Appendix B

LTE-NB1 BAND12

CONTENT

1 Effective (Isotropic) Radiated Power Output Data

Effective Isotropic Radiated Power of Transmitter (EIRP) for LTE-NB1 BAND12

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND12	TM1	3.75	LCH	1T0	22.34	19.59	34.77	PASS
				1T47	22.35	19.6	34.77	PASS
			MCH	1T0	22.26	19.51	34.77	PASS
				1T47	22.36	19.61	34.77	PASS
			HCH	1T0	22.4	19.65	34.77	PASS
				1T47	22.36	19.61	34.77	PASS
	TM2	3.75	LCH	1T0	22.51	19.76	34.77	PASS
				1T47	22.58	19.83	34.77	PASS
			MCH	1T0	22.45	19.7	34.77	PASS
				1T47	22.42	19.67	34.77	PASS
			HCH	1T0	22.42	19.67	34.77	PASS
				1T47	22.44	19.69	34.77	PASS

Test Band	Test Mode	Sub-carrier Spacin (kHz)	Test channel	Number of T	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND12	TM1	15	LCH	1T0	22.1	19.35	34.77	PASS
				1T11	22.12	19.37	34.77	PASS
			MCH	1T0	22.18	19.43	34.77	PASS
				1T11	22.26	19.51	34.77	PASS
			HCH	1T0	22.23	19.48	34.77	PASS
				1T11	22.22	19.47	34.77	PASS
	TM2	15	LCH	1T0	22.22	19.47	34.77	PASS
				1T11	22.21	19.46	34.77	PASS
				12T0	20.26	17.51	34.77	PASS
			MCH	1T0	22.33	19.58	34.77	PASS
				1T11	22.37	19.62	34.77	PASS
				12T0	20.35	17.6	34.77	PASS
			HCH	1T0	22.38	19.63	34.77	PASS
				1T11	22.41	19.66	34.77	PASS
				12T0	20.25	17.5	34.77	PASS

Note:
a: For getting the ERP (Efficient Radiated Power) in substitution method, the following formula should be taken to calculate it,

ERP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBd]

b: SGP=Signal Generator Level

2 Peak-to-Average Ratio

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
BAND12	TM1/1T	LCH	5.13	13	PASS
		MCH	4.58	13	PASS
		HCH	4.67	13	PASS
	TM2/1T	LCH	4.84	13	PASS
		MCH	4.12	13	PASS
		HCH	4.03	13	PASS
	TM2/Full T	LCH	6.41	13	PASS
		MCH	5.10	13	PASS
		HCH	3.22	13	PASS

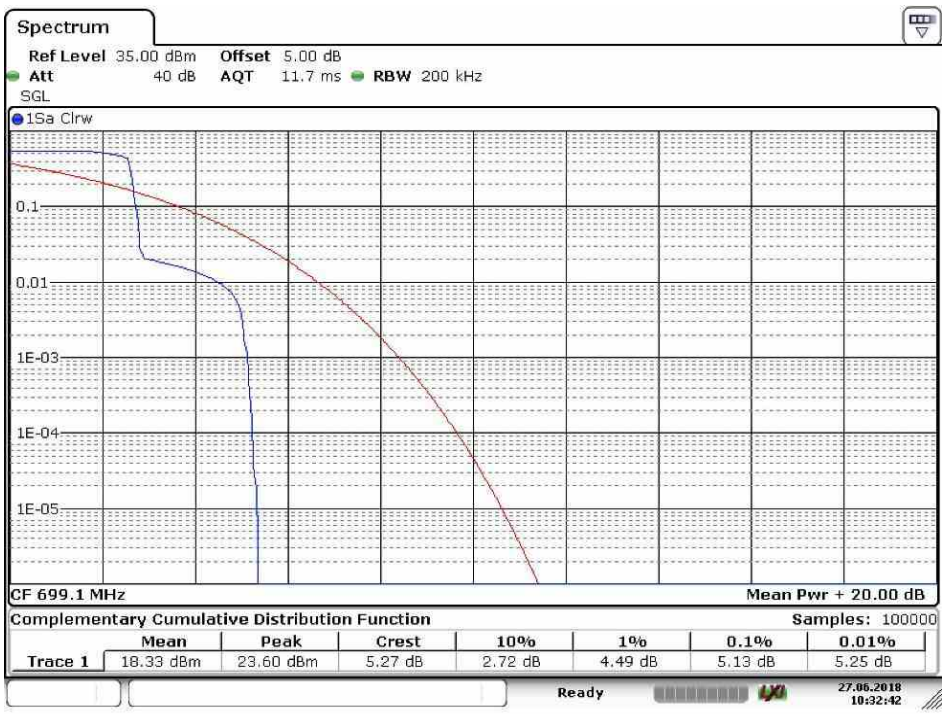
Part II - Test Plots

2.1 For LTE-NB1

2.1.1 Test Band = LTE-NB1 BAND12

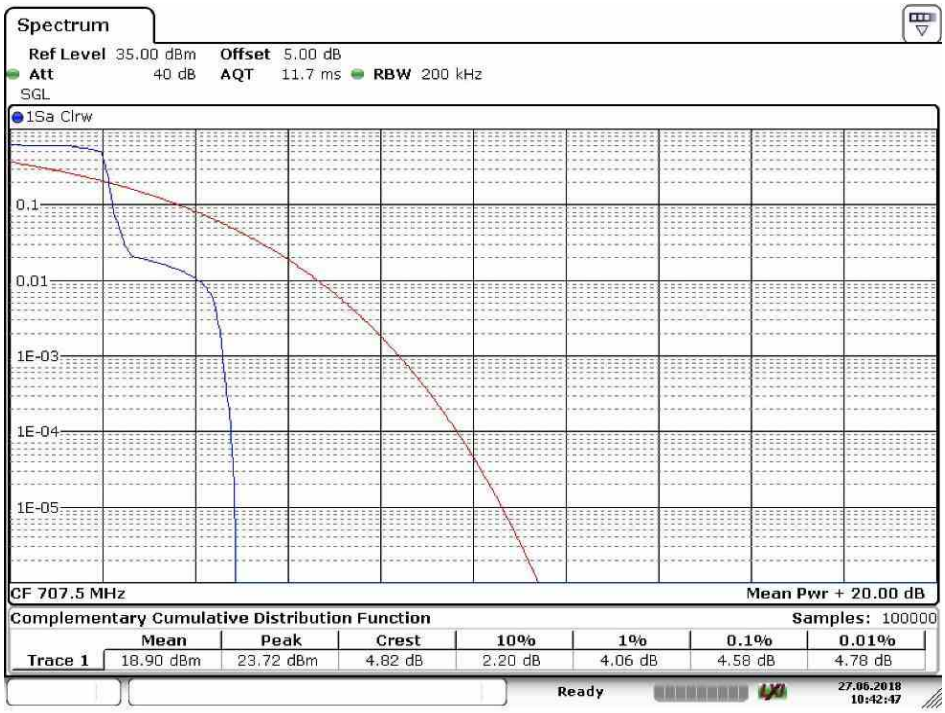
2.1.1.1 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=15kHz.T size=1T0

2.1.1.1.1 Test Channel = LCH



Date: 27.JUN.2018 10:32:43

2.1.1.1.2 Test Channel = MCH



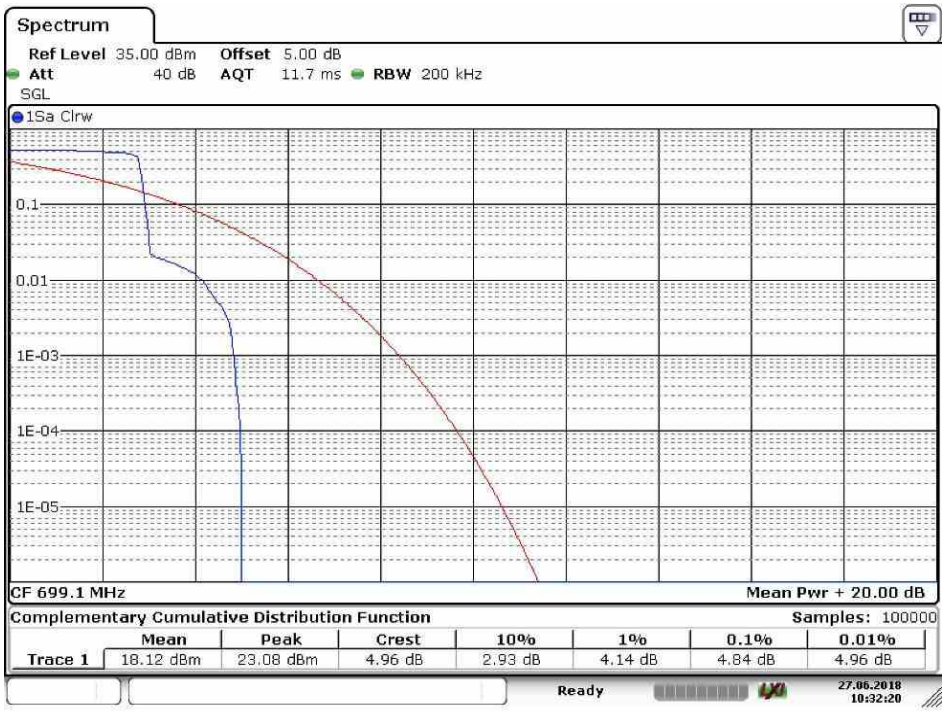
Date: 27.JUN.2018 10:42:47

2.1.1.1.3 Test Channel = HCH

Date: 27.JUN.2018 11:03:06

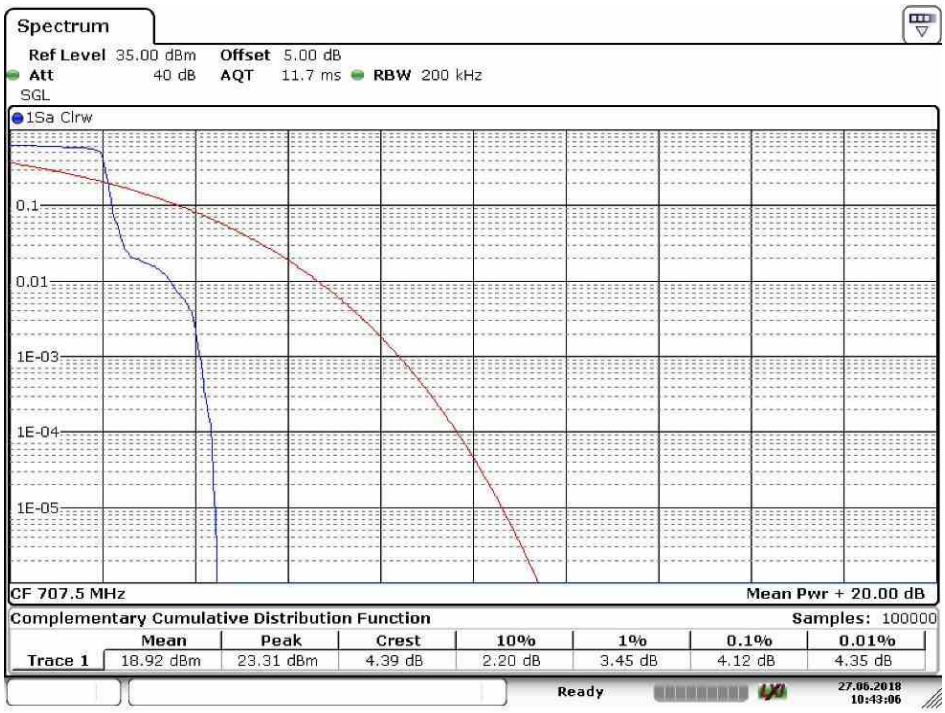
2.1.1.2 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz.T size=1T0

