



# Appendix B

## LTE-NB1 Band 17





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## 1 Effective (Isotropic) Radiated Power Output Data

### 1.1 Test Result for LTE NB1 Band 17

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Conducted Power (dBm)	ERP (dBm)	limit (dBm)	Verdict
NB1 Band 17	BPSK	3.75	23731	1T0	22.94	22.20	34.77	PASS
NB1 Band 17	BPSK	3.75	23731	1T47	22.80	22.06	34.77	PASS
NB1 Band 17	BPSK	3.75	23790	1T0	23.06	22.32	34.77	PASS
NB1 Band 17	BPSK	3.75	23790	1T47	23.10	22.36	34.77	PASS
NB1 Band 17	BPSK	3.75	23849	1T0	22.98	22.24	34.77	PASS
NB1 Band 17	BPSK	3.75	23849	1T47	22.86	22.12	34.77	PASS
NB1 Band 17	QPSK	3.75	23731	1T0	23.03	22.29	34.77	PASS
NB1 Band 17	QPSK	3.75	23731	1T47	22.93	22.19	34.77	PASS
NB1 Band 17	QPSK	3.75	23790	1T0	23.04	22.30	34.77	PASS
NB1 Band 17	QPSK	3.75	23790	1T47	23.16	22.42	34.77	PASS
NB1 Band 17	QPSK	3.75	23849	1T0	23.11	22.37	34.77	PASS
NB1 Band 17	QPSK	3.75	23849	1T47	22.95	22.21	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 17	BPSK	15	23731	1T0	22.84	22.10	34.77	PASS
NB1 Band 17	BPSK	15	23731	1T11	22.84	22.10	34.77	PASS
NB1 Band 17	BPSK	15	23790	1T0	22.87	22.13	34.77	PASS
NB1 Band 17	BPSK	15	23790	1T11	22.98	22.24	34.77	PASS
NB1 Band 17	BPSK	15	23849	1T0	22.82	22.08	34.77	PASS
NB1 Band 17	BPSK	15	23849	1T11	23.11	22.37	34.77	PASS
NB1 Band 17	QPSK	15	23731	1T0	23.16	22.42	34.77	PASS
NB1 Band 17	QPSK	15	23731	1T11	22.85	22.11	34.77	PASS
NB1 Band 17	QPSK	15	23731	12T0	20.78	20.04	34.77	PASS
NB1 Band 17	QPSK	15	23790	1T0	22.97	22.23	34.77	PASS
NB1 Band 17	QPSK	15	23790	1T11	22.92	22.18	34.77	PASS
NB1 Band 17	QPSK	15	23790	12T0	20.89	20.15	34.77	PASS
NB1 Band 17	QPSK	15	23849	1T0	23.08	22.34	34.77	PASS
NB1 Band 17	QPSK	15	23849	1T11	22.85	22.11	34.77	PASS
NB1 Band 17	QPSK	15	23849	12T0	20.92	20.18	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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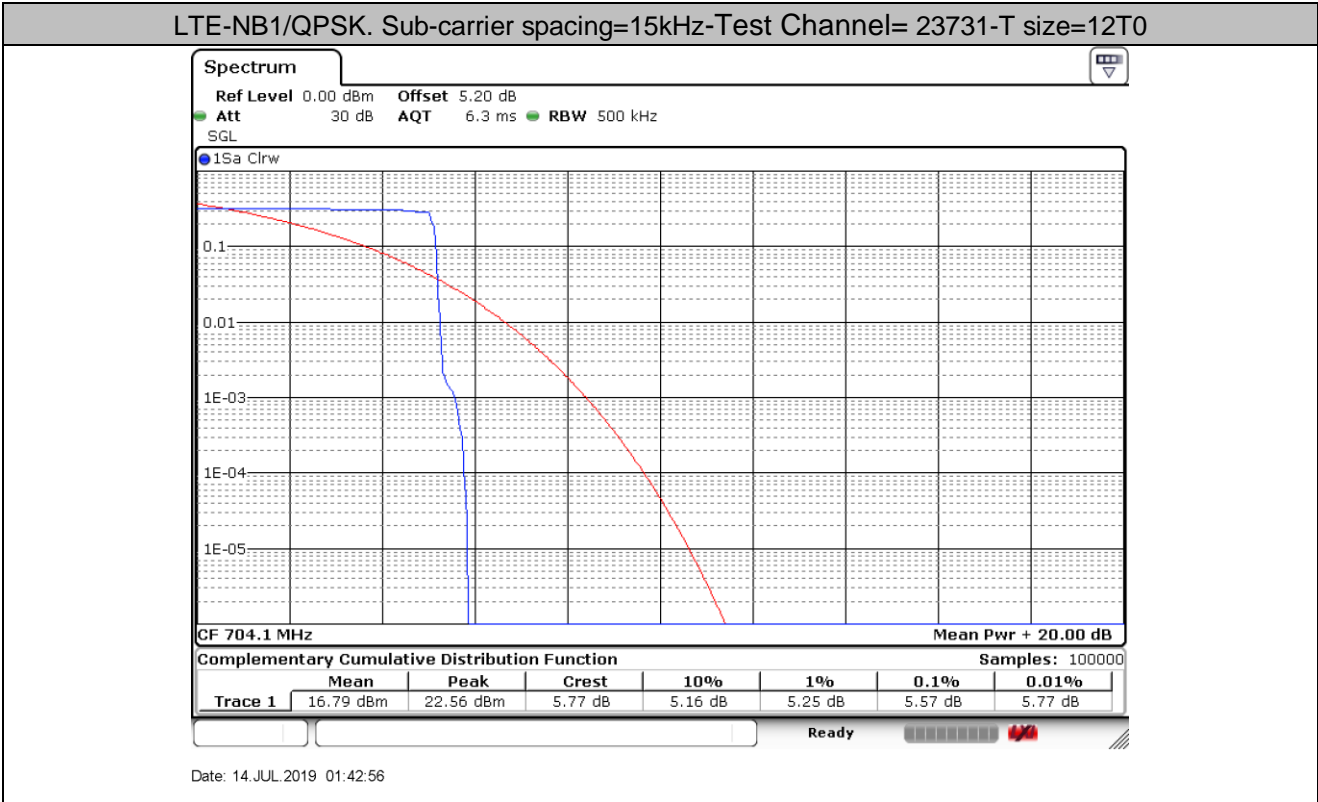
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## 2 Peak-to-Average Ratio

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
NB1 Band 17	QPSK/12T0	23731	5.57	13	PASS
NB1 Band 17	QPSK/12T0	23790	5.59	13	PASS
NB1 Band 17	QPSK/12T0	23849	5.59	13	PASS

