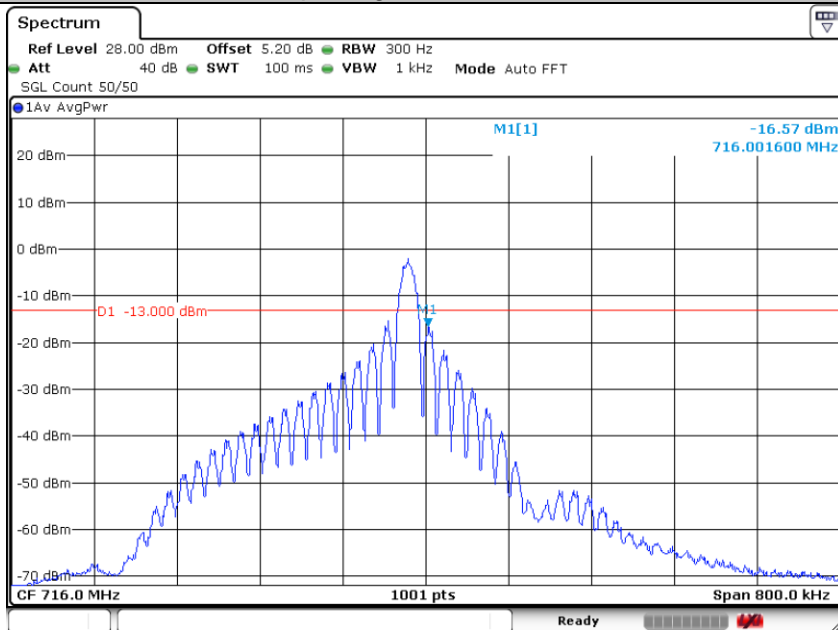
LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23011-T size=12T0



Date: 20.AUG.2019 05:48:02

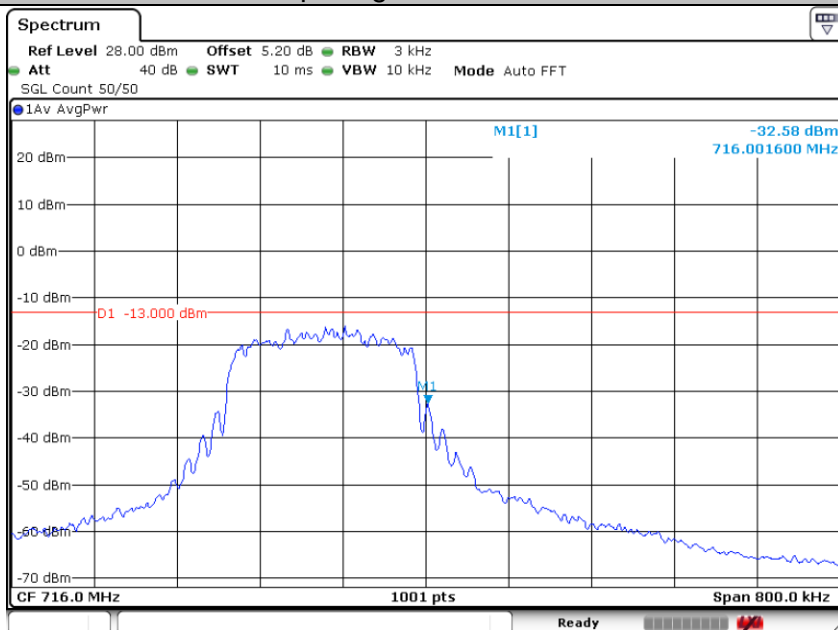


LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23179-T size=1T11



Date: 20.AUG.2019 05:50:39

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23179-T size=12T0



Date: 20.AUG.2019 05:50:00



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6 Spurious Emission at Antenna Terminal

