



Appendix B

LTE-NB1 BAND 13



CONTENT

	Page
1 EFFECTIVE (ISOTROPIC) RADIATED POWER OUTPUT DATA.....	3
2 PEAK-TO-AVERAGE RATIO.....	4
2.1 FOR LTE-NB1.....	4
2.1.1 <i>Test Band = LTE-NB1 band13</i>	4
3 MODULATION CHARACTERISTICS	9
3.1 FOR LTE-NB1.....	9
3.1.1 <i>Test Band = LTE-NB1 band13</i>	9
4 BANDWIDTH.....	11
4.1 FOR LTE-NB1.....	11
4.1.1 <i>Test Band = LTE-NB1 band13</i>	11
5 BAND EDGES COMPLIANCE.....	15
5.1 FOR LTE-NB1.....	15
5.1.1 <i>Test Band = LTE-NB1 band13</i>	15
6 SPURIOUS EMISSION AT ANTENNA TERMINAL.....	21
6.1 FOR LTE-NB1.....	21
6.1.1 <i>Test Band = LTE-NB1 band13</i>	21
7 FIELD STRENGTH OF SPURIOUS RADIATION	28
7.1 FOR LTE-NB1.....	28
7.1.1 <i>Test Band = LTE-NB1 band13</i>	28
8 FREQUENCY STABILITY.....	30
8.1 FREQUENCY ERROR VS. VOLTAGE	30
8.2 FREQUENCY ERROR VS. TEMPERATURE	31



1 Effective (Isotropic) Radiated Power Output Data

Effective Isotropic Radiated Power of Transmitter (EIRP) for LTE-NB1 BAND13

Test Band	Test Mode	Sub-carrier Spacing (kHz)	Test channel	Number of T	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND13	TM1	3.75	LCH	1T0	22.73	19.78	34.77	PASS
				1T47	22.64	19.69	34.77	PASS
			MCH	1T0	22.61	19.66	34.77	PASS
				1T47	22.67	19.72	34.77	PASS
			HCH	1T0	22.67	19.72	34.77	PASS
				1T47	22.54	19.59	34.77	PASS
	TM2	3.75	LCH	1T0	22.67	19.72	34.77	PASS
				1T47	22.7	19.75	34.77	PASS
			MCH	1T0	22.75	19.8	34.77	PASS
				1T47	22.64	19.69	34.77	PASS
			HCH	1T0	22.68	19.73	34.77	PASS
				1T47	22.63	19.68	34.77	PASS

Test Band	Test Mode	Sub-carrier Spacin (kHz)	Test channel	Number of T	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND13	TM1	15	LCH	1T0	23.02	20.07	34.77	PASS
				1T11	23.15	20.2	34.77	PASS
			MCH	1T0	22.83	19.88	34.77	PASS
				1T11	22.78	19.83	34.77	PASS
			HCH	1T0	22.81	19.86	34.77	PASS
				1T11	22.71	19.76	34.77	PASS
	TM2	15	LCH	1T0	23.07	20.12	34.77	PASS
				1T11	23.03	20.08	34.77	PASS
				12T0	21.15	18.2	34.77	PASS
			MCH	1T0	22.87	19.92	34.77	PASS
				1T11	22.95	20	34.77	PASS
				12T0	20.88	17.93	34.77	PASS
			HCH	1T0	22.75	19.8	34.77	PASS
				1T11	22.73	19.78	34.77	PASS
				12T0	22.84	19.89	34.77	PASS

Note:

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

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

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
BAND13	TM1/1T	LCH	4.46	13	PASS
		MCH	4.52	13	PASS
		HCH	4.61	13	PASS
	TM2/1T	LCH	3.97	13	PASS
		MCH	4.14	13	PASS
		HCH	4.03	13	PASS
	TM2/Full T	LCH	4.29	13	PASS
		MCH	4.04	13	PASS
		HCH	4.03	13	PASS