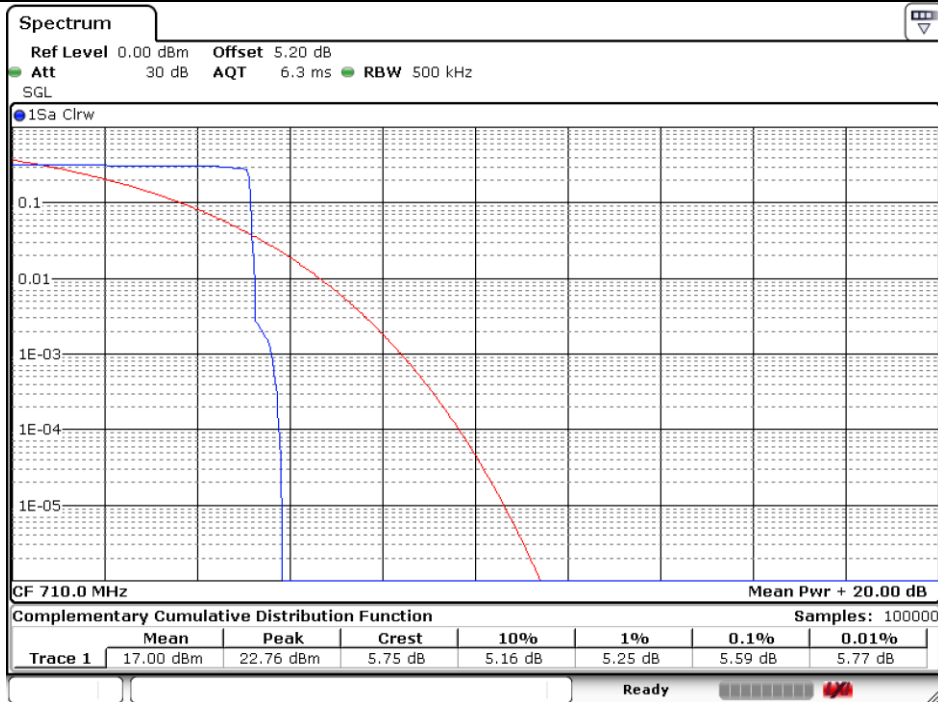
### 2.1 For LTE-NB1

#### 2.1.1 Test Band = LTE-NB1 Band 17



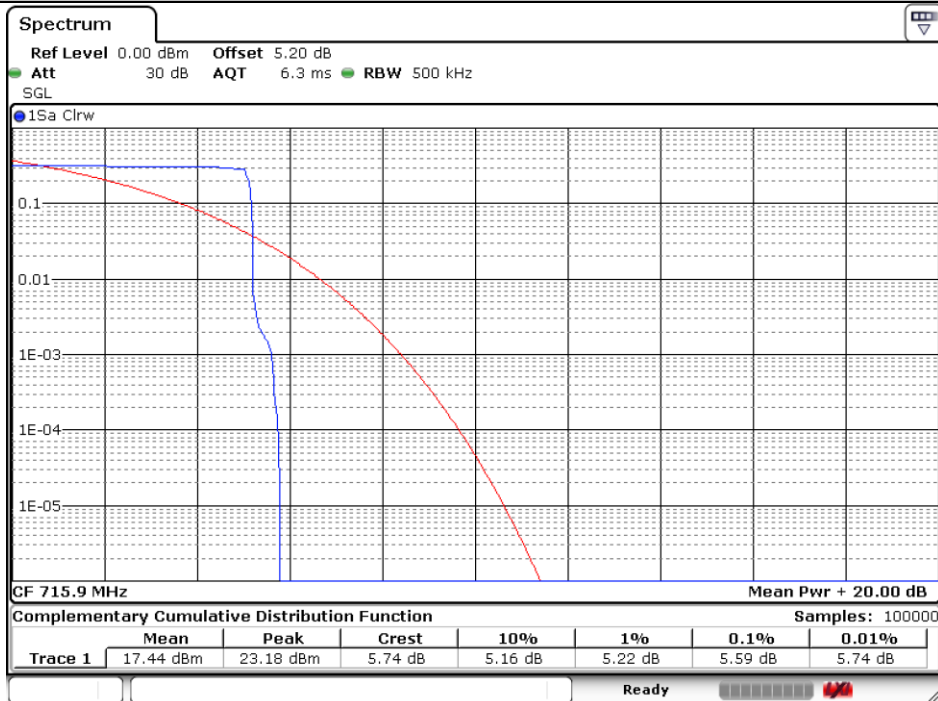


## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23790-T size=12T0



Date: 14.JUL.2019 01:43:27

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23849-T size=12T0



Date: 14.JUL.2019 01:44:55



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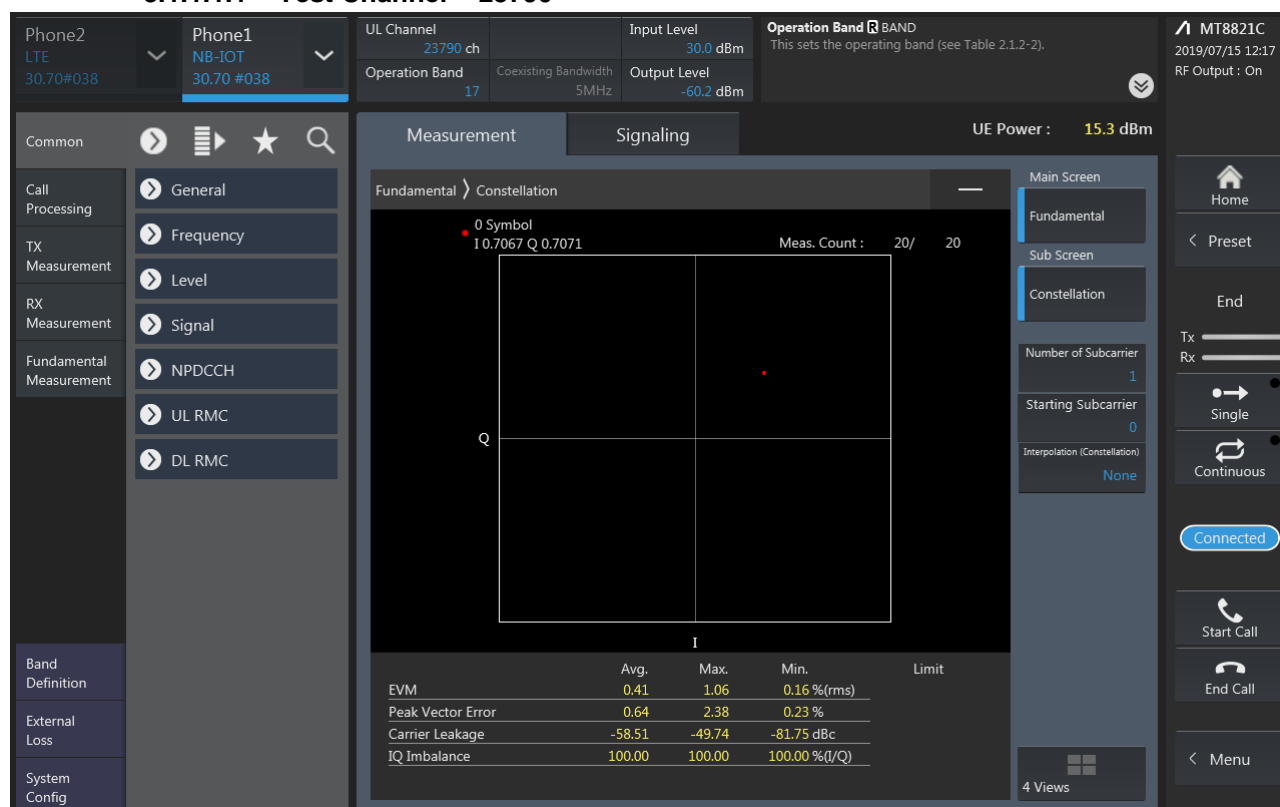
## 3 Modulation Characteristics

### 3.1 For LTE-NB1

#### 3.1.1 Test Band = LTE-NB1 Band 17

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

##### 3.1.1.1.1 Test Channel = 23790

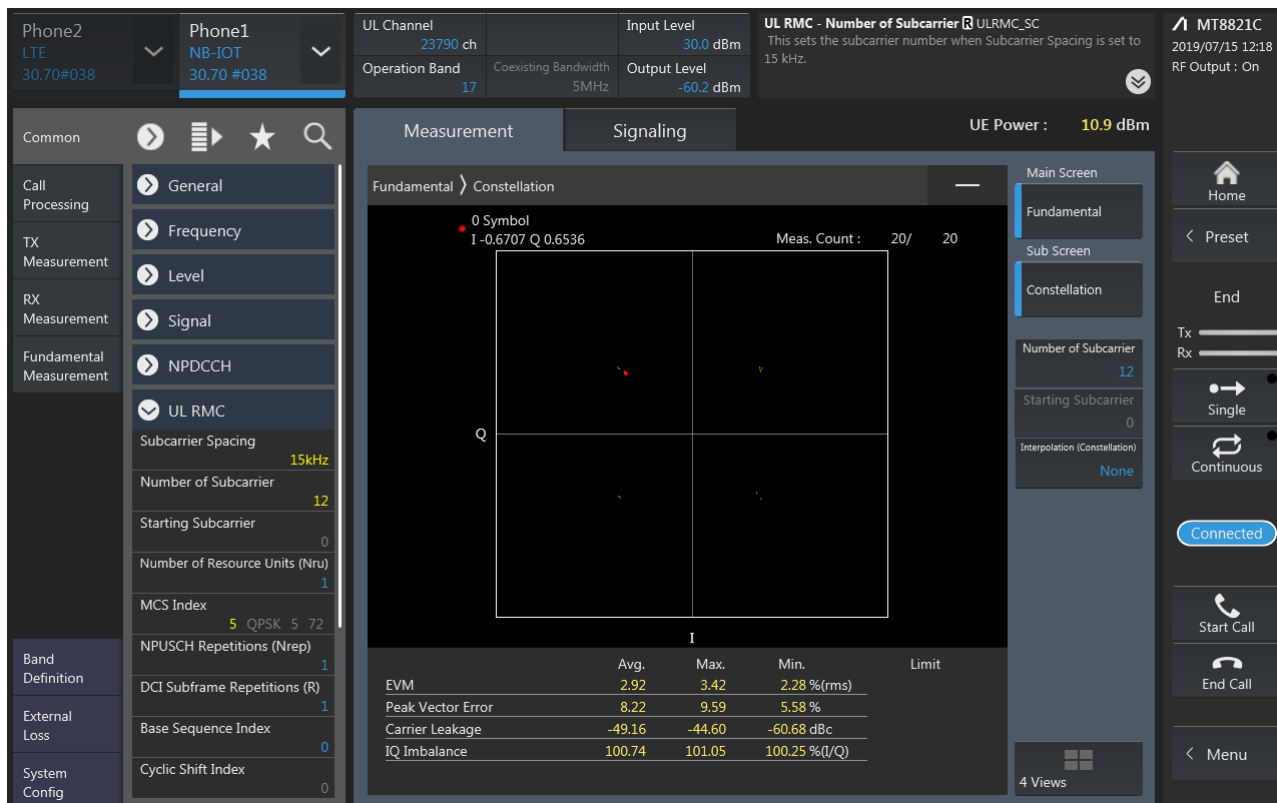


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### 3.1.1.2 Test Mode = LTE-NB1/QPSK. Sub-carrier spacing=15kHz.T size=12T0

