



# Appendix B

## LTE-NB1 Band 4





## CONTENT

	Page
<b>1 EFFECTIVE (ISOTROPIC) RADIATED POWER OUTPUT DATA.....</b>	<b>3</b>
1.1 TEST RESULT FOR LTE NB1 BAND 4 .....	3
<b>2 PEAK-TO-AVERAGE RATIO.....</b>	<b>4</b>
2.1 FOR LTE-NB1 .....	4
2.1.1 Test Band = LTE-NB1 Band 4 .....	4
<b>3 MODULATION CHARACTERISTICS .....</b>	<b>6</b>
3.1 FOR LTE-NB1 .....	6
3.1.1 Test Band = LTE-NB1 Band 4 .....	6
<b>4 BANDWIDTH .....</b>	<b>8</b>
4.1 FOR LTE-NB1 .....	8
4.1.1 Test Band = LTE-NB1 Band 4 .....	8
<b>5 BAND EDGES COMPLIANCE.....</b>	<b>10</b>
5.1 FOR LTE-NB1 .....	10
5.1.1 Test Band = LTE-NB1 Band 4 .....	10
<b>6 SPURIOUS EMISSION AT ANTENNA TERMINAL .....</b>	<b>15</b>
6.1 FOR LTE-NB1 .....	15
6.1.1 Test Band = LTE-NB1 Band 4 .....	15
<b>7 FIELD STRENGTH OF SPURIOUS RADIATION.....</b>	<b>22</b>
7.1 FOR LTE-NB1 .....	22
7.1.1 Test Band = LTE-NB1 Band 4 .....	22
<b>8 FREQUENCY STABILITY .....</b>	<b>24</b>
8.1 FREQUENCY ERROR VS. VOLTAGE .....	24
8.2 FREQUENCY ERROR VS. TEMPERATURE .....	24



# 1 Effective (Isotropic) Radiated Power Output Data

## 1.1 Test Result for LTE NB1 Band 4

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	EIRP (dBm)	limit (dBm)	Verdict
NB1 Band 4	BPSK	3.75	19951	1T0	23.12	25.76	30.00	PASS
NB1 Band 4	BPSK	3.75	19951	1T47	22.85	25.49	30.00	PASS
NB1 Band 4	BPSK	3.75	20175	1T0	23.10	25.74	30.00	PASS
NB1 Band 4	BPSK	3.75	20175	1T47	23.17	25.81	30.00	PASS
NB1 Band 4	BPSK	3.75	20399	1T0	23.11	25.75	30.00	PASS
NB1 Band 4	BPSK	3.75	20399	1T47	23.17	25.81	30.00	PASS
NB1 Band 4	QPSK	3.75	19951	1T0	22.88	25.52	30.00	PASS
NB1 Band 4	QPSK	3.75	19951	1T47	22.89	25.53	30.00	PASS
NB1 Band 4	QPSK	3.75	20175	1T0	22.95	25.59	30.00	PASS
NB1 Band 4	QPSK	3.75	20175	1T47	23.15	25.79	30.00	PASS
NB1 Band 4	QPSK	3.75	20399	1T0	22.82	25.46	30.00	PASS
NB1 Band 4	QPSK	3.75	20399	1T47	23.11	25.76	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 4	BPSK	15	19951	1T0	22.81	25.45	30.00	PASS
NB1 Band 4	BPSK	15	19951	1T11	23.19	25.83	30.00	PASS
NB1 Band 4	BPSK	15	20175	1T0	22.81	25.45	30.00	PASS
NB1 Band 4	BPSK	15	20175	1T11	22.85	25.49	30.00	PASS
NB1 Band 4	BPSK	15	20399	1T0	22.88	25.52	30.00	PASS
NB1 Band 4	BPSK	15	20399	1T11	22.97	25.61	30.00	PASS
NB1 Band 4	QPSK	15	19951	1T0	23.16	25.80	30.00	PASS
NB1 Band 4	QPSK	15	19951	1T11	22.85	25.49	30.00	PASS
NB1 Band 4	QPSK	15	19951	12T0	21.08	23.72	30.00	PASS
NB1 Band 4	QPSK	15	20175	1T0	22.89	25.53	30.00	PASS
NB1 Band 4	QPSK	15	20175	1T11	23.12	25.76	30.00	PASS
NB1 Band 4	QPSK	15	20175	12T0	21.06	23.70	30.00	PASS
NB1 Band 4	QPSK	15	20399	1T0	23.00	25.64	30.00	PASS
NB1 Band 4	QPSK	15	20399	1T11	23.07	25.71	30.00	PASS
NB1 Band 4	QPSK	15	20399	12T0	20.89	23.53	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,

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

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



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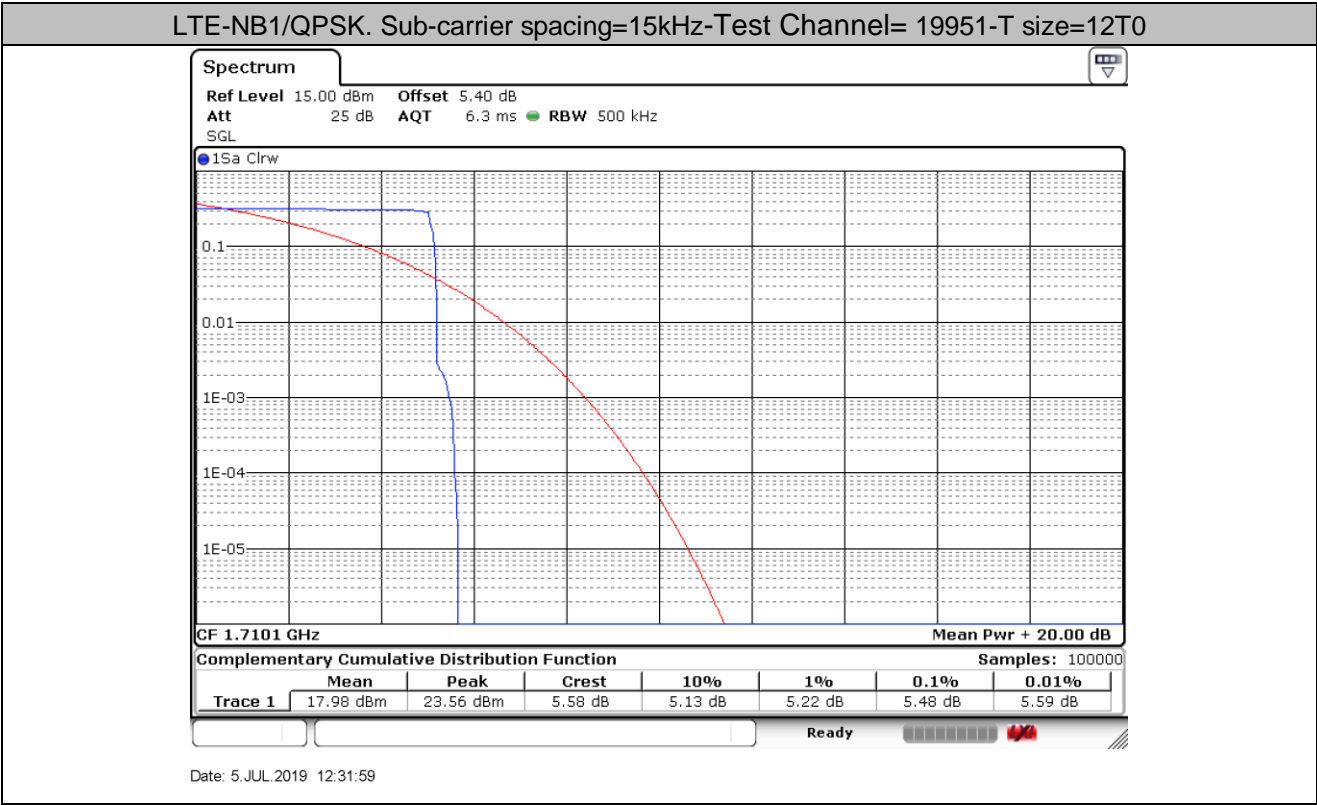
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## 2 Peak-to-Average Ratio

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
NB1 Band 4	QPSK/12T0	19951	5.48	13	PASS
NB1 Band 4	QPSK/12T0	20175	5.48	13	PASS
NB1 Band 4	QPSK/12T0	20399	5.51	13	PASS