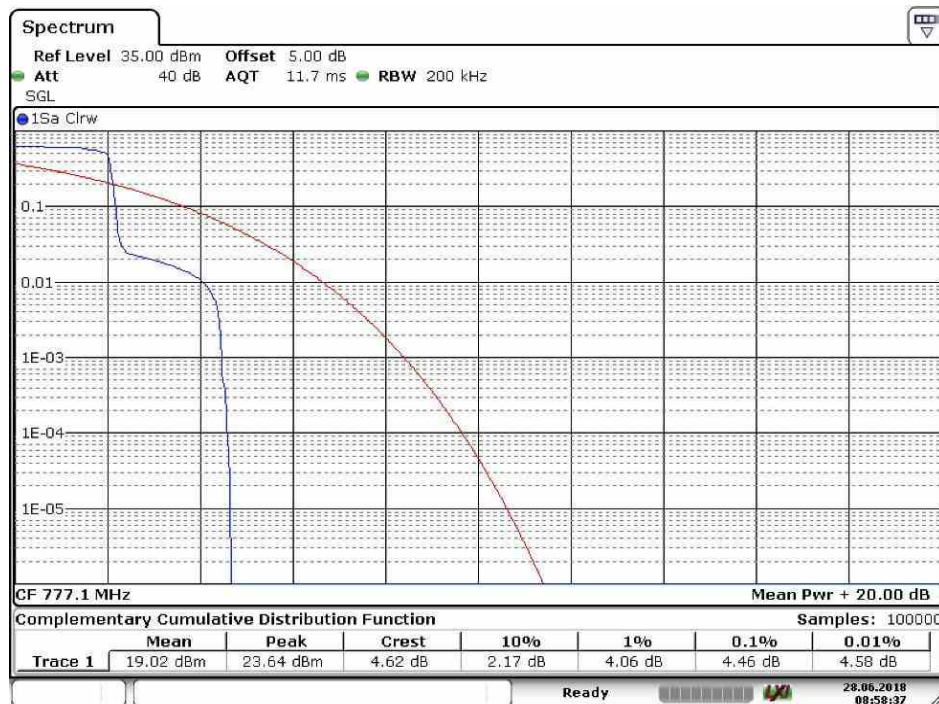
Part II - Test Plots

2.1 For LTE-NB1

2.1.1 Test Band = LTE-NB1 band13

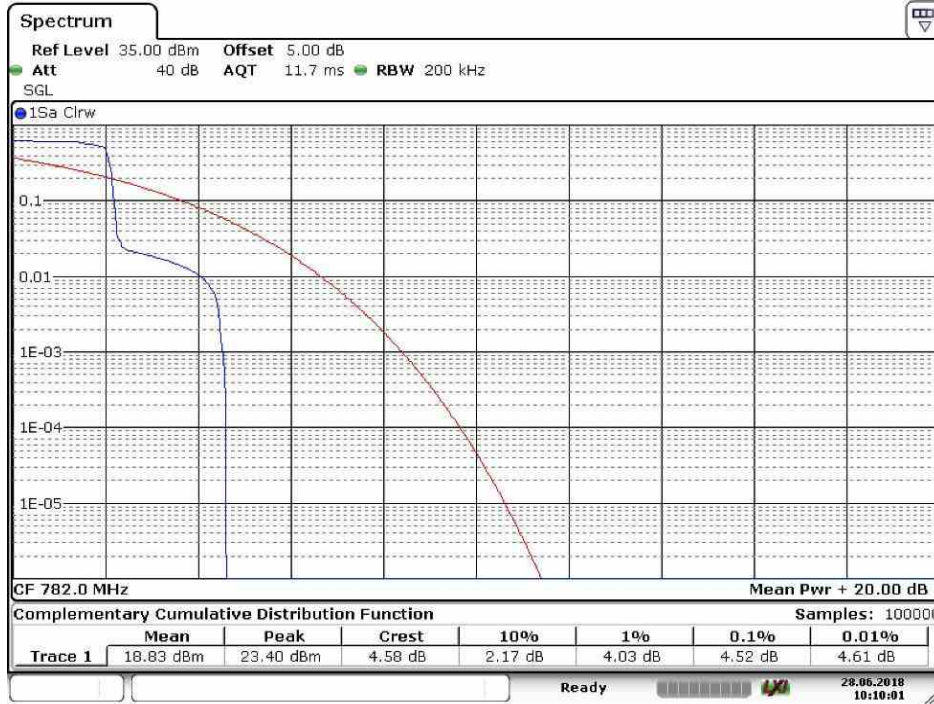
2.1.1.1 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=15kHz.T size=1T0