2.1.1.2.1 Test Channel = LCH



Date: 27.JUN.2018 10:32:21

2.1.1.2.2 Test Channel = MCH



Date: 27.JUN.2018 10:43:06

2.1.1.2.3 Test Channel = HCH

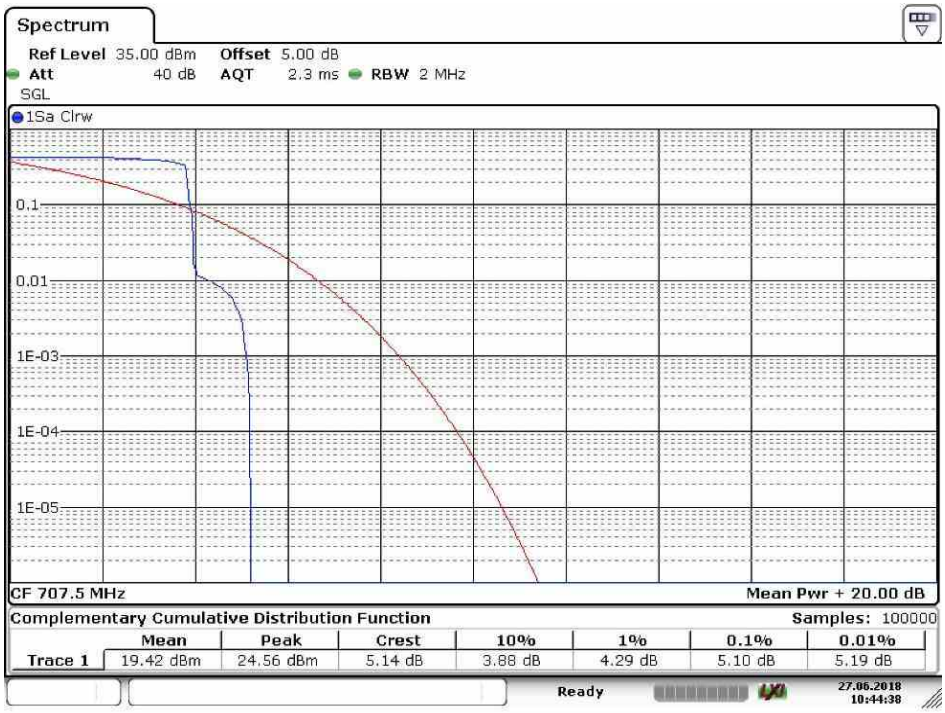
Date: 27.JUN.2018 11:02:35

2.1.1.3 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz.T size=12T0

2.1.1.3.1 Test Channel = LCH

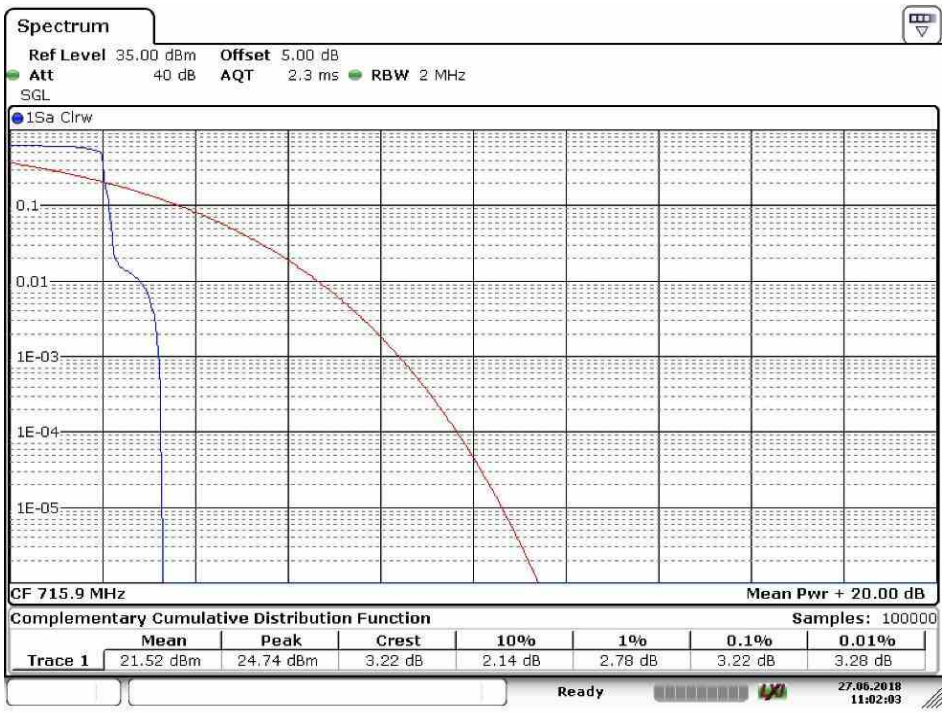
Date: 27.JUN.2018 10:31:33

2.1.1.3.2 Test Channel = MCH



Date: 27.JUN.2018 10:44:38

2.1.1.3.3 Test Channel = HCH



Date: 27.JUN.2018 11:02:03

3 Modulation Characteristics

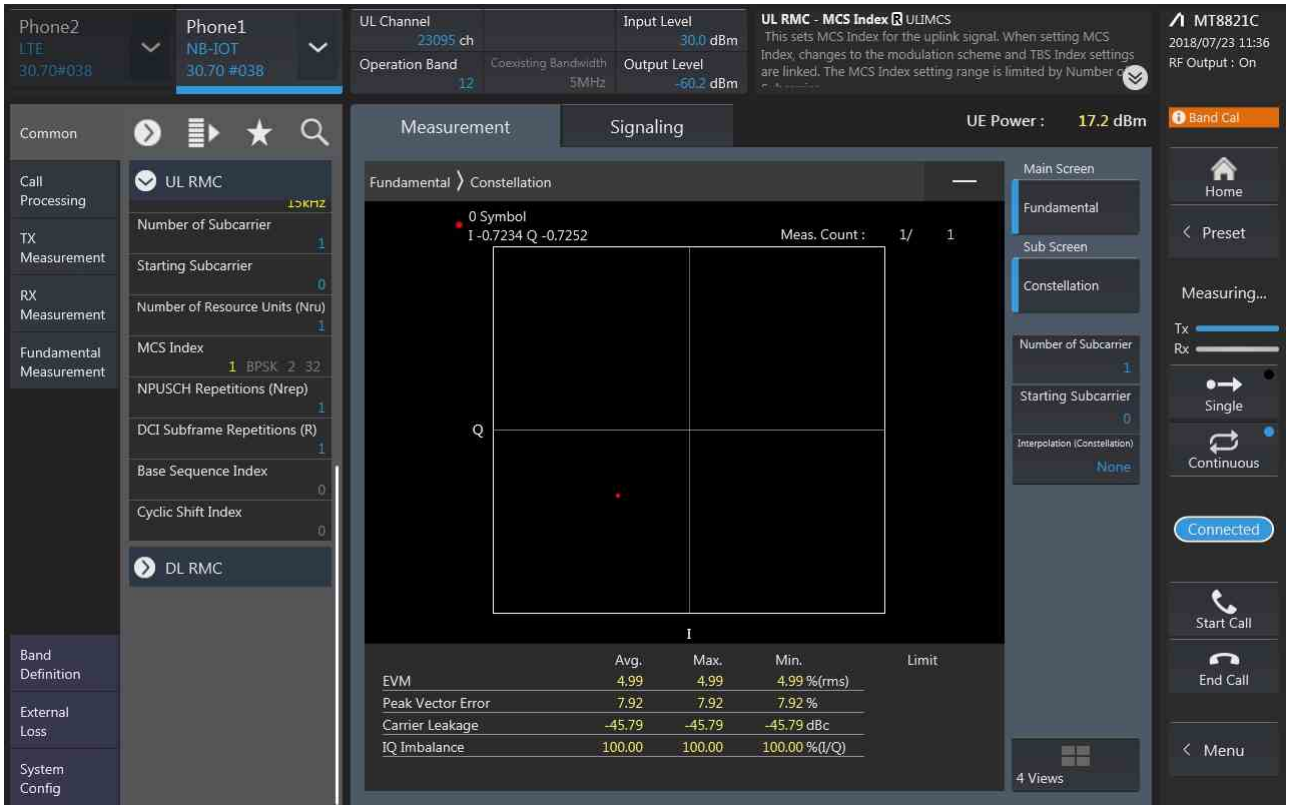
Part I - Test Plots

3.1 For LTE-NB1

3.1.1 Test Band = LTE-NB1 BAND12

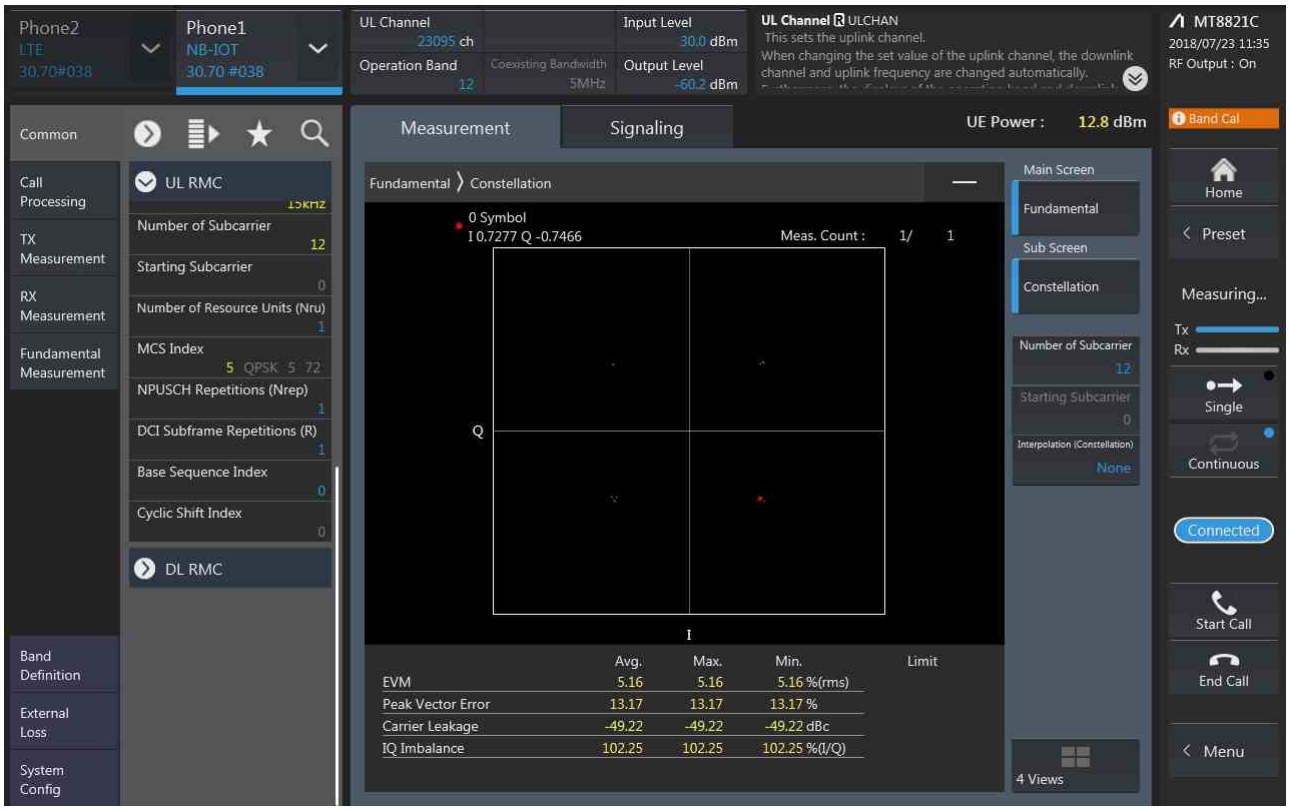
3.1.1.1 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=15kHz.T size=1T0

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz.T size=12T0

3.1.1.2.1 Test Channel = MCH



4 Bandwidth

Part I - Test Results

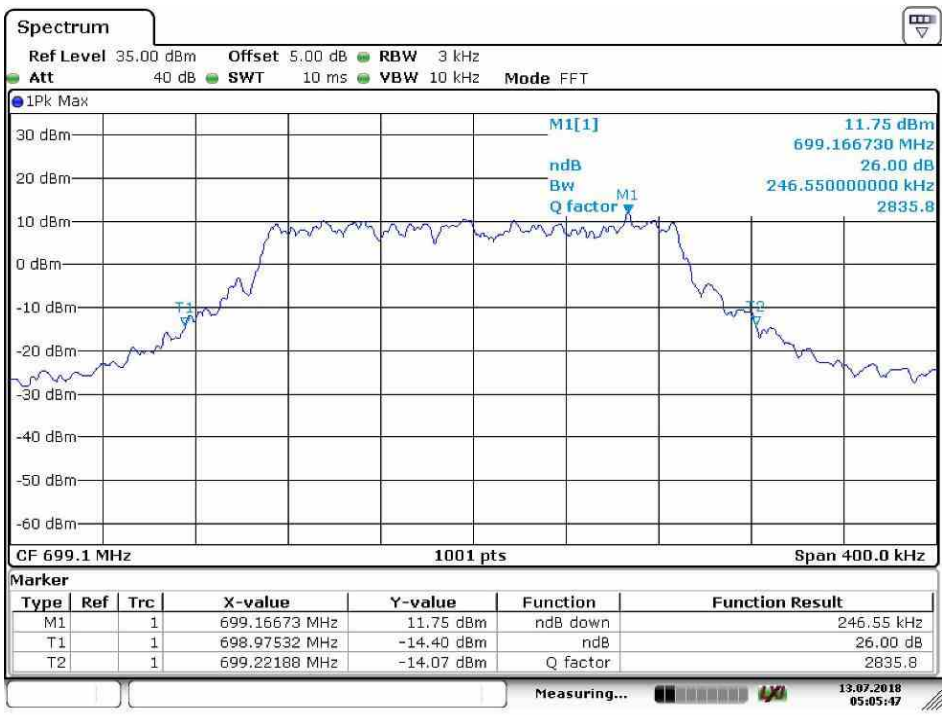
Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
BAND12	TM2/15kHz	LCH	187.01	246.55	PASS
		MCH	185.01	246.75	PASS
		HCH	185.01	243.76	PASS

