



Appendix B

LTE-NB1 Band 71





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1 Effective (Isotropic) Radiated Power Output Data

1.1 Test Result for LTE NB1 Band 71

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	ERP (dBm)	limit (dBm)	Verdict
NB1 Band 71	BPSK	3.75	133123	1T0	23.03	22.08	34.77	PASS
NB1 Band 71	BPSK	3.75	133123	1T47	22.81	21.86	34.77	PASS
NB1 Band 71	BPSK	3.75	133297	1T0	22.85	21.90	34.77	PASS
NB1 Band 71	BPSK	3.75	133297	1T47	23.03	22.08	34.77	PASS
NB1 Band 71	BPSK	3.75	133471	1T0	23.12	22.17	34.77	PASS
NB1 Band 71	BPSK	3.75	133471	1T47	23.05	22.10	34.77	PASS
NB1 Band 71	QPSK	3.75	133123	1T0	22.96	22.01	34.77	PASS
NB1 Band 71	QPSK	3.75	133123	1T47	22.99	22.04	34.77	PASS
NB1 Band 71	QPSK	3.75	133297	1T0	23.15	22.20	34.77	PASS
NB1 Band 71	QPSK	3.75	133297	1T47	22.96	22.01	34.77	PASS
NB1 Band 71	QPSK	3.75	133471	1T0	22.99	22.04	34.77	PASS
NB1 Band 71	QPSK	3.75	133471	1T47	23.09	22.14	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 71	BPSK	15	133123	1T0	23.19	22.24	34.77	PASS
NB1 Band 71	BPSK	15	133123	1T11	23.16	22.21	34.77	PASS
NB1 Band 71	BPSK	15	133297	1T0	22.86	21.91	34.77	PASS
NB1 Band 71	BPSK	15	133297	1T11	22.83	21.88	34.77	PASS
NB1 Band 71	BPSK	15	133471	1T0	22.82	21.87	34.77	PASS
NB1 Band 71	BPSK	15	133471	1T11	23.11	22.16	34.77	PASS
NB1 Band 71	QPSK	15	133123	1T0	22.99	22.04	34.77	PASS
NB1 Band 71	QPSK	15	133123	1T11	23.08	22.13	34.77	PASS
NB1 Band 71	QPSK	15	133123	12T0	21.44	20.49	34.77	PASS
NB1 Band 71	QPSK	15	133297	1T0	23.04	22.09	34.77	PASS
NB1 Band 71	QPSK	15	133297	1T11	22.89	21.94	34.77	PASS
NB1 Band 71	QPSK	15	133297	12T0	21.36	20.41	34.77	PASS
NB1 Band 71	QPSK	15	133471	1T0	23.09	22.14	34.77	PASS
NB1 Band 71	QPSK	15	133471	1T11	22.97	22.02	34.77	PASS
NB1 Band 71	QPSK	15	133471	12T0	21.61	20.66	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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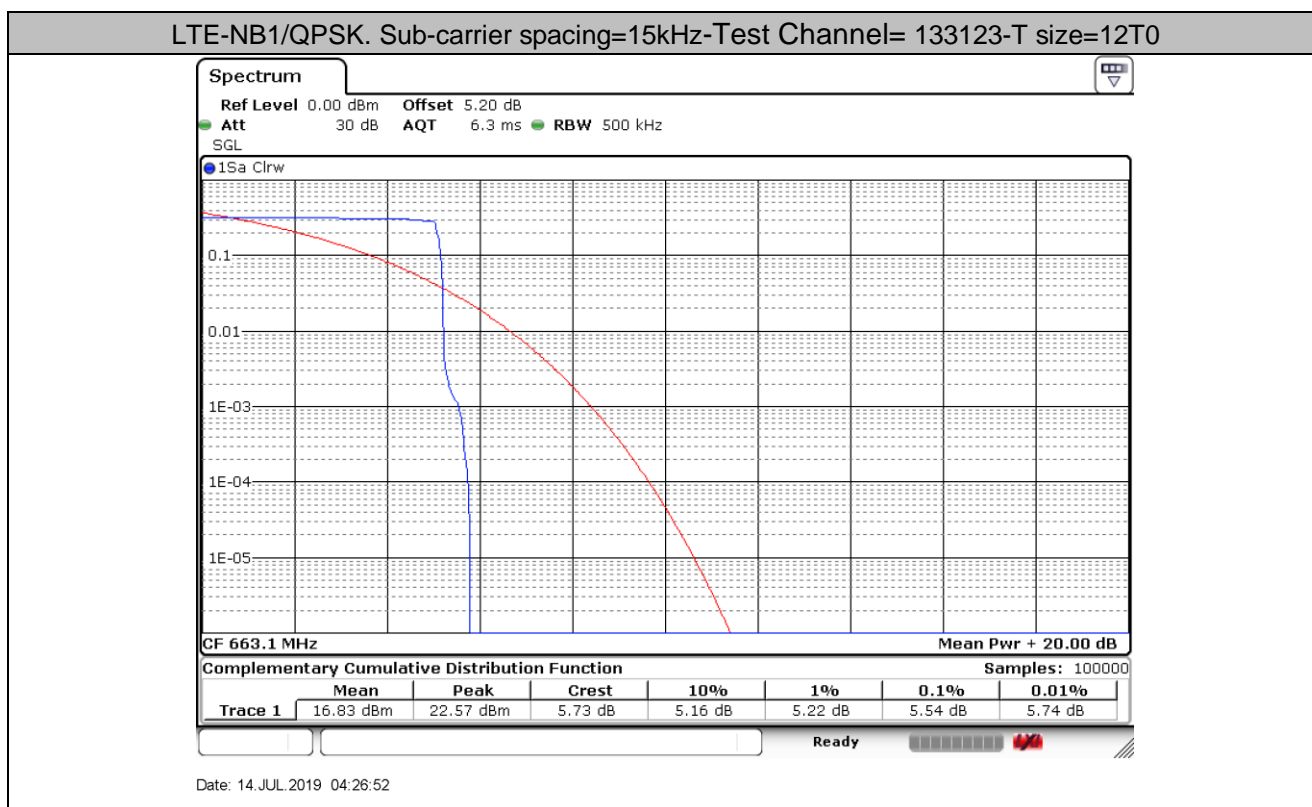
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2 Peak-to-Average Ratio

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
NB1 Band 71	QPSK/12T0	133123	5.54	13	PASS
NB1 Band 71	QPSK/12T0	133297	5.62	13	PASS
NB1 Band 71	QPSK/12T0	133471	7.94	13	PASS

2.1 For LTE-NB1

2.1.1 Test Band = LTE-NB1 Band 71

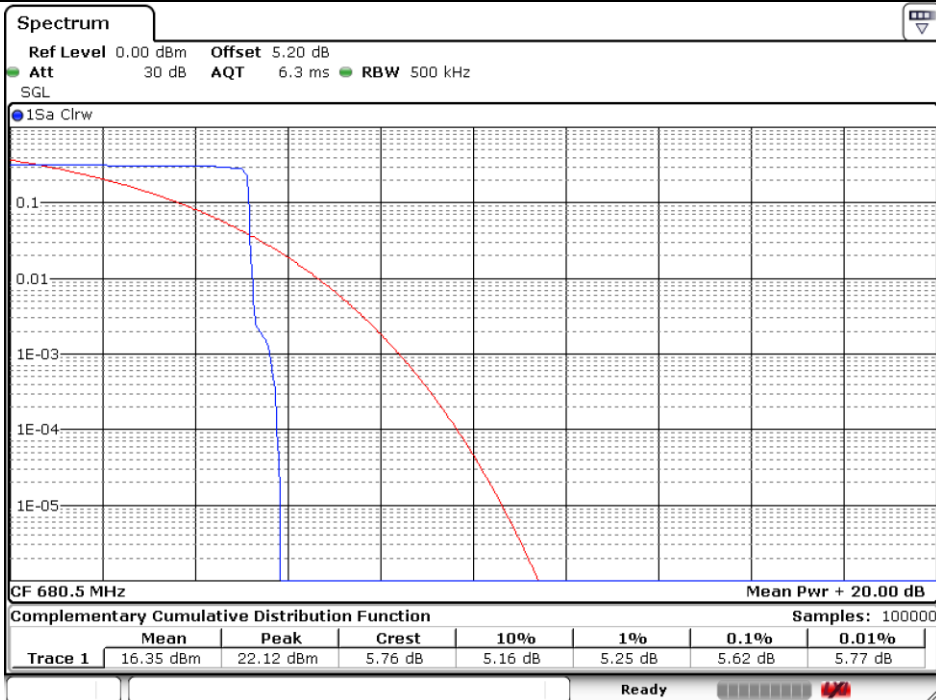


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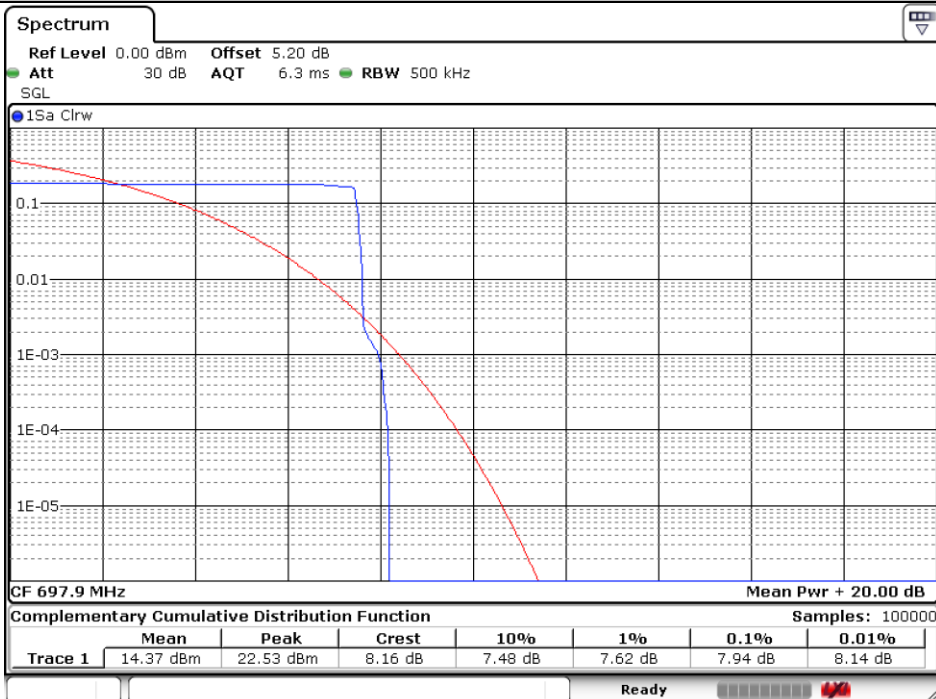
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 133297-T size=12T0