2.1.1.1.1 Test Channel = LCH



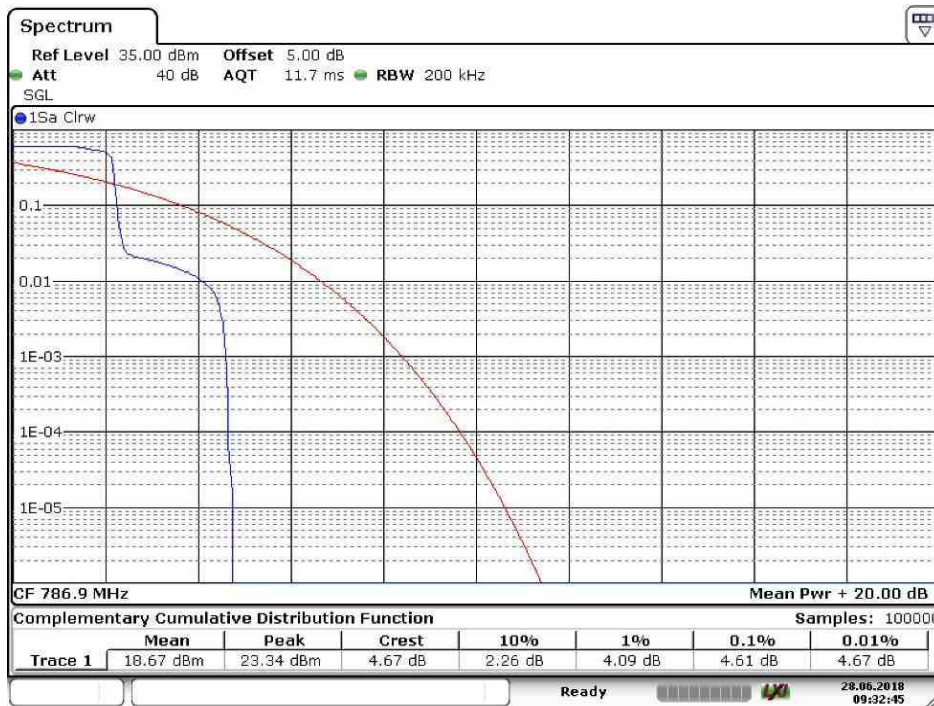
Date: 28 JUN 2018 08:58:38

2.1.1.1.2 Test Channel = MCH



Date: 28.JUN.2018 10:10:01

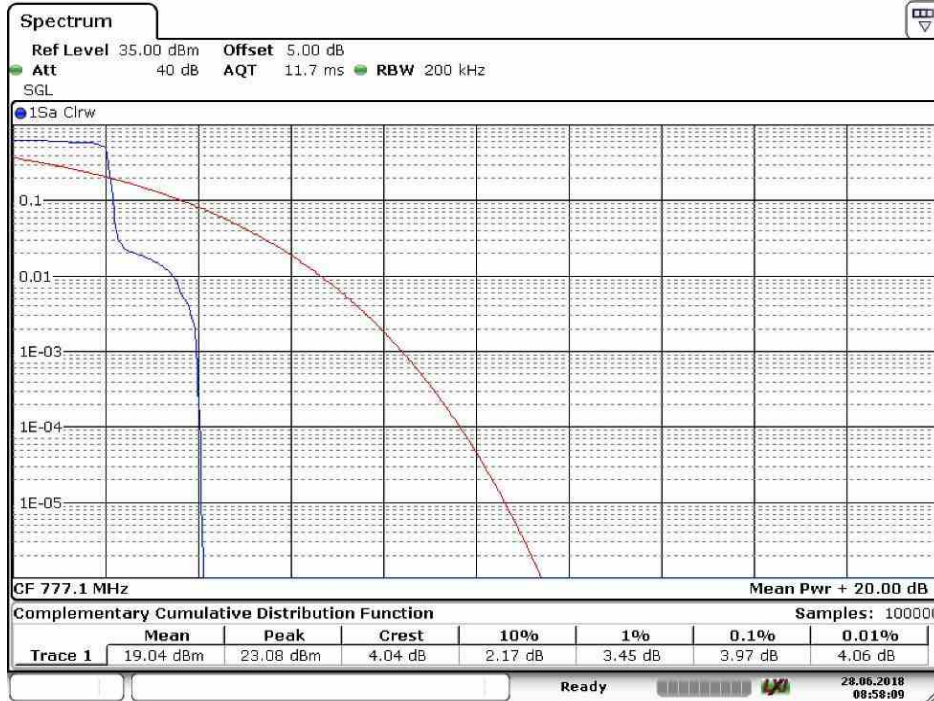
2.1.1.1.3 Test Channel = HCH



Date: 28.JUN.2018 09:32:45

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: 28.JUN.2018 08:58:09

2.1.1.2.2 Test Channel = MCH



Date: 28.JUN.2018 10:08:59

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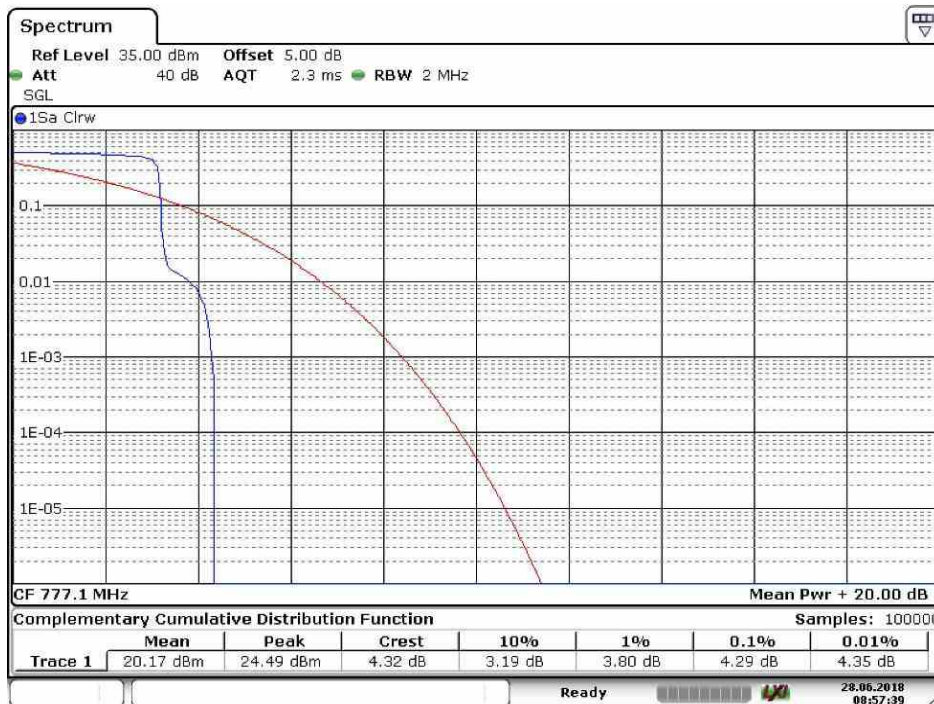
2.1.1.2.3 Test Channel = HCH



Date: 28.JUN.2018 09:31:57

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: 28.JUN.2018 08:57:40

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2.1.1.3.2 Test Channel = MCH



Date: 28.JUN.2018 09:27:06

2.1.1.3.3 Test Channel = HCH



Date: 28.JUN.2018 09:31:28

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3 Modulation Characteristics