4.1 For LTE-NB1

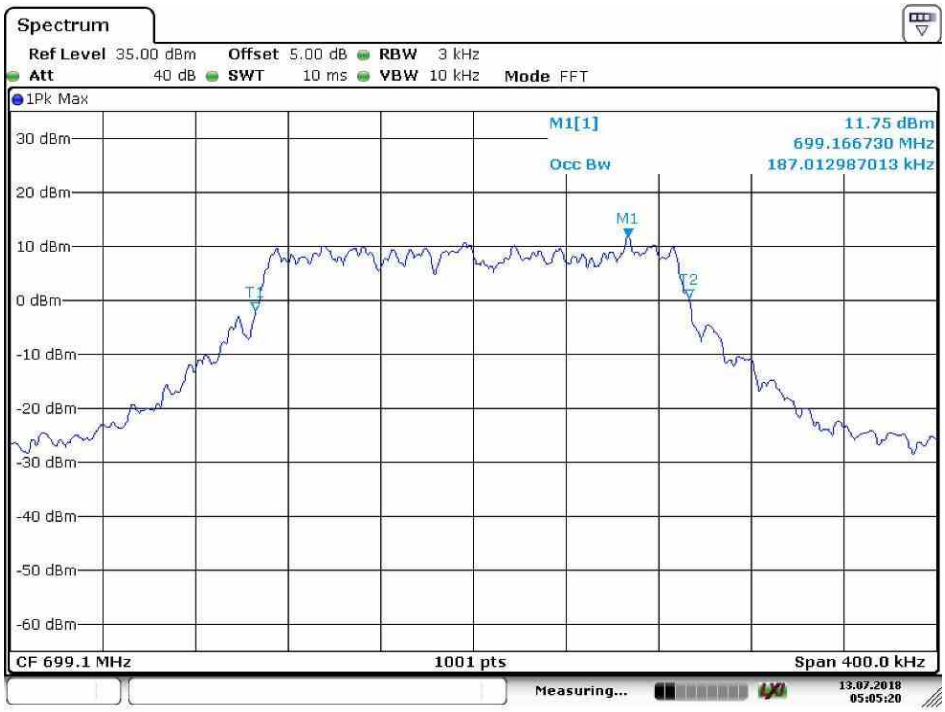
4.1.1 Test Band = LTE-NB1 BAND12

4.1.1.1 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz.T size=12T0

4.1.1.1.1 Test Channel = LCH

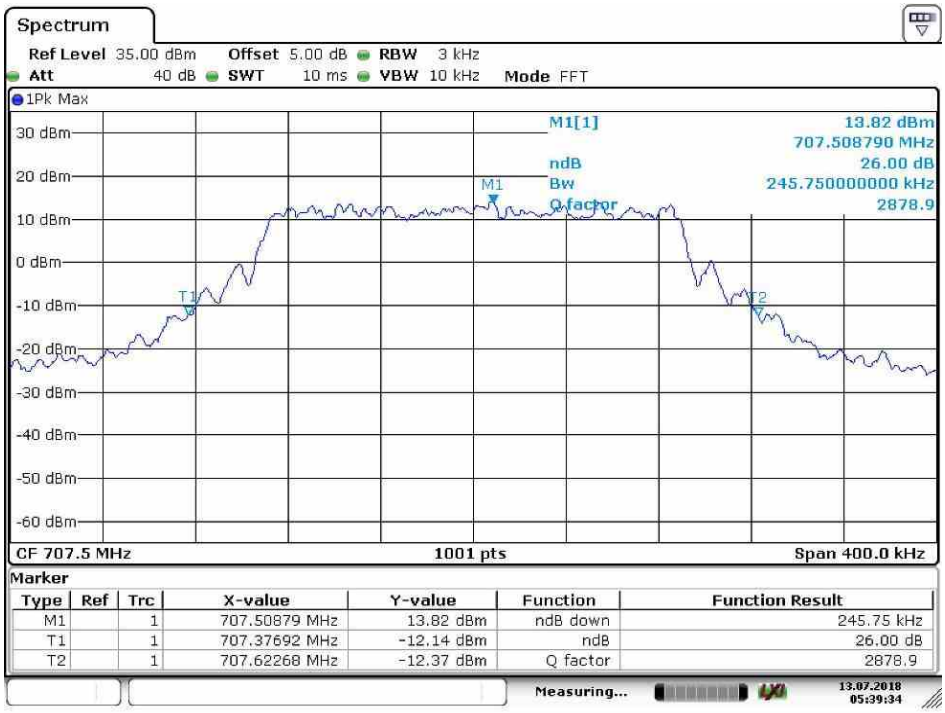


Date: 13.JUL.2018 05:05:48

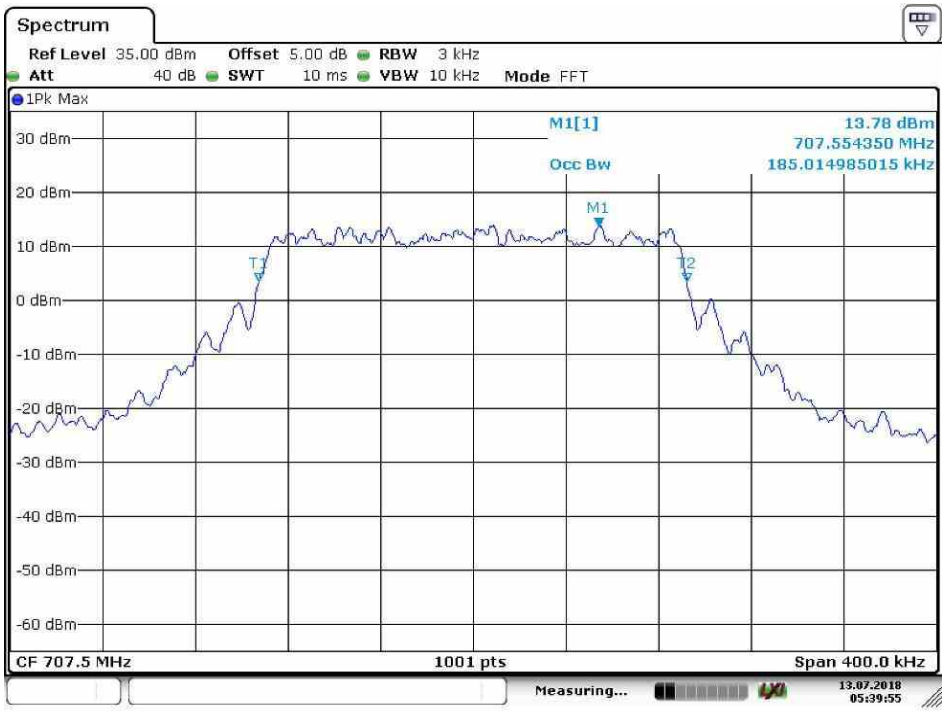


Date: 13.JUL.2018 05:05:21

4.1.1.1.2 Test Channel = MCH

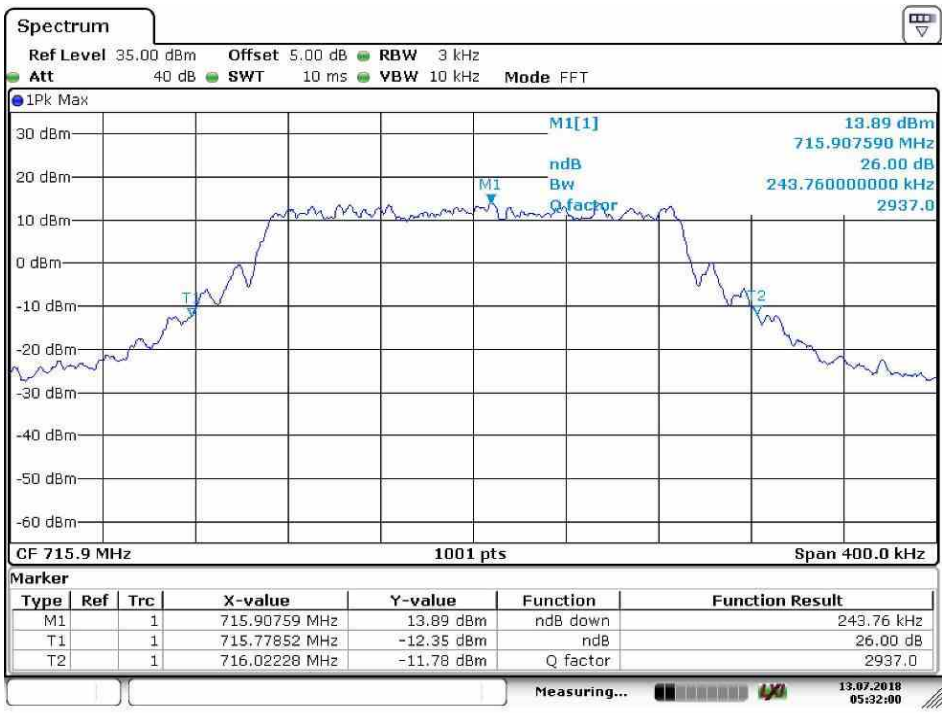


Date: 13.JUL.2018 05:39:34

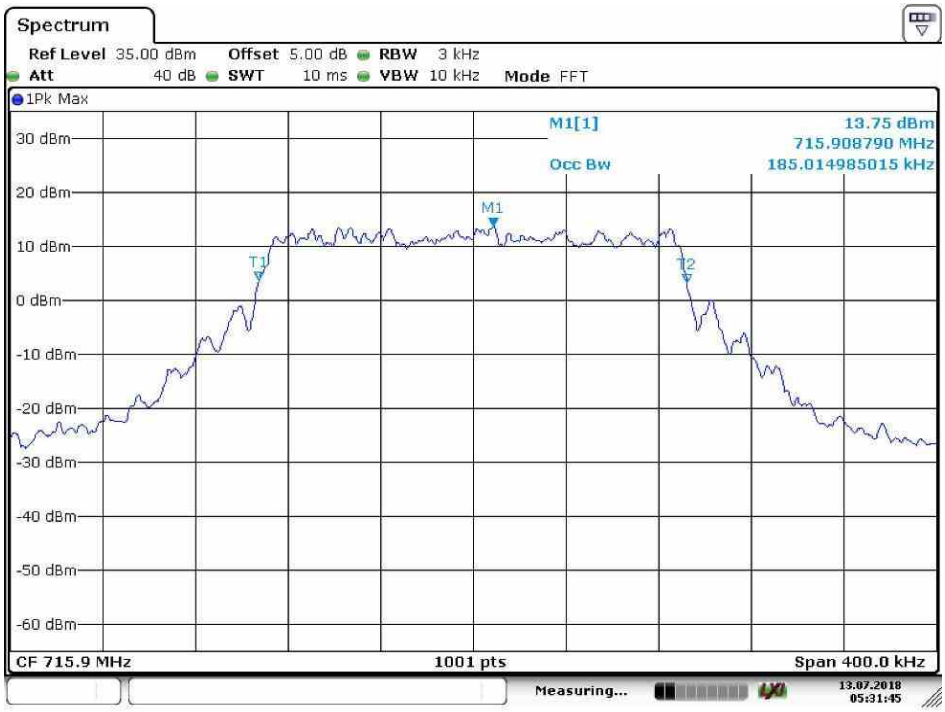


Date: 13.JUL.2018 05:39:55

4.1.1.1.3 Test Channel = HCH



Date: 13.JUL.2018 05:32:00



Date: 13.JUL.2018 05:31:46

5 Band Edges Compliance

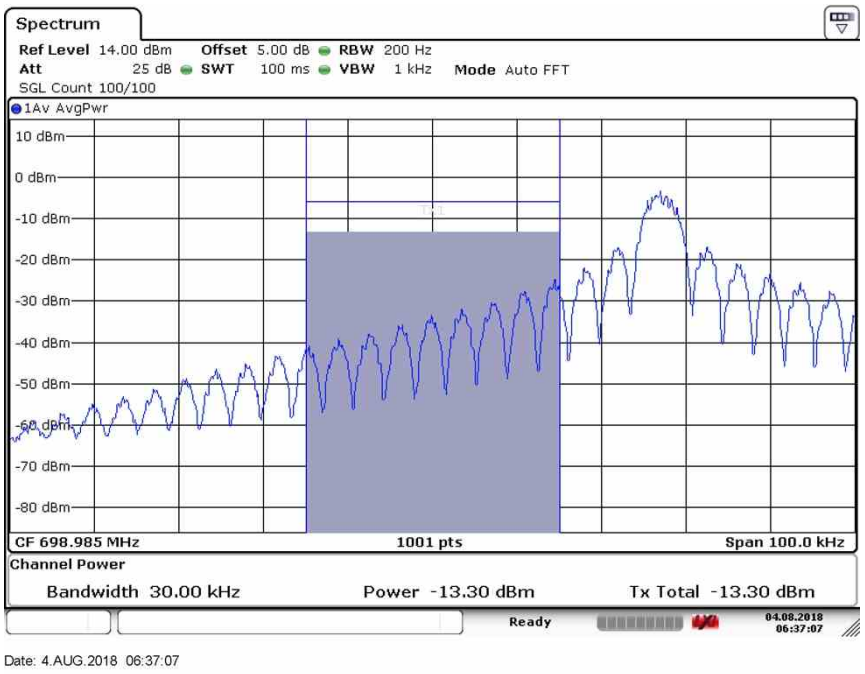
5.1 For LTE-NB1

5.1.1 Test Band = LTE-NB1 BAND12

5.1.1.1 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=3.75kHz

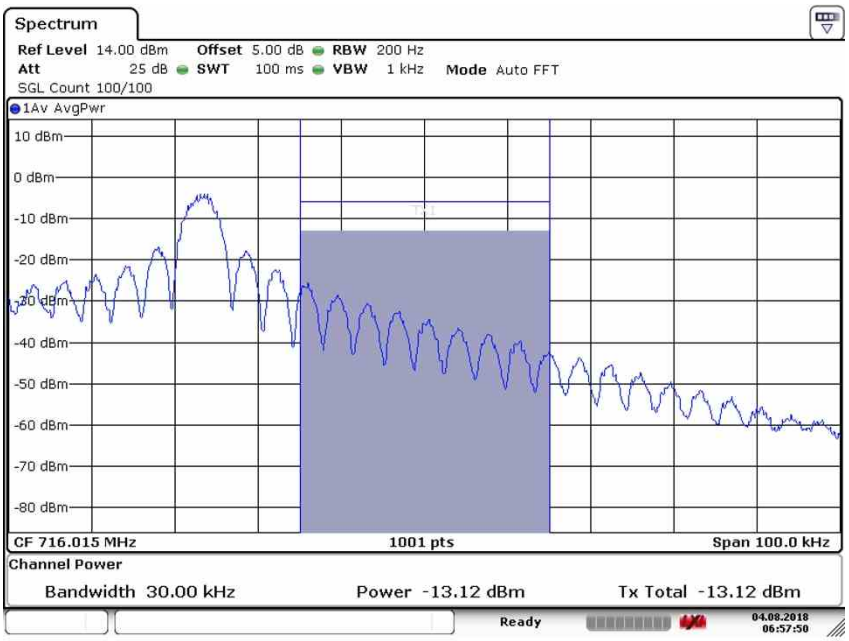
5.1.1.1.1 Test Channel = LCH

5.1.1.1.1.1 Test T size=1T



5.1.1.1.2 Test Channel = HCH

5.1.1.1.2.1 Test T size=1T

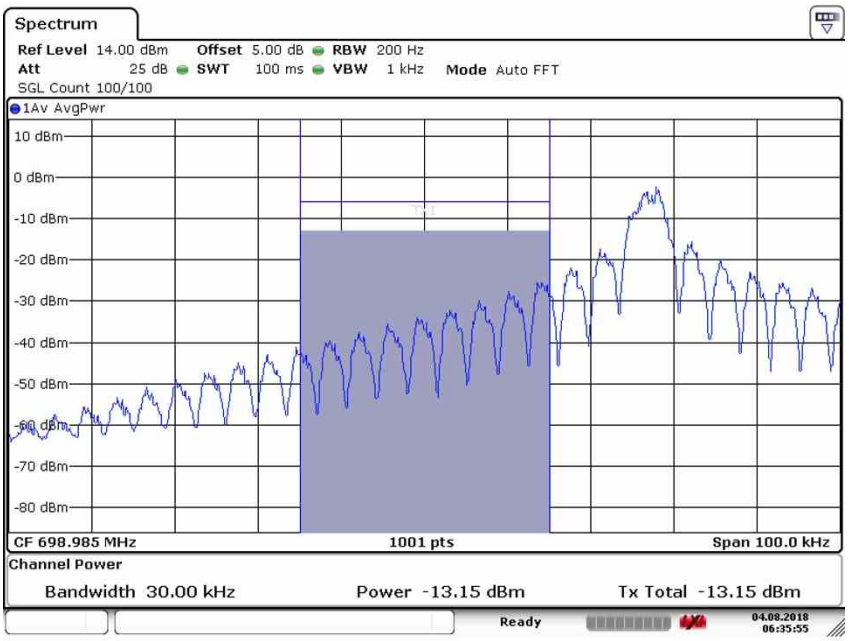


Date: 4.AUG.2018 06:57:50