Date: 14.JUL.2019 04:30:31

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 133471-T size=12T0



Date: 14.JUL.2019 04:38:10



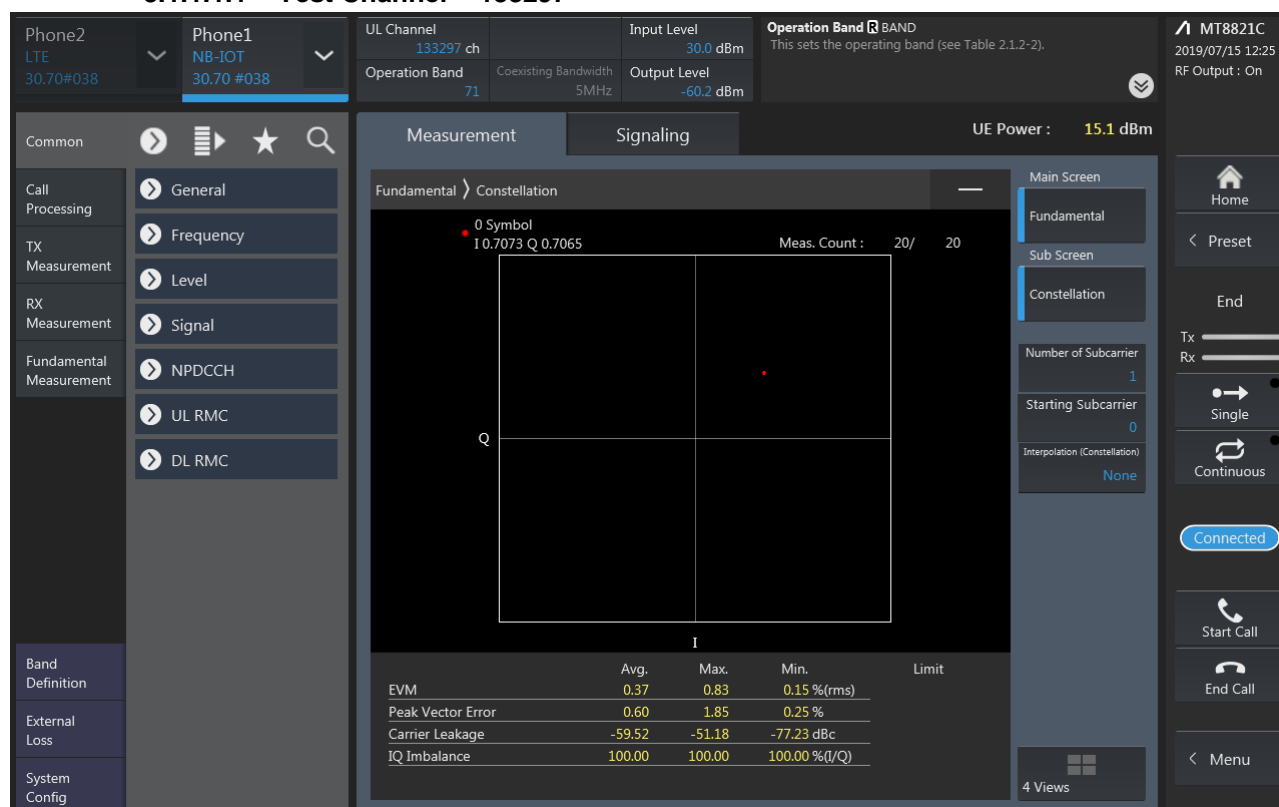
3 Modulation Characteristics

3.1 For LTE-NB1

3.1.1 Test Band = LTE-NB1 Band 71

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

3.1.1.1.1 Test Channel = 133297



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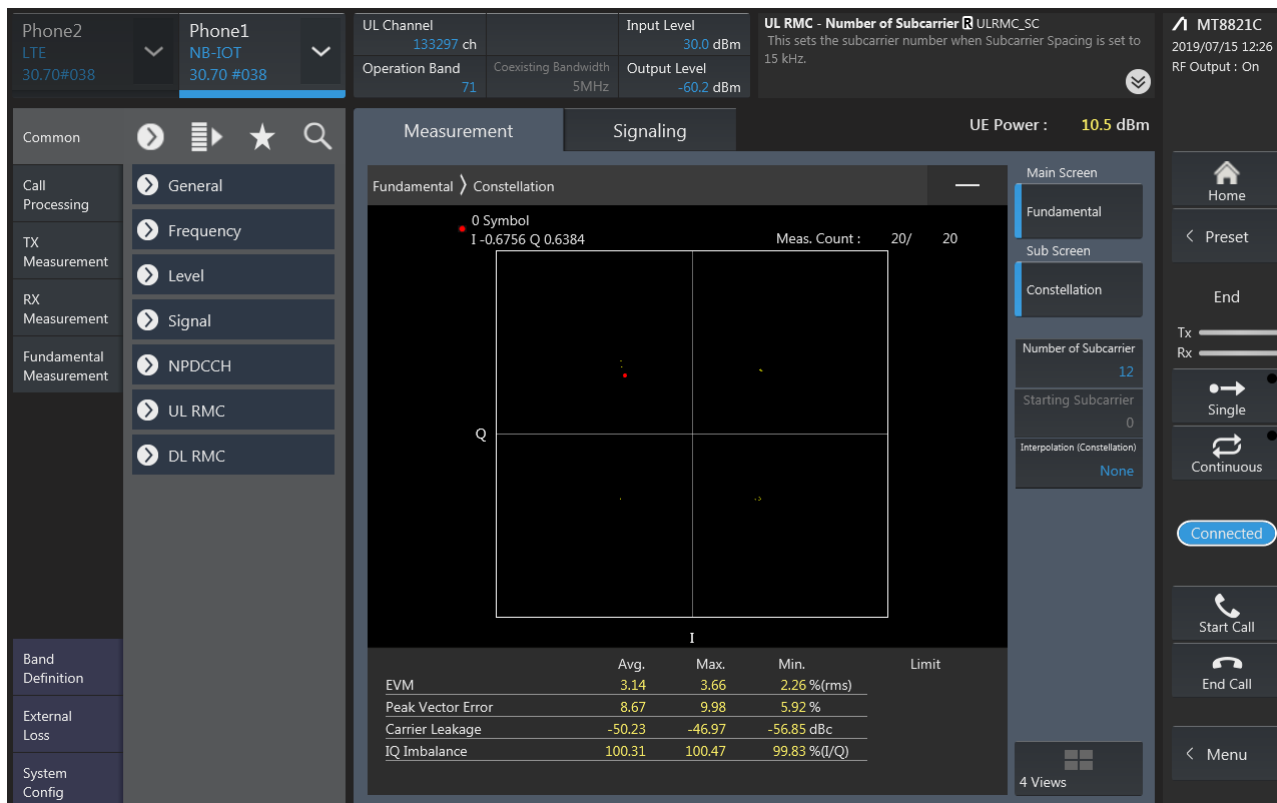
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3.1.1.2 Test Mode = LTE-NB1/QPSK. Sub-carrier spacing=15kHz.T size=12T0