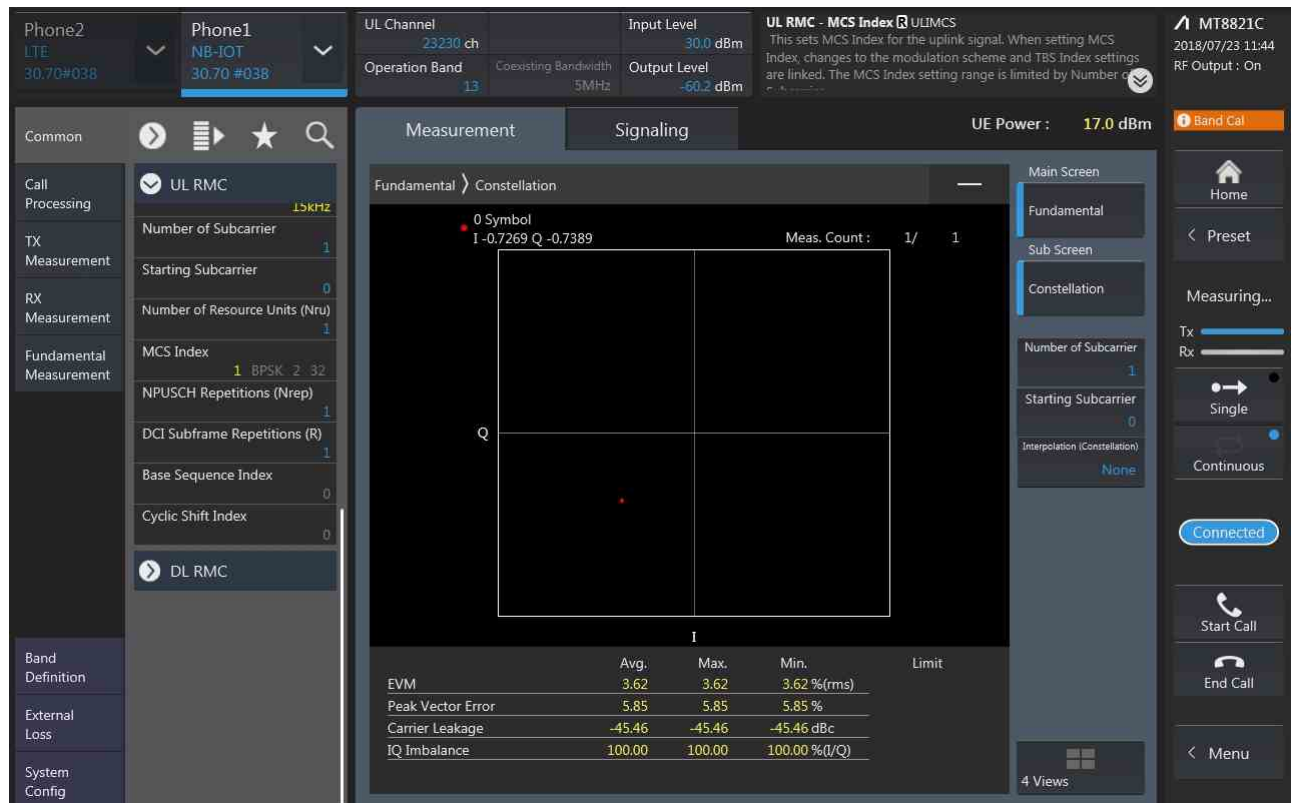
Part I - Test Plots

3.1 For LTE-NB1

3.1.1 Test Band = LTE-NB1 band13

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

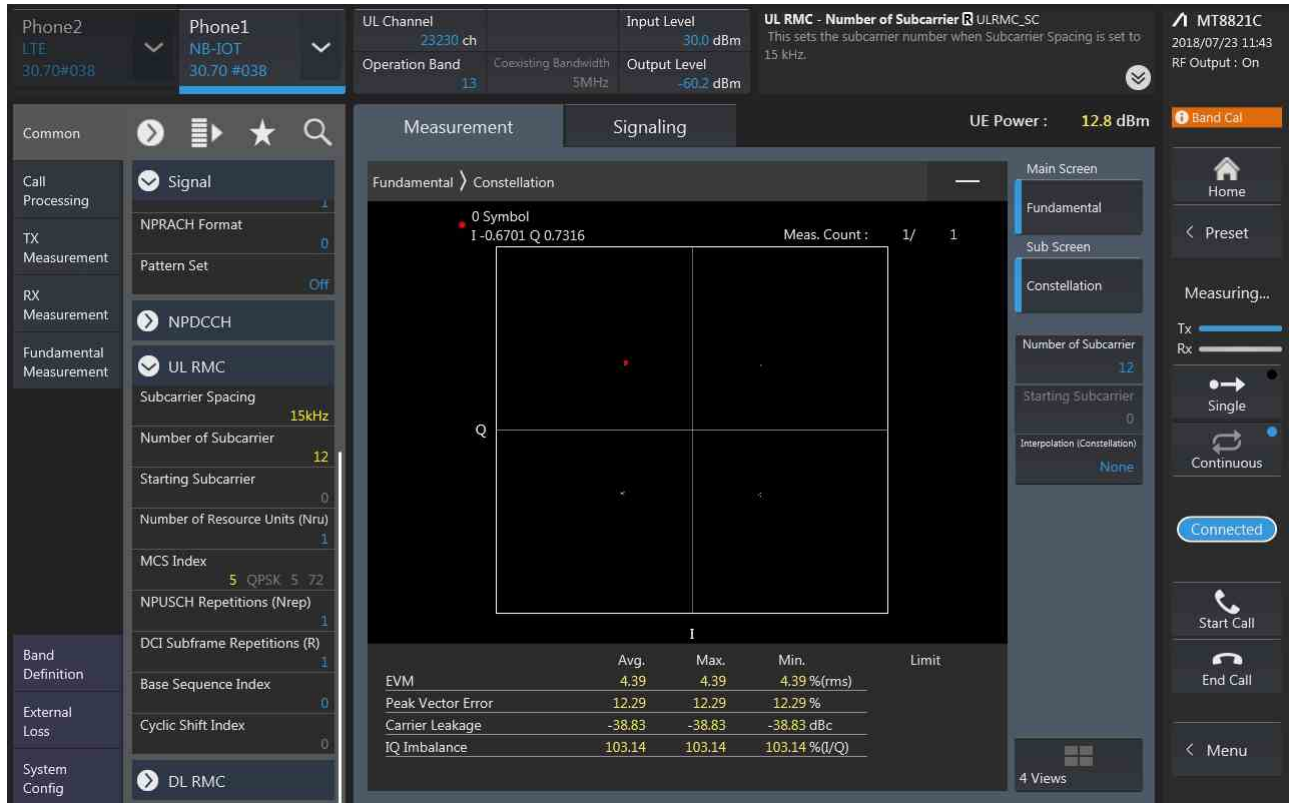
3.1.1.1.1 Test Channel = MCH



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

3.1.1.2.1 Test Channel = MCH



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4 Bandwidth

Part I - Test Results

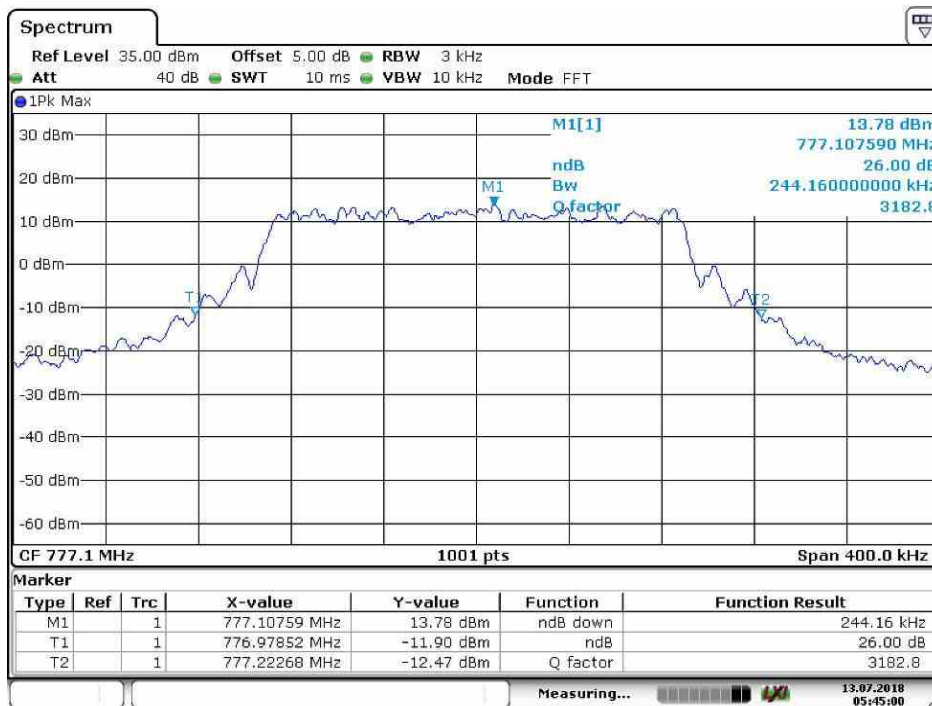
Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
BAND13	TM2/15kHz	LCH	185.81	244.16	PASS
		MCH	184.61	243.36	PASS
		HCH	185.01	244.16	PASS