5.1.1.2 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=3.75kHz

5.1.1.2.1 Test Channel = LCH

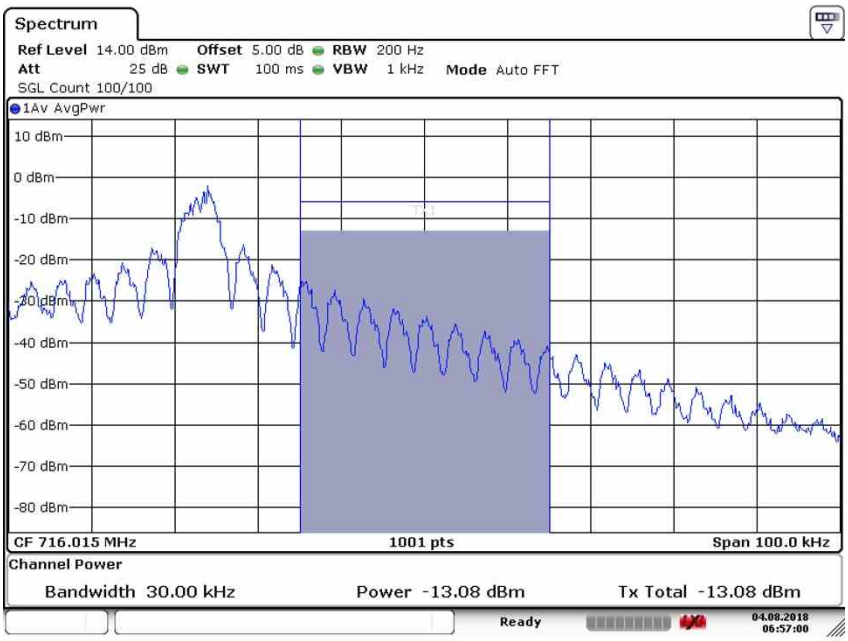
5.1.1.2.1.1 Test T size=1T



Date: 4.AUG.2018 06:35:56

5.1.1.2.2 Test Channel = HCH

5.1.1.2.2.1 Test T size=1T

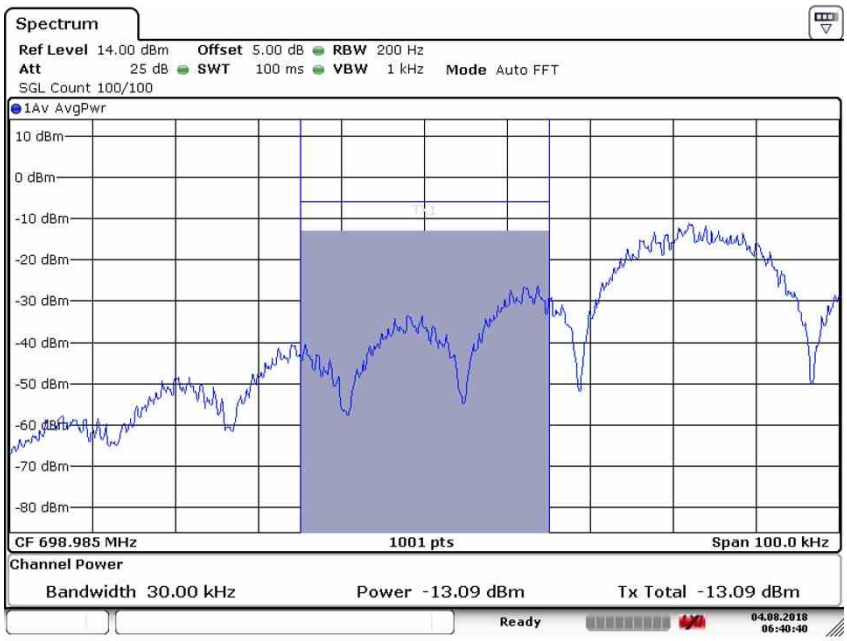


Date: 4.AUG.2018 06:57:01

5.1.1.3 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=15kHz

5.1.1.3.1 Test Channel = LCH

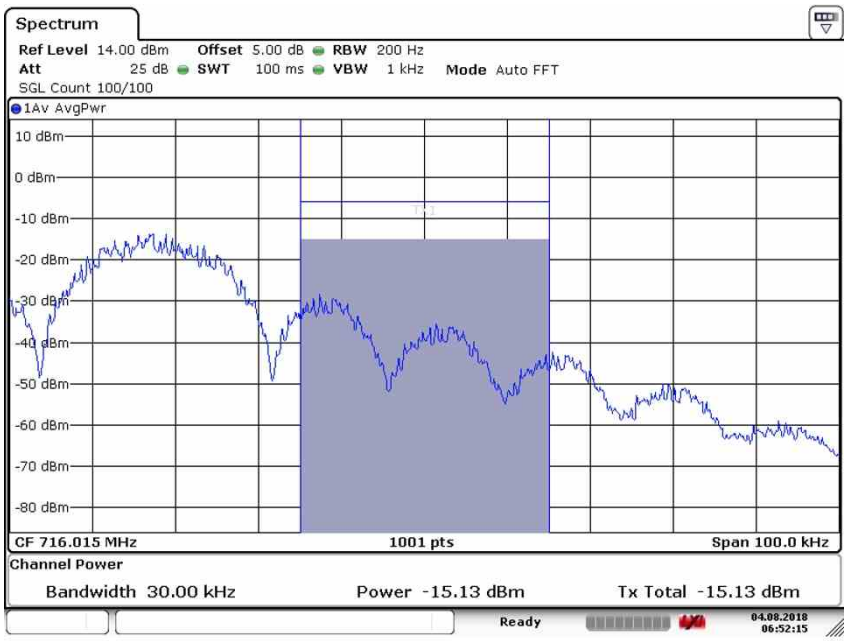
5.1.1.3.1.1 Test T size=1T



Date: 4.AUG.2018 06:40:41

5.1.1.3.2 Test Channel = HCH

5.1.1.3.2.1 Test T size=1T

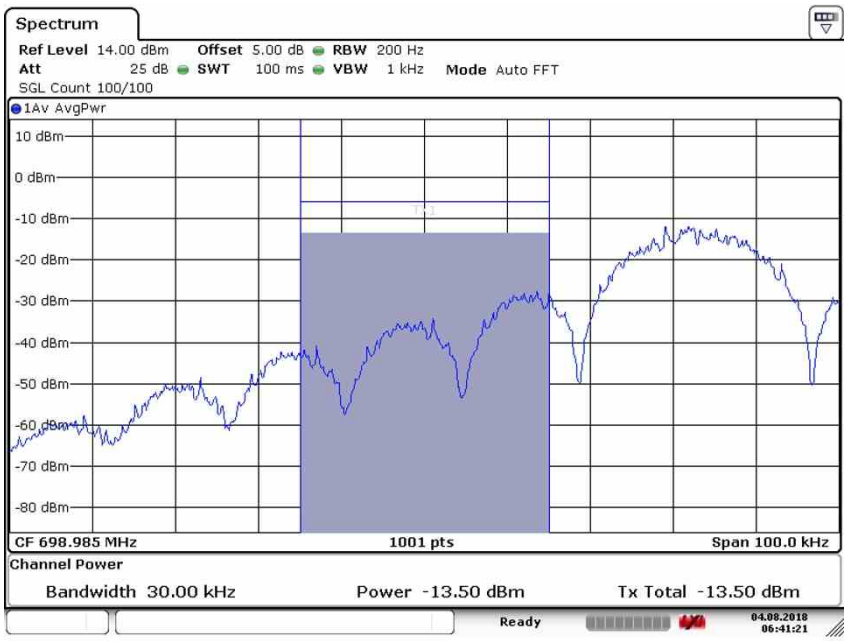


Date: 4.AUG.2018 06:52:16

5.1.1.4 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz

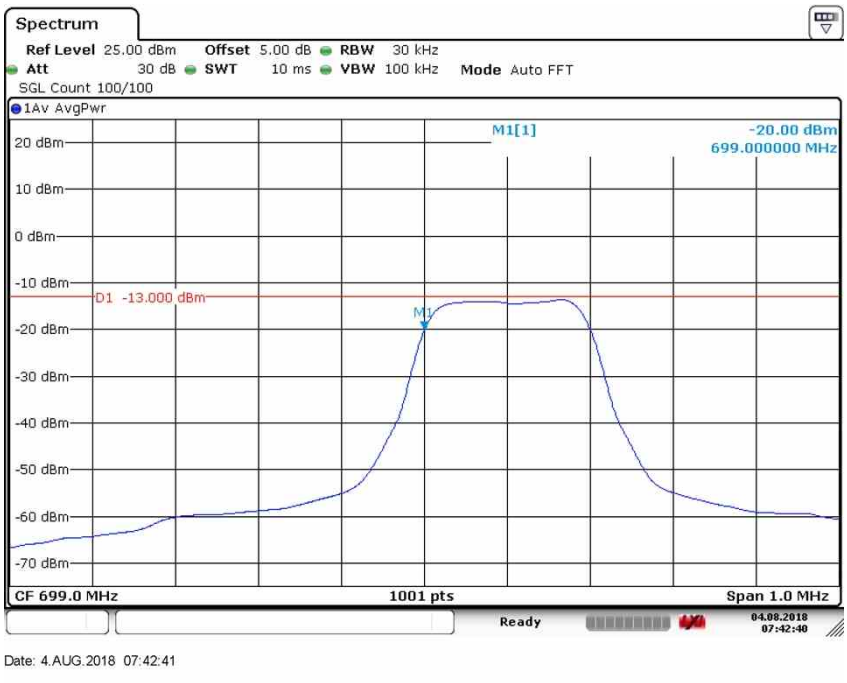
5.1.1.4.1 Test Channel = LCH

5.1.1.4.1.1 Test T size=1T



Date: 4.AUG.2018 06:41:21

5.1.1.4.1.2 Test T size=Full T



Date: 4.AUG.2018 07:42:41

5.1.1.4.2 Test Channel = HCH

5.1.1.4.2.1 Test T size=1T

Date: 4.AUG.2018 06:51:44

5.1.1.4.2.2 Test T size=Full T

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.