3.1.1.2.1 Test Channel = 133297



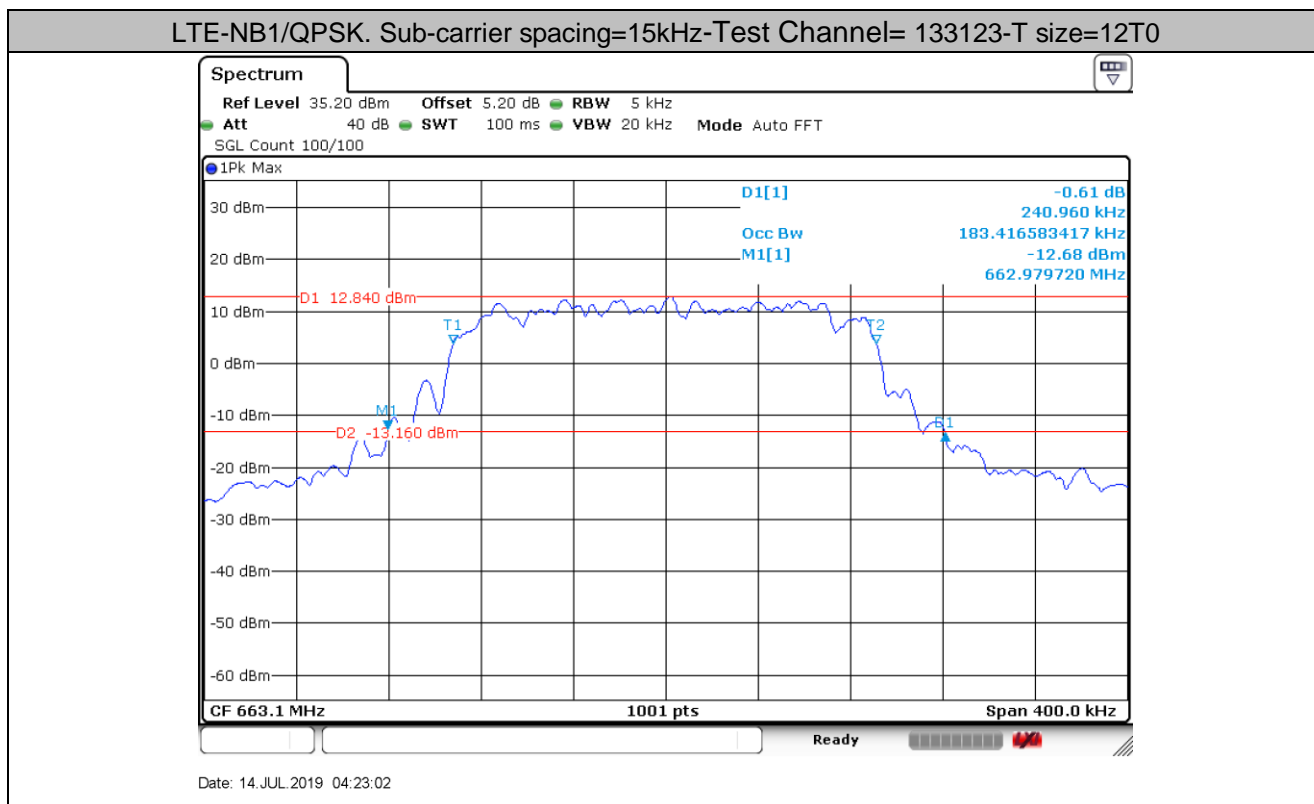


4 Bandwidth

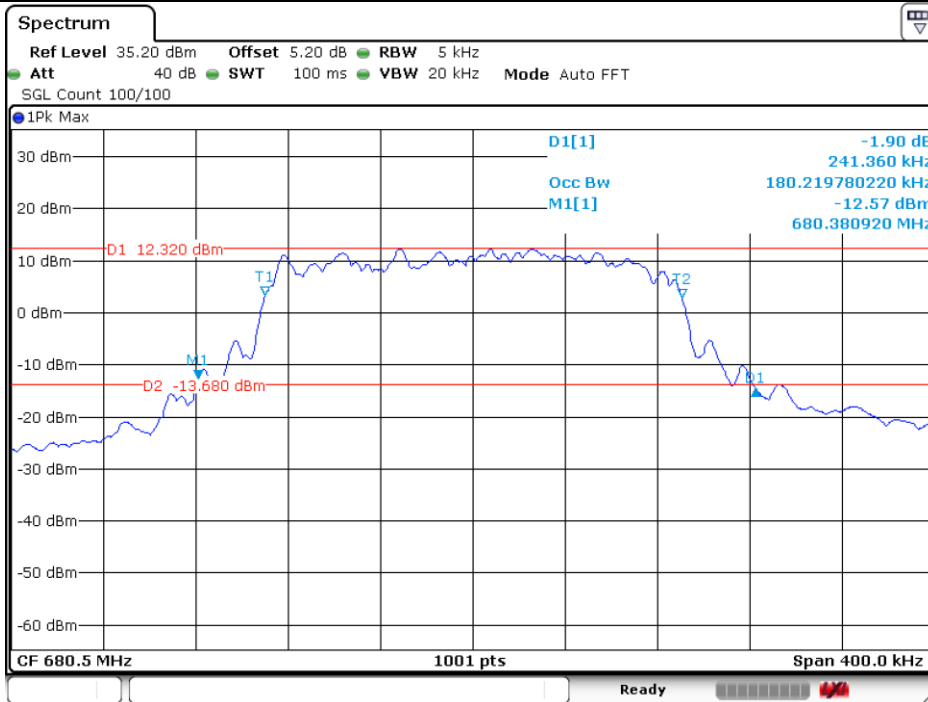
Test Band	Test Mode	T size	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
NB1 Band 71	QPSK/15kHz	12T0	133123	183.42	240.96	PASS
NB1 Band 71	QPSK/15kHz	12T0	133297	180.22	241.36	PASS
NB1 Band 71	QPSK/15kHz	12T0	133471	181.82	242.16	PASS

4.1 For LTE-NB1

4.1.1 Test Band = LTE-NB1 Band 71

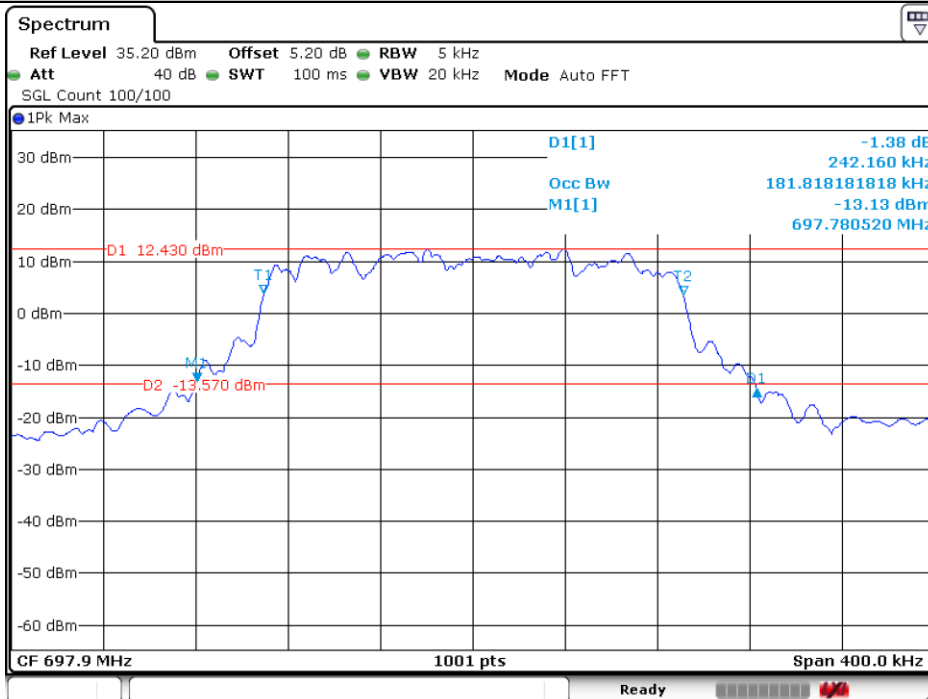


LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 133297-T size=12T0



Date: 14.JUL.2019 04:33:00

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 133471-T size=12T0



Date: 14.JUL.2019 04:37:24



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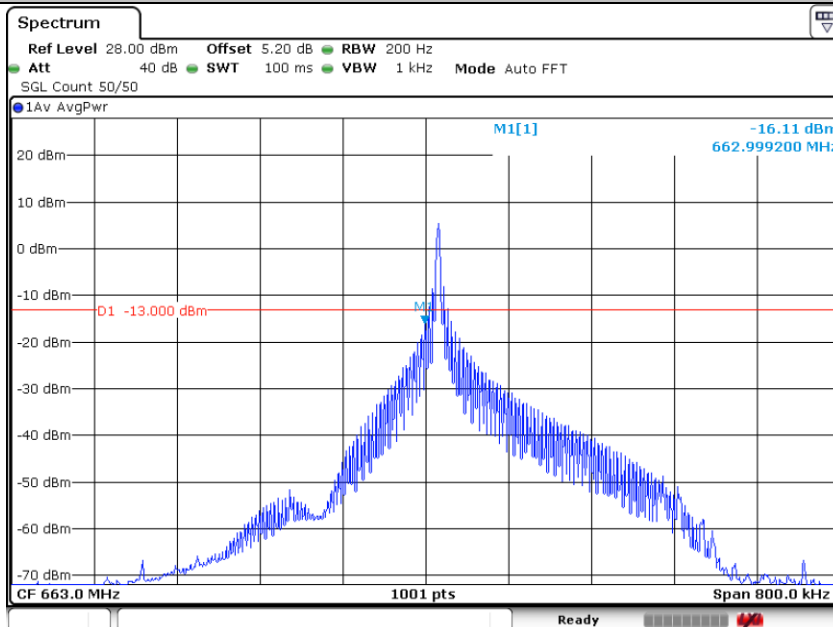
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5 Band Edges Compliance