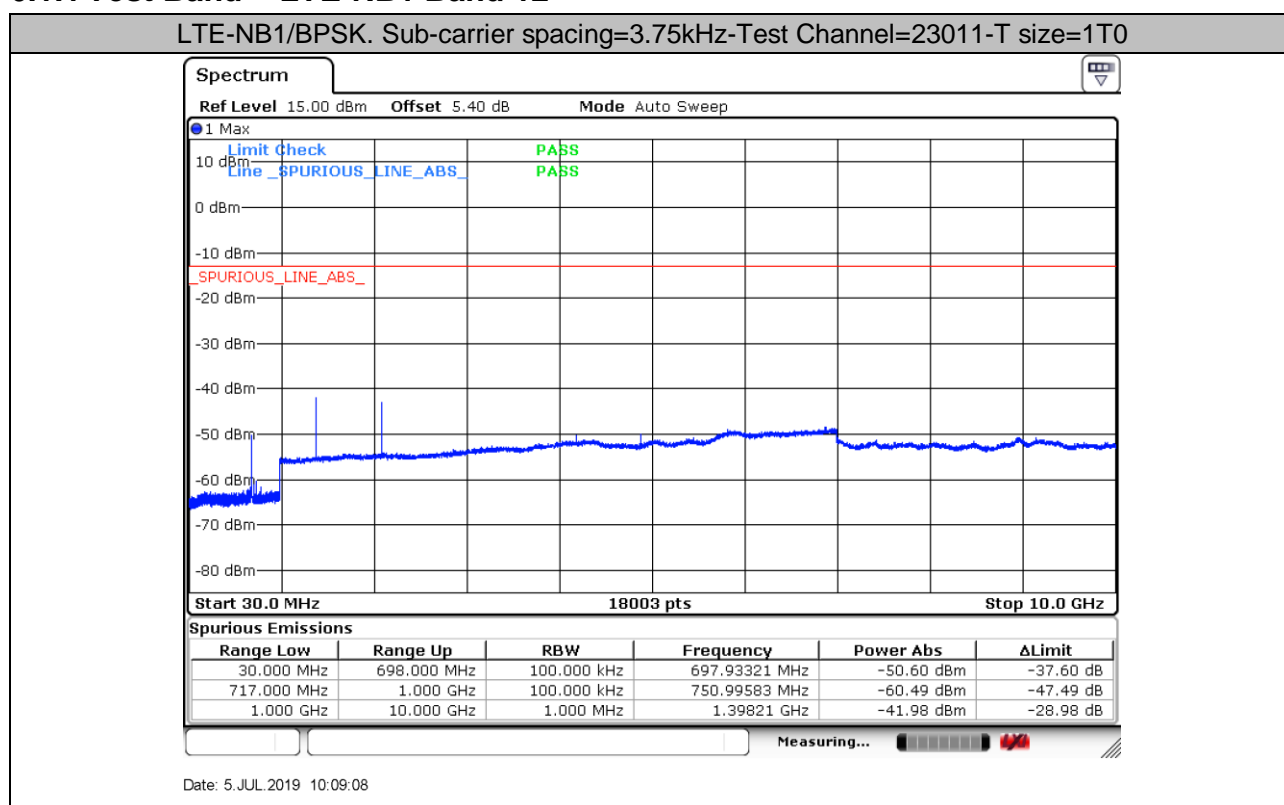
NOTE1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k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