#### 3.1.1.2.1 Test Channel = 23790

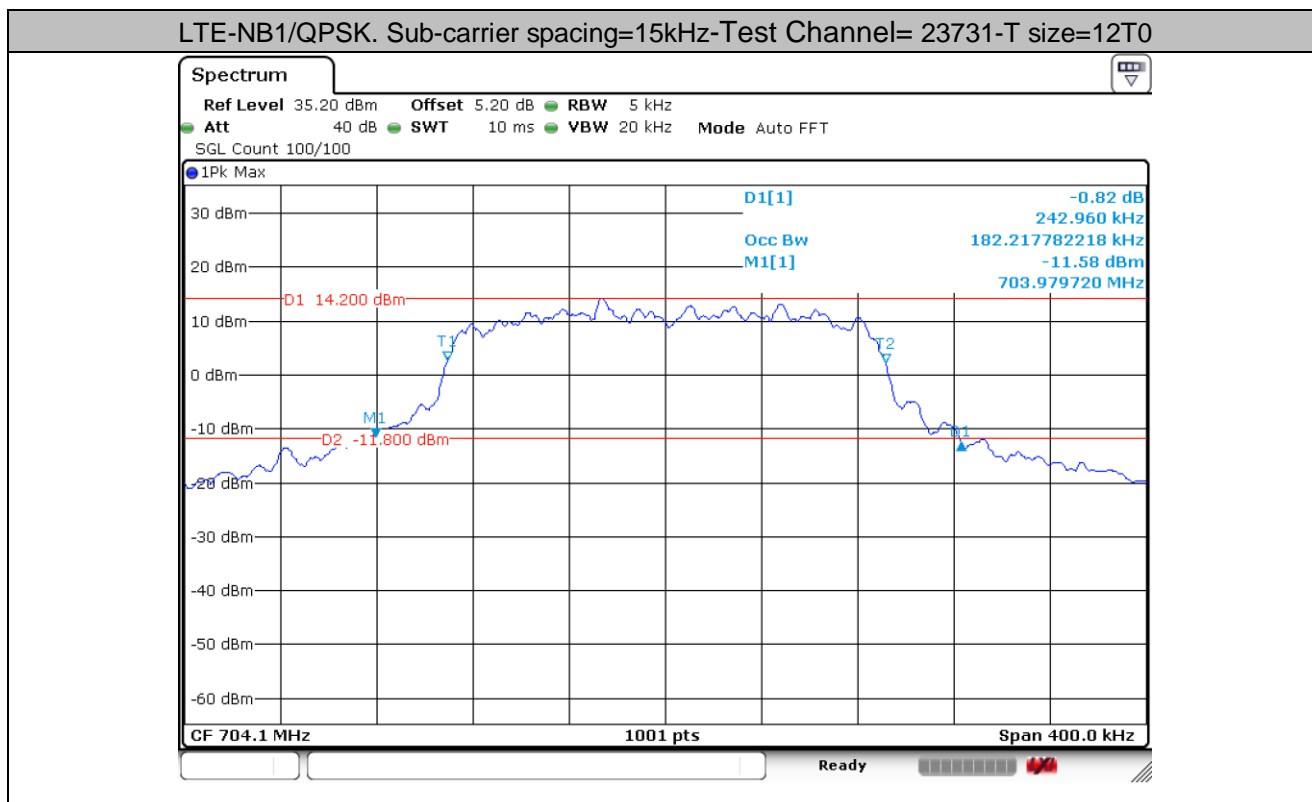


## 4 Bandwidth

Test Band	Test Mode	T size	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
NB1 Band 17	QPSK/15kHz	12T0	23731	182.22	242.96	PASS
NB1 Band 17	QPSK/15kHz	12T0	23790	181.42	266.93	PASS
NB1 Band 17	QPSK/15kHz	12T0	23849	181.82	266.13	PASS

### 4.1 For LTE-NB1

#### 4.1.1 Test Band = LTE-NB1 Band 17



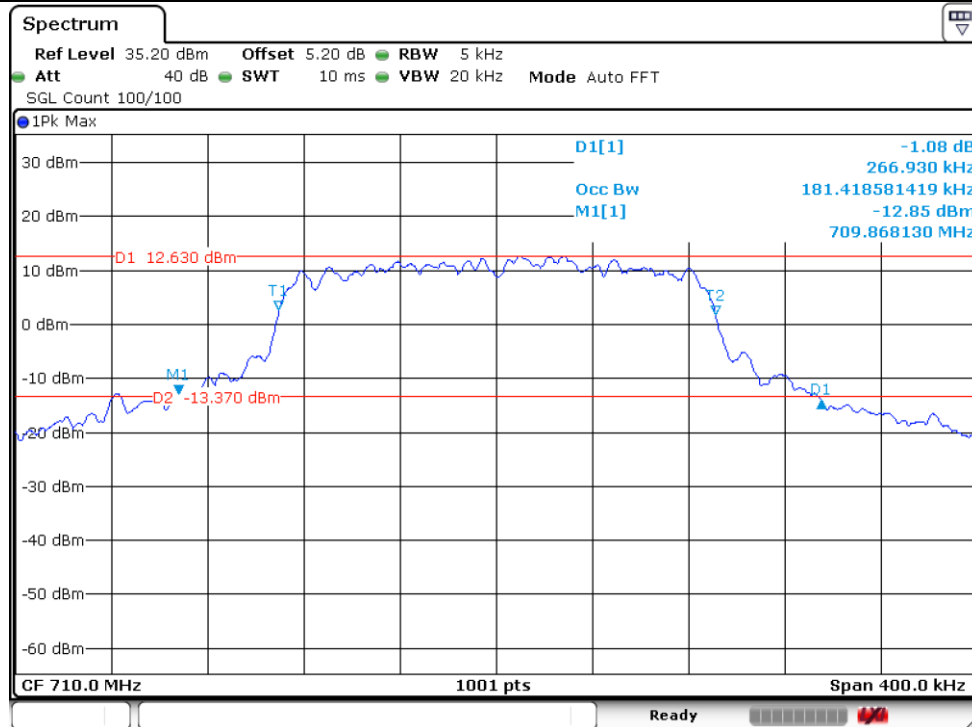
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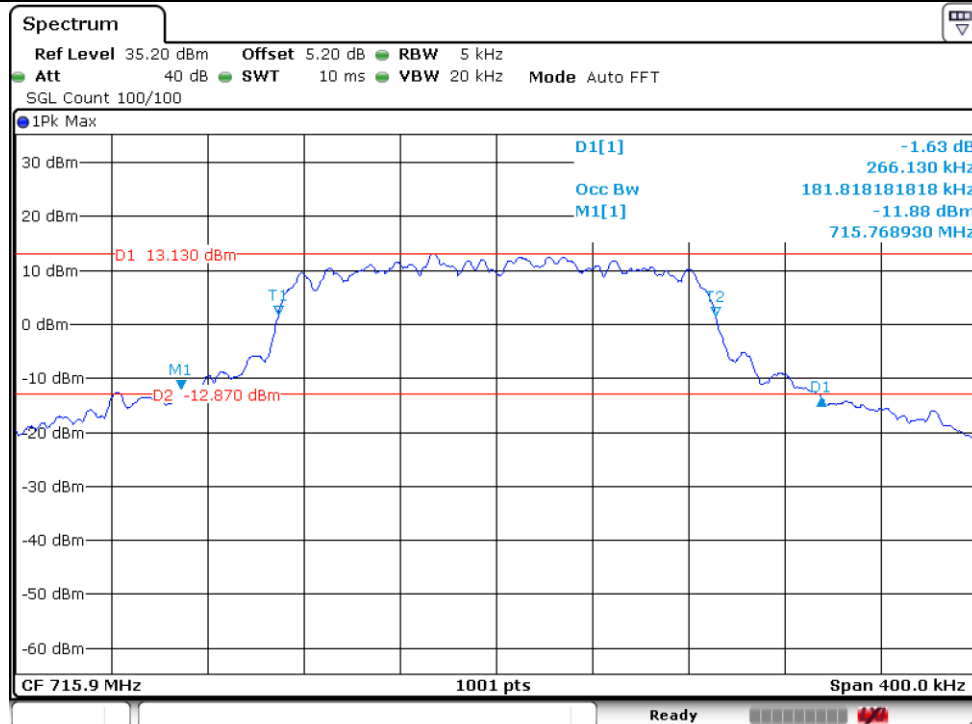
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23790-T size=12T0



## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel= 23849-T size=12T0

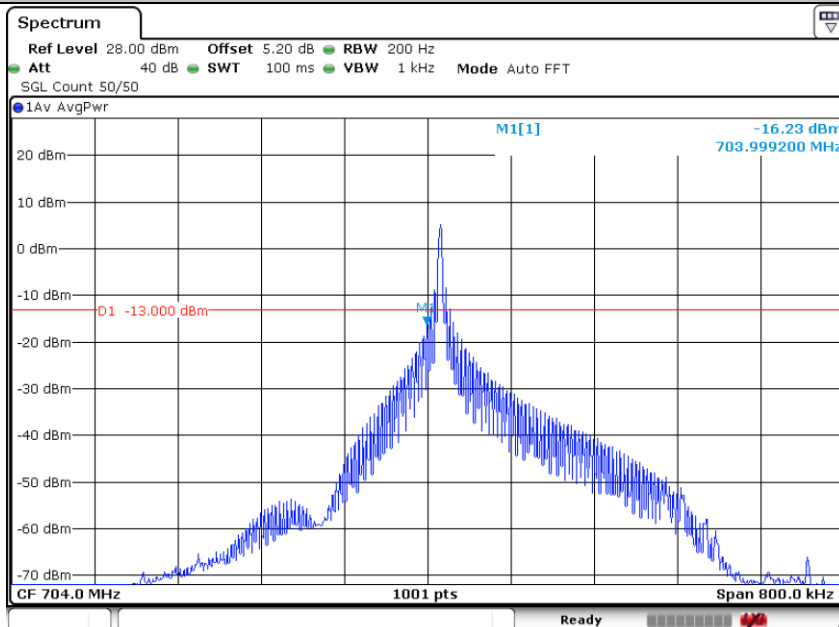


## 5 Band Edges Compliance

### 5.1 For LTE-NB1

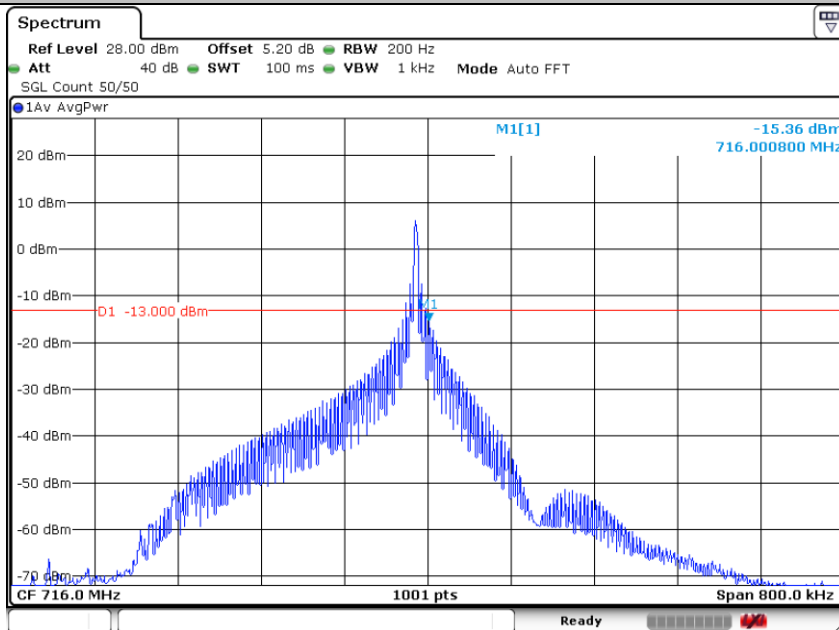
#### 5.1.1 Test Band = LTE-NB1 Band 17

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23731-T size=1T0



Date: 20.AUG.2019 06:20:16

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23849-T size=1T47



Date: 20.AUG.2019 06:38:12



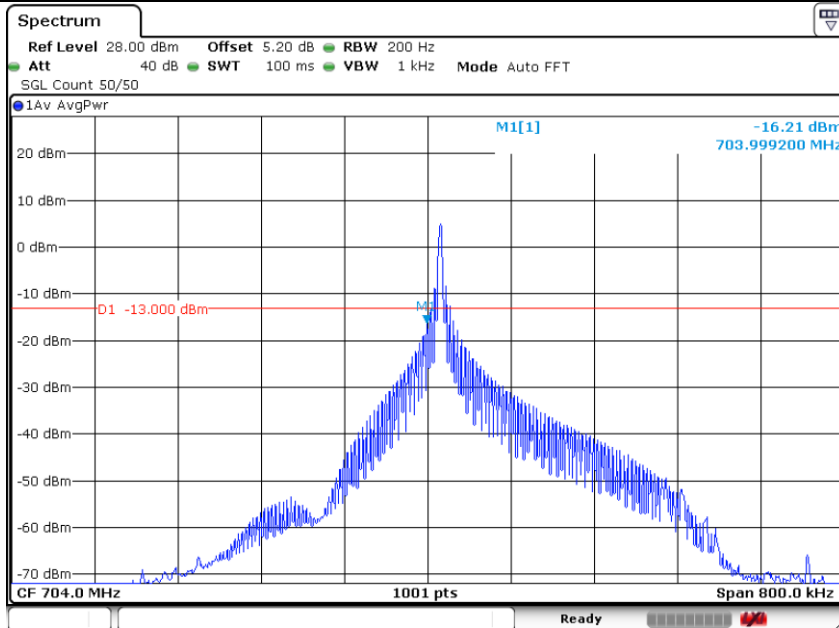
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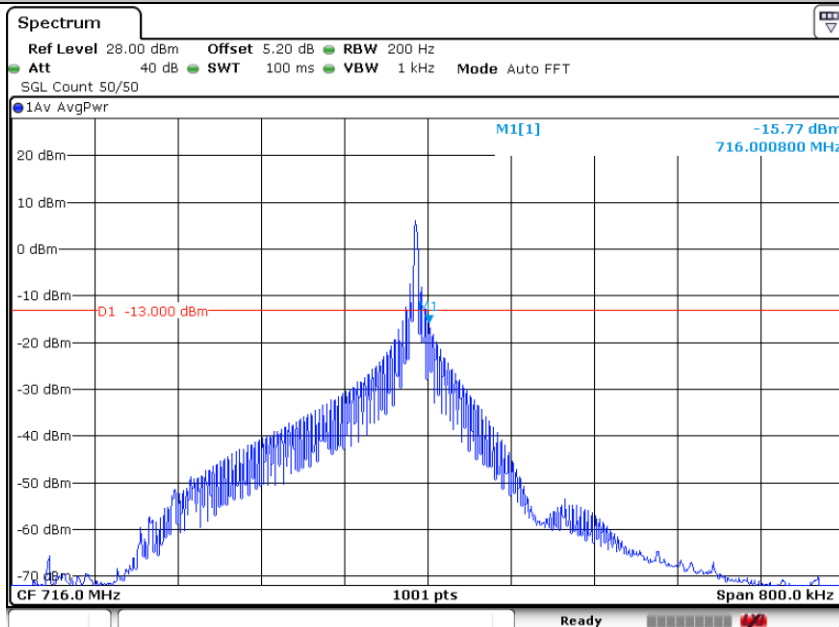
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## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23731-T size=1T0



Date: 20.AUG.2019 06:23:04

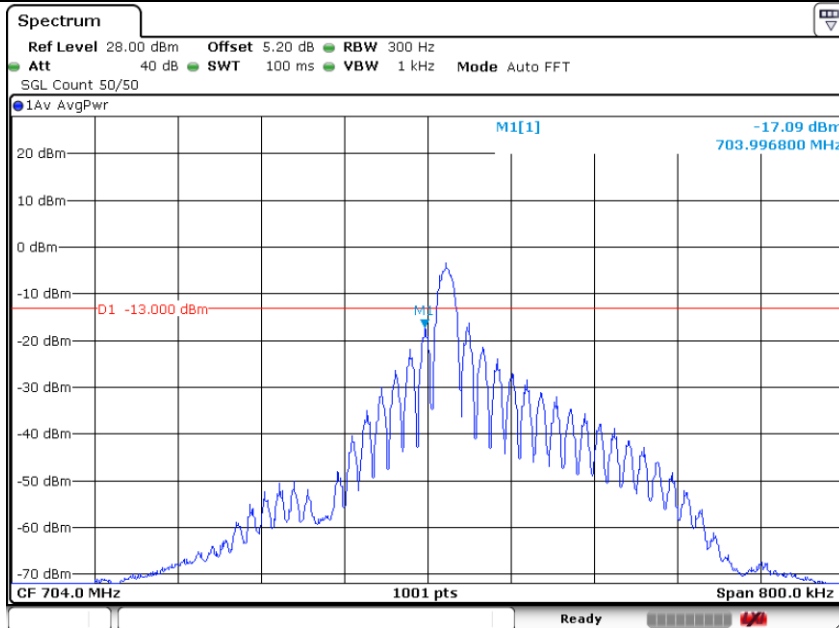
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Date: 20.AUG.2019 06:37:02

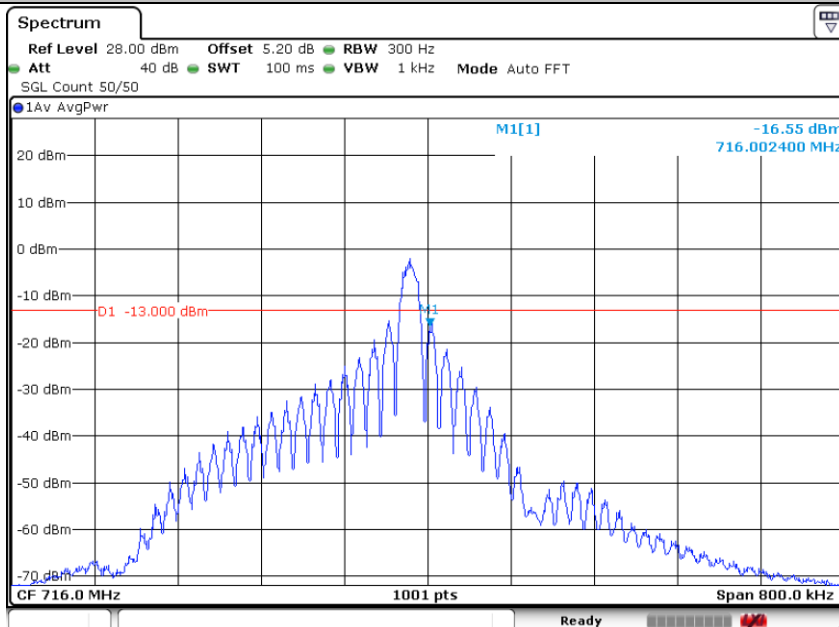


## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23731-T size=1T0



Date: 20.AUG.2019 06:25:49

## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23849-T size=1T11



Date: 20.AUG.2019 06:33:57



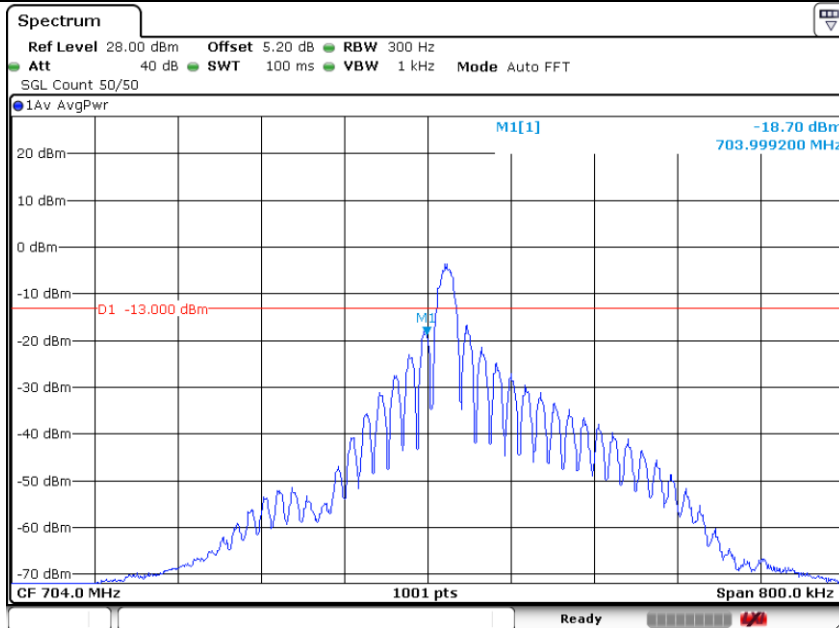
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23731-T size=1T0