5.1 For LTE-NB1

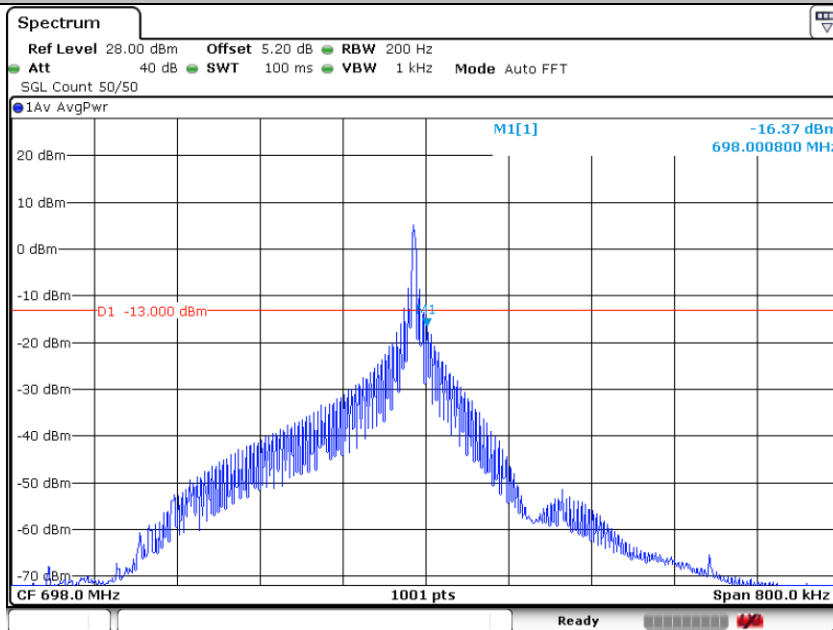
5.1.1 Test Band = LTE-NB1 Band 71

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=133123-T size=1T0



Date: 20 AUG 2019 19:55:43

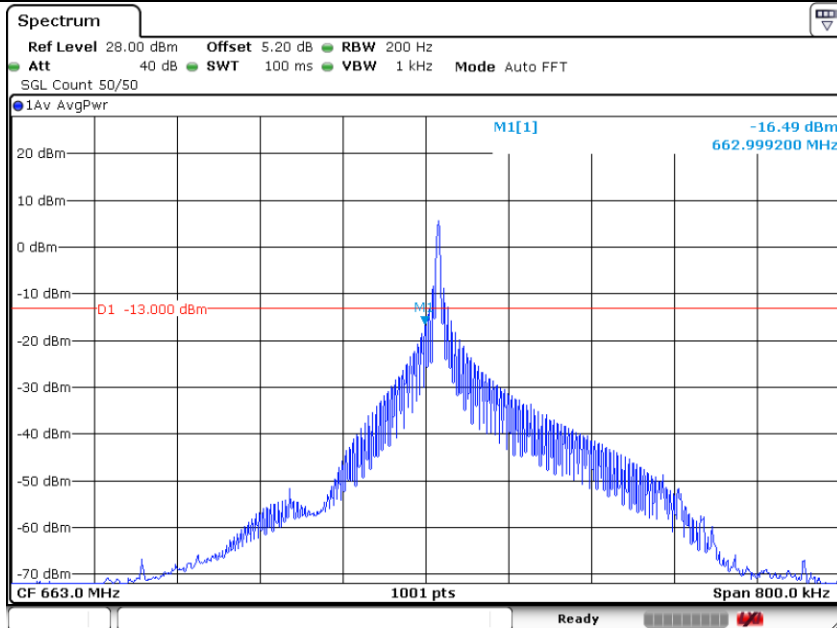
LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=133471-T size=1T47



Date: 20 AUG 2019 20:09:39

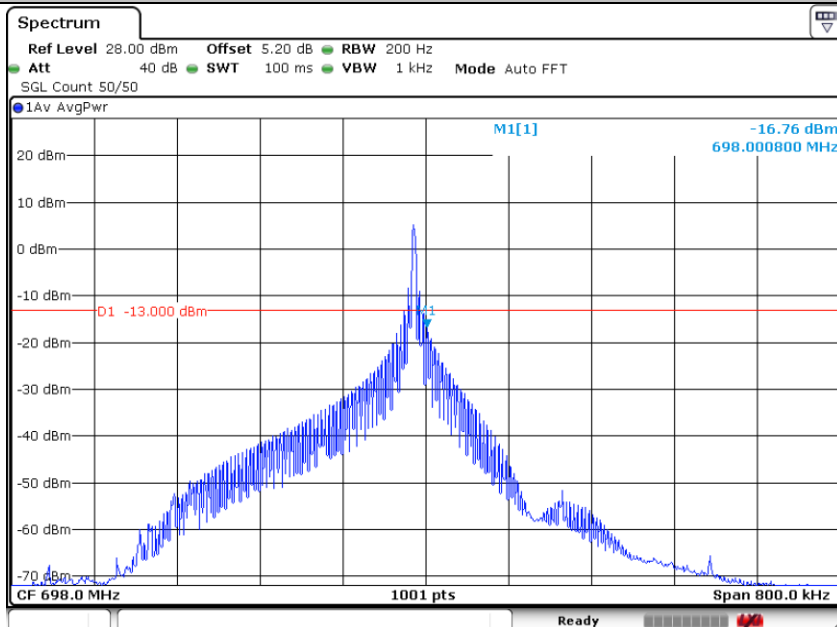


LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=133123-T size=1T0



Date: 20.AUG.2019 19:55:09

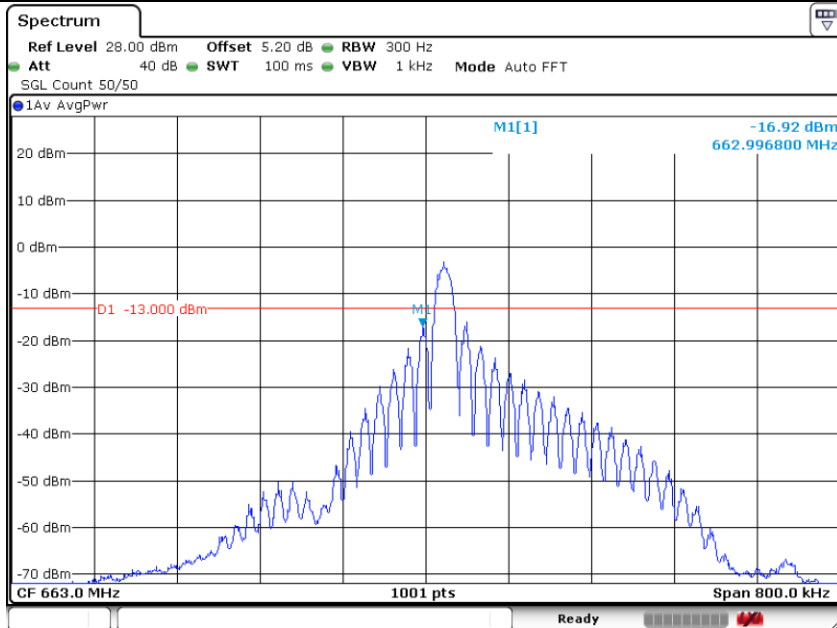
LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=133471-T size=1T47