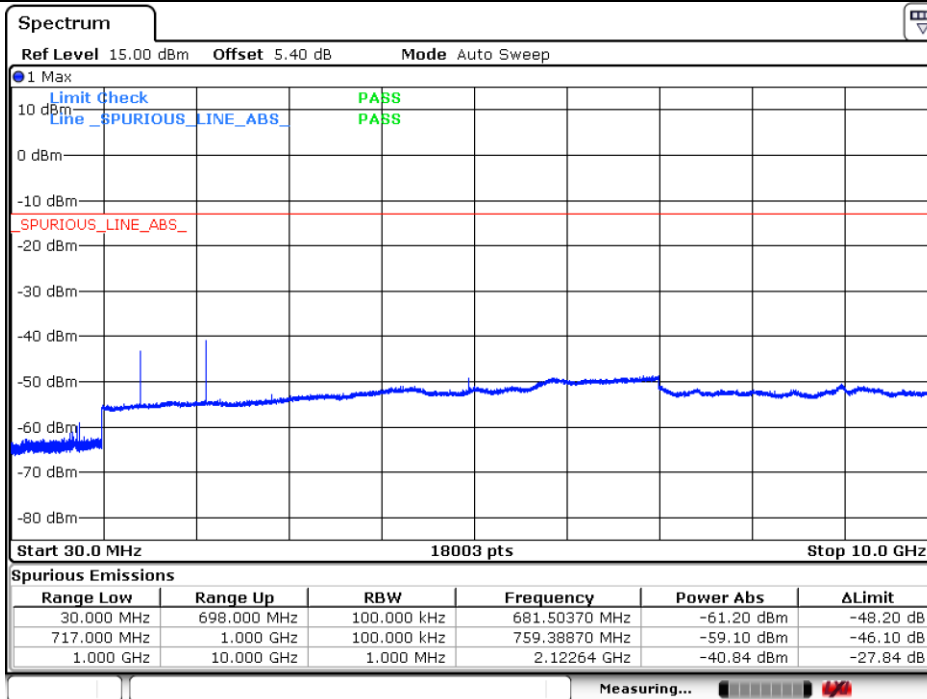
Part I - Test Plots

6.1 For LTE-NB1

6.1.1 Test Band = LTE-NB1 Band 12

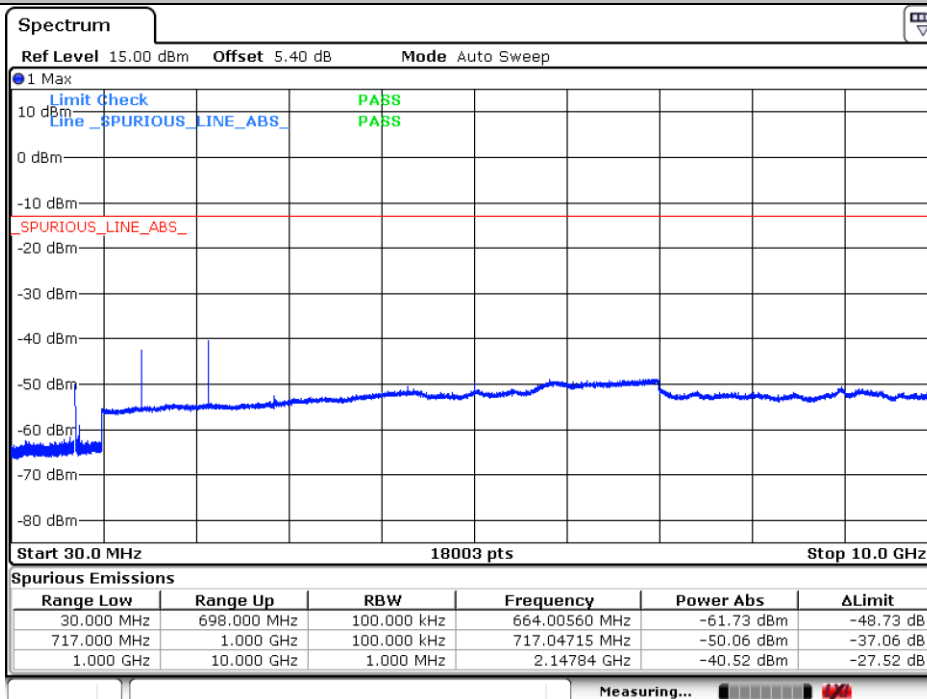


LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23095-T size=1T0



Date: 5 JUL 2019 10:17:51

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23179-T size=1T0



Date: 5 JUL 2019 10:29:41



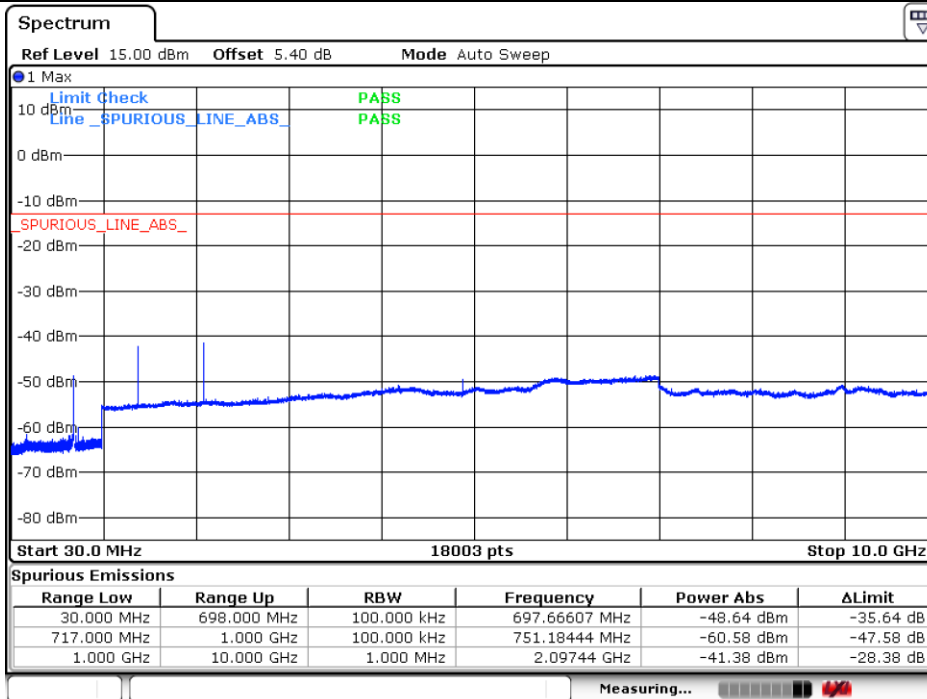
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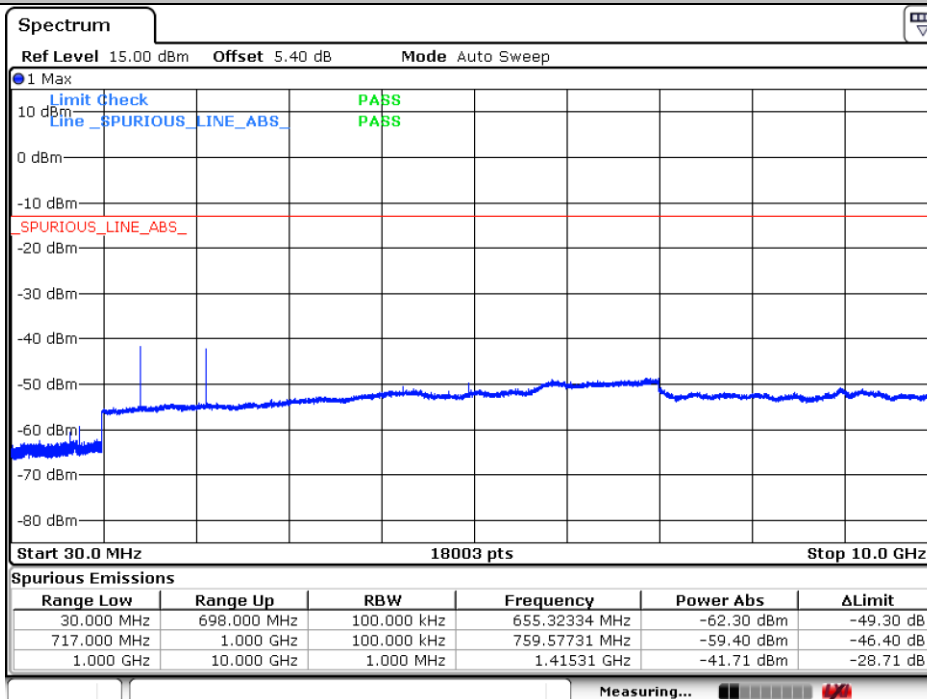
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23011-T size=1T0