4.1 For LTE-NB1

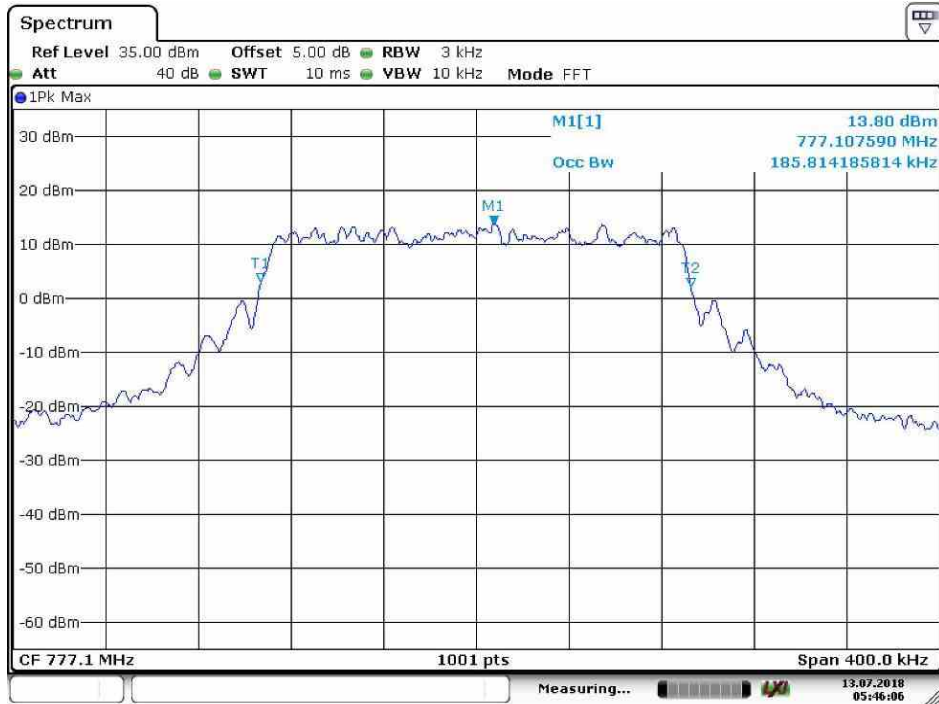
4.1.1 Test Band = LTE-NB1 band13

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

4.1.1.1.1 Test Channel = LCH

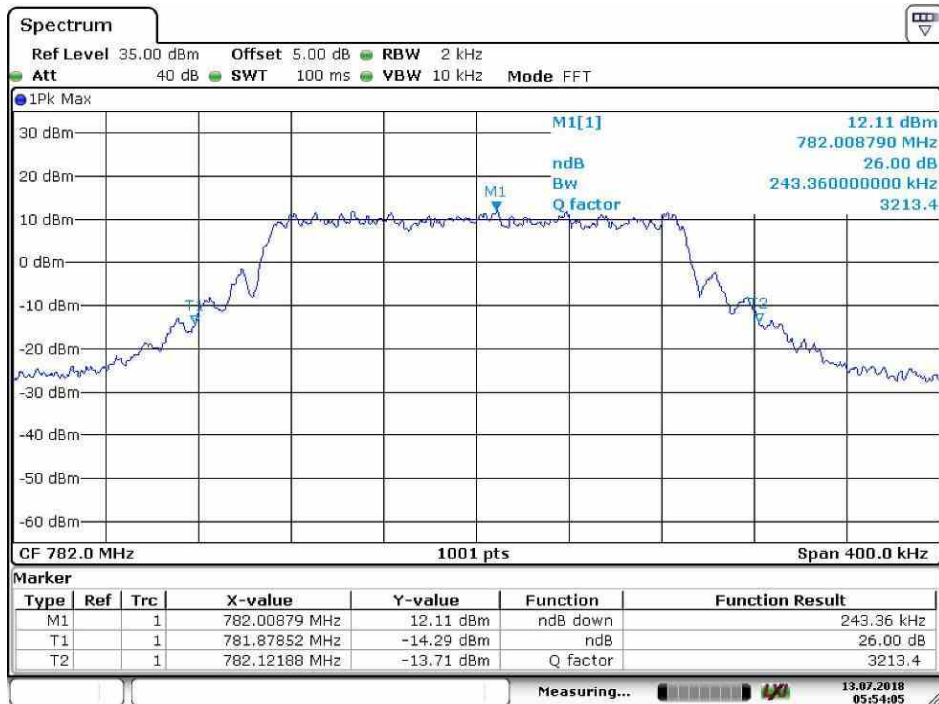


Date: 13.JUL.2018 05:45:00