Date: 20.AUG.2019 20:09:08

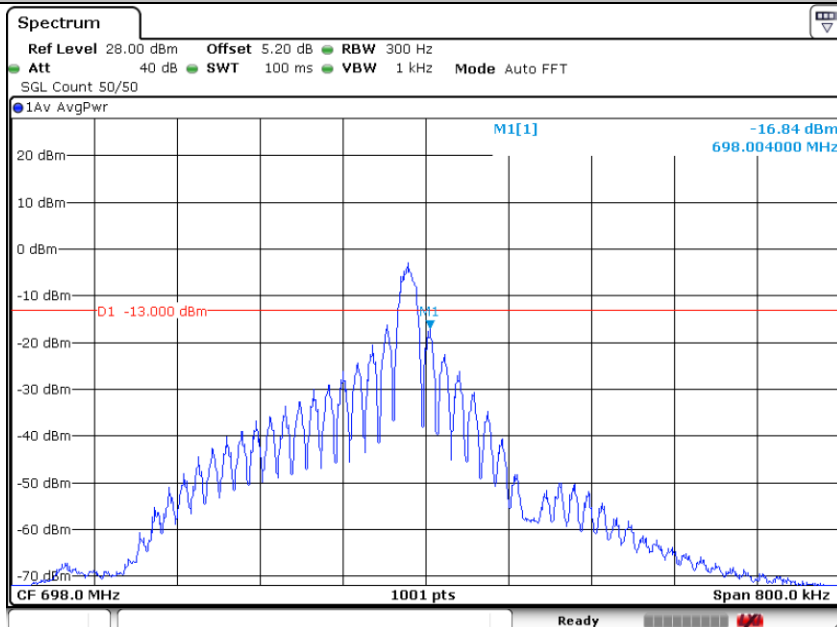


LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=133123-T size=1T0



Date: 20.AUG.2019 19:57:31

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=133471-T size=1T11



Date: 20.AUG.2019 20:06:09



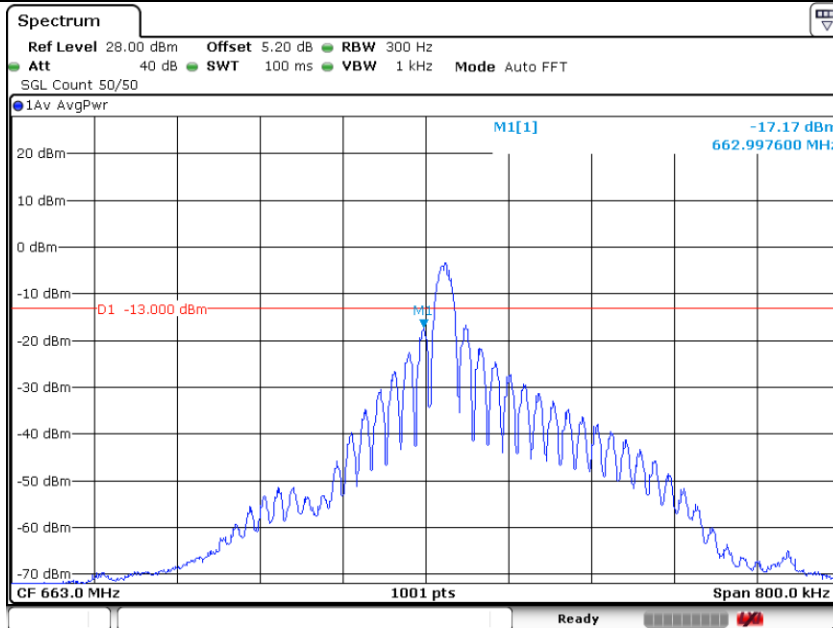
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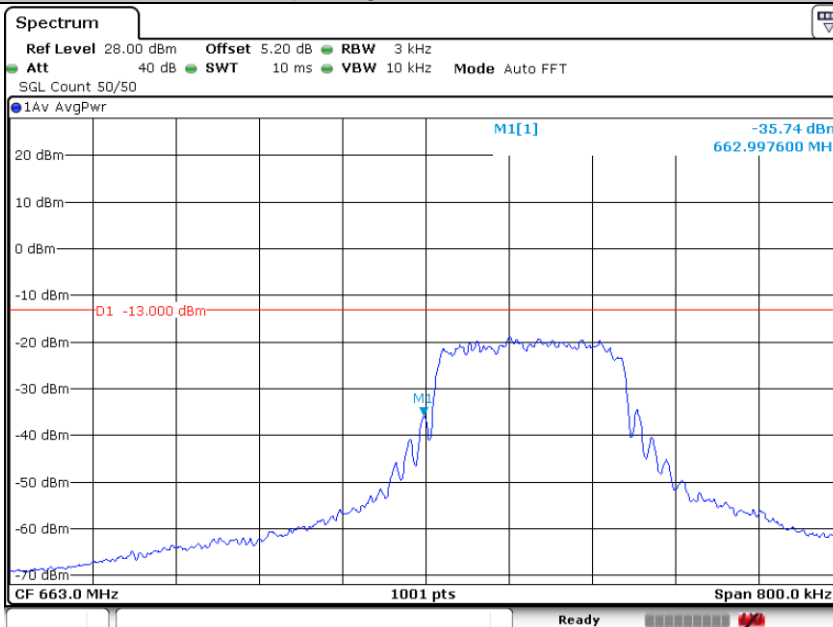
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133123-T size=1T0



Date: 20.AUG.2019 19:58:16

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133123-T size=12T0



Date: 20.AUG.2019 19:58:45

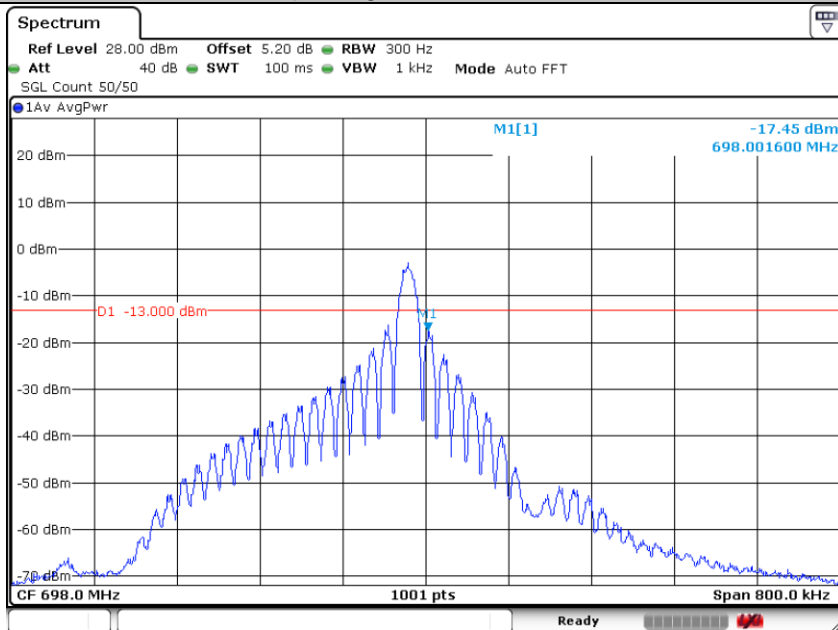


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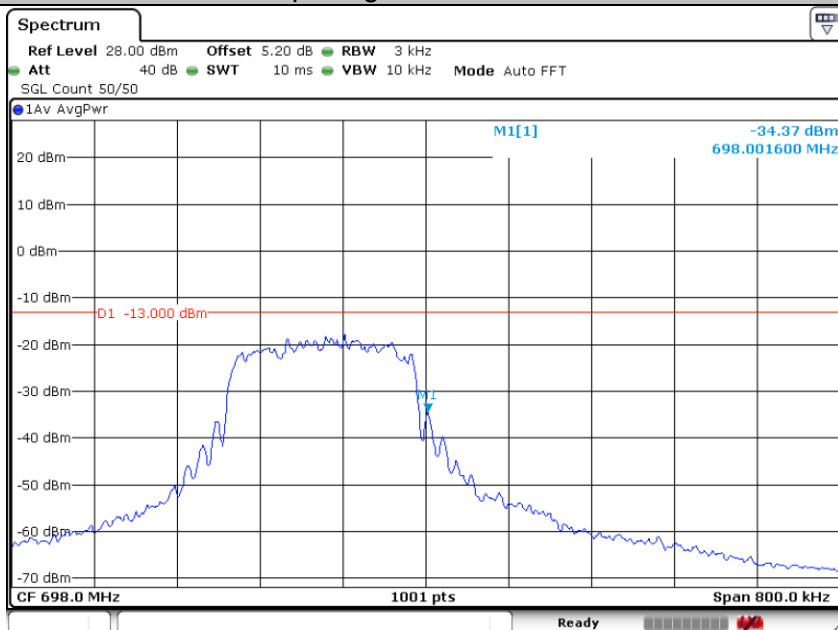
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133471-T size=1T11



Date: 20.AUG.2019 20:05:46

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133471-T size=12T0



Date: 20.AUG.2019 20:03:59



6 Spurious Emission at Antenna Terminal

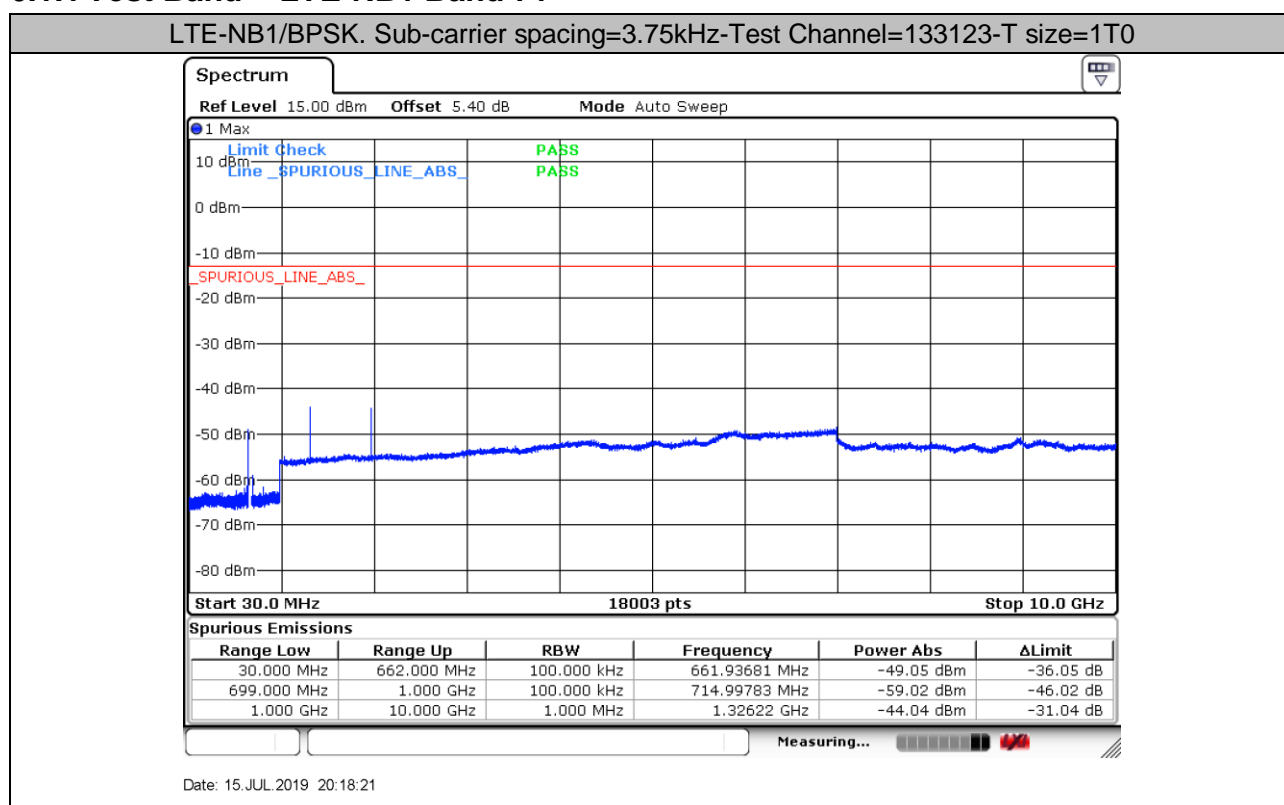
NOTE1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k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