Date: 5 JUL 2019 10:08:23

LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23095-T size=1T0



Date: 5 JUL 2019 10:17:02



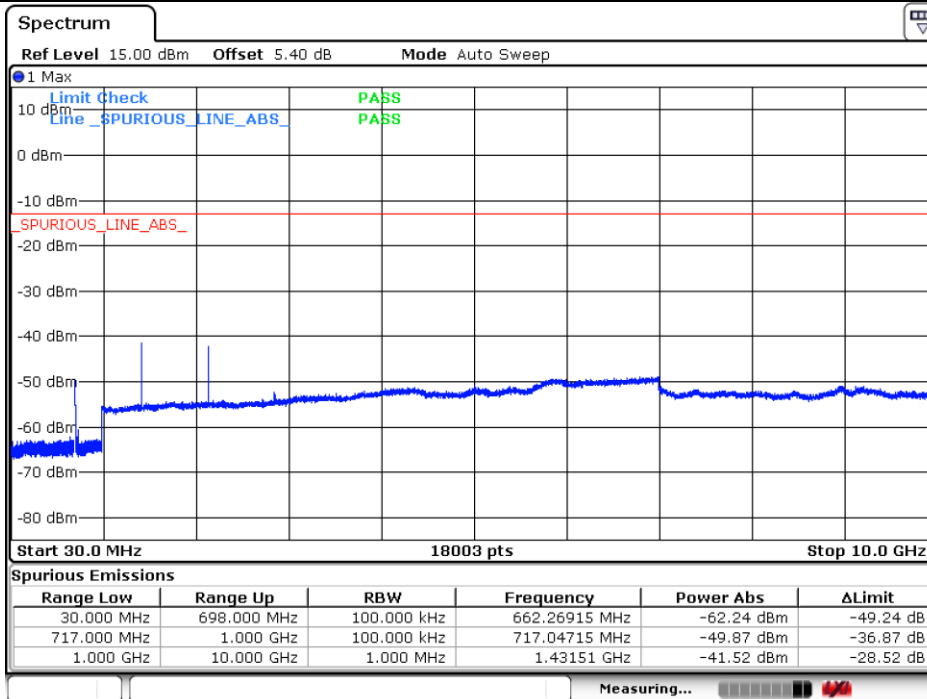
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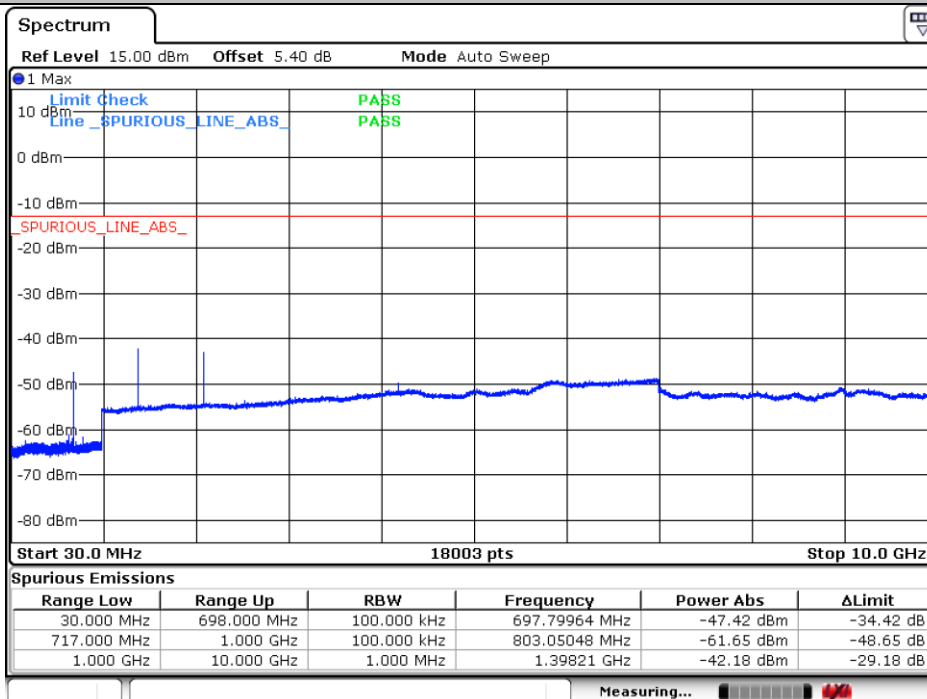
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23179-T size=1T0