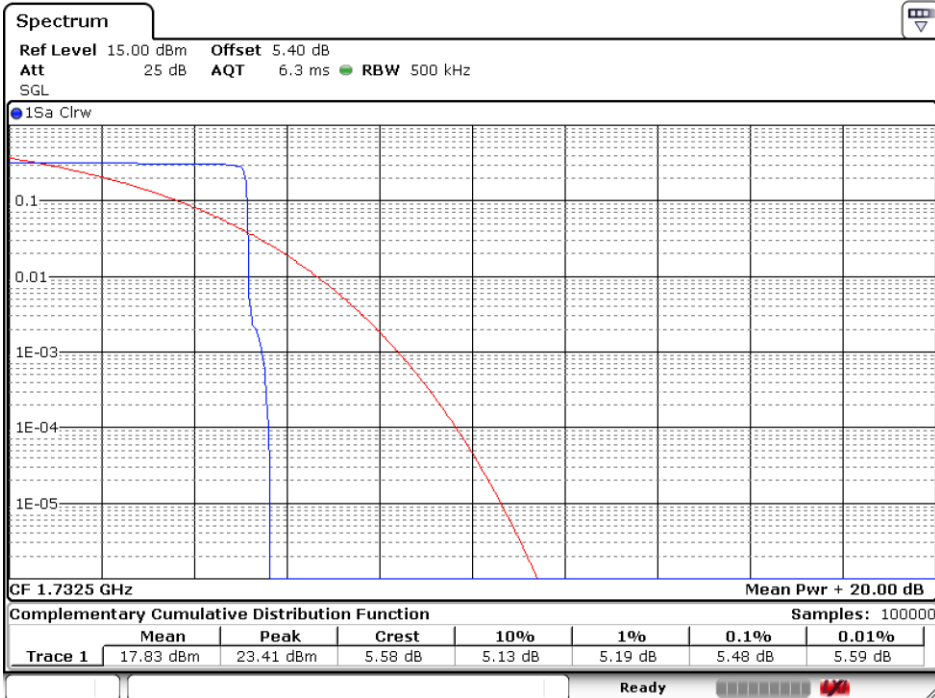
### 2.1 For LTE-NB1

#### 2.1.1 Test Band = LTE-NB1 Band 4



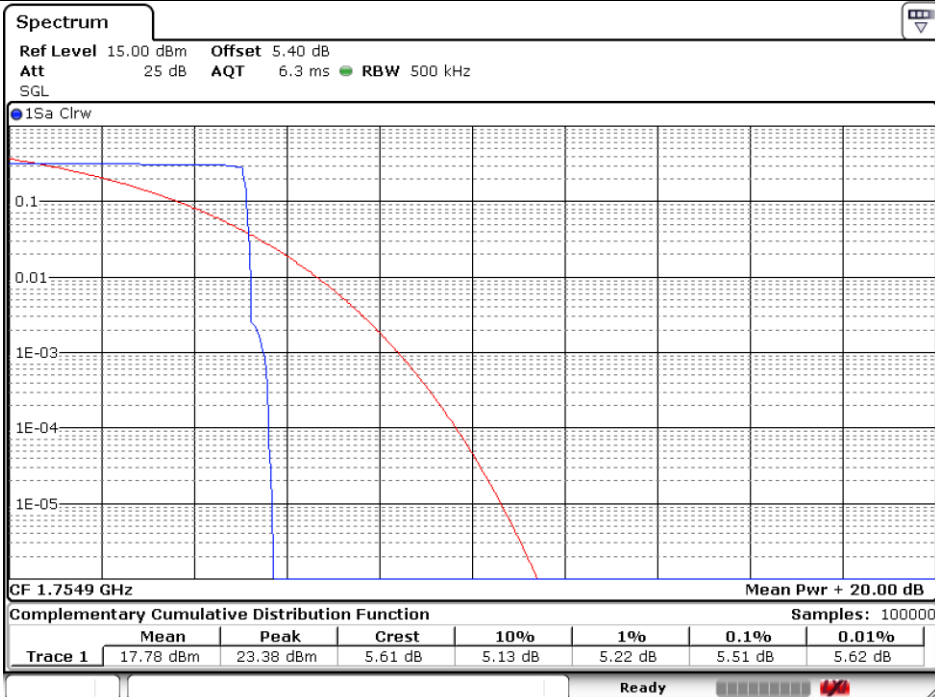


## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 20175-T size=12T0



Date: 5 JUL 2019 12:37:41

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 20399-T size=12T0



Date: 5 JUL 2019 12:44:05



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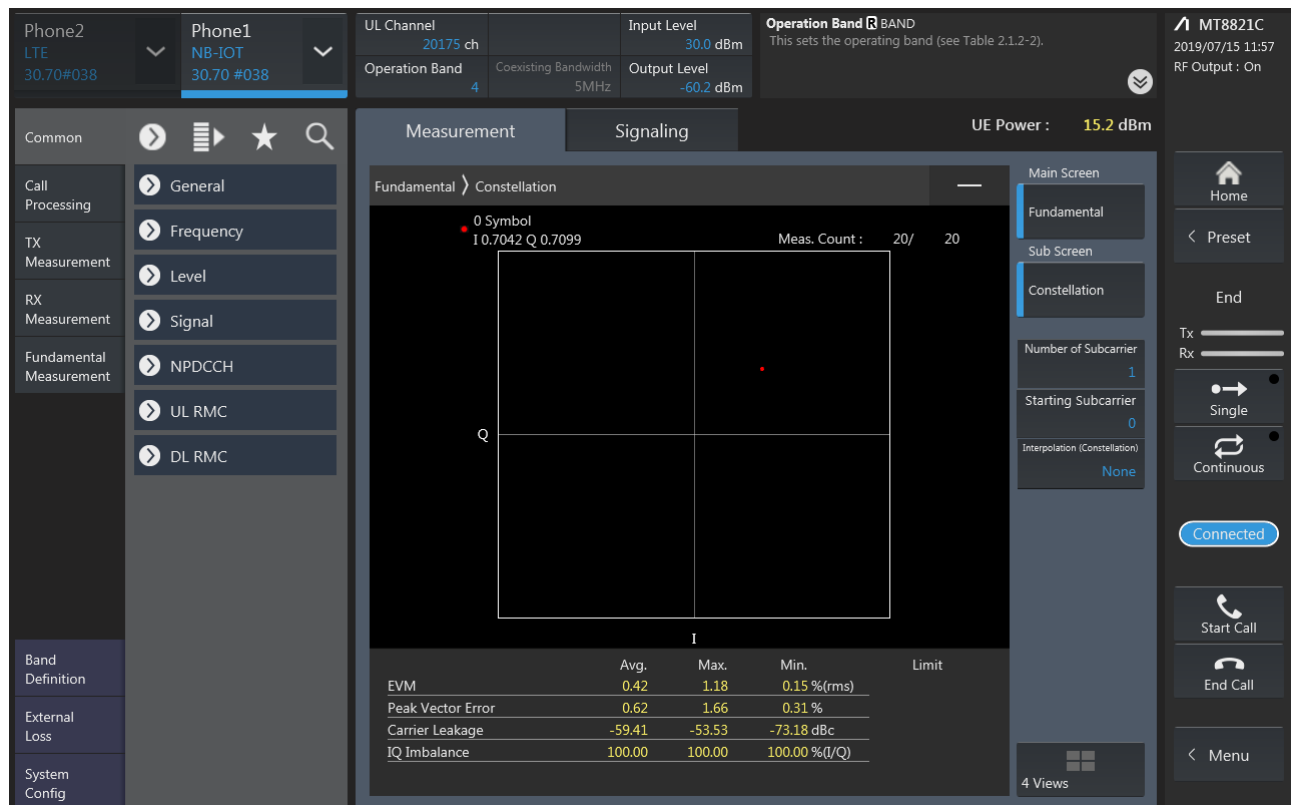
## 3 Modulation Characteristics

### 3.1 For LTE-NB1

#### 3.1.1 Test Band = LTE-NB1 Band 4

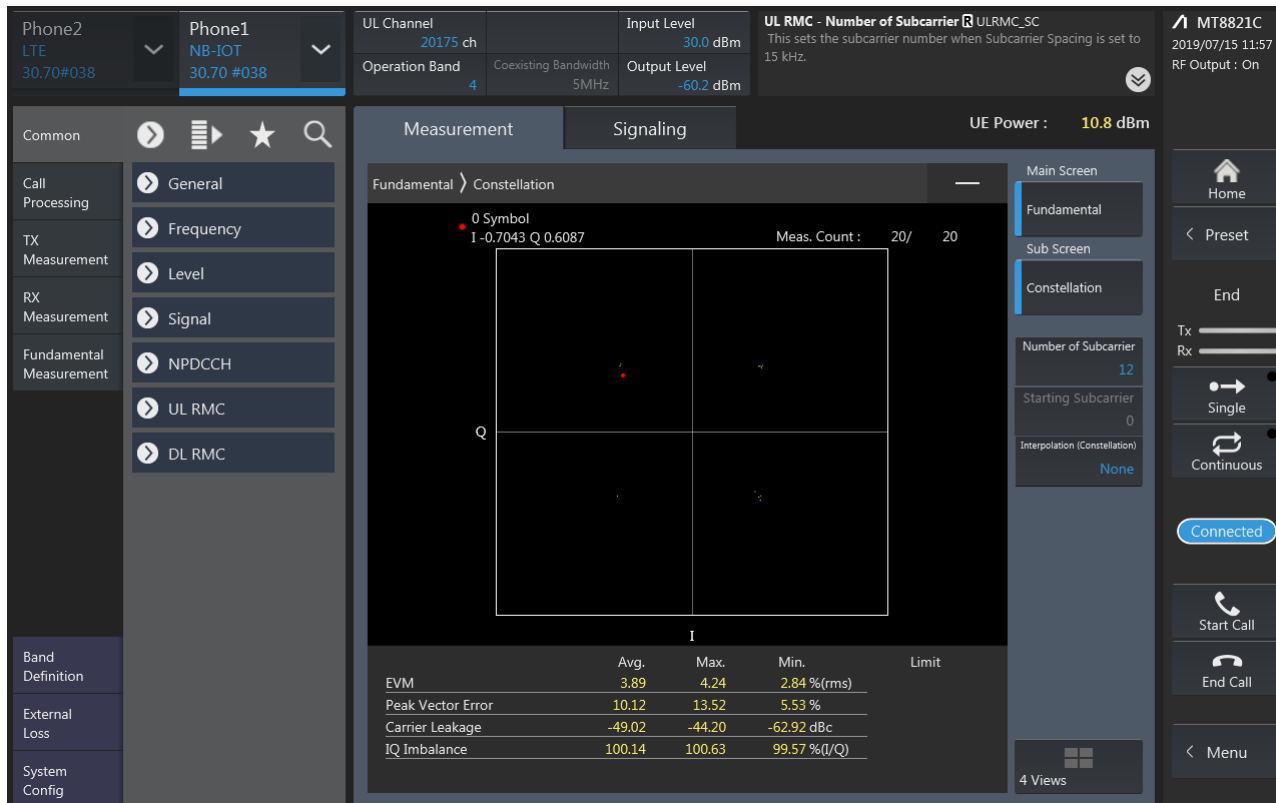
##### 3.1.1.1 Test Mode = LTE-NB1/BPSK. Sub-carrier spacing=15kHz.T size=12T0