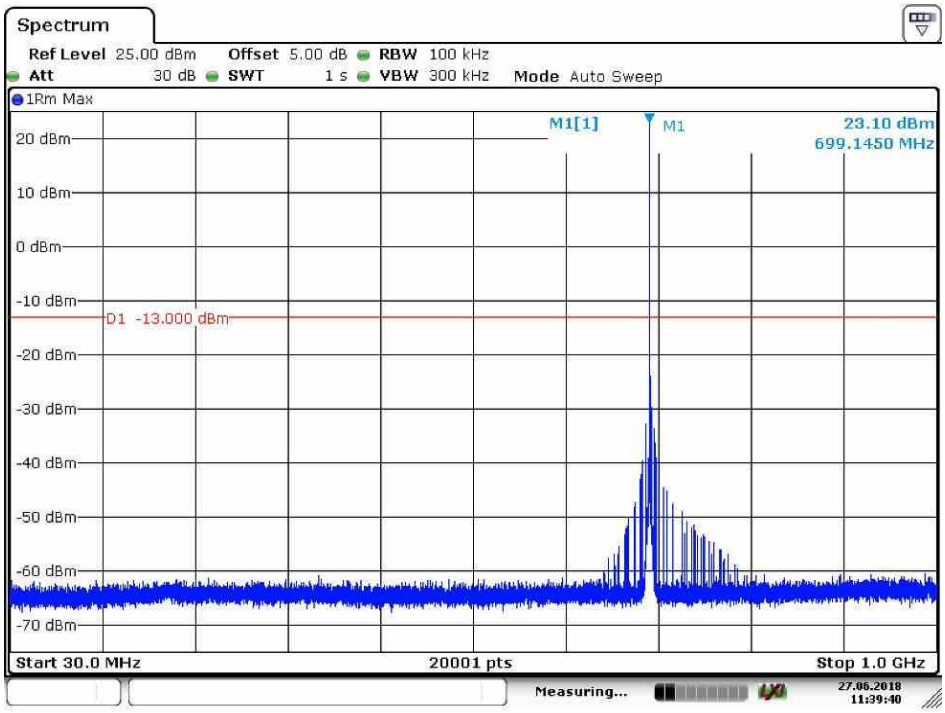
Part I - Test Plots

6.1 For LTE-NB1

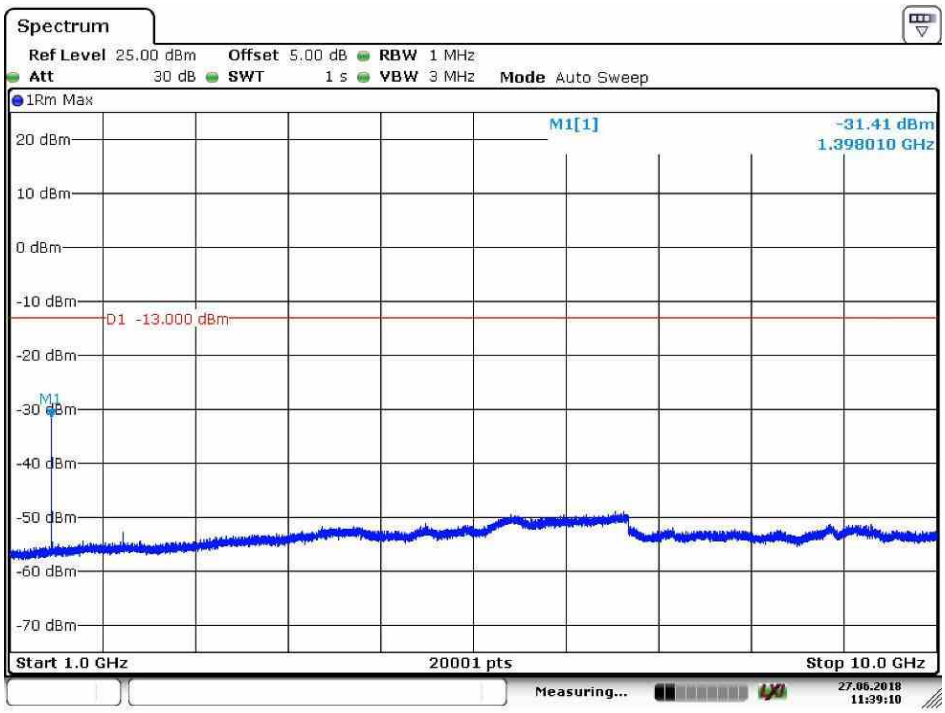
6.1.1 Test Band = LTE-NB1 BAND12

6.1.1.1 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=3.75kHz

6.1.1.1.1 Test Channel = LCH

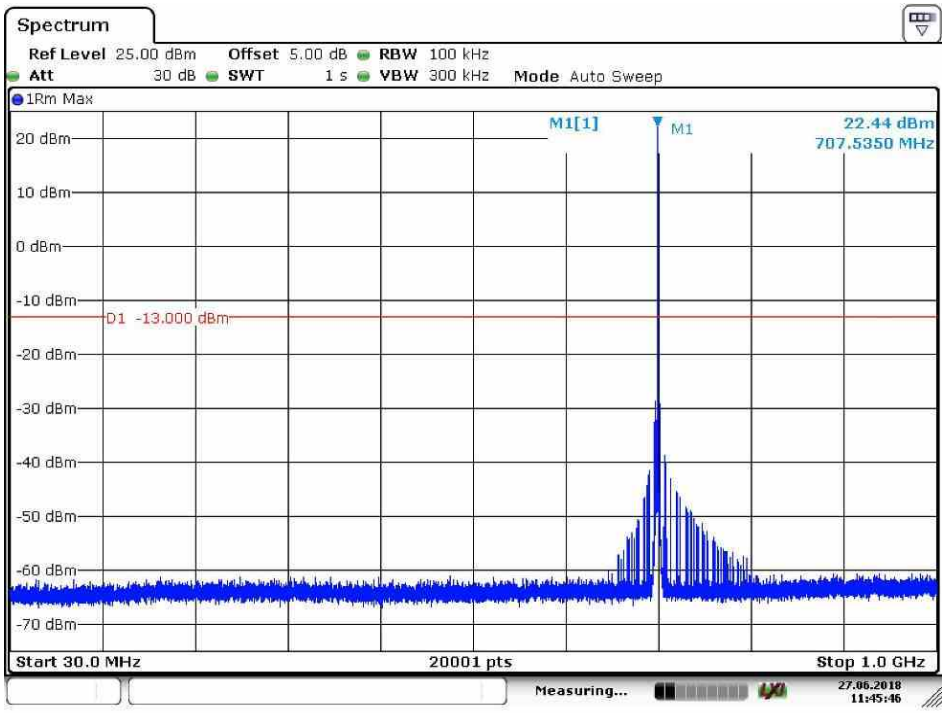


Date: 27.JUN.2018 11:39:40

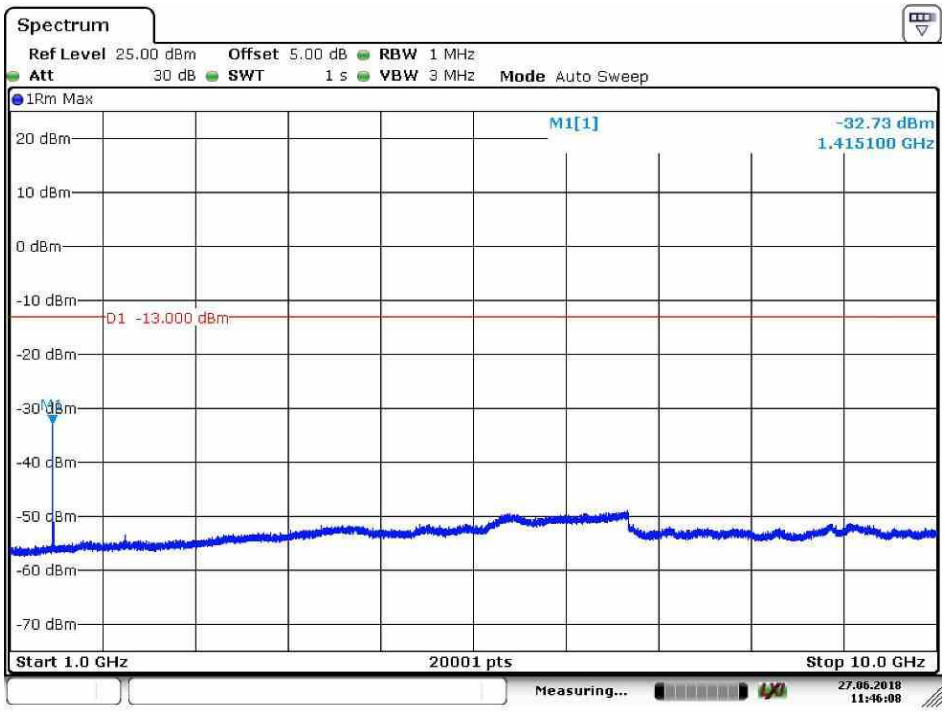


Date: 27.JUN.2018 11:39:11

6.1.1.1.2 Test Channel = MCH

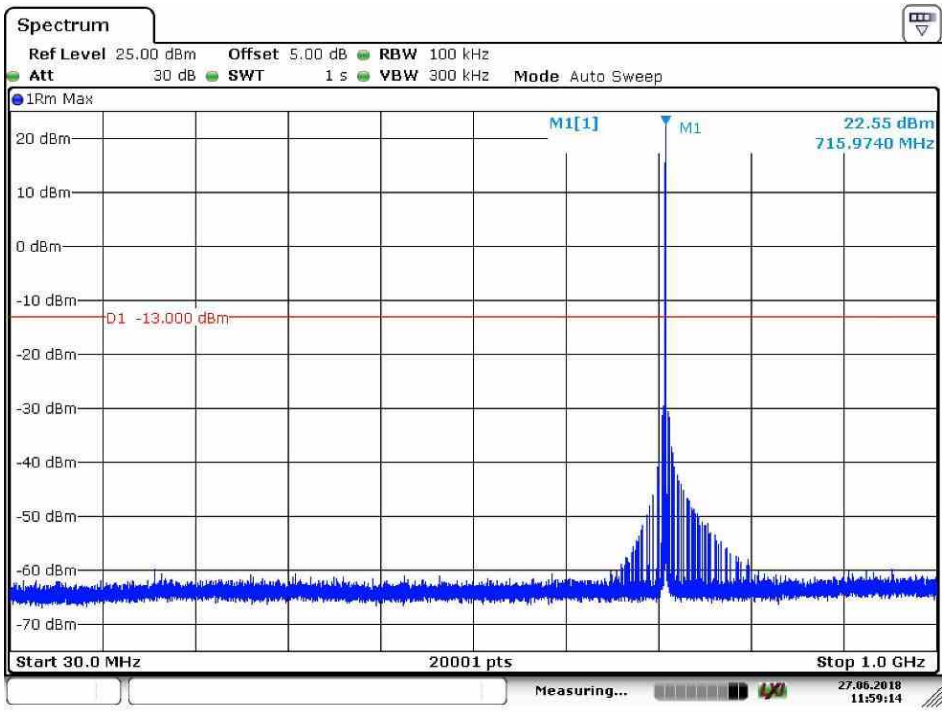


Date: 27.JUN.2018 11:45:47

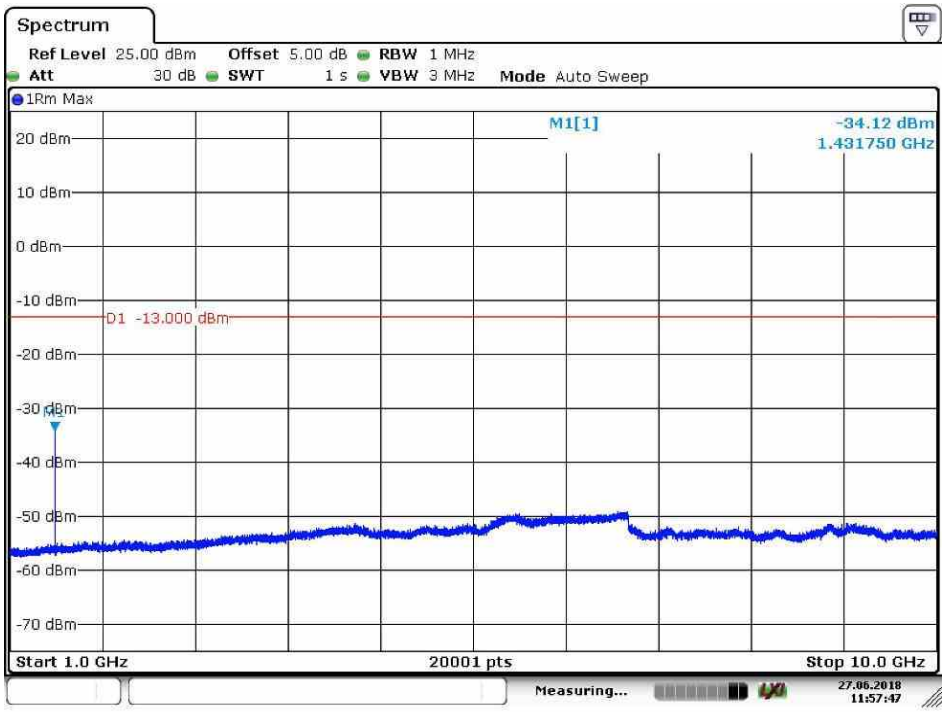


Date: 27.JUN.2018 11:46:09

6.1.1.1.3 Test Channel = HCH



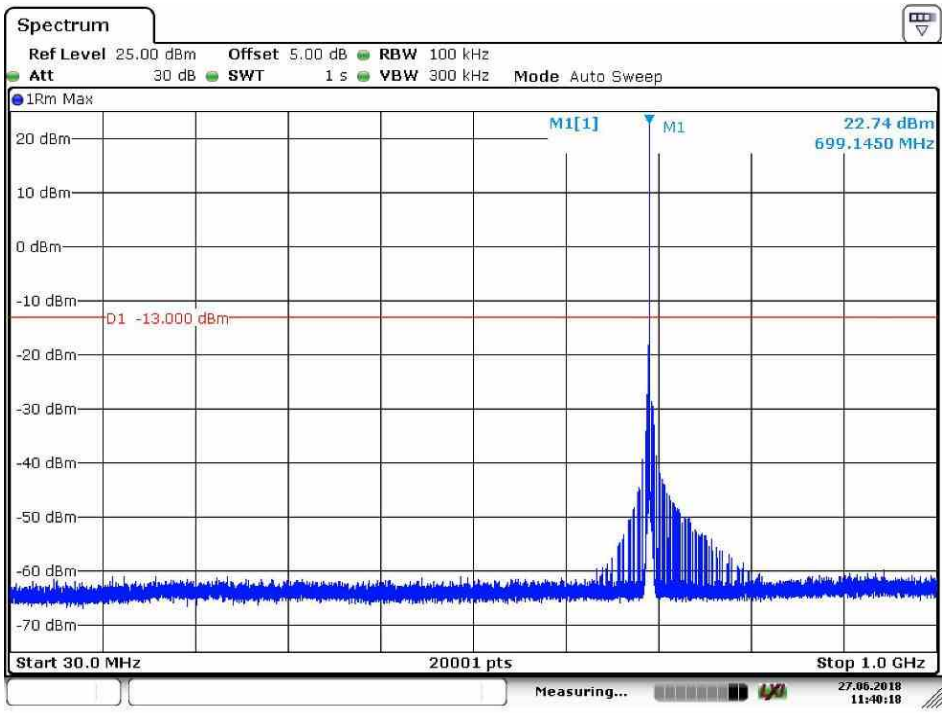
Date: 27.JUN.2018 11:59:14



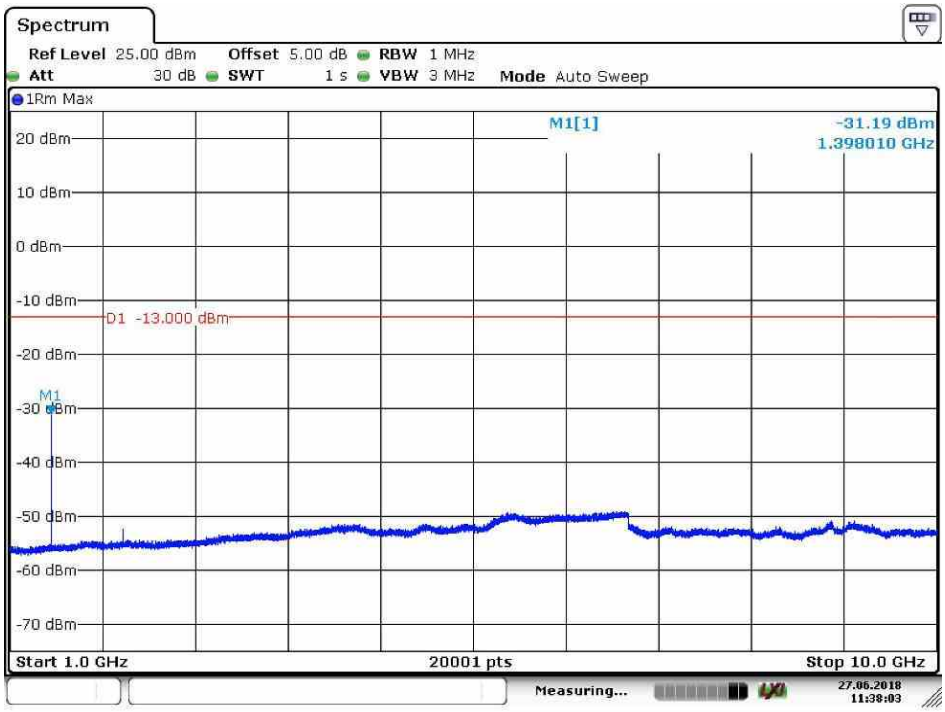
Date: 27.JUN.2018 11:57:47

6.1.1.2 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=3.75kHz

6.1.1.2.1 Test Channel = LCH

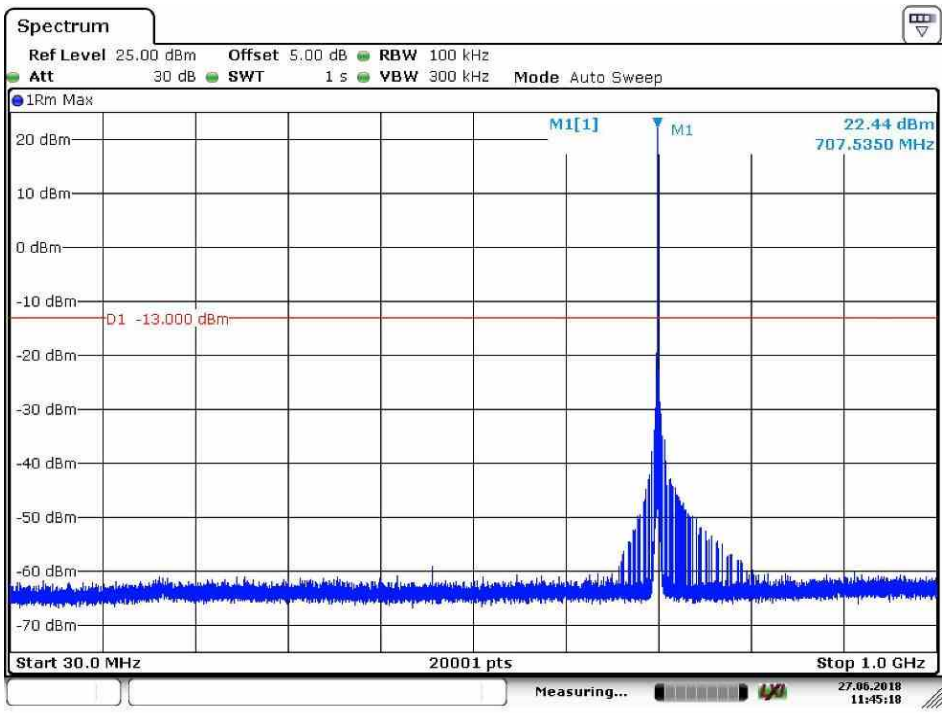


Date: 27.JUN.2018 11:40:19

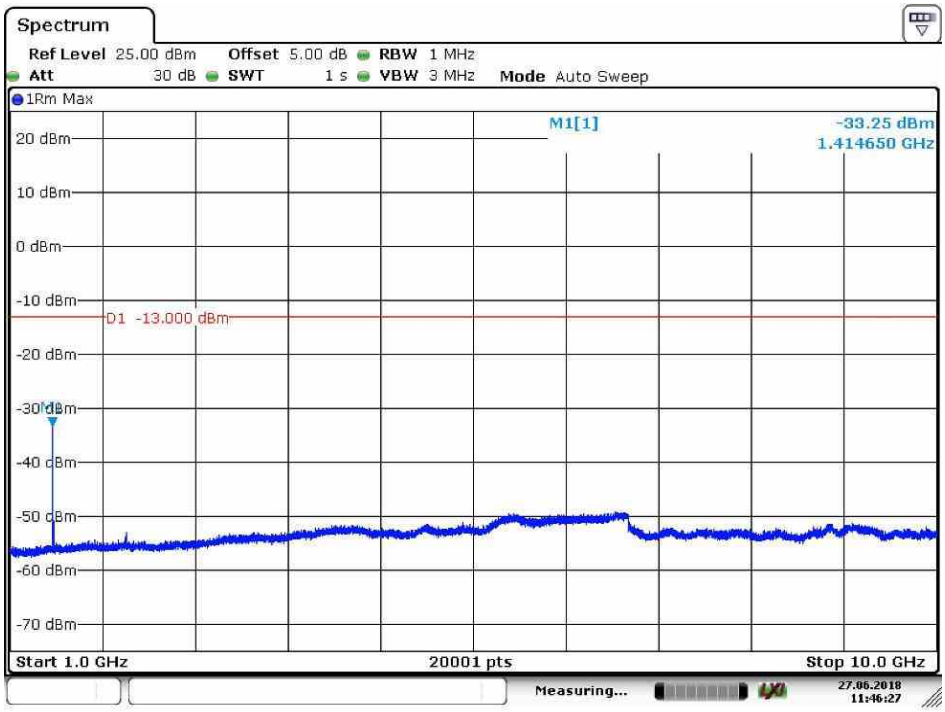


Date: 27.JUN.2018 11:38:03

6.1.1.2.2 Test Channel = MCH

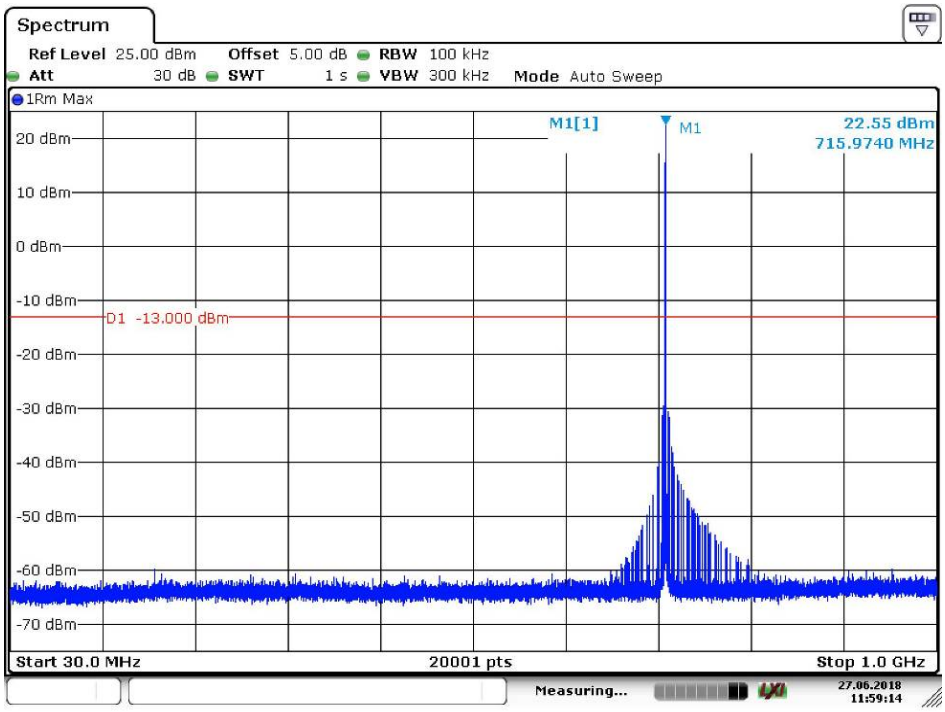


Date: 27.JUN.2018 11:45:18

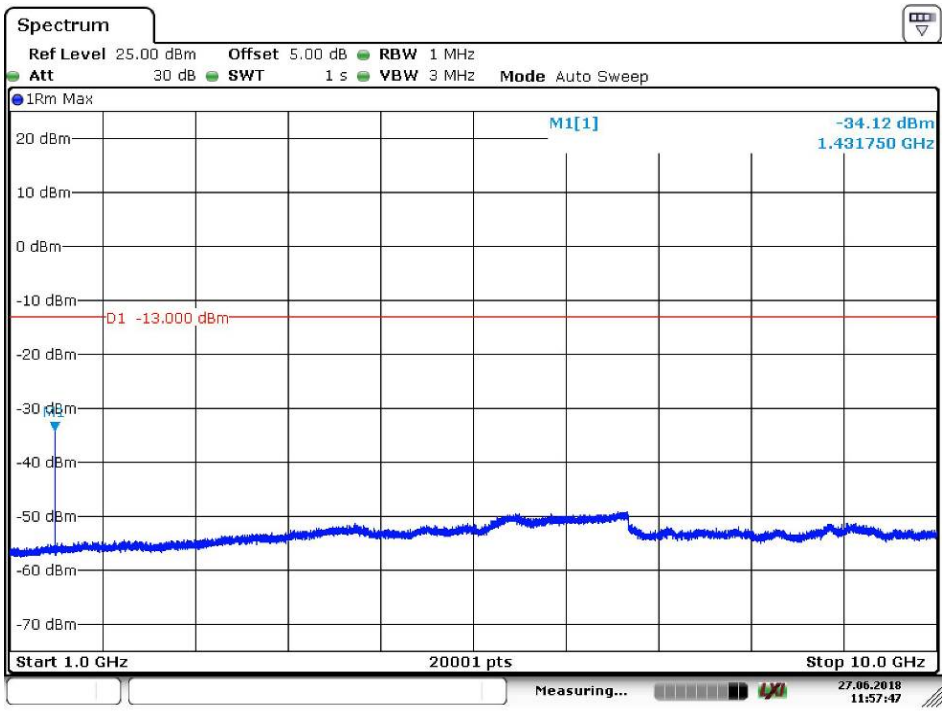


Date: 27.JUN.2018 11:46:27

6.1.1.2.3 Test Channel = HCH



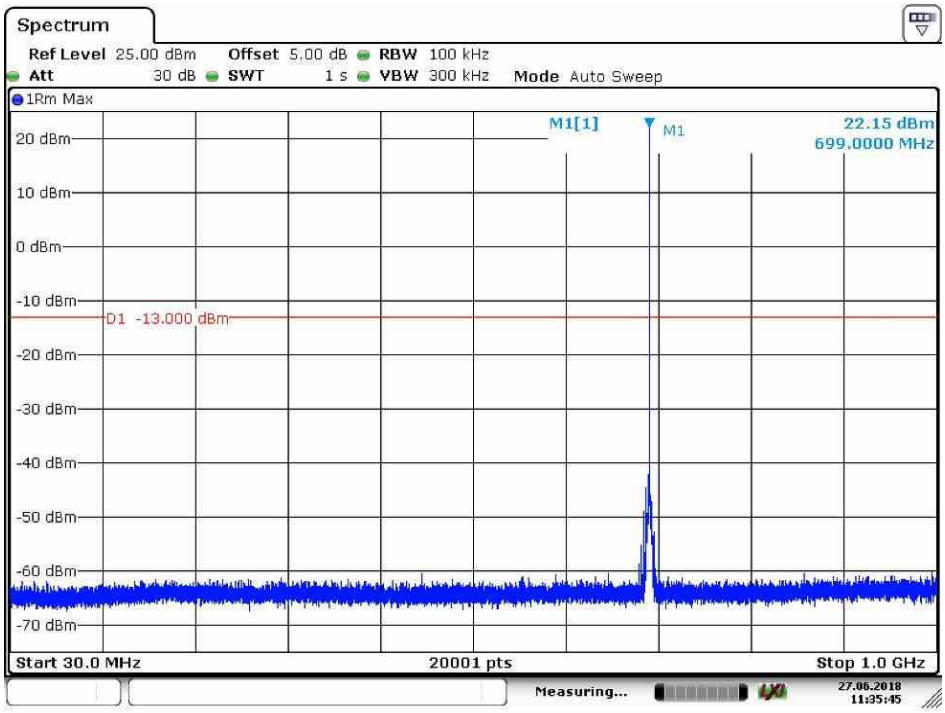
Date: 27.JUN.2018 11:59:14



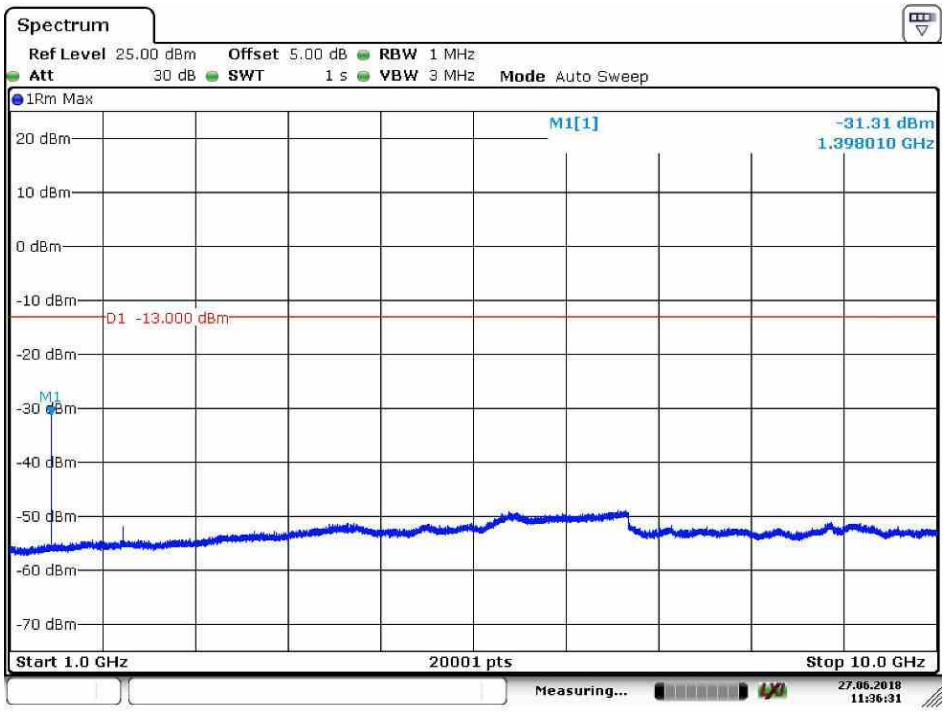
Date: 27.JUN.2018 11:57:47

6.1.1.3 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=15kHz

6.1.1.3.1 Test Channel = LCH

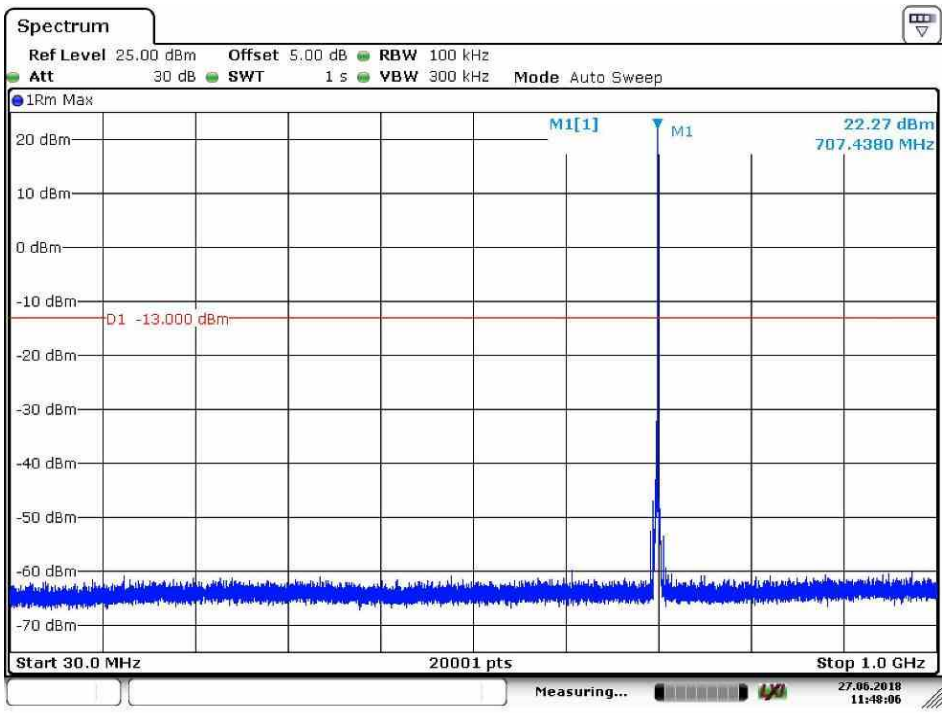


Date: 27.JUN.2018 11:35:45

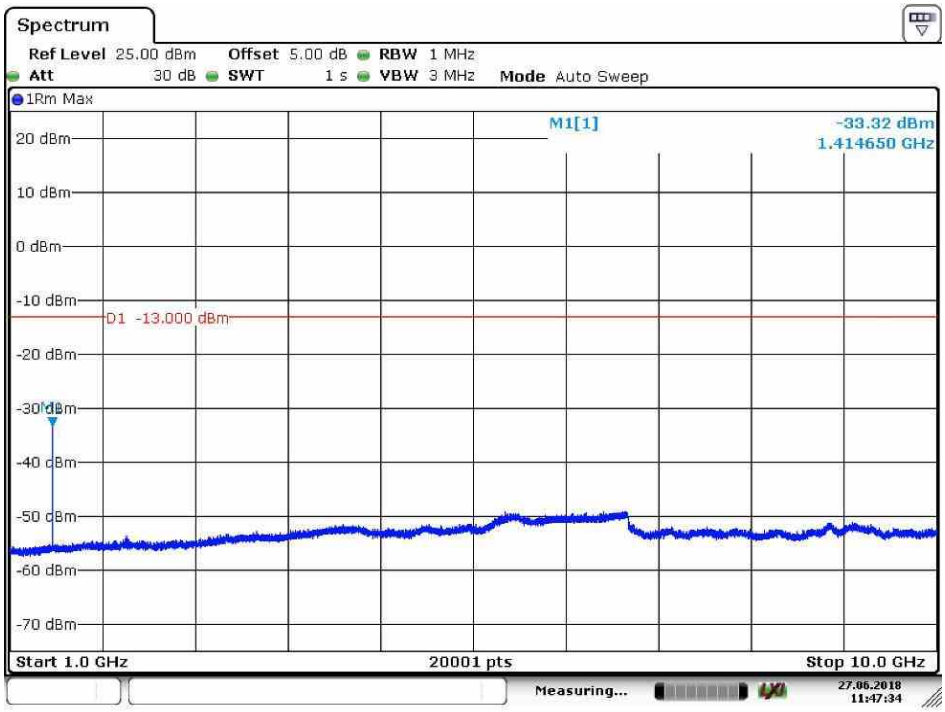


Date: 27.JUN.2018 11:36:31

6.1.1.3.2 Test Channel = MCH

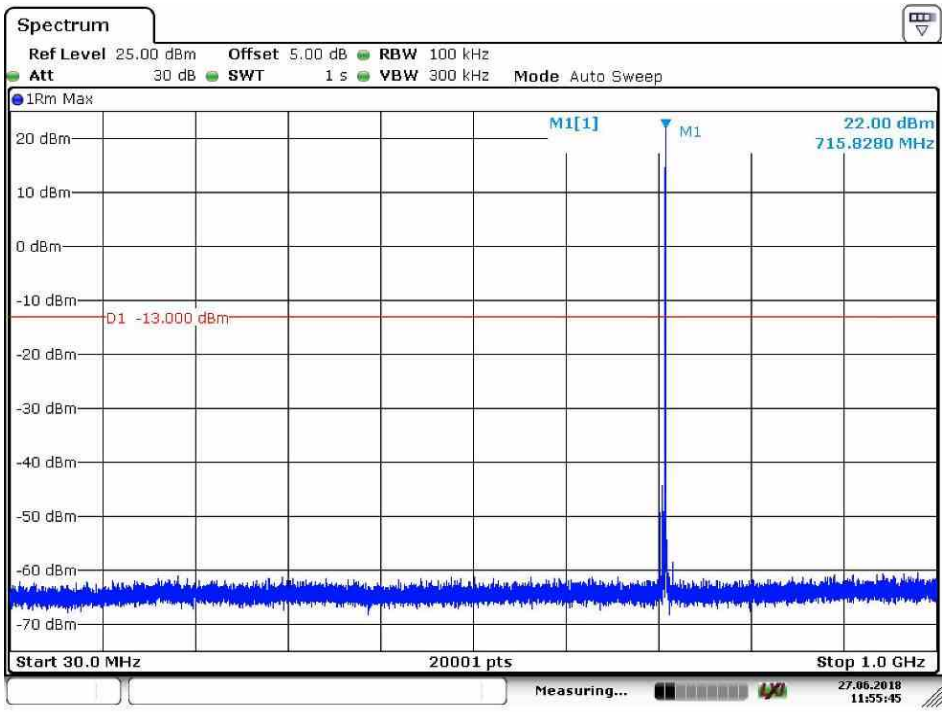


Date: 27.JUN.2018 11:48:07

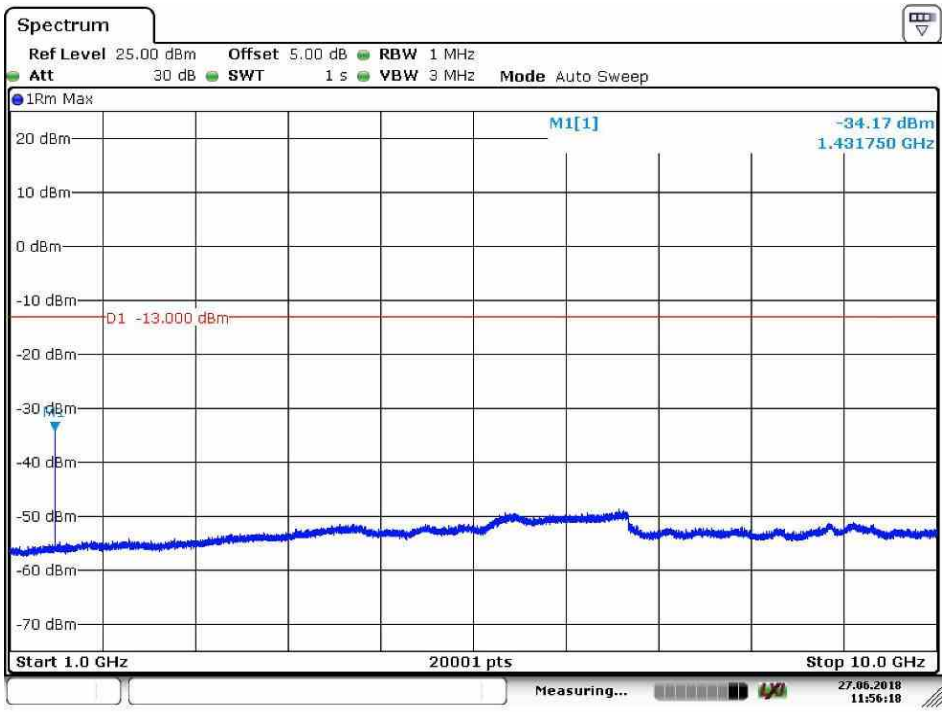