Date: 5 JUL 2019 10:29:03

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23011-T size=1T0



Date: 5 JUL 2019 10:10:20

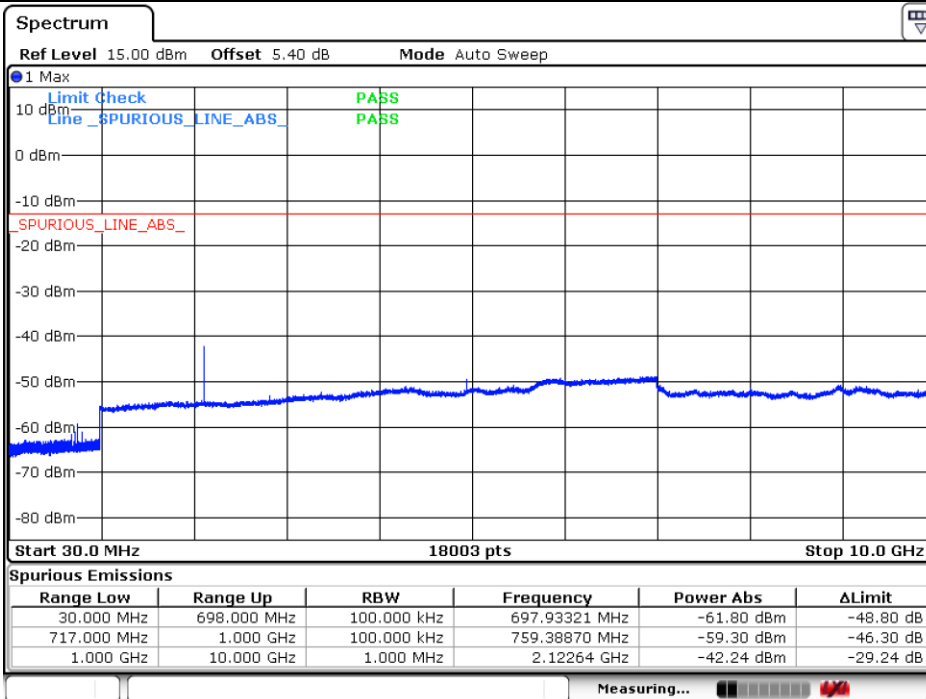


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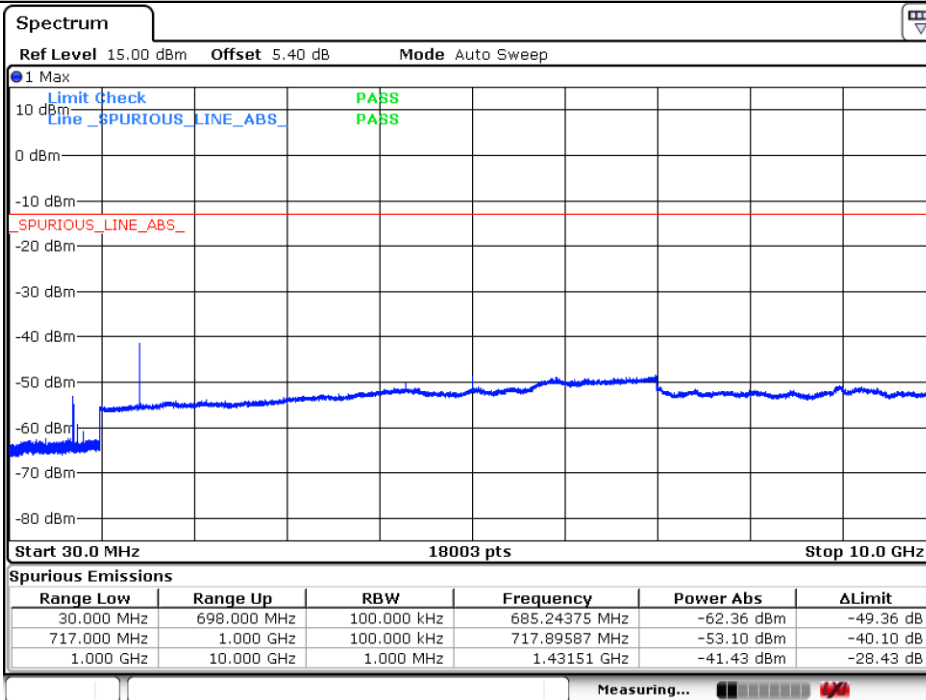
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LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23095-T size=1T0