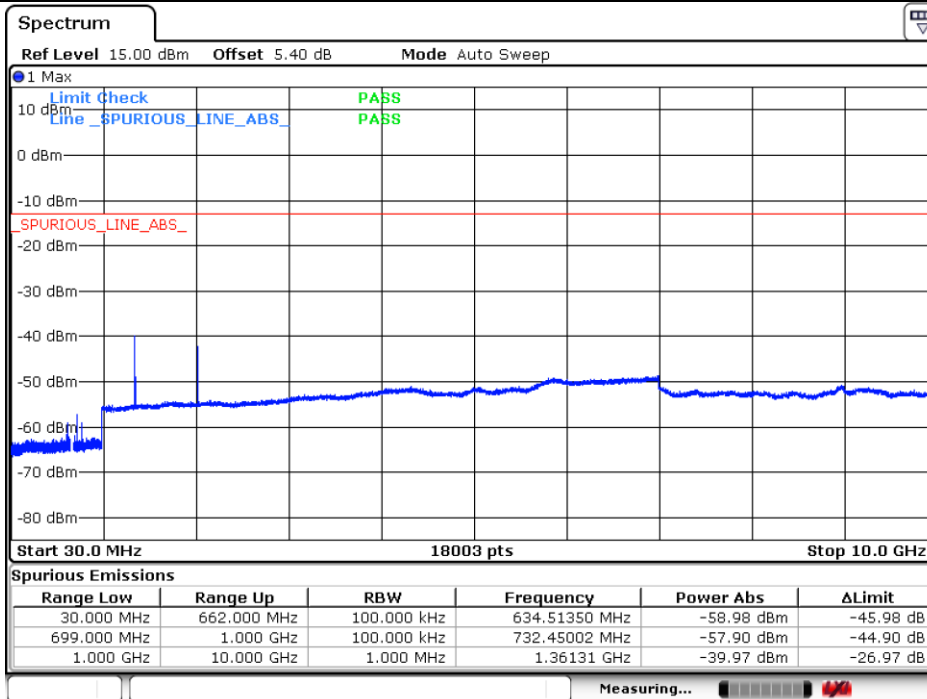
Part I - Test Plots

6.1 For LTE-NB1

6.1.1 Test Band = LTE-NB1 Band 71

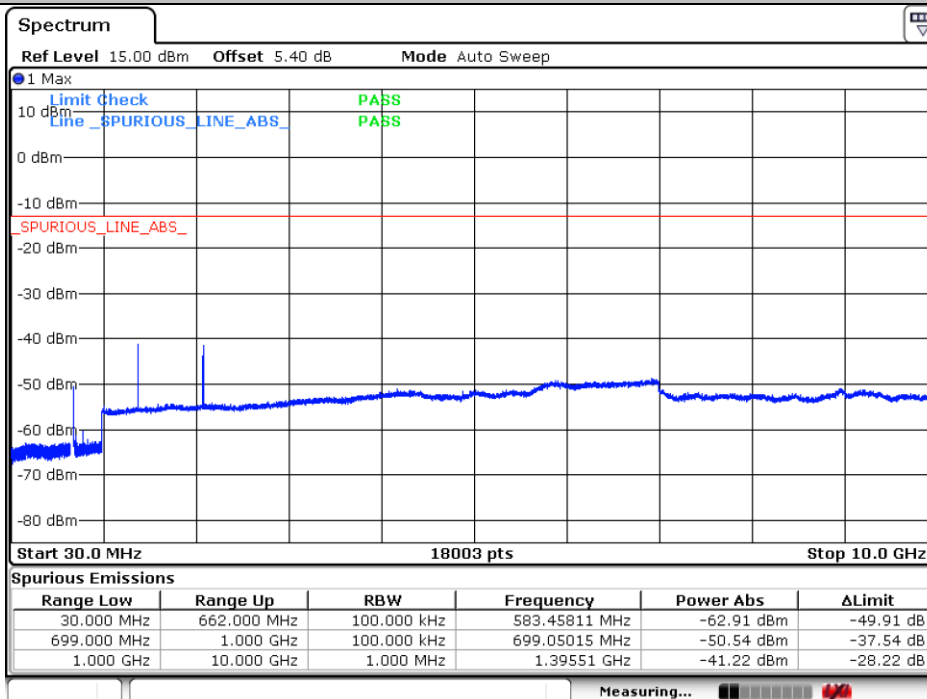


LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=133297-T size=1T0



Date: 15 JUL 2019 20:24:38

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=133471-T size=1T0



Date: 15 JUL 2019 20:26:25



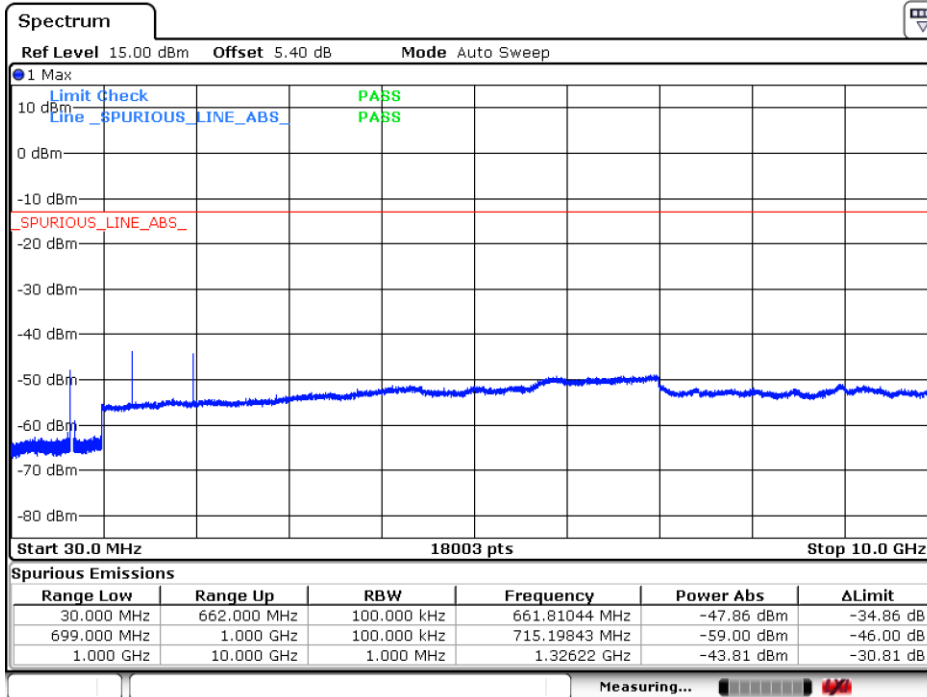
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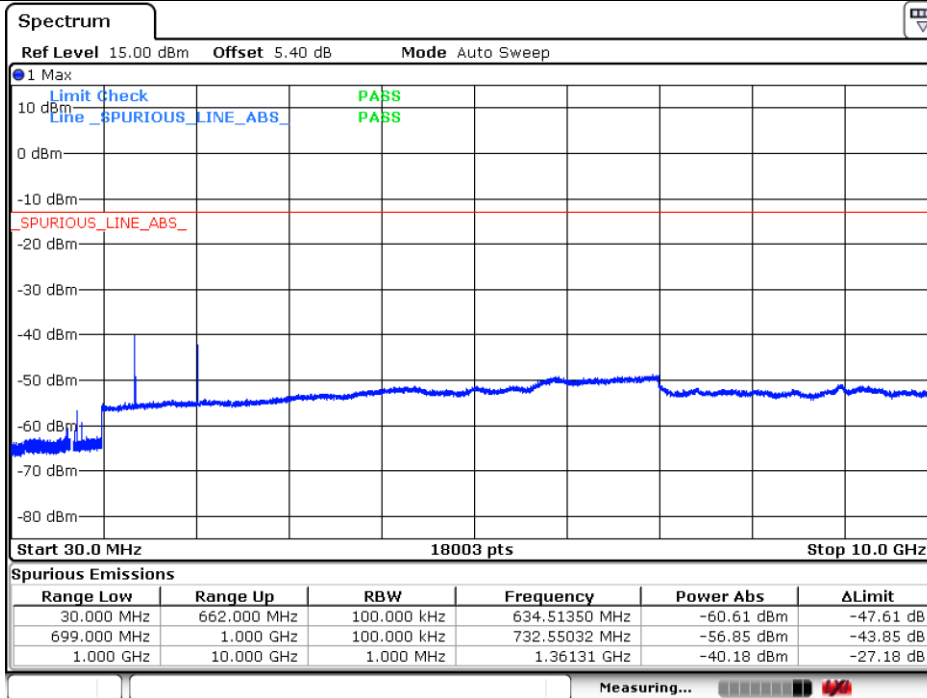
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=133123-T size=1T0