Date: 27.JUN.2018 11:47:35

6.1.1.3.3 Test Channel = HCH



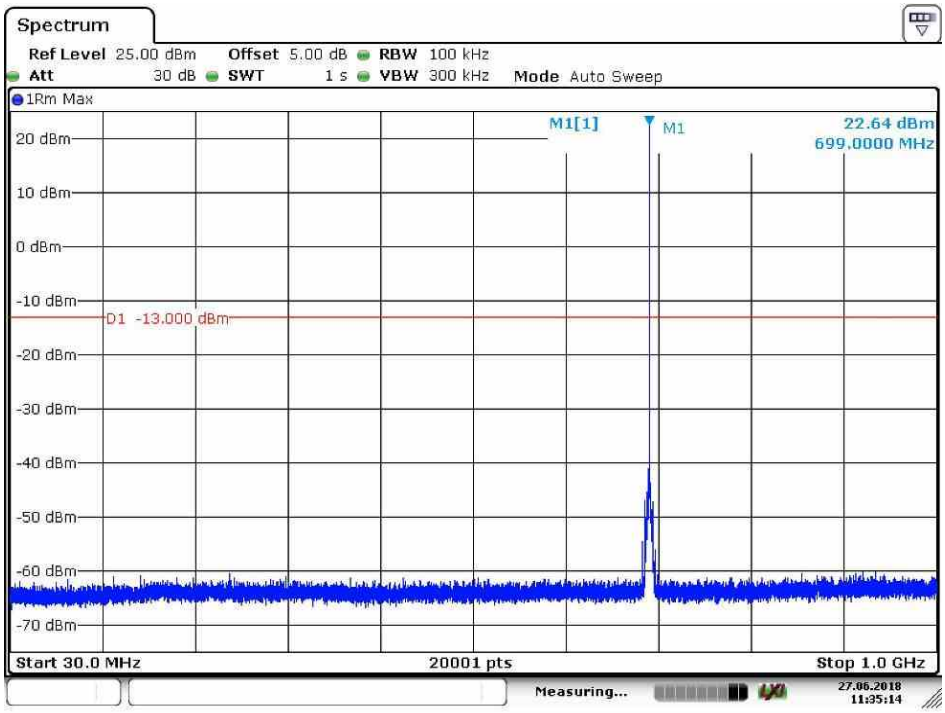
Date: 27.JUN.2018 11:55:46



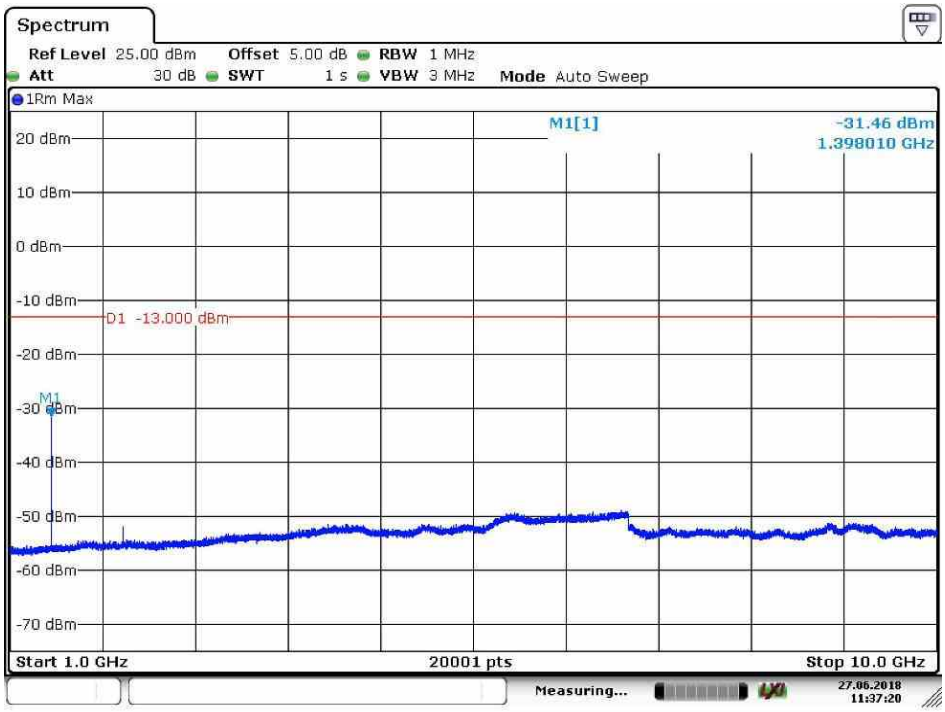
Date: 27.JUN.2018 11:56:18

6.1.1.4 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz

6.1.1.4.1 Test Channel = LCH



Date: 27.JUN.2018 11:35:14



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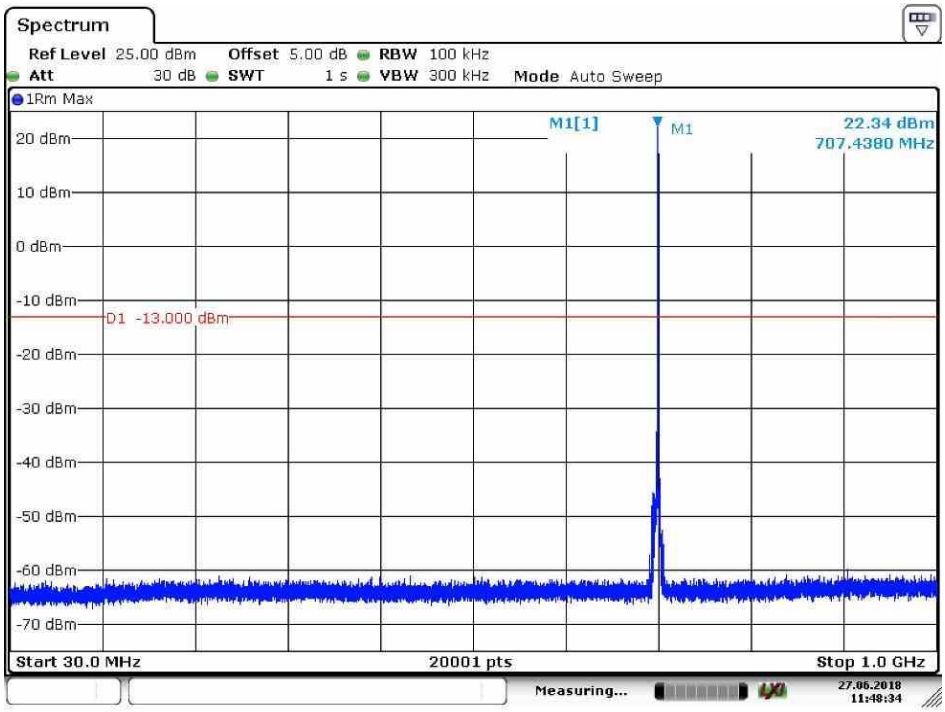
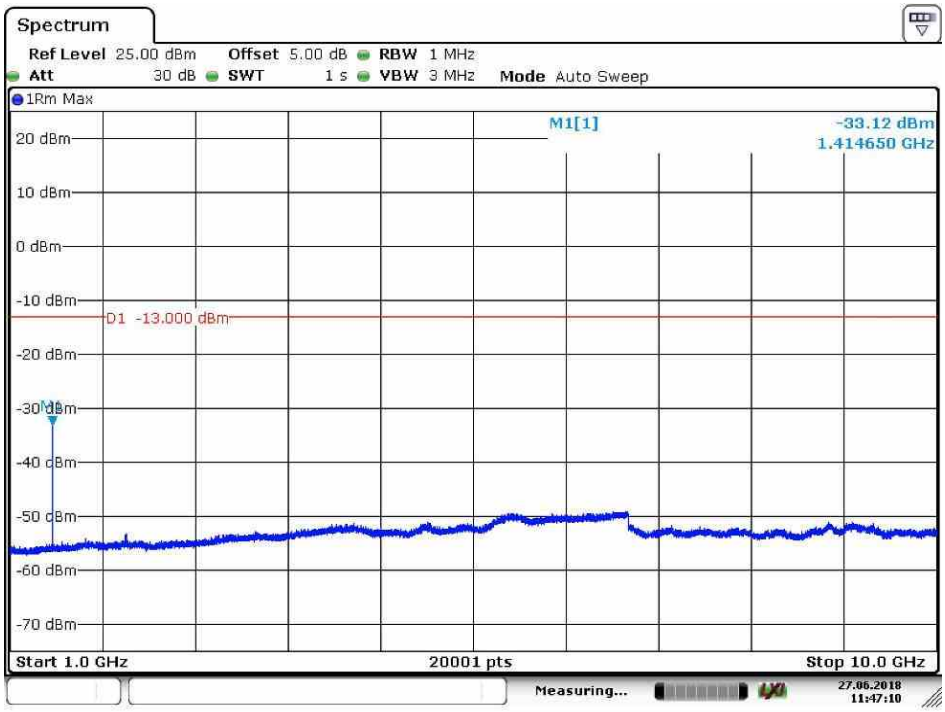
6.1.1.4.2 Test Channel = MCH



Date: 27.JUN.2018 11:48:35



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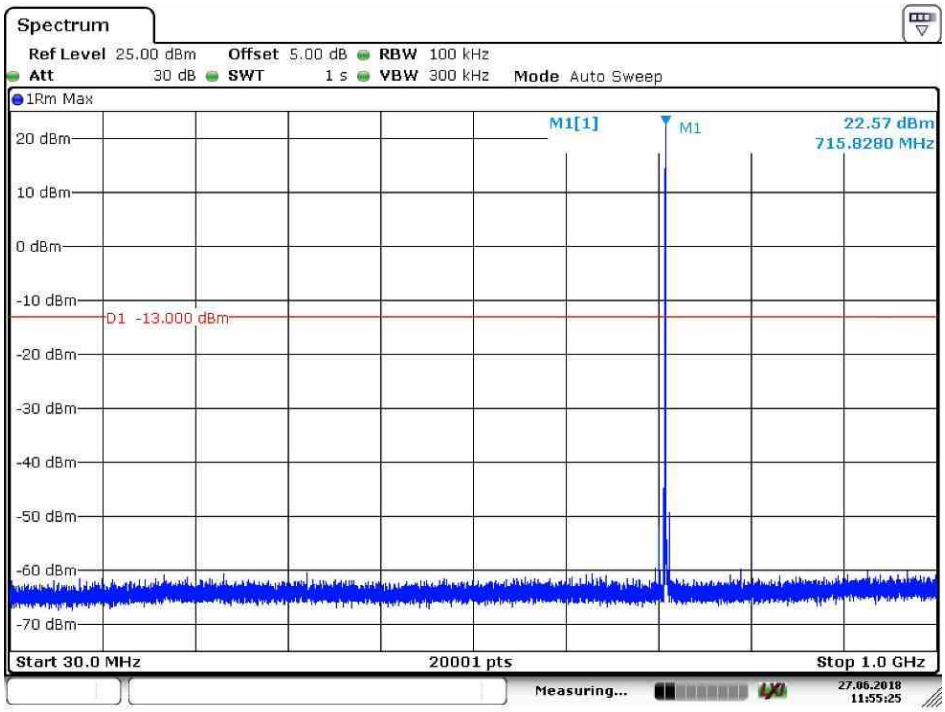
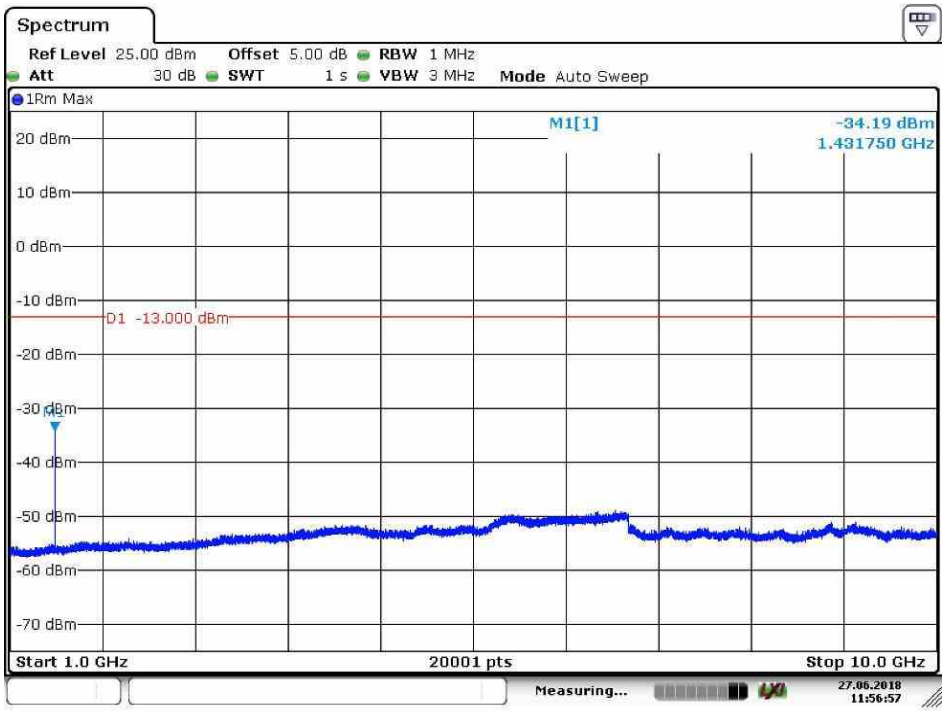
6.1.1.4.3 Test Channel = HCH



Date: 27.JUN.2018 11:55:25



Date: 27.JUN.2018 11:56:58

7 Field Strength of Spurious Radiation

7.1 For LTE-NB1

7.1.1 Test Band = LTE-NB1 BAND12

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

7.1.1.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.226667	-81.98	-13.00	-68.98	Vertical
1402.500000	-45.28	-13.00	-32.28	Vertical
2105.000000	-52.97	-13.00	-39.97	Vertical
3507.000000	-66.84	-13.00	-53.84	Vertical
5173.762500	-66.80	-13.00	-53.80	Vertical
6049.800000	-65.21	-13.00	-52.21	Vertical
62.713333	-77.70	-13.00	-64.70	Horizontal
1402.500000	-37.16	-13.00	-24.16	Horizontal
2104.500000	-52.73	-13.00	-39.73	Horizontal
3507.487500	-68.03	-13.00	-55.03	Horizontal
5048.475000	-66.48	-13.00	-53.48	Horizontal
7807.725000	-64.27	-13.00	-51.27	Horizontal

7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.880000	-81.43	-13.00	-68.43	Vertical
568.295833	-81.12	-13.00	-68.12	Vertical
1415.000000	-48.27	-13.00	-35.27	Vertical
2122.500000	-59.91	-13.00	-46.91	Vertical