Date: 5 JUL 2019 10:18:38

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23179-T size=1T0



Date: 5 JUL 2019 10:28:25



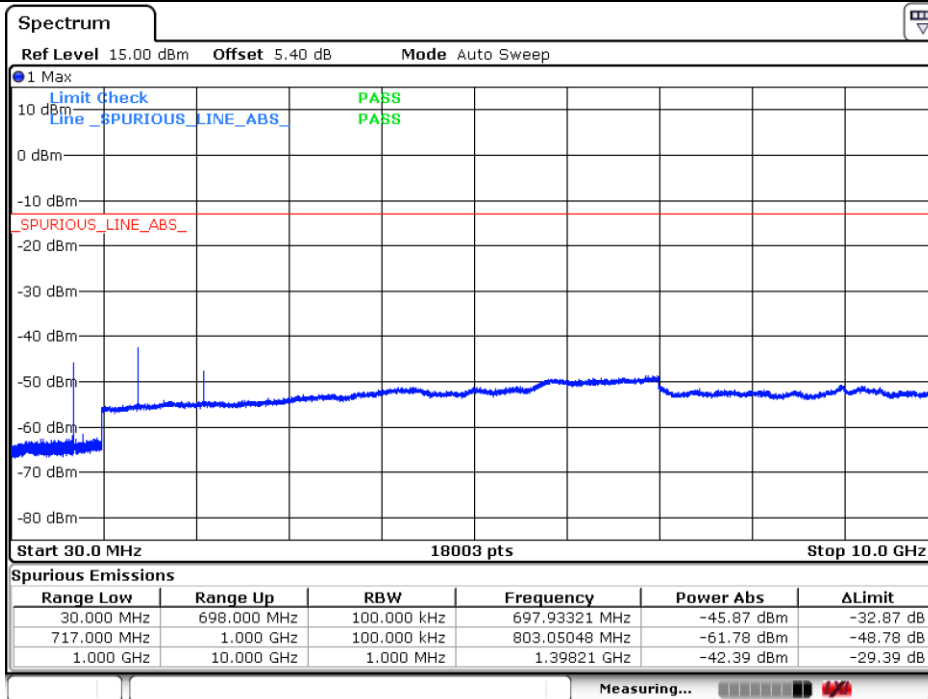
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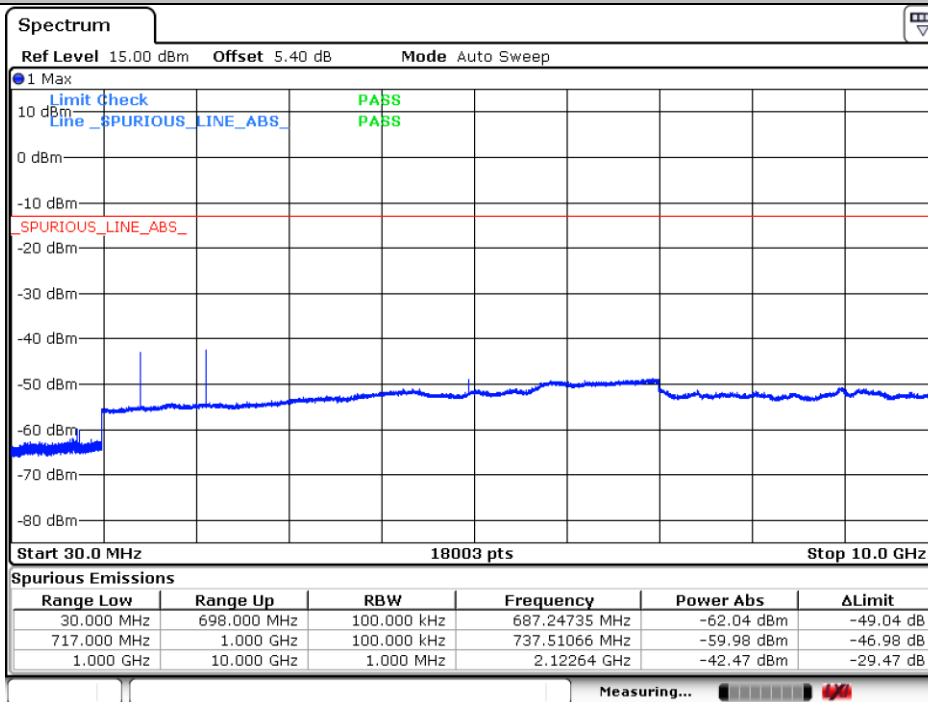
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23011-T size=1T0