Date: 20.AUG.2019 06:24:01

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23731-T size=12T0



Date: 20.AUG.2019 06:27:49

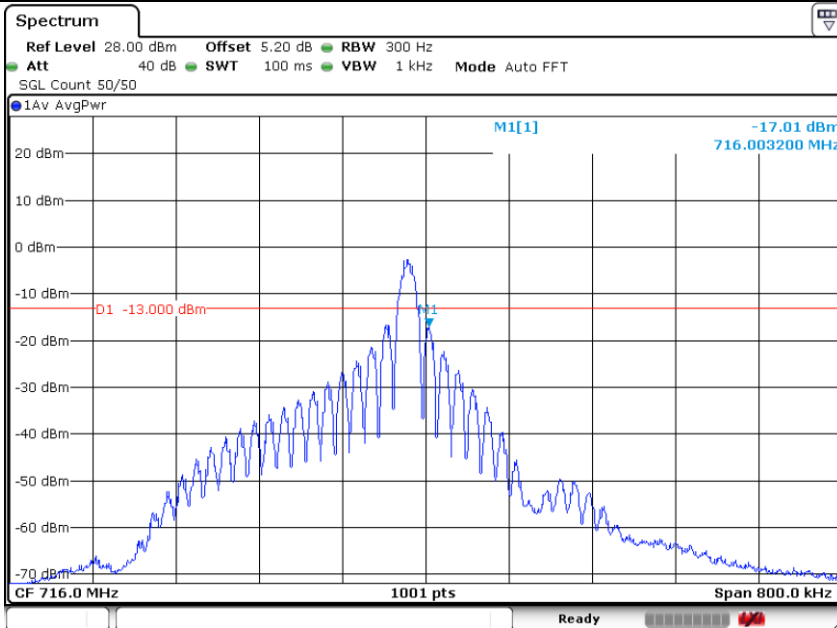


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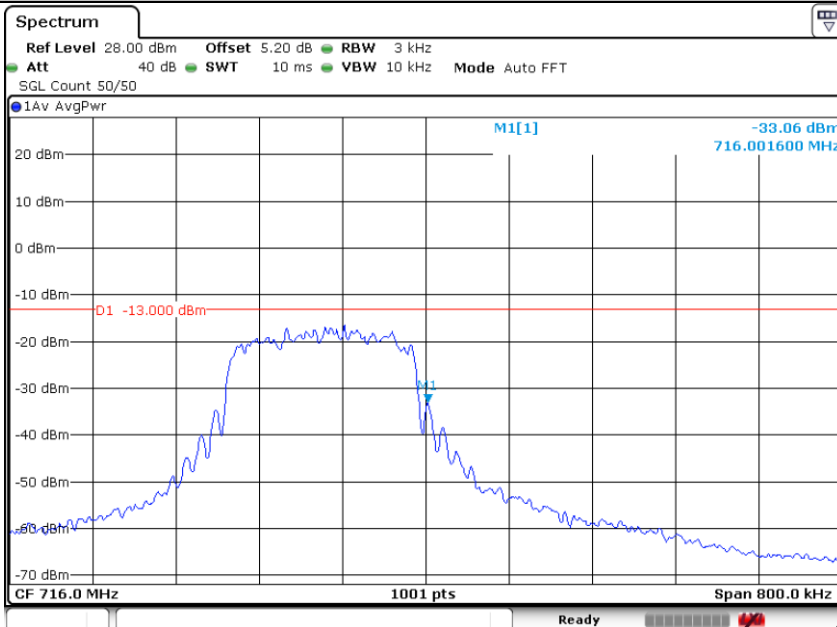
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23849-T size=1T11



Date: 20.AUG.2019 06:35:34

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23849-T size=12T0



Date: 20.AUG.2019 06:30:48



## 6 Spurious Emission at Antenna Terminal

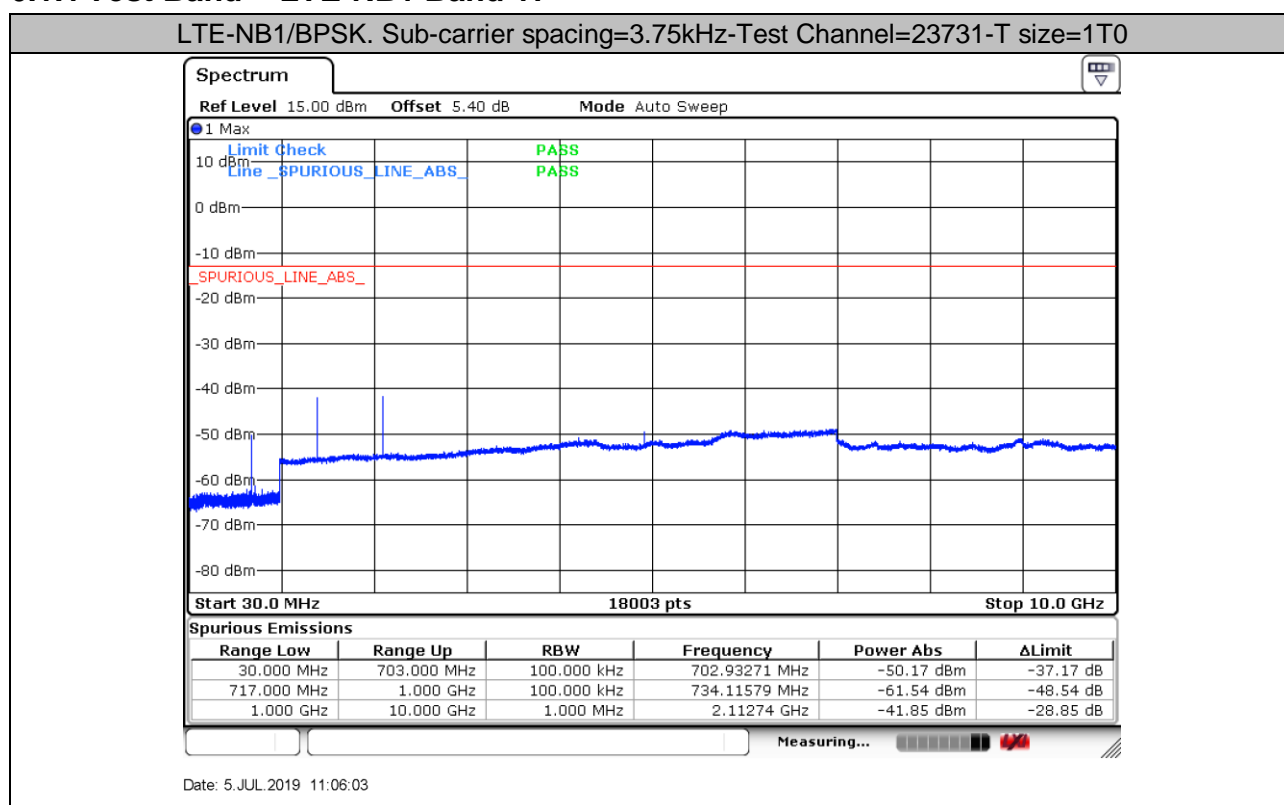
NOTE1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of  $< RBW/2$  so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points =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