3537.712500	-67.44	-13.00	-54.44	Vertical
7074.037500	-63.19	-13.00	-50.19	Vertical
62.993333	-77.98	-13.00	-64.98	Horizontal
943.258333	-62.29	-13.00	-49.29	Horizontal
1414.500000	-40.94	-13.00	-27.94	Horizontal
2122.500000	-53.91	-13.00	-40.91	Horizontal
3536.737500	-66.73	-13.00	-53.73	Horizontal
7917.900000	-64.02	-13.00	-51.02	Horizontal

7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.440000	-81.89	-13.00	-68.89	Vertical
124.966667	-87.69	-13.00	-74.69	Vertical
1427.000000	-49.15	-13.00	-36.15	Vertical
2140.500000	-59.41	-13.00	-46.41	Vertical
3566.962500	-67.58	-13.00	-54.58	Vertical
5708.062500	-65.99	-13.00	-52.99	Vertical
61.920000	-78.33	-13.00	-65.33	Horizontal
104.293333	-84.75	-13.00	-71.75	Horizontal
1426.500000	-40.28	-13.00	-27.28	Horizontal
2140.500000	-56.92	-13.00	-43.92	Horizontal
3566.962500	-66.69	-13.00	-53.69	Horizontal
7708.762500	-64.94	-13.00	-51.94	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) We have tested all modulation and all bandwidth, but only the worst case data presented in this report.

8 Frequency Stability

8.1 Frequency Error VS. Voltage

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
BAND12	TM1/15k	LCH	TN	VL	3.46	0.004956	PASS
				VN	7.56	0.010813	PASS
				VH	-6.96	-0.009957	PASS
		MCH	TN	VL	-5.39	-0.007614	PASS
				VN	-5.86	-0.008286	PASS
				VH	-3.85	-0.005447	PASS
		HCH	TN	VL	-0.38	-0.000526	PASS
				VN	-6.56	-0.009159	PASS
				VH	-1.51	-0.002107	PASS
	TM2/15k	LCH	TN	VL	-2.99	-0.004272	PASS
				VN	1.62	0.002314	PASS
				VH	3.88	0.005550	PASS
		MCH	TN	VL	7.95	0.011233	PASS
				VN	9.62	0.013599	PASS
				VH	-0.62	-0.000879	PASS
		HCH	TN	VL	-5.47	-0.007637	PASS
				VN	4.99	0.006969	PASS