Date: 15 JUL 2019 20:18:55

LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=133297-T size=1T0



Date: 15 JUL 2019 20:23:52



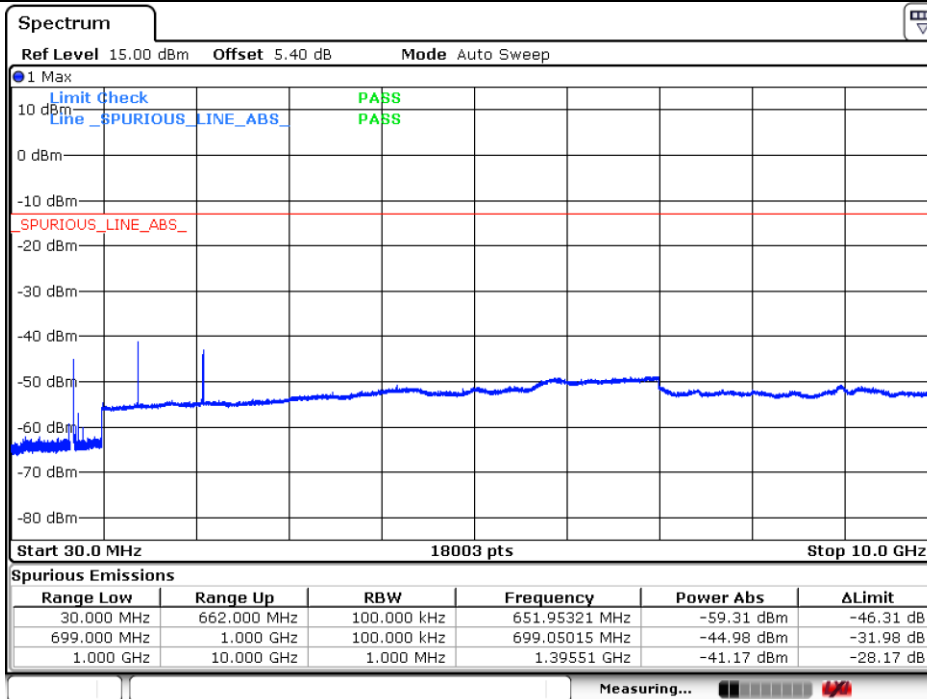
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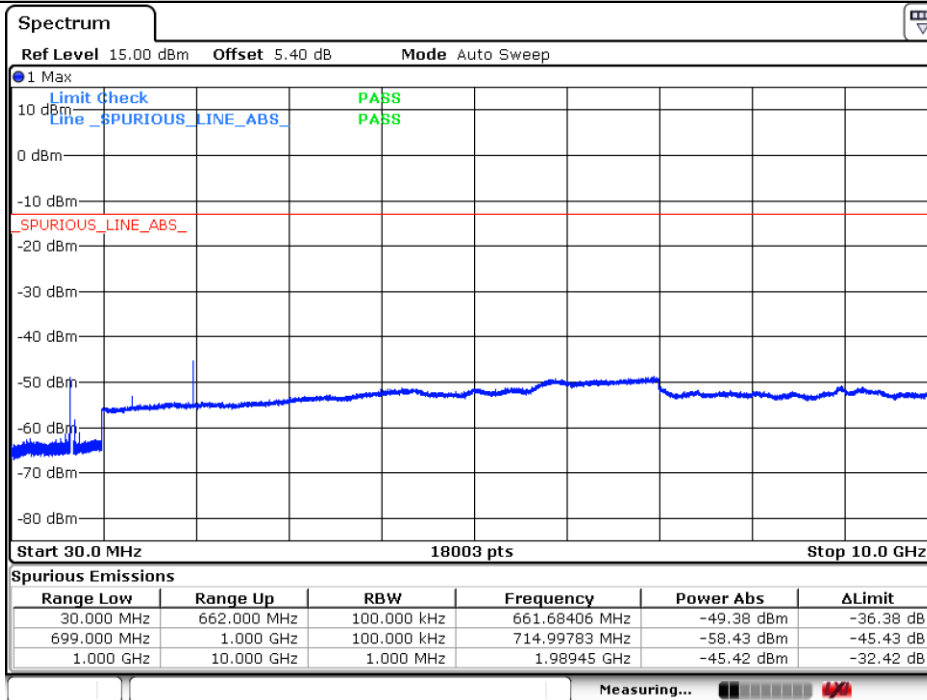
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LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=133471-T size=1T0



Date: 15.JUL.2019 20:27:08

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=133123-T size=1T0



Date: 15.JUL.2019 20:20:02



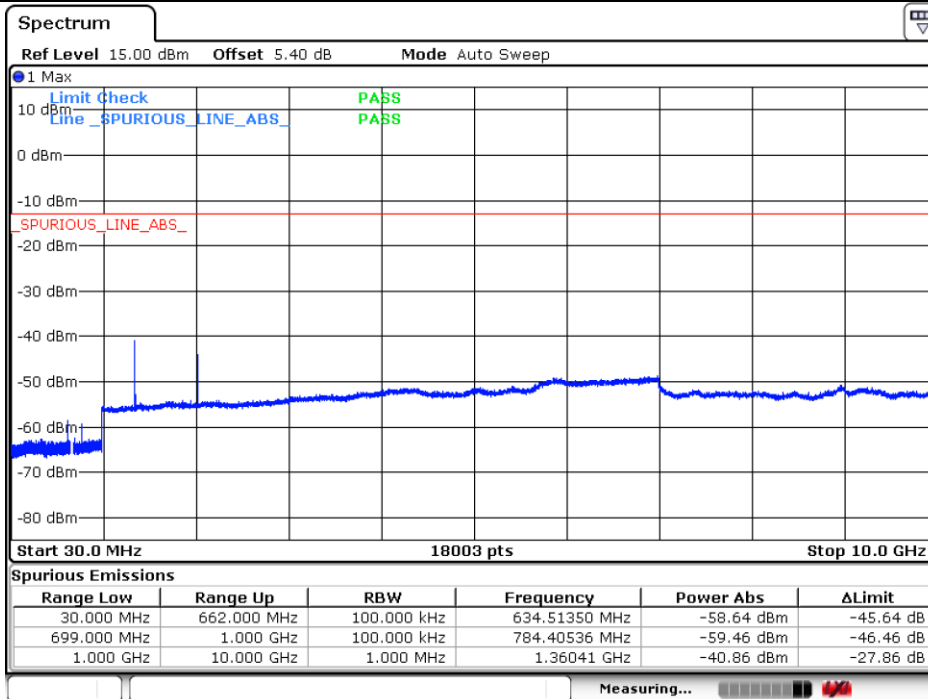
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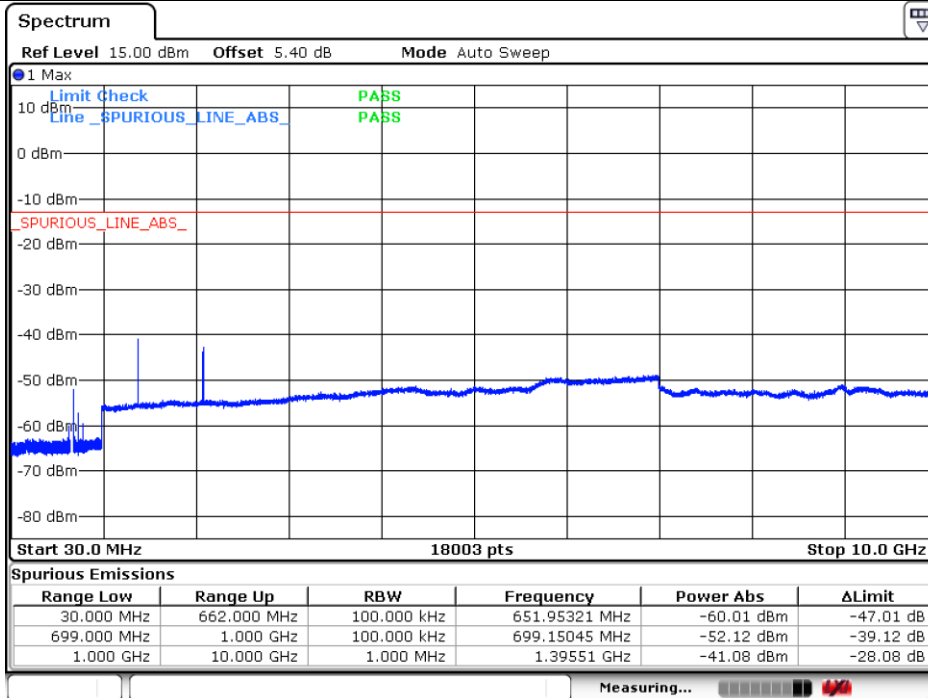
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LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=133297-T size=1T0



Date: 15.JUL.2019 20:21:36

LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=133471-T size=1T0



Date: 15.JUL.2019 20:28:43

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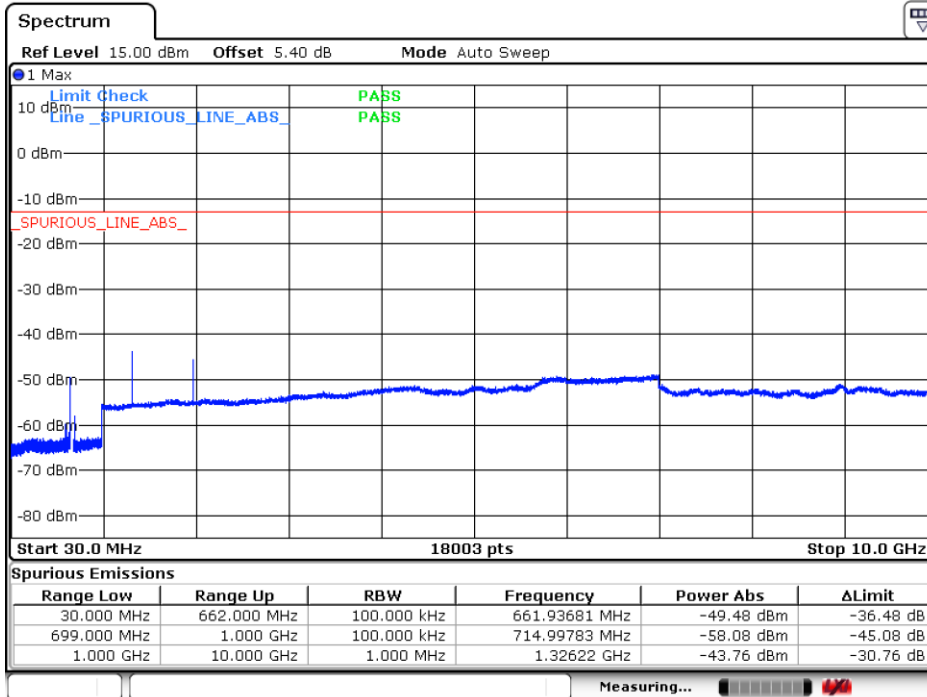
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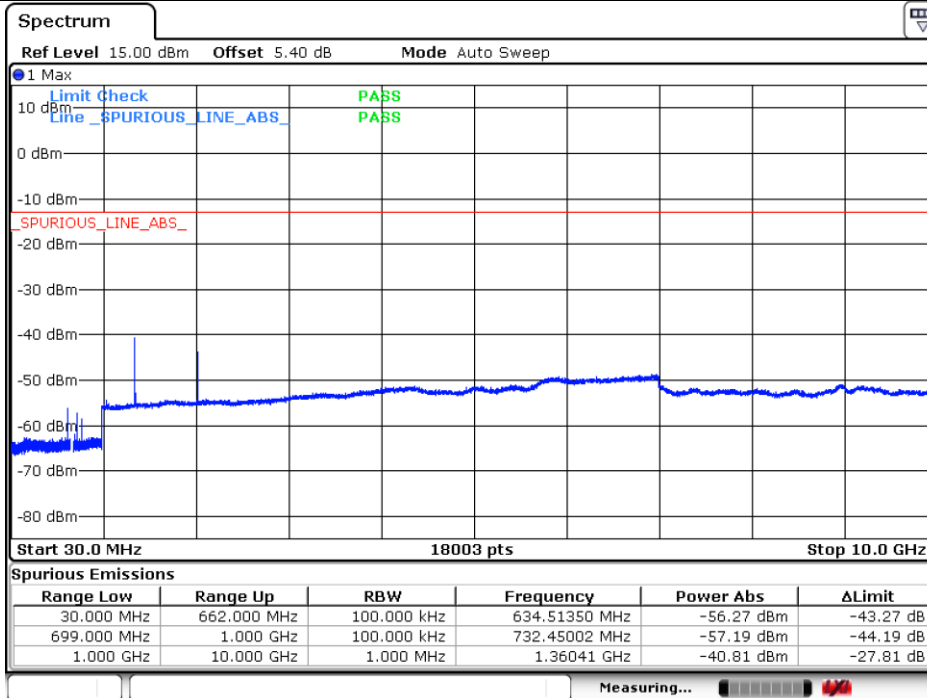
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133123-T size=1T0