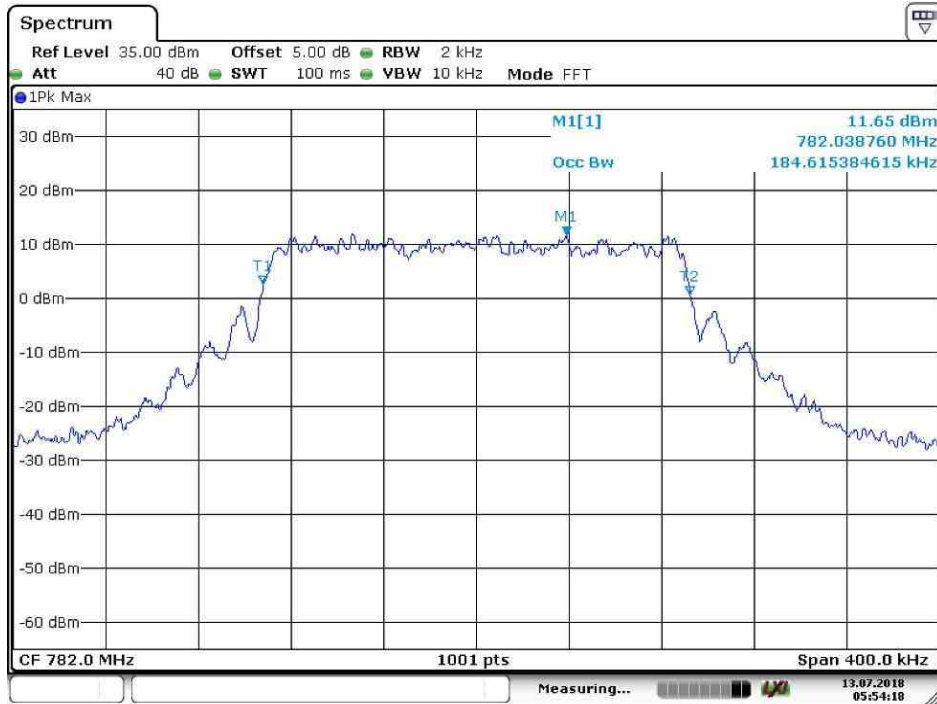
Date: 13.JUL.2018 05:46:07

4.1.1.1.2 Test Channel = MCH



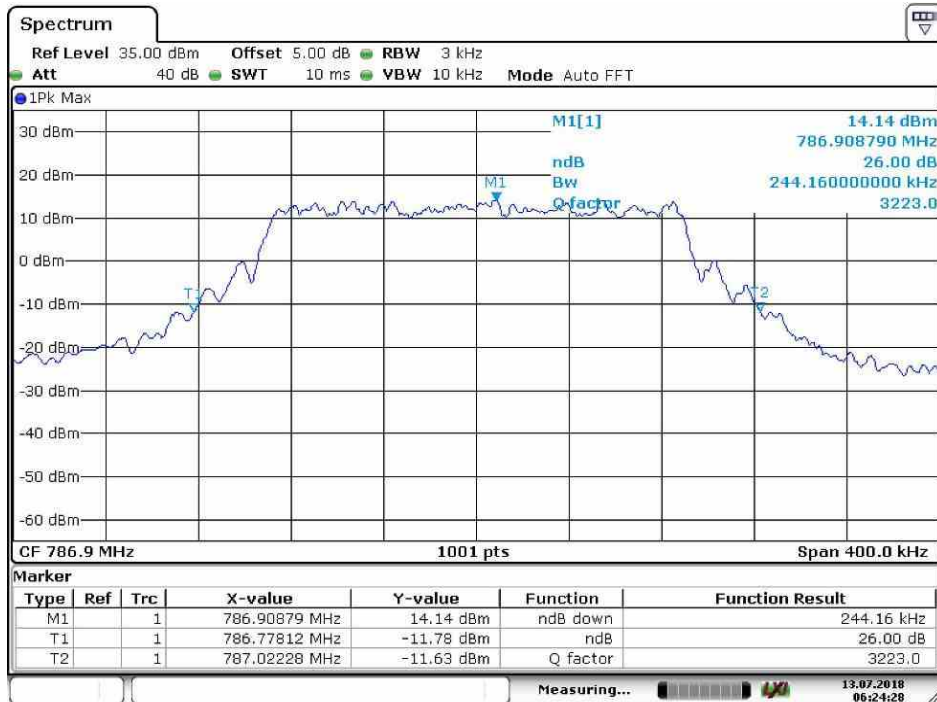
Date: 13.JUL.2018 05:54:06

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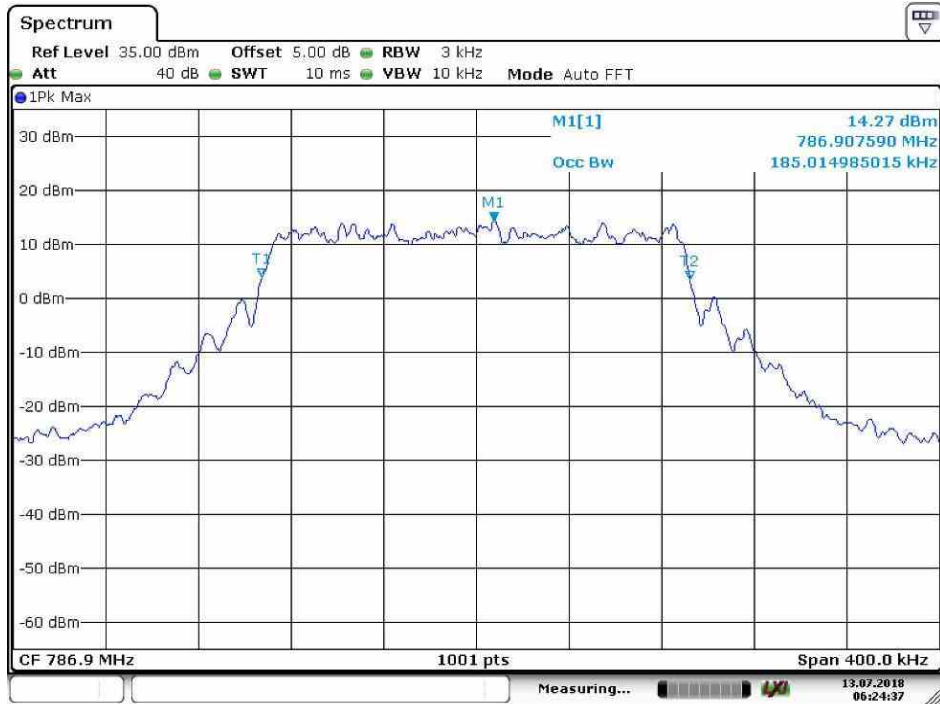