##### 3.1.1.1.1 Test Channel = 20175



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

#### 3.1.1.2.1 Test Channel = 20175

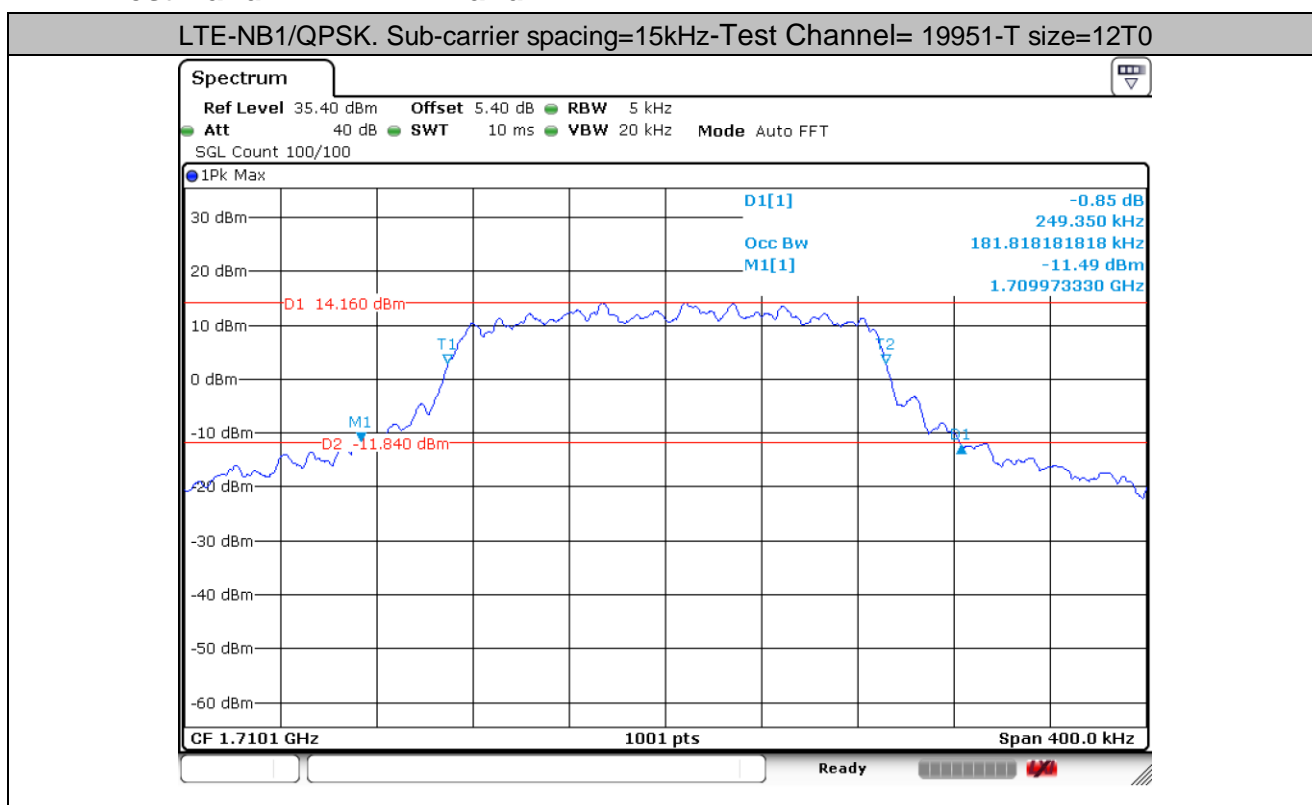


## 4 Bandwidth

Test Band	Test Mode	T size	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
NB1 Band 4	QPSK/15kHz	12T0	19951	181.82	249.35	PASS
NB1 Band 4	QPSK/15kHz	12T0	20175	181.02	249.75	PASS
NB1 Band 4	QPSK/15kHz	12T0	20399	181.02	242.56	PASS

#### 4.1 For LTE-NB1

#### 4.1.1 Test Band = LTE-NB1 Band 4



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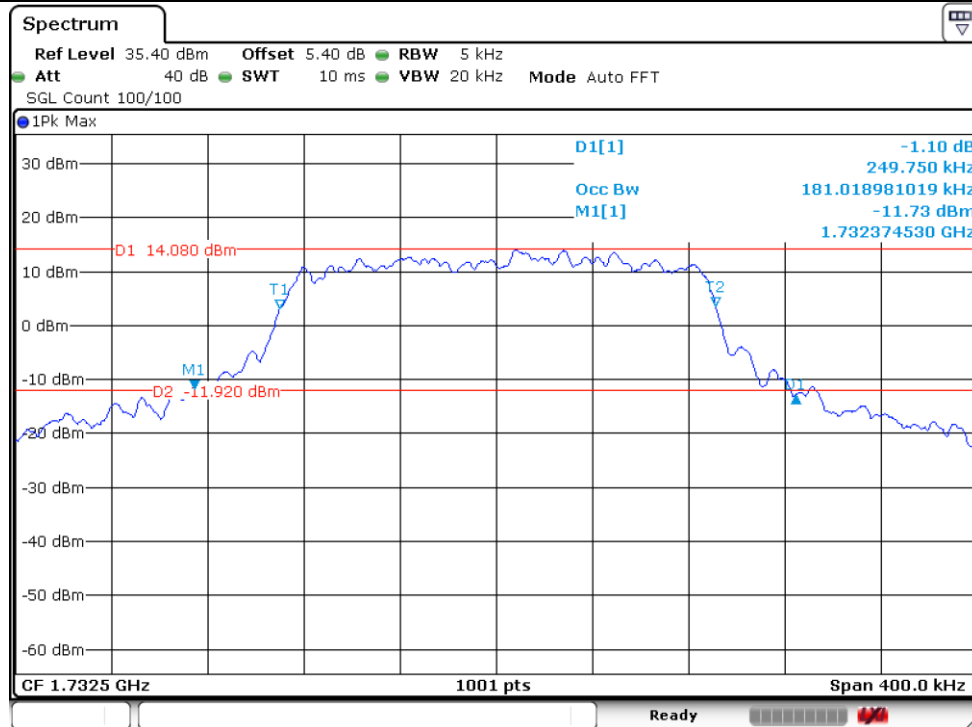
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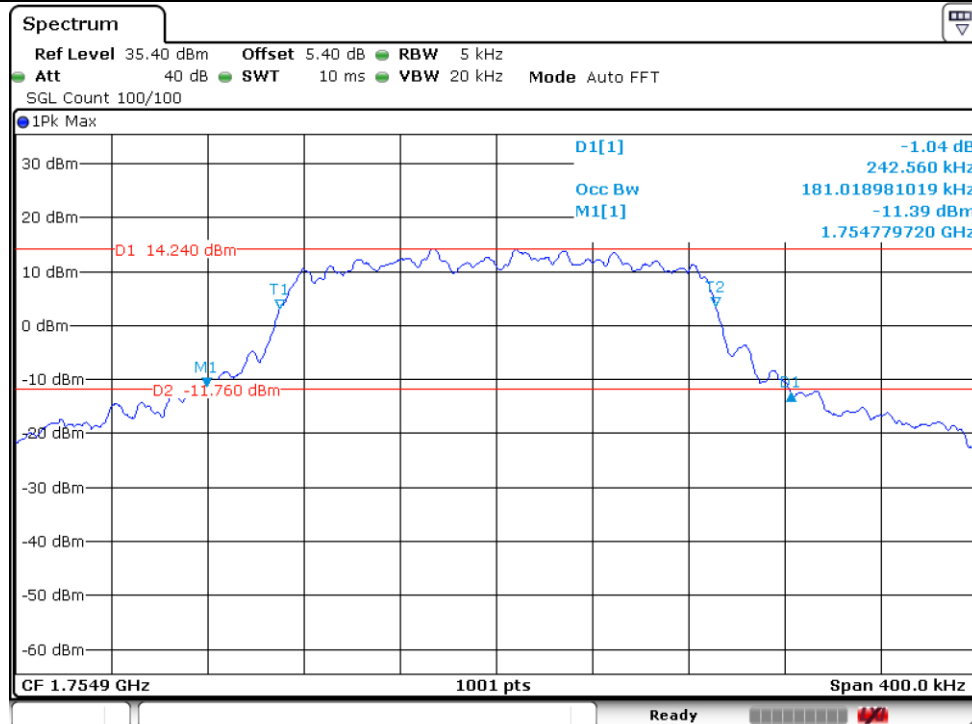
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 20175-T size=12T0



## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 20399-T size=12T0

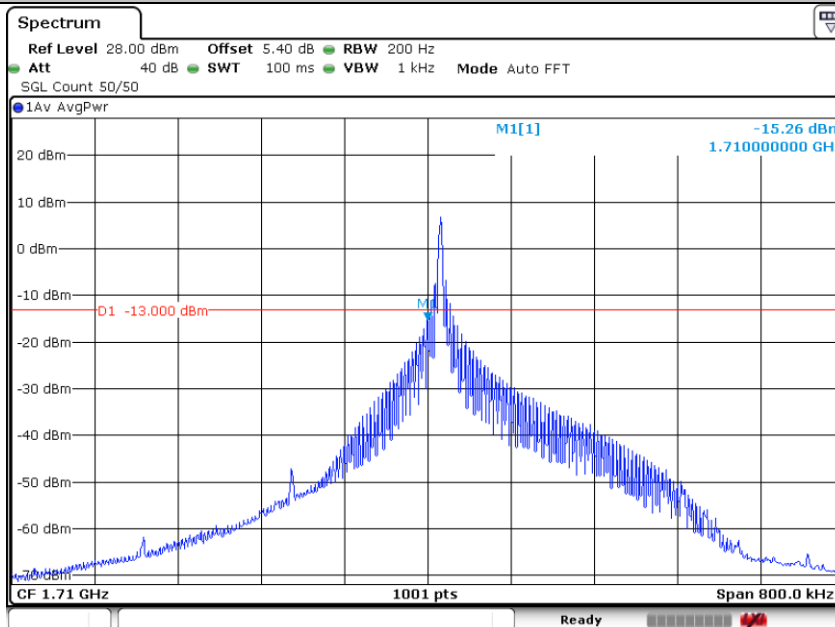


## 5 Band Edges Compliance

### 5.1 For LTE-NB1

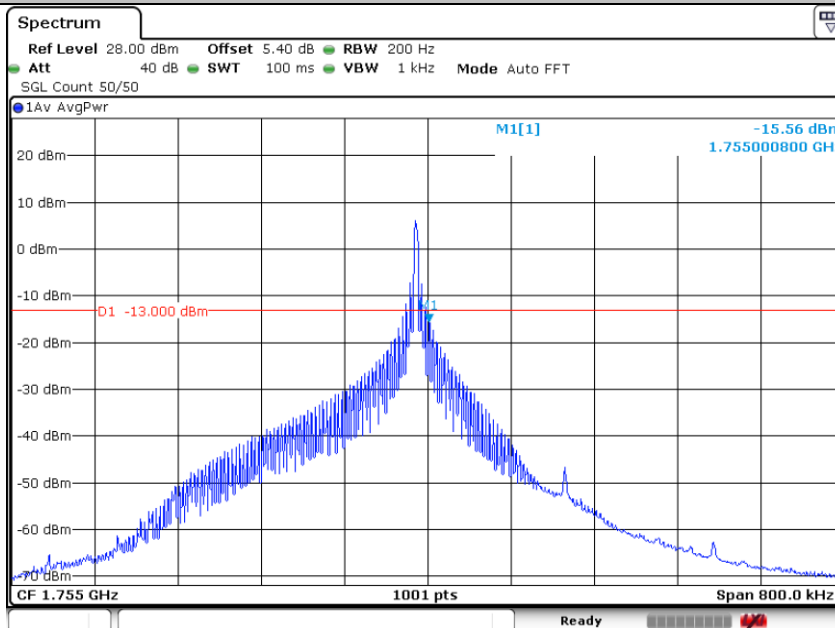
#### 5.1.1 Test Band = LTE-NB1 Band 4

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=19951-T size=1T0



Date: 20.AUG.2019 05:19:04

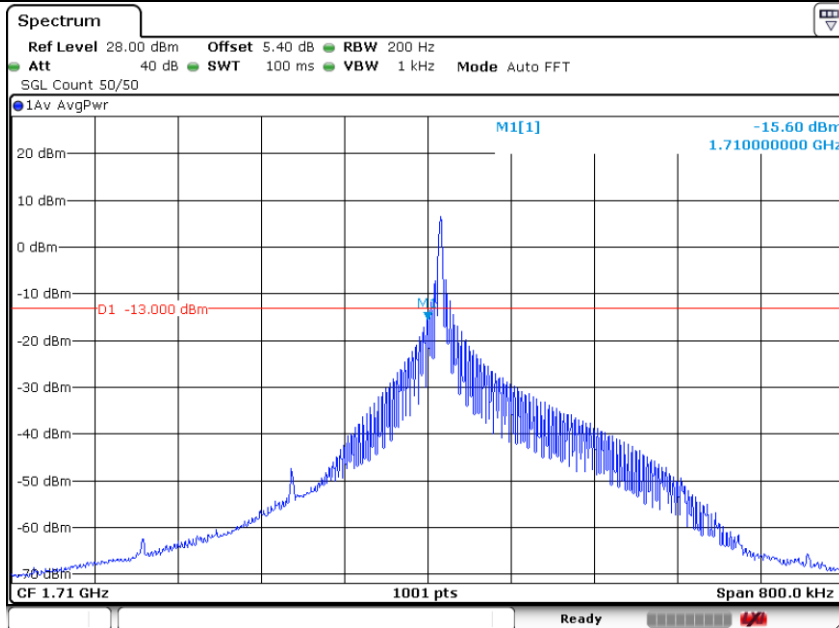
LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=20399-T size=1T47



Date: 20.AUG.2019 05:26:29

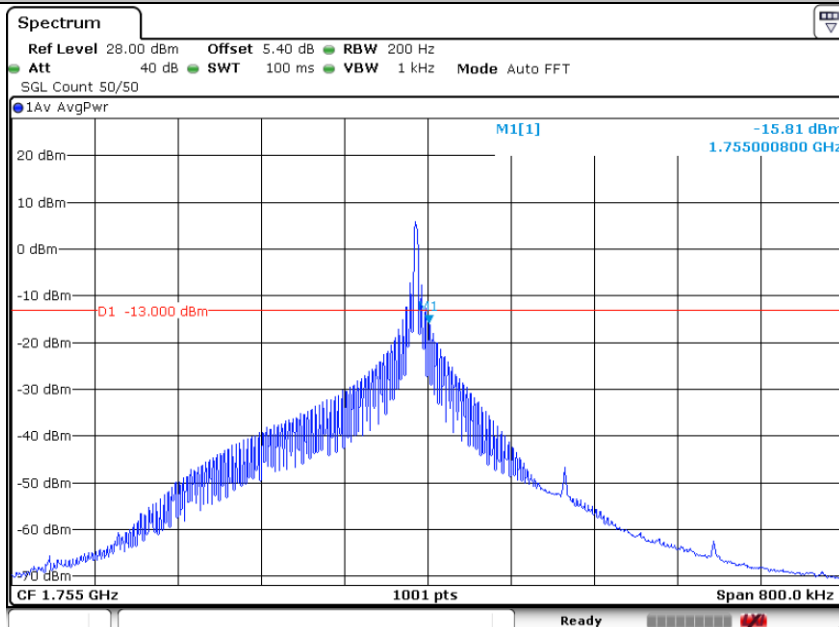


## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=19951-T size=1T0



Date: 20.AUG.2019 05:19:40

## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=20399-T size=1T47



Date: 20.AUG.2019 05:26:02

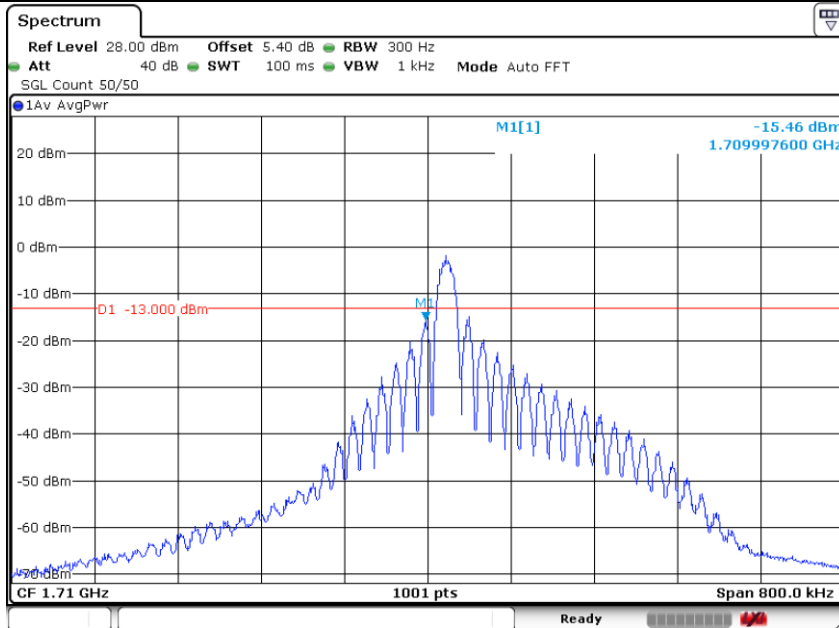


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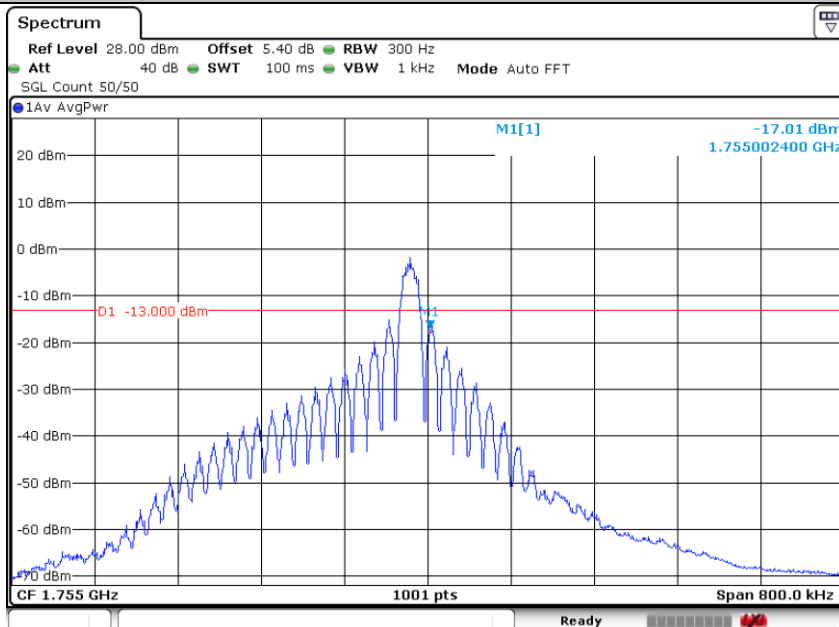
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## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=19951-T size=1T0