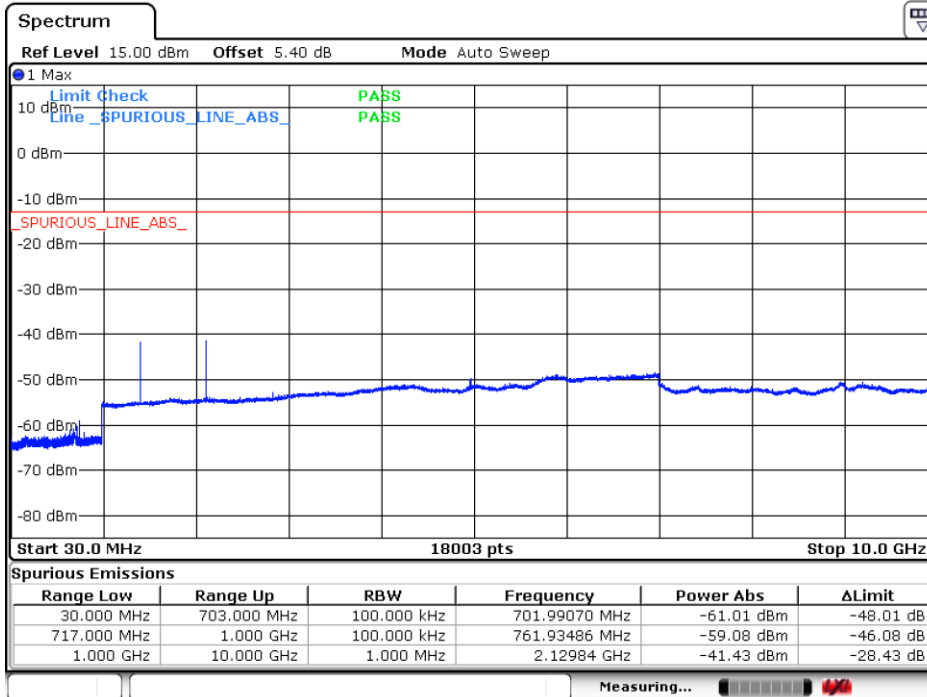
Part I - Test Plots

### 6.1 For LTE-NB1

#### 6.1.1 Test Band = LTE-NB1 Band 17

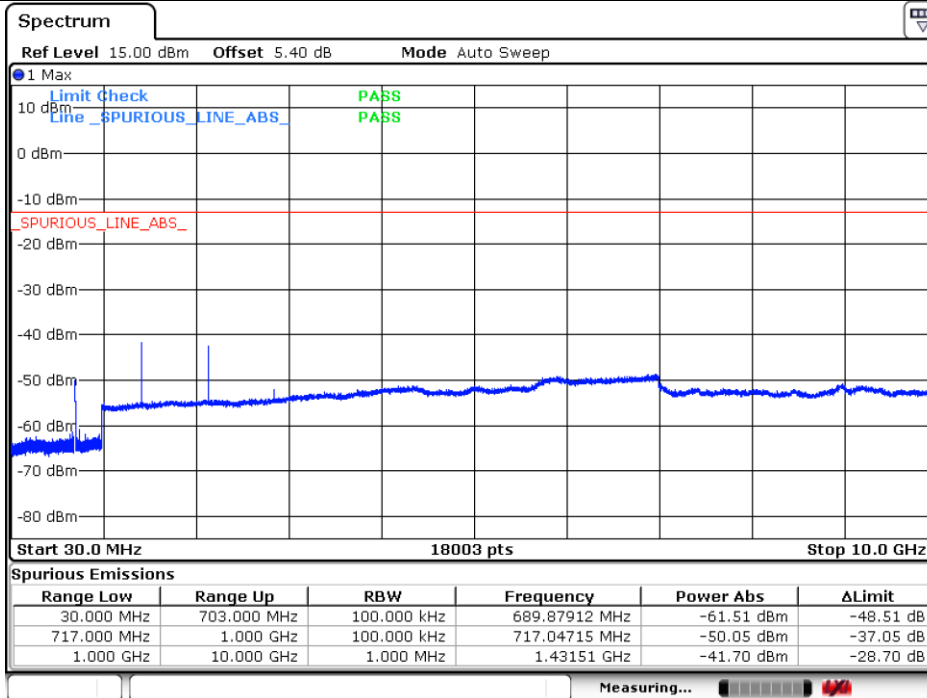


LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23790-T size=1T0



Date: 5 JUL 2019 11:14:56

LTE-NB1/BPSK. Sub-carrier spacing=3.75kHz-Test Channel=23849-T size=1T0



Date: 5 JUL 2019 11:26:51



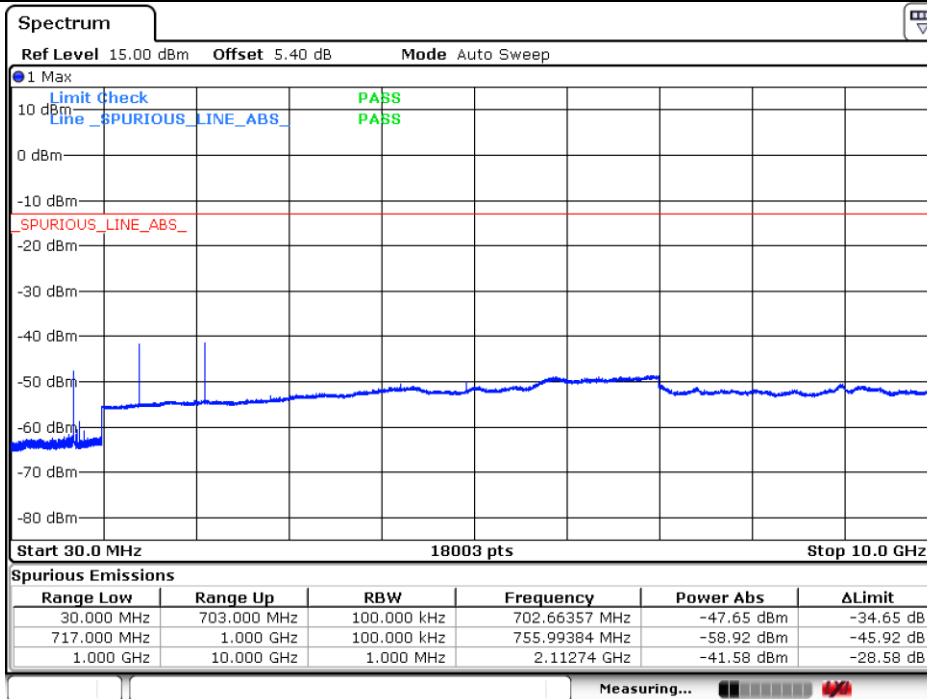
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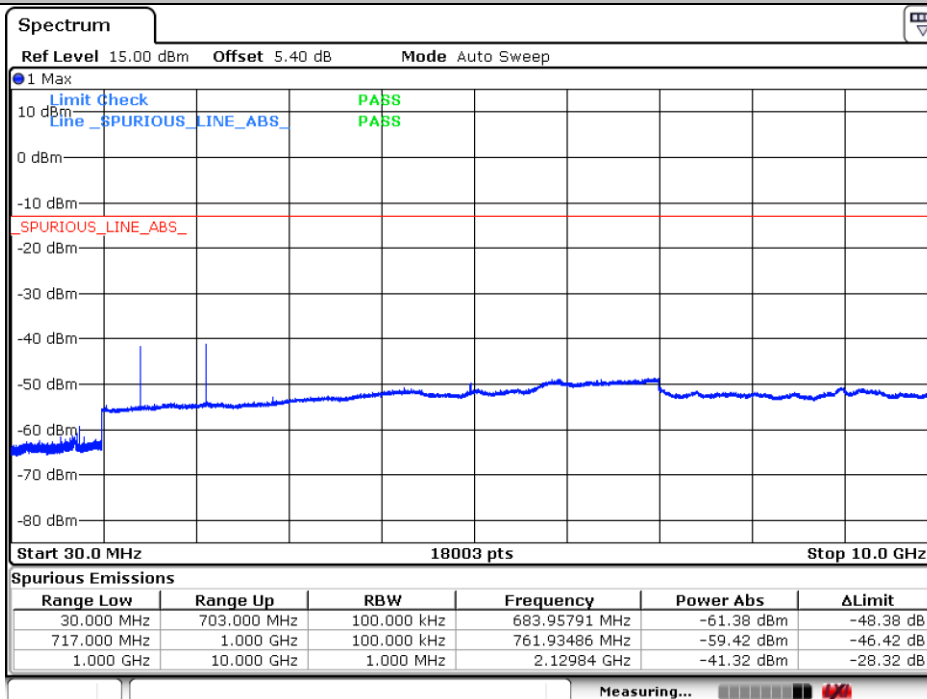


## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23731-T size=1T0



Date: 5 JUL 2019 11:05:25

## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23790-T size=1T0



Date: 5 JUL 2019 11:13:15



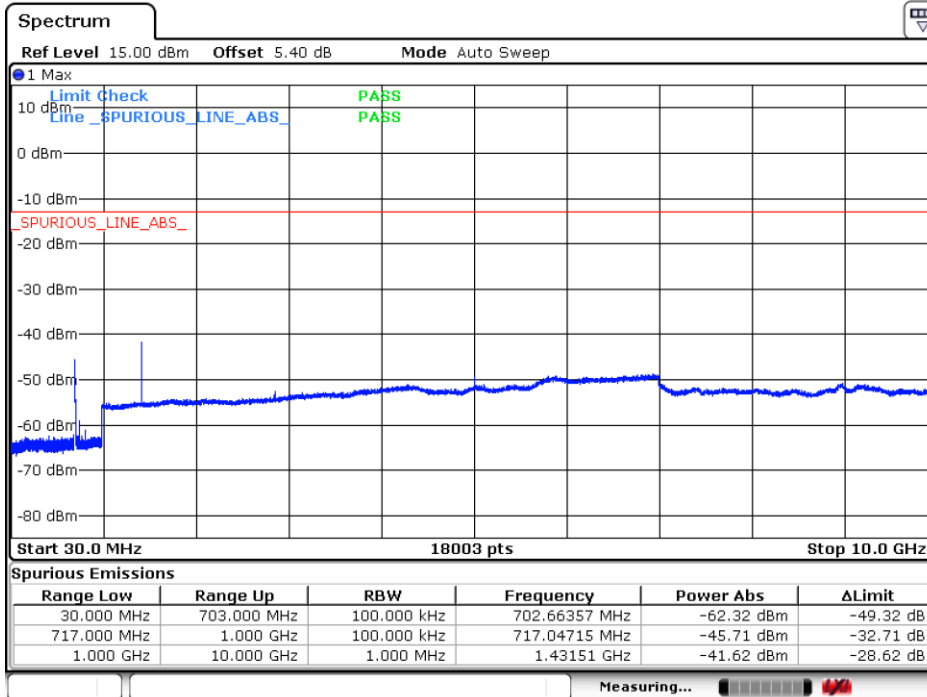
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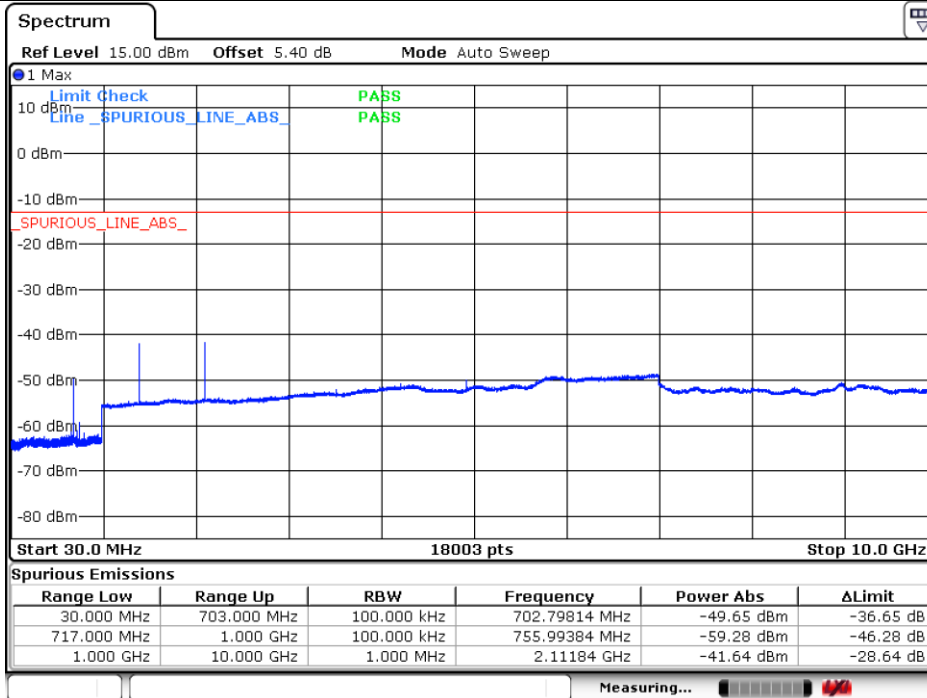
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## LTE-NB1/QPSK. Sub-carrier spacing=3.75kHz-Test Channel=23849-T size=1T0



Date: 5 JUL 2019 11:26:16

## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23731-T size=1T0



Date: 5 JUL 2019 11:03:17

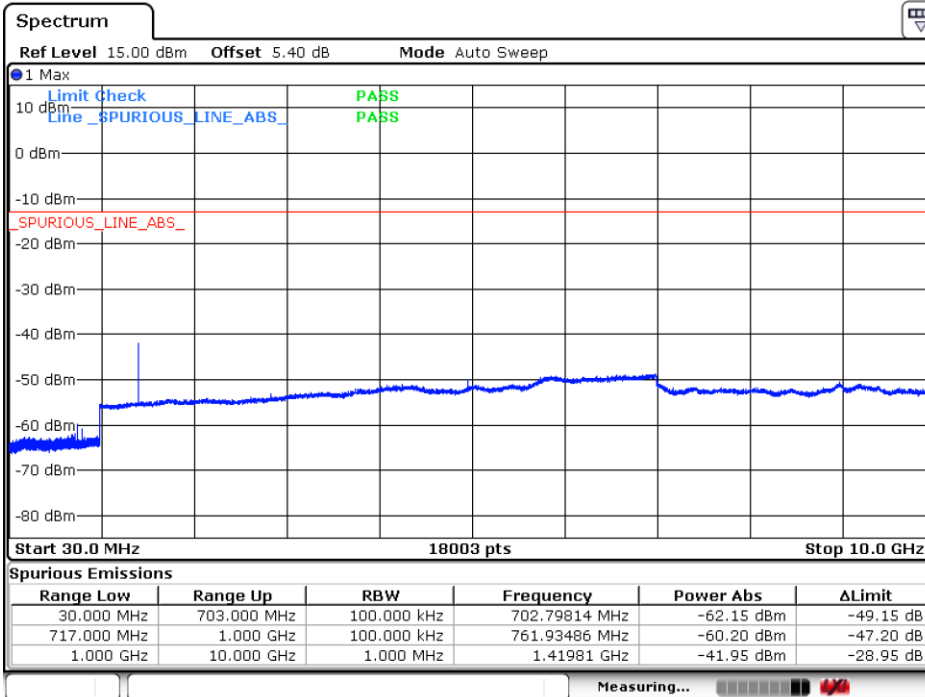


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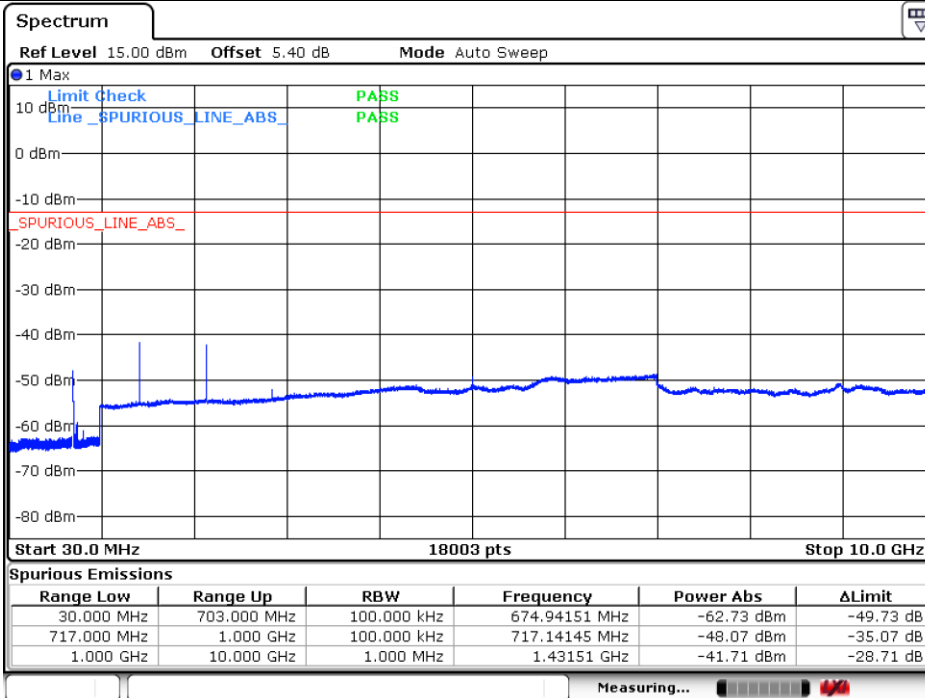
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## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23790-T size=1T0