Date: 13.JUL.2018 05:54:18

4.1.1.1.3 Test Channel = HCH



Date: 13.JUL.2018 06:24:28



Date: 13.JUL.2018 06:24:38

5 Band Edges Compliance

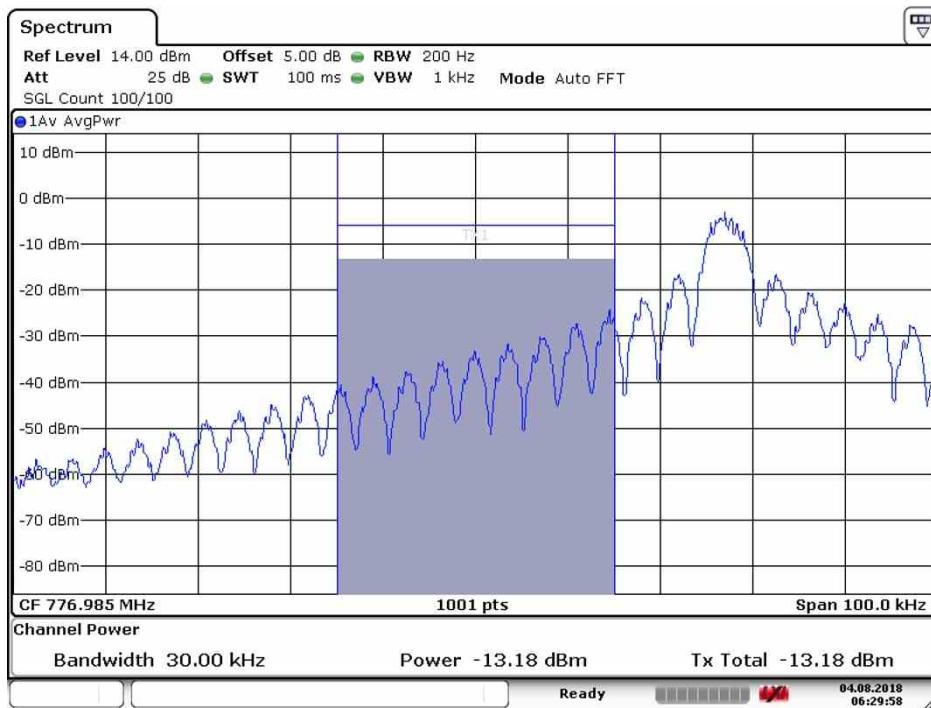
5.1 For LTE-NB1

5.1.1 Test Band = LTE-NB1 band13

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

5.1.1.1.1 Test Channel = LCH

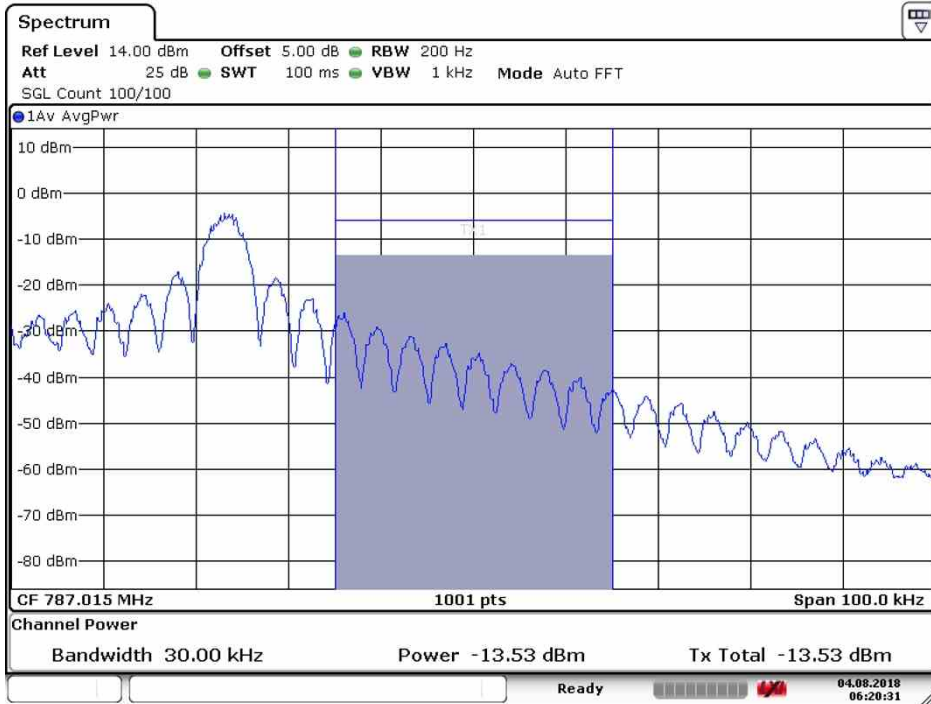
5.1.1.1.1.1 Test T size=1T