Date: 20.AUG.2019 05:22:03

## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=20399-T size=1T11



Date: 20.AUG.2019 05:25:17



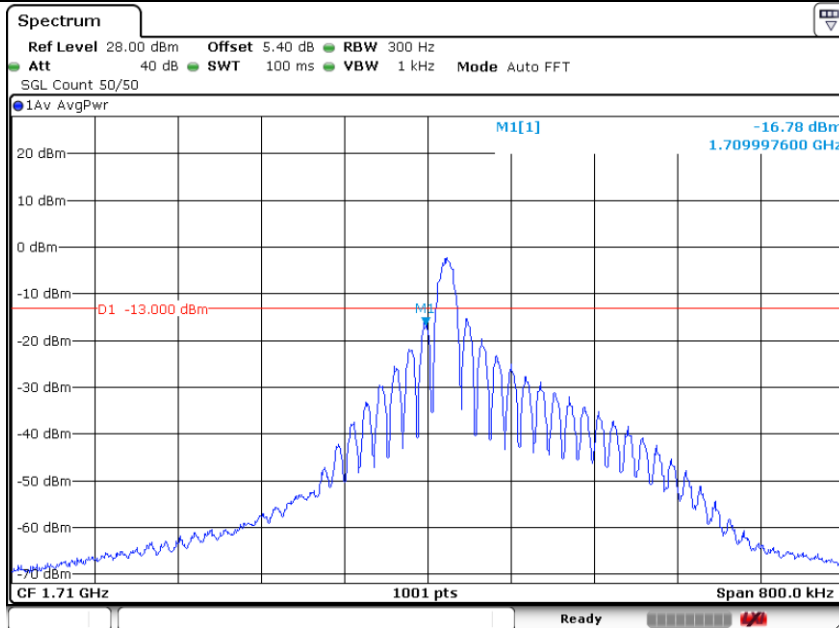
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=19951-T size=1T0



Date: 20.AUG.2019 05:21:29

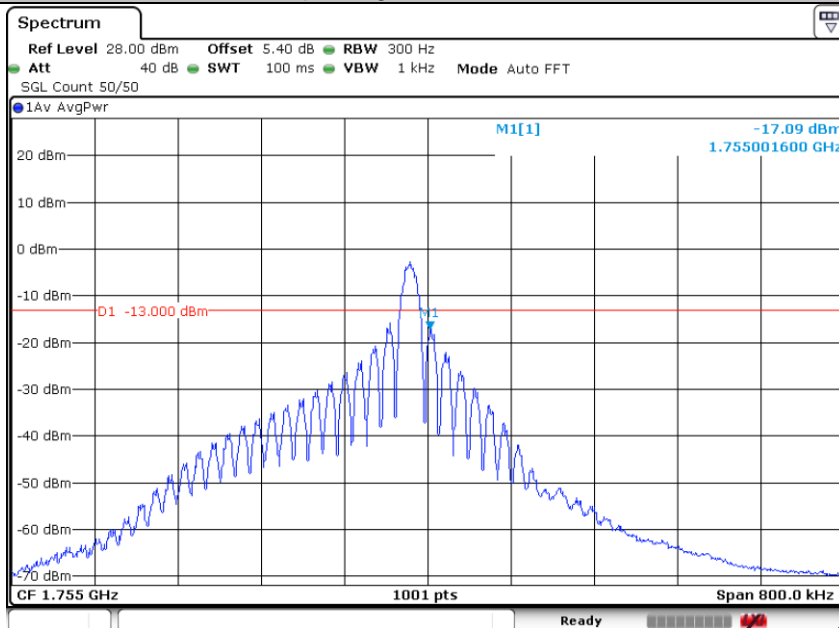
## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=19951-T size=12T0



Date: 20.AUG.2019 05:22:42

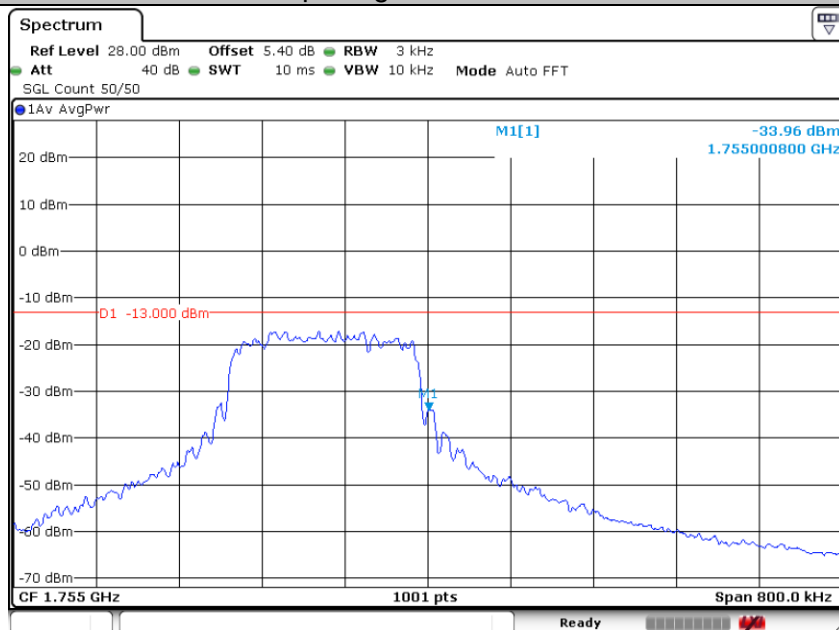


## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=20399-T size=1T11



Date: 20.AUG.2019 05:24:50

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=20399-T size=12T0



Date: 20.AUG.2019 05:23:51



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## 6 Spurious Emission at Antenna Terminal

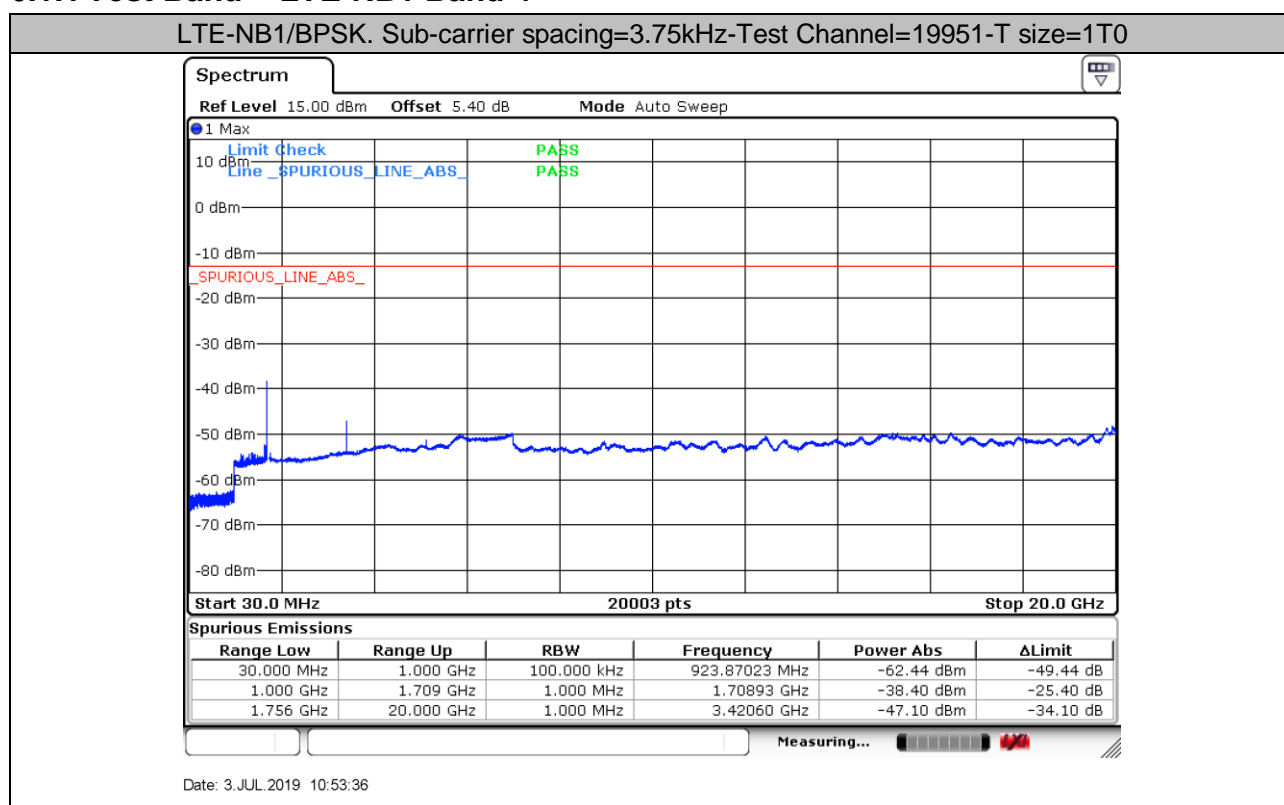
NOTE1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of  $< RBW/2$  so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points =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