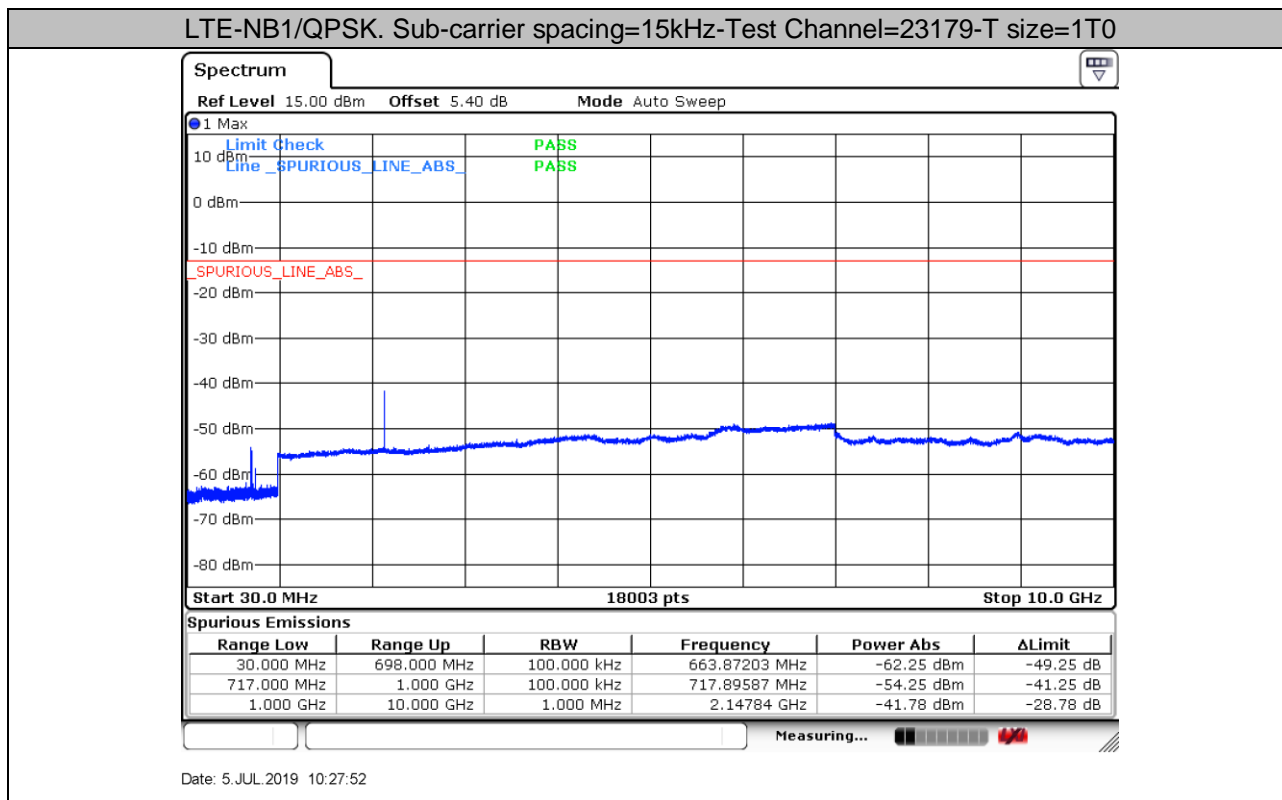
Date: 5 JUL 2019 10:10:43

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23095-T size=1T0



Date: 5 JUL 2019 10:19:19





7 Field Strength of Spurious Radiation

7.1 For LTE-NB1

7.1.1 Test Band = LTE-NB1 Band 12

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

7.1.1.1.1 Test Channel = 23011

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.533333	-80.14	-13.00	67.14	Vertical
341.126667	-84.90	-13.00	71.90	Vertical
1402.500000	-66.62	-13.00	53.62	Vertical
2200.000000	-59.43	-13.00	46.43	Vertical
6125.362500	-63.97	-13.00	50.97	Vertical
8873.887500	-62.66	-13.00	49.66	Vertical
63.040000	-76.13	-13.00	63.13	Horizontal
272.760000	-85.94	-13.00	72.94	Horizontal
1402.500000	-60.21	-13.00	47.21	Horizontal
2270.000000	-59.55	-13.00	46.55	Horizontal
3582.562500	-67.86	-13.00	54.86	Horizontal
6285.750000	-64.27	-13.00	51.27	Horizontal