Date: 15 JUL 2019 20:19:36

LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133297-T size=1T0



Date: 15 JUL 2019 20:23:02



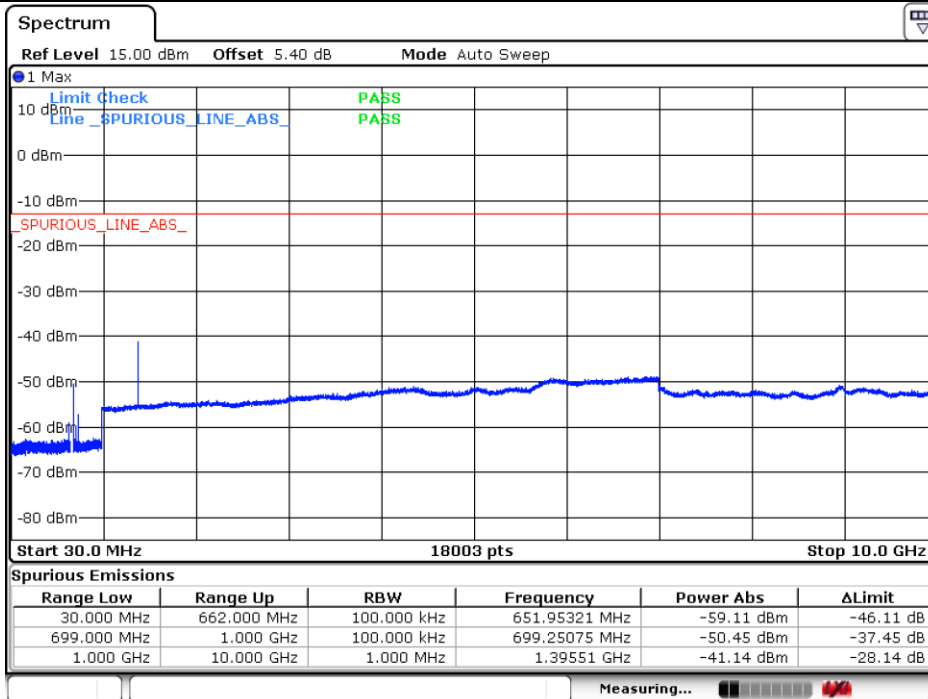
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=133471-T size=1T0



Date: 15 JUL 2019 20:27:42



7 Field Strength of Spurious Radiation

7.1 For LTE-NB1

7.1.1 Test Band = LTE-NB1 Band 71

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

7.1.1.1.1 Test Channel = 133123

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.346667	-79.84	-13.00	66.84	Vertical
124.966667	-85.71	-13.00	72.71	Vertical
333.380000	-84.50	-13.00	71.50	Vertical
1330.500000	-51.60	-13.00	38.60	Vertical
1997.000000	-57.00	-13.00	44.00	Vertical
5513.062500	-65.03	-13.00	52.03	Vertical
63.413333	-76.40	-13.00	63.40	Horizontal
271.033333	-86.13	-13.00	73.13	Horizontal
1331.000000	-44.57	-13.00	31.57	Horizontal
1996.500000	-51.12	-13.00	38.12	Horizontal
4271.887500	-65.76	-13.00	52.76	Horizontal
7614.675000	-63.55	-13.00	50.55	Horizontal

7.1.1.1.2 Test Channel = 133297

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.206667	-80.01	-13.00	67.01	Vertical
334.826667	-84.93	-13.00	71.93	Vertical
1361.000000	-51.33	-13.00	38.33	Vertical
2041.500000	-57.45	-13.00	44.45	Vertical
2706.500000	-57.68	-13.00	44.68	Vertical
6058.575000	-63.68	-13.00	50.68	Vertical
62.806667	-75.83	-13.00	62.83	Horizontal
265.293333	-86.50	-13.00	73.50	Horizontal
1360.500000	-47.46	-13.00	34.46	Horizontal
2041.500000	-55.19	-13.00	42.19	Horizontal
2681.500000	-57.74	-13.00	44.74	Horizontal
6057.600000	-63.97	-13.00	50.97	Horizontal



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7.1.1.1.3 Test Channel = 133471

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.720000	-80.22	-13.00	67.22	Vertical
124.966667	-84.95	-13.00	71.95	Vertical
359.186667	-83.60	-13.00	70.60	Vertical
1390.500000	-49.12	-13.00	36.12	Vertical
2086.500000	-52.34	-13.00	39.34	Vertical
4867.612500	-62.17	-13.00	49.17	Vertical
63.180000	-76.52	-13.00	63.52	Horizontal
270.986667	-85.41	-13.00	72.41	Horizontal
1390.500000	-41.30	-13.00	28.30	Horizontal
2086.500000	-45.63	-13.00	32.63	Horizontal
3477.750000	-63.56	-13.00	50.56	Horizontal
4868.587500	-55.05	-13.00	42.05	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 71	180KHz	BPSK/15KHz	133123	12T0	VL	TN	13.67	0.020619	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	VN	TN	11.61	0.017513	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	VH	TN	12.08	0.018223	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	VL	TN	8.44	0.012409	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	VN	TN	-9.80	-0.014404	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	VH	TN	3.33	0.004897	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	VL	TN	14.25	0.020420	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	VN	TN	-11.85	-0.016982	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	VH	TN	11.25	0.016113	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	VL	TN	1.80	0.002710	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	VN	TN	-13.93	-0.021014	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	VH	TN	-5.46	-0.008241	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	VL	TN	-12.66	-0.018611	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	VN	TN	-3.90	-0.005727	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	VH	TN	-4.46	-0.006551	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	VL	TN	3.97	0.005686	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	VN	TN	-11.91	-0.017064	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	VH	TN	6.53	0.009363	±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 71	180KHz	BPSK/15KHz	133123	12T0	NV	-30	9.43	0.014227	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	-20	-5.69	-0.008576	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	0	11.80	0.017801	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	10	-5.32	-0.008019	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	20	-1.98	-0.002985	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	30	4.84	0.007297	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	40	8.12	0.012240	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133123	12T0	NV	50	-11.40	-0.017188	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	-30	-0.50	-0.000730	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	-20	-9.58	-0.014075	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	0	8.22	0.012083	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	10	-14.96	-0.021979	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	20	-13.36	-0.019636	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	30	-4.34	-0.006370	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	40	-14.10	-0.020716	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133297	12T0	NV	50	12.78	0.018786	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	-30	2.77	0.003974	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	-20	-5.73	-0.008212	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	0	-7.78	-0.011145	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	10	3.37	0.004825	±2.5	PASS



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NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	20	7.49	0.010733	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	30	14.21	0.020359	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	40	2.79	0.003994	±2.5	PASS
NB1 Band 71	180KHz	BPSK/15KHz	133471	12T0	NV	50	4.57	0.006546	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	-30	-13.53	-0.020402	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	-20	-6.30	-0.009496	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	0	-10.93	-0.016488	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	10	7.16	0.010790	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	20	7.21	0.010871	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	30	14.29	0.021547	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	40	2.35	0.003537	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133123	12T0	NV	50	-5.98	-0.009019	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	-30	-5.45	-0.008011	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	-20	9.82	0.014428	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	0	14.95	0.021970	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	10	-0.55	-0.000801	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	20	4.28	0.006291	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	30	-5.49	-0.008068	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	40	-1.04	-0.001529	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133297	12T0	NV	50	-3.33	-0.004899	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	-30	4.19	0.006006	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	-20	-3.72	-0.005335	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	0	11.81	0.016923	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	10	3.87	0.005548	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	20	9.54	0.013668	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	30	3.09	0.004431	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	40	-1.51	-0.002167	±2.5	PASS
NB1 Band 71	180KHz	QPSK/15KHz	133471	12T0	NV	50	-6.81	-0.009755	±2.5	PASS

The End