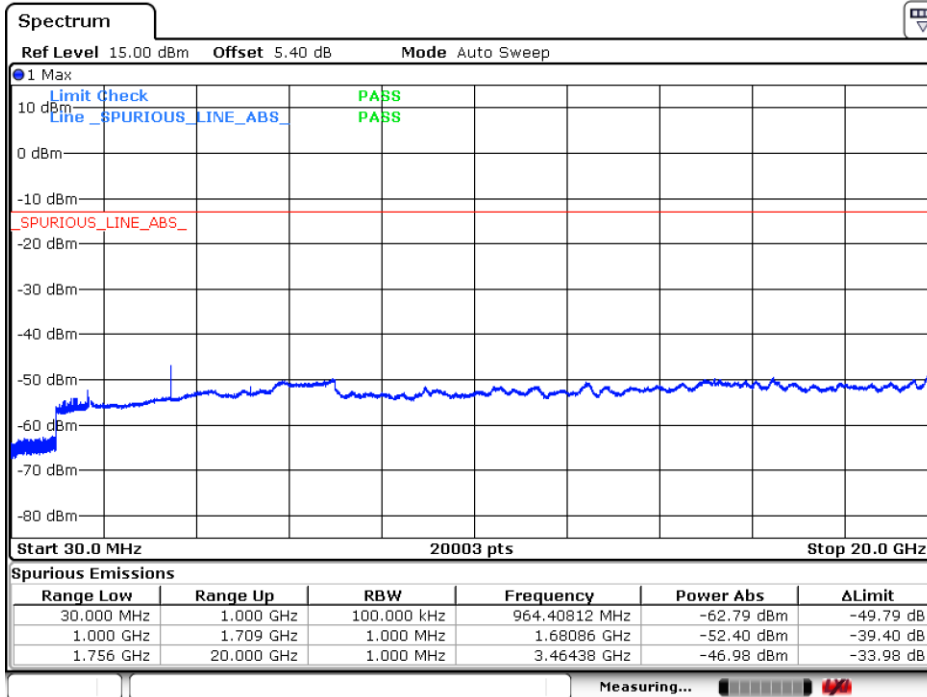
Part I - Test Plots

### 6.1 For LTE-NB1

#### 6.1.1 Test Band = LTE-NB1 Band 4

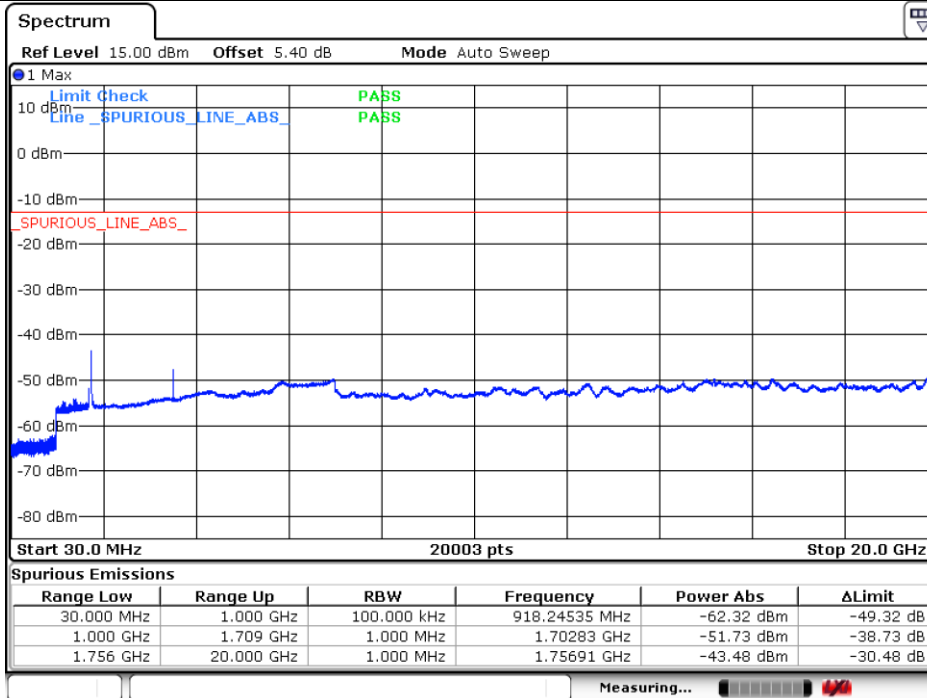


LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=20175-T size=1T0



Date: 3 JUL 2019 10:55:21

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=20399-T size=1T0



Date: 3 JUL 2019 12:31:37



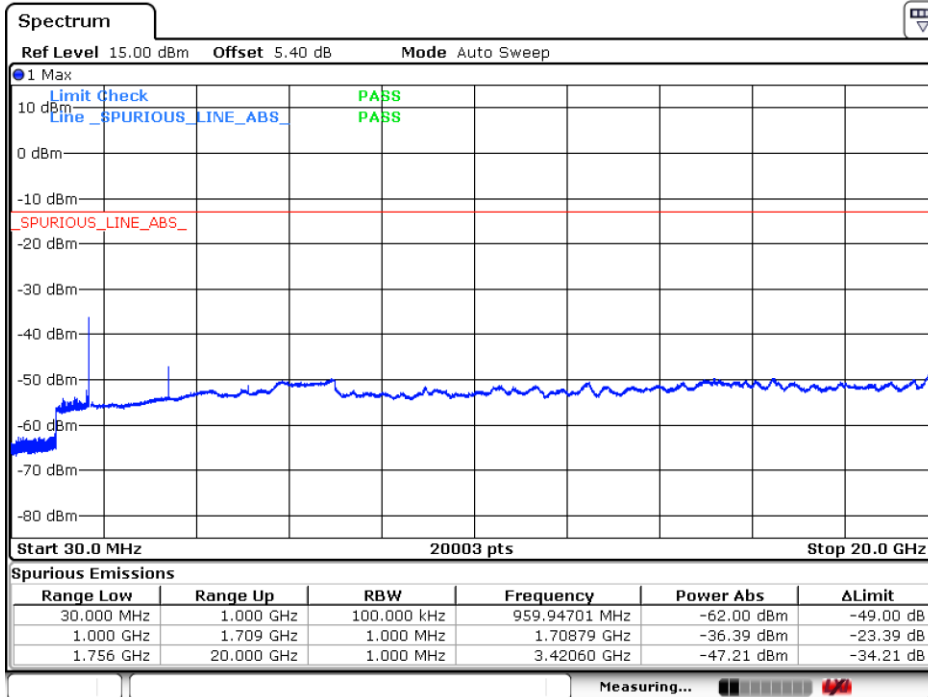
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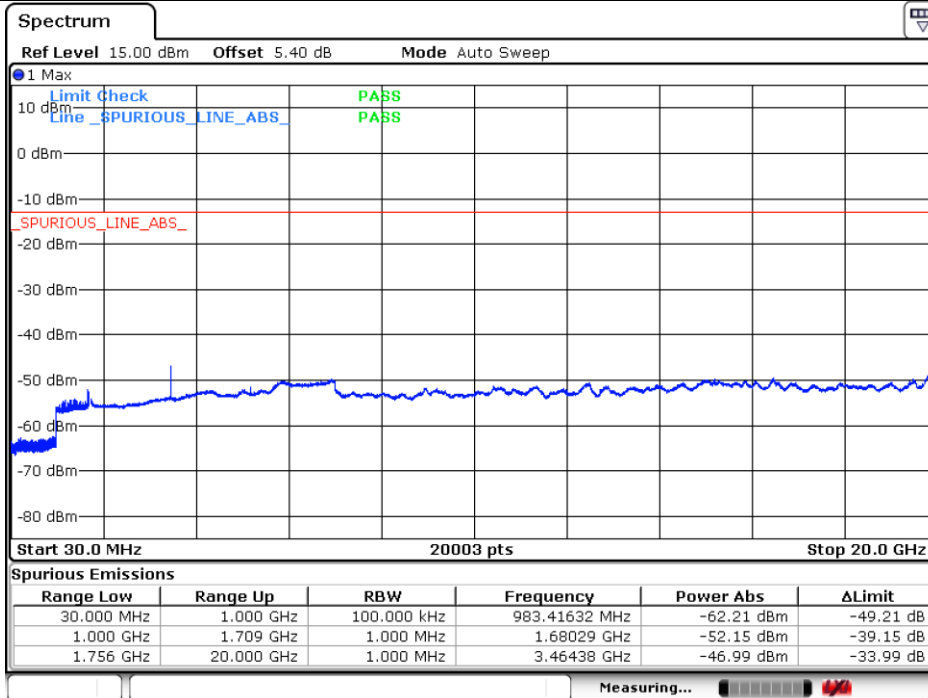


## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=19951-T size=1T0



Date: 3 JUL 2019 10:52:49

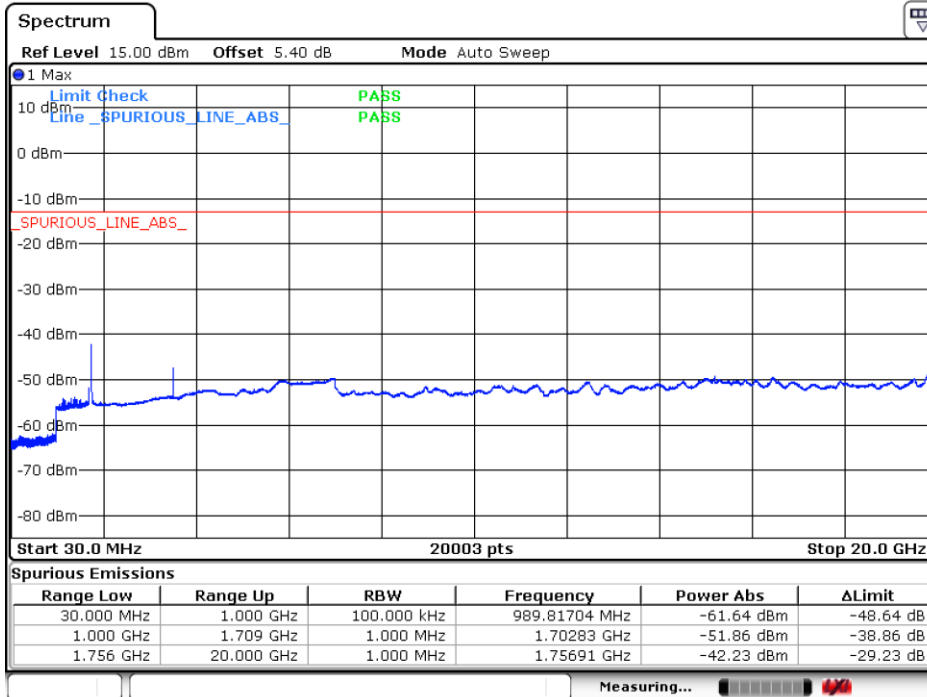
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Date: 3 JUL 2019 10:56:16