				VH	7.63	0.010658	PASS

8.2 Frequency Error VS. Temperature

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
BAND12	TM1 15kHz	LCH	VN	-30	9.47	0.013544	PASS
				-20	8.01	0.011459	PASS
				-10	-4.79	-0.006852	PASS
				0	-1.49	-0.002137	PASS
				10	6.86	0.009819	PASS
				20	3.29	0.004704	PASS
				30	-9.22	-0.013183	PASS
				40	-1.10	-0.001567	PASS
				50	0.53	0.000763	PASS
		MCH	VN	-30	9.90	0.013995	PASS
				-20	7.63	0.010778	PASS
				-10	2.88	0.004067	PASS
				0	6.27	0.008866	PASS
				10	9.36	0.013230	PASS
				20	-2.09	-0.002952	PASS
				30	-3.37	-0.004757	PASS
				40	4.01	0.005665	PASS
				50	-0.85	-0.001206	PASS
		HCH	VN	-30	6.69	0.009340	PASS
				-20	-5.94	-0.008293	PASS
				-10	3.17	0.004424	PASS
				0	-3.49	-0.004872	PASS
				10	-5.21	-0.007273	PASS
				20	6.30	0.008801	PASS
				30	3.64	0.005088	PASS
				40	-2.15	-0.003005	PASS
				50	1.04	0.001447	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
BAND12	TM2 15kHz	LCH	VN	-30	0.75	0.001067	PASS
				-20	7.35	0.010509	PASS
				-10	-4.48	-0.006407	PASS
				0	-7.89	-0.011292	PASS
				10	-1.84	-0.002629	PASS
				20	9.47	0.013550	PASS
				30	8.99	0.012854	PASS
				40	1.04	0.001494	PASS
				50	-0.03	-0.000041	PASS
		MCH	VN	-30	-5.73	-0.008106	PASS
				-20	5.21	0.007362	PASS
				-10	-6.32	-0.008936	PASS
				0	5.63	0.007961	PASS
				10	-1.10	-0.001556	PASS
				20	5.88	0.008309	PASS
				30	-3.33	-0.004700	PASS
				40	6.56	0.009272	PASS
				50	-1.87	-0.002644	PASS
		HCH	VN	-30	-9.39	-0.013116	PASS
				-20	-2.76	-0.003862	PASS
				-10	9.16	0.012793	PASS
				0	-8.34	-0.011654	PASS
				10	-7.38	-0.010312	PASS
				20	7.03	0.009826	PASS
				30	-3.37	-0.004713	PASS
				40	-4.93	-0.006888	PASS
				50	-8.62	-0.012035	PASS

The End