Date: 5 JUL 2019 11:16:03

## LTE-NB1/BPSK. Sub-carrier spacing=15kHz-Test Channel=23849-T size=1T0



Date: 5 JUL 2019 11:25:23

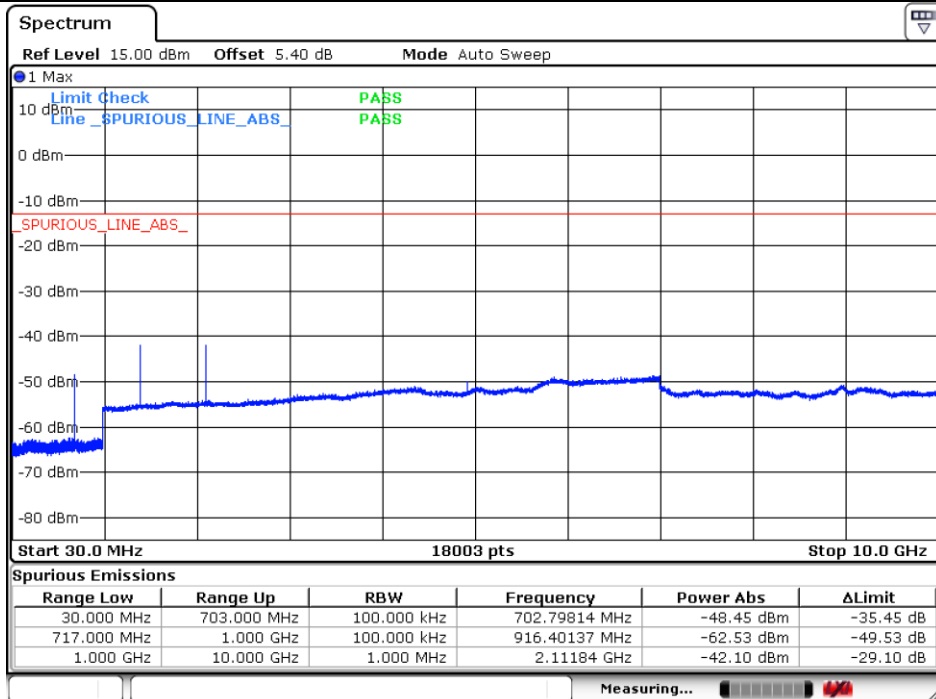


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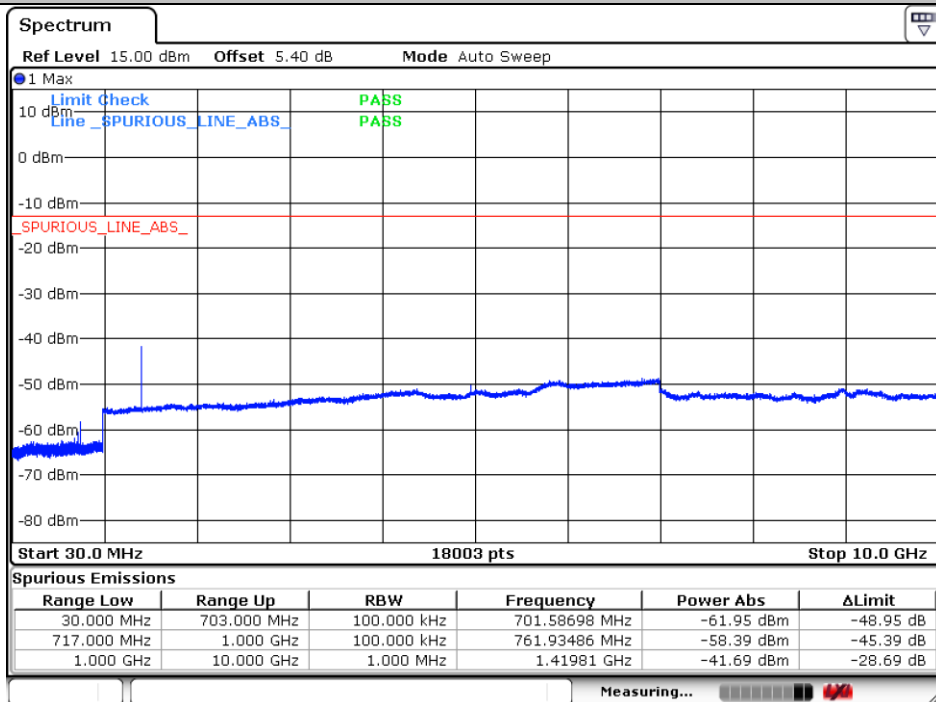
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## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23731-T size=1T0



Date: 5 JUL 2019 11:04:02

## LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23790-T size=1T0



Date: 5 JUL 2019 11:16:33



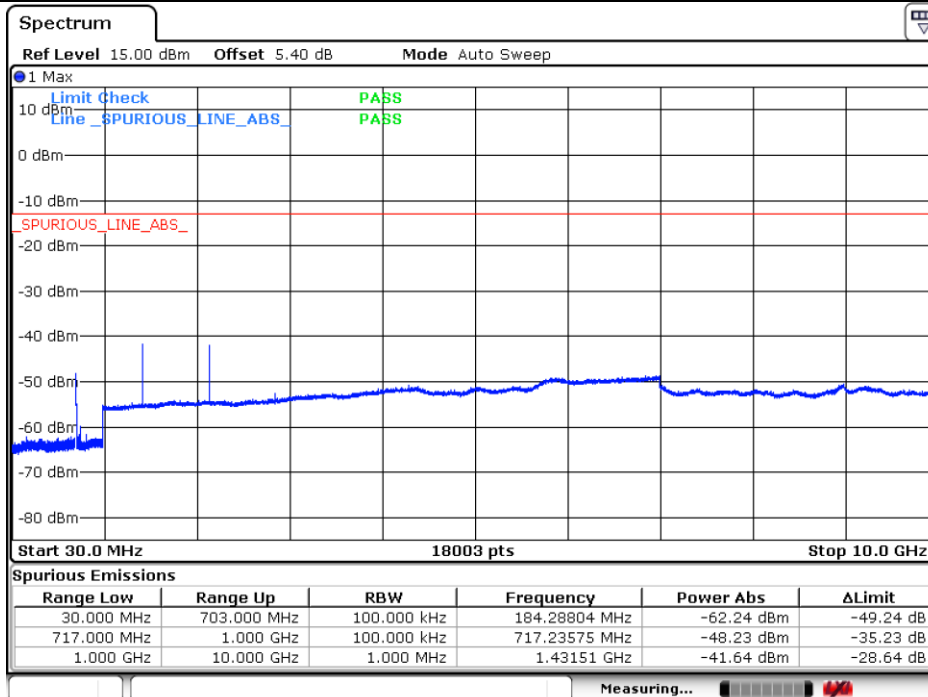
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LTE-NB1/QPSK. Sub-carrier spacing=15kHz-Test Channel=23849-T size=1T0



Date: 5 JUL 2019 11:23:59



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## 7 Field Strength of Spurious Radiation

### 7.1 For LTE-NB1

#### 7.1.1 Test Band = LTE-NB1 Band 17

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

##### 7.1.1.1.1 Test Channel = 23731

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.253333	-79.94	-13.00	66.94	Vertical
338.373333	-85.02	-13.00	72.02	Vertical
1413.000000	-65.42	-13.00	52.42	Vertical
2270.000000	-59.61	-13.00	46.61	Vertical
3561.112500	-67.85	-13.00	54.85	Vertical
6055.650000	-63.74	-13.00	50.74	Vertical
62.246667	-76.64	-13.00	63.64	Horizontal
258.293333	-86.94	-13.00	73.94	Horizontal
1412.500000	-62.28	-13.00	49.28	Horizontal
2200.000000	-59.67	-13.00	46.67	Horizontal
4905.150000	-65.06	-13.00	52.06	Horizontal
7912.537500	-62.64	-13.00	49.64	Horizontal

##### 7.1.1.1.2 Test Channel = 23790

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
65.280000	-81.06	-13.00	68.06	Vertical
311.633333	-85.68	-13.00	72.68	Vertical
1419.500000	-65.61	-13.00	52.61	Vertical
2103.000000	-62.02	-13.00	49.02	Vertical
4424.962500	-65.86	-13.00	52.86	Vertical
7959.337500	-62.58	-13.00	49.58	Vertical
62.620000	-76.25	-13.00	63.25	Horizontal
282.886667	-86.06	-13.00	73.06	Horizontal
1420.000000	-57.09	-13.00	44.09	Horizontal
2333.500000	-59.28	-13.00	46.28	Horizontal
3565.500000	-67.27	-13.00	54.27	Horizontal
6055.650000	-63.88	-13.00	50.88	Horizontal



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7.1.1.1.3 Test Channel = 23849

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
124.966667	-85.84	-13.00	72.84	Vertical
352.560000	-84.98	-13.00	71.98	Vertical
1427.000000	-65.50	-13.00	52.50	Vertical
2249.000000	-59.51	-13.00	46.51	Vertical
3728.812500	-67.46	-13.00	54.46	Vertical
6139.500000	-63.98	-13.00	50.98	Vertical
63.973333	-76.65	-13.00	63.65	Horizontal
279.153333	-86.49	-13.00	73.49	Horizontal
1426.500000	-58.21	-13.00	45.21	Horizontal
2651.000000	-58.12	-13.00	45.12	Horizontal
4014.487500	-66.70	-13.00	53.70	Horizontal
7831.125000	-63.10	-13.00	50.10	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.



## 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 17	180KHz	BPSK/15KHz	23731	12T0	VL	TN	3.90	0.005534	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	VN	TN	-14.38	-0.020419	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	VH	TN	8.96	0.012720	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	VL	TN	-9.96	-0.014026	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	VN	TN	-2.18	-0.003075	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	VH	TN	-4.84	-0.006820	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	VL	TN	10.24	0.014308	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	VN	TN	-13.95	-0.019491	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	VH	TN	-3.76	-0.005252	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	VL	TN	2.74	0.003897	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	VN	TN	-9.50	-0.013487	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	VH	TN	13.03	0.018511	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	VL	TN	3.01	0.004239	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	VN	TN	1.24	0.001746	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	VH	TN	-7.01	-0.009875	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	VL	TN	-10.28	-0.014353	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	VN	TN	1.40	0.001959	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	VH	TN	-1.87	-0.002606	±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 17	180KHz	BPSK/15KHz	23731	12T0	NV	-30	-4.10	-0.005823	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	-20	8.91	0.012660	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	0	3.86	0.005477	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	10	7.70	0.010929	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	20	-11.34	-0.016103	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	30	12.56	0.017840	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	40	12.54	0.017811	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23731	12T0	NV	50	-8.40	-0.011928	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	-30	-0.85	-0.001202	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	-20	-13.28	-0.018705	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	0	0.04	0.000060	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	10	-5.49	-0.007729	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	20	3.80	0.005351	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	30	2.76	0.003890	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	40	-3.99	-0.005620	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23790	12T0	NV	50	-0.47	-0.000661	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	-30	3.00	0.004197	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	-20	-2.26	-0.003162	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	0	-11.32	-0.015811	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	10	-3.93	-0.005490	±2.5	PASS



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NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	20	7.75	0.010825	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	30	5.12	0.007148	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	40	11.83	0.016522	±2.5	PASS
NB1 Band 17	180KHz	BPSK/15KHz	23849	12T0	NV	50	-3.16	-0.004414	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	-30	-9.81	-0.013928	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	-20	1.15	0.001633	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	0	3.83	0.005442	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	10	-10.47	-0.014863	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	20	10.81	0.015351	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	30	-11.76	-0.016696	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	40	1.09	0.001544	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23731	12T0	NV	50	6.60	0.009370	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	-30	1.17	0.001652	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	-20	-9.51	-0.013396	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	0	-13.18	-0.018559	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	10	5.30	0.007471	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	20	-1.73	-0.002433	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	30	3.70	0.005206	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	40	0.74	0.001042	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23790	12T0	NV	50	-9.43	-0.013282	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	-30	-13.93	-0.019456	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	-20	8.59	0.012002	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	0	5.90	0.008237	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	10	-5.72	-0.007994	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	20	-6.43	-0.008981	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	30	-9.41	-0.013147	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	40	-9.09	-0.012694	±2.5	PASS
NB1 Band 17	180KHz	QPSK/15KHz	23849	12T0	NV	50	1.68	0.002351	±2.5	PASS

The End



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