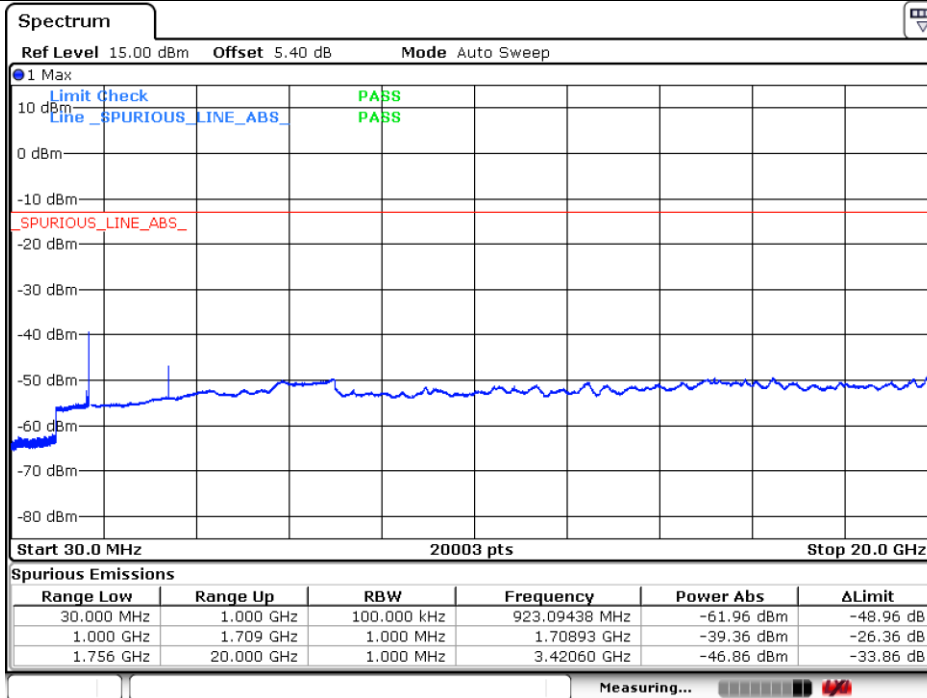


## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=20399-T size=1T0



Date: 3 JUL 2019 12:30:59

## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=19951-T size=1T0



Date: 3 JUL 2019 10:49:33

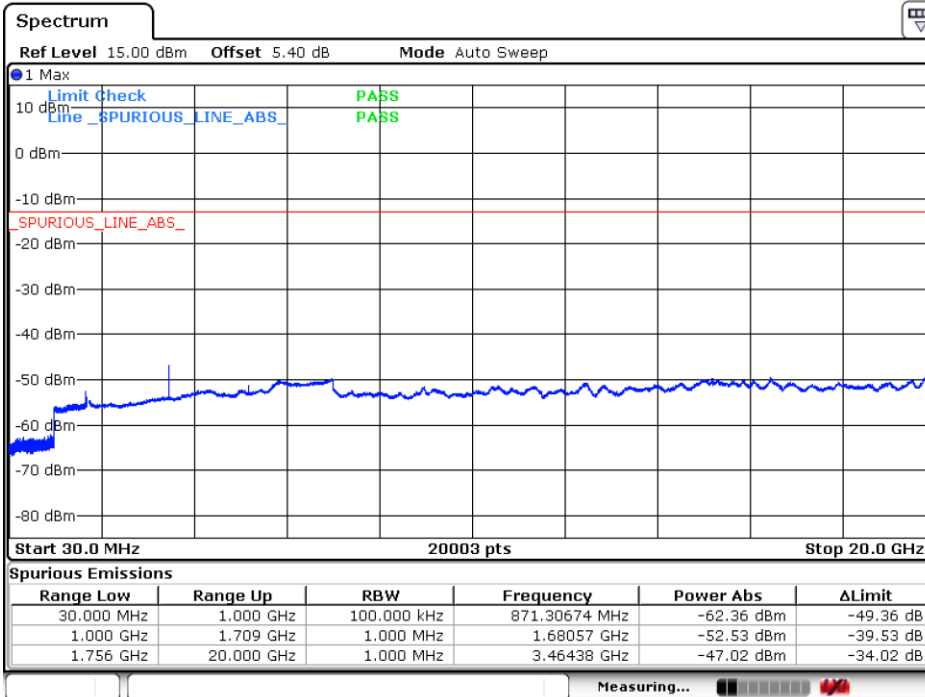


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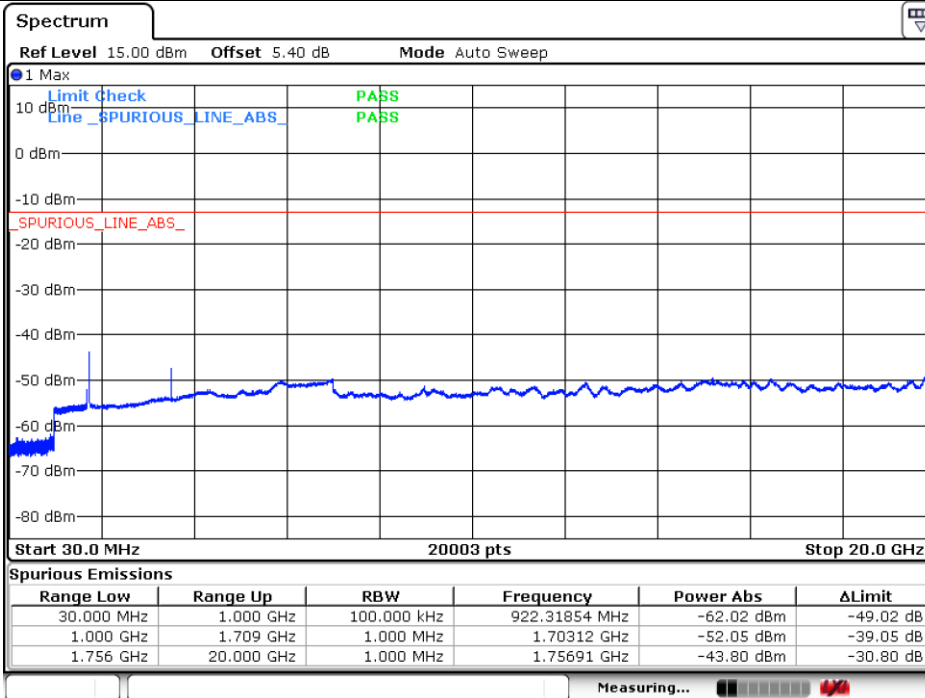
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## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=20175-T size=1T0



Date: 3 JUL 2019 10:59:14

## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=20399-T size=1T0



Date: 3 JUL 2019 12:26:25



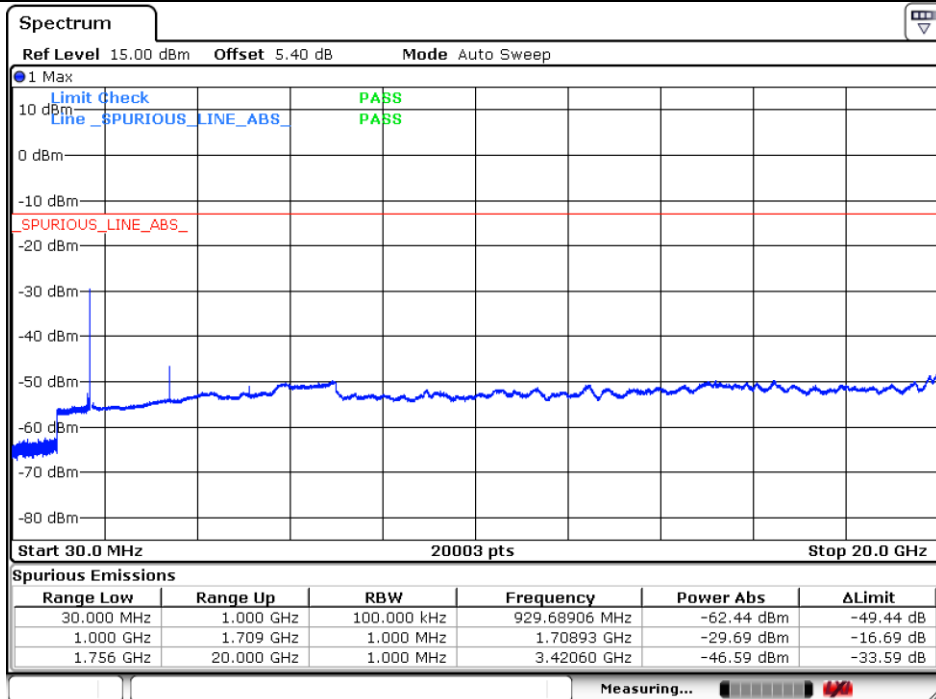
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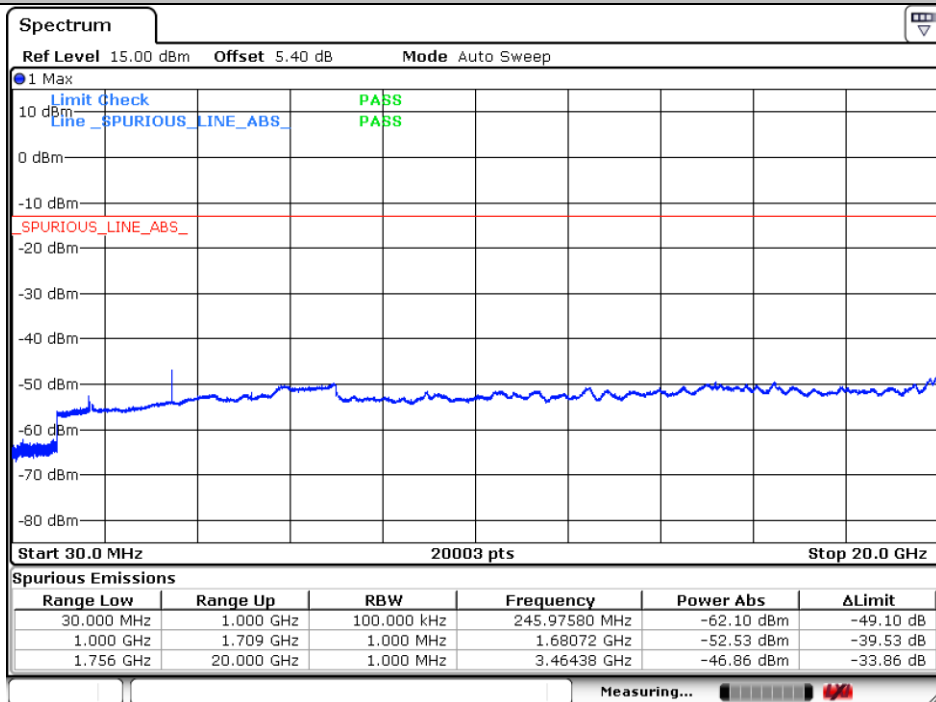
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=19951-T size=1T0