7.1.1.1.2 Test Channel = 23095

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.740000	-80.00	-13.00	67.00	Vertical
317.840000	-85.65	-13.00	72.65	Vertical
1414.500000	-66.01	-13.00	53.01	Vertical
2134.000000	-61.61	-13.00	48.61	Vertical
5035.312500	-65.37	-13.00	52.37	Vertical
7984.687500	-62.64	-13.00	49.64	Vertical
62.853333	-75.04	-13.00	62.04	Horizontal
278.313333	-86.18	-13.00	73.18	Horizontal
1414.500000	-58.52	-13.00	45.52	Horizontal
2200.000000	-59.64	-13.00	46.64	Horizontal
4307.475000	-65.81	-13.00	52.81	Horizontal
6489.525000	-63.98	-13.00	50.98	Horizontal



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7.1.1.1.3 Test Channel = 23179

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.673333	-80.54	-13.00	67.54	Vertical
339.213333	-84.61	-13.00	71.61	Vertical
1426.500000	-66.23	-13.00	53.23	Vertical
2200.000000	-59.23	-13.00	46.23	Vertical
3923.325000	-66.76	-13.00	53.76	Vertical
7516.687500	-63.59	-13.00	50.59	Vertical
63.320000	-76.31	-13.00	63.31	Horizontal
269.026667	-86.08	-13.00	73.08	Horizontal
1427.000000	-58.11	-13.00	45.11	Horizontal
2270.000000	-59.50	-13.00	46.50	Horizontal
3564.037500	-67.79	-13.00	54.79	Horizontal
7861.837500	-62.40	-13.00	49.40	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 12	180KHz	BPSK/15KHz	23011	12T0	VL	TN	9.88	0.014135	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	VN	TN	9.52	0.013617	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	VH	TN	-9.11	-0.013036	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	VL	TN	-11.44	-0.016172	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	VN	TN	2.53	0.003573	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	VH	TN	12.62	0.017836	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	VL	TN	-0.24	-0.000342	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	VN	TN	7.14	0.009976	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	VH	TN	-7.16	-0.009997	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	VL	TN	-2.61	-0.003738	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	VN	TN	-1.54	-0.002204	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	VH	TN	0.76	0.001087	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	VL	TN	5.75	0.008120	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	VN	TN	-4.56	-0.006449	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	VH	TN	-3.29	-0.004645	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	VL	TN	-4.32	-0.006027	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	VN	TN	11.64	0.016264	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	VH	TN	13.60	0.018991	±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 12	180KHz	BPSK/15KHz	23011	12T0	NV	-30	-10.74	-0.015356	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	-20	-12.15	-0.017380	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	0	-2.84	-0.004063	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	10	-4.03	-0.005765	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	20	6.14	0.008788	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	30	-7.32	-0.010474	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	40	7.44	0.010641	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23011	12T0	NV	50	9.33	0.013345	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	-30	-14.11	-0.019947	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	-20	-7.41	-0.010470	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	0	-6.81	-0.009630	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	10	5.95	0.008403	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	20	-7.28	-0.010285	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	30	-8.67	-0.012252	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	40	9.27	0.013108	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23095	12T0	NV	50	-8.40	-0.011872	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	-30	-3.13	-0.004369	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	-20	6.48	0.009046	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	0	6.11	0.008542	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	10	5.27	0.007365	±2.5	PASS



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NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	20	-9.03	-0.012614	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	30	3.41	0.004759	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	40	-6.31	-0.008816	±2.5	PASS
NB1 Band 12	180KHz	BPSK/15KHz	23179	12T0	NV	50	-13.73	-0.019174	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	-30	-12.41	-0.017748	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	-20	-0.75	-0.001067	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	0	-5.89	-0.008427	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	10	-7.97	-0.011398	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	20	5.28	0.007554	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	30	-14.17	-0.020276	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	40	1.13	0.001622	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23011	12T0	NV	50	-3.07	-0.004385	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	-30	6.14	0.008676	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	-20	-9.08	-0.012838	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	0	-6.21	-0.008771	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	10	-10.31	-0.014575	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	20	6.06	0.008566	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	30	11.54	0.016309	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	40	-2.67	-0.003776	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23095	12T0	NV	50	0.18	0.000254	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	-30	14.48	0.020221	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	-20	8.70	0.012158	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	0	-5.76	-0.008051	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	10	-0.04	-0.000057	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	20	0.97	0.001355	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	30	-2.60	-0.003626	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	40	3.78	0.005286	±2.5	PASS
NB1 Band 12	180KHz	QPSK/15KHz	23179	12T0	NV	50	-11.03	-0.015403	±2.5	PASS

The End