Date: 3 JUL 2019 10:51:38

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=20175-T size=1T0



Date: 3 JUL 2019 10:58:23



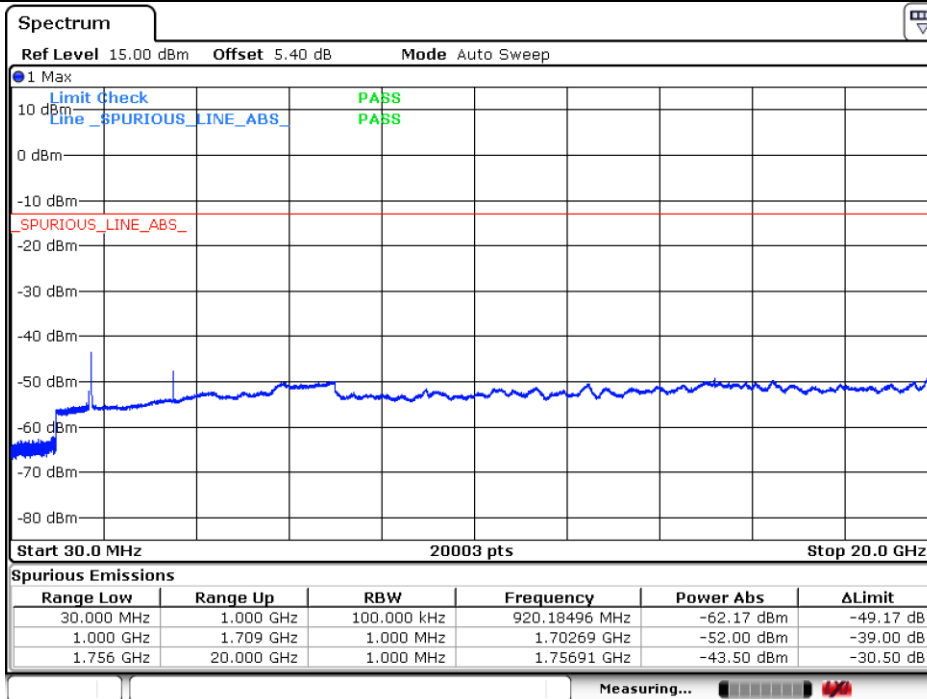
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=20399-T size=1T0



Date: 3 JUL 2019 12:27:01



## 7 Field Strength of Spurious Radiation

### 7.1 For LTE-NB1

#### 7.1.1 Test Band = LTE-NB1 Band 4

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

##### 7.1.1.1.1 Test Channel = 19951

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.200000	-80.49	-13.00	67.49	Vertical
314.100000	-85.77	-13.00	72.77	Vertical
791.779167	-78.34	-13.00	65.34	Vertical
3424.775000	-59.45	-13.00	46.45	Vertical
5137.200000	-61.73	-13.00	48.73	Vertical
6849.625000	-57.68	-13.00	44.68	Vertical
62.350000	-76.23	-13.00	63.23	Horizontal
281.850000	-86.29	-13.00	73.29	Horizontal
788.891667	-78.35	-13.00	65.35	Horizontal
3424.775000	-52.54	-13.00	39.54	Horizontal
5137.200000	-53.21	-13.00	40.21	Horizontal
6849.625000	-60.68	-13.00	47.68	Horizontal

##### 7.1.1.1.2 Test Channel = 20175

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
65.350000	-81.10	-13.00	68.10	Vertical
339.500000	-85.30	-13.00	72.30	Vertical
779.587500	-78.37	-13.00	65.37	Vertical
3465.075000	-61.62	-13.00	48.62	Vertical
5197.162500	-65.26	-13.00	52.26	Vertical
6929.737500	-56.87	-13.00	43.87	Vertical
63.200000	-76.27	-13.00	63.27	Horizontal
271.950000	-85.63	-13.00	72.63	Horizontal
791.137500	-78.67	-13.00	65.67	Horizontal
3465.075000	-49.60	-13.00	36.60	Horizontal
5197.162500	-56.34	-13.00	43.34	Horizontal
6929.250000	-60.72	-13.00	47.72	Horizontal



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**7.1.1.1.3 Test Channel = 20399**

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.600000	-80.67	-13.00	67.67	Vertical
355.450000	-84.75	-13.00	71.75	Vertical
809.333333	-77.64	-13.00	64.64	Vertical
3504.725000	-62.59	-13.00	49.59	Vertical
5257.125000	-64.70	-13.00	51.70	Vertical
7009.850000	-55.11	-13.00	42.11	Vertical
63.100000	-76.80	-13.00	63.80	Horizontal
273.300000	-86.16	-13.00	73.16	Horizontal
789.487500	-77.97	-13.00	64.97	Horizontal
3504.725000	-56.04	-13.00	43.04	Horizontal
5257.450000	-58.34	-13.00	45.34	Horizontal
7009.850000	-60.04	-13.00	47.04	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 4	180KHz	BPSK/15KHz	19951	12T0	VL	TN	11.85	0.006927	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	VN	TN	11.51	0.006732	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	VH	TN	1.67	0.000974	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	VL	TN	-11.80	-0.006813	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	VN	TN	2.44	0.001411	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	VH	TN	-12.50	-0.007217	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	VL	TN	14.30	0.008149	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	VN	TN	-5.27	-0.003001	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	VH	TN	-4.44	-0.002533	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	VL	TN	-0.75	-0.000441	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	VN	TN	11.64	0.006804	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	VH	TN	-11.19	-0.006542	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	VL	TN	-0.14	-0.000082	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	VN	TN	5.74	0.003311	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	VH	TN	-8.65	-0.004995	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	VL	TN	7.22	0.004113	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	VN	TN	-13.15	-0.007492	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	VH	TN	4.86	0.002767	±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 4	180KHz	BPSK/15KHz	19951	12T0	NV	-30	-1.67	-0.000978	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	-20	13.78	0.008057	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	0	-7.20	-0.004210	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	10	-1.92	-0.001122	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	20	-12.91	-0.007548	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	30	11.71	0.006850	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	40	-11.97	-0.007000	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	19951	12T0	NV	50	-2.70	-0.001577	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	-30	-8.32	-0.004803	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	-20	7.54	0.004355	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	0	12.81	0.007396	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	10	-11.50	-0.006636	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	20	-14.17	-0.008181	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	30	1.90	0.001095	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	40	3.99	0.002305	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20175	12T0	NV	50	8.64	0.004988	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	-30	-1.12	-0.000640	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	-20	-13.32	-0.007593	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	0	8.58	0.004889	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	10	-14.68	-0.008363	±2.5	PASS



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NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	20	-1.31	-0.000747	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	30	-12.03	-0.006857	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	40	1.49	0.000850	±2.5	PASS
NB1 Band 4	180KHz	BPSK/15KHz	20399	12T0	NV	50	-12.28	-0.007000	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	-30	14.06	0.008220	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	-20	-7.84	-0.004584	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	0	13.76	0.008047	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	10	3.19	0.001867	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	20	8.83	0.005164	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	30	11.58	0.006774	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	40	-4.14	-0.002421	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	19951	12T0	NV	50	5.77	0.003373	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	-30	-13.03	-0.007521	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	-20	-3.31	-0.001909	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	0	13.08	0.007549	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	10	-3.65	-0.002105	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	20	3.86	0.002226	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	30	2.19	0.001266	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	40	4.41	0.002548	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20175	12T0	NV	50	6.84	0.003947	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	-30	-3.20	-0.001824	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	-20	0.93	0.000529	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	0	-6.01	-0.003423	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	10	11.41	0.006502	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	20	6.64	0.003783	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	30	-1.81	-0.001033	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	40	9.78	0.005574	±2.5	PASS
NB1 Band 4	180KHz	QPSK/15KHz	20399	12T0	NV	50	13.96	0.007955	±2.5	PASS

The End



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