Date: 4.AUG.2018 06:29:59

5.1.1.1.2 Test Channel = HCH

5.1.1.1.2.1 Test T size=1T

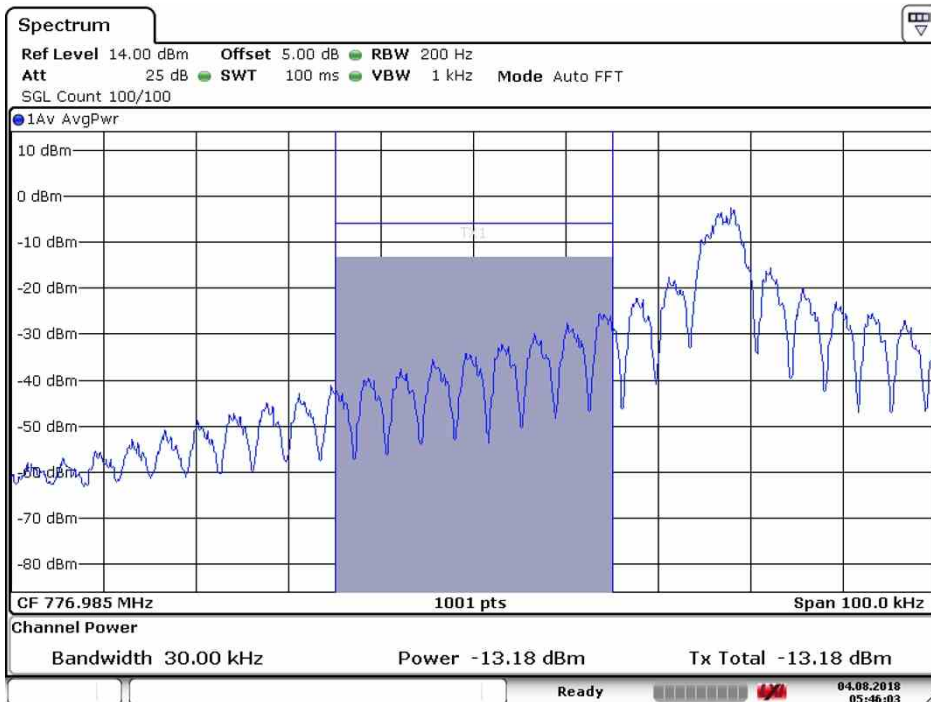


Date: 4.AUG.2018 06:20:31

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

5.1.1.2.1 Test Channel = LCH

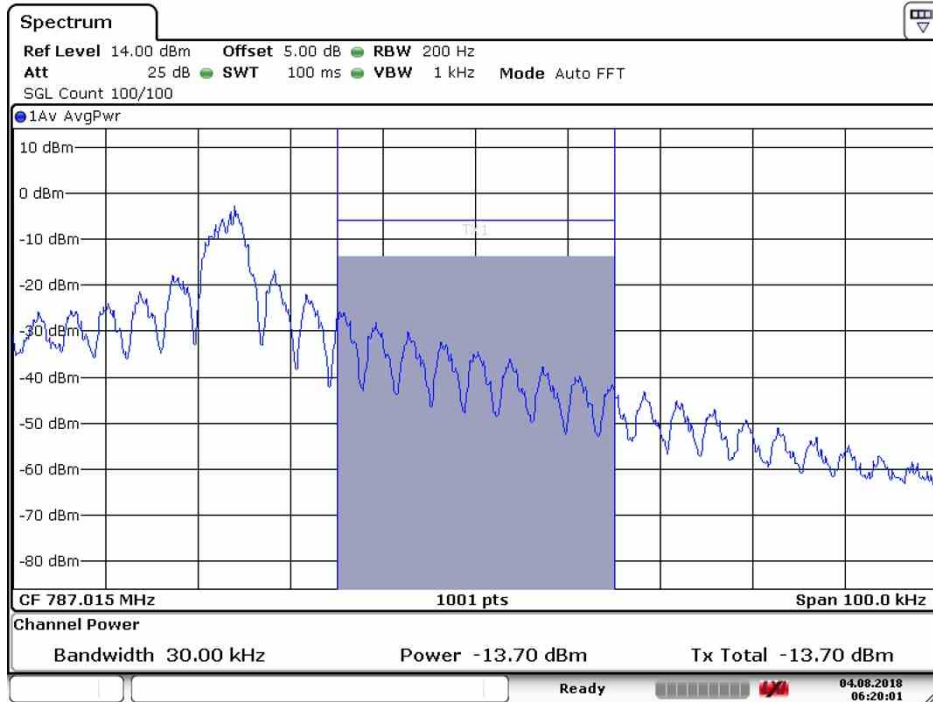
5.1.1.2.1.1 Test T size=1T



Date: 4.AUG.2018 05:46:03

5.1.1.2.2 Test Channel = HCH

5.1.1.2.2.1 Test T size=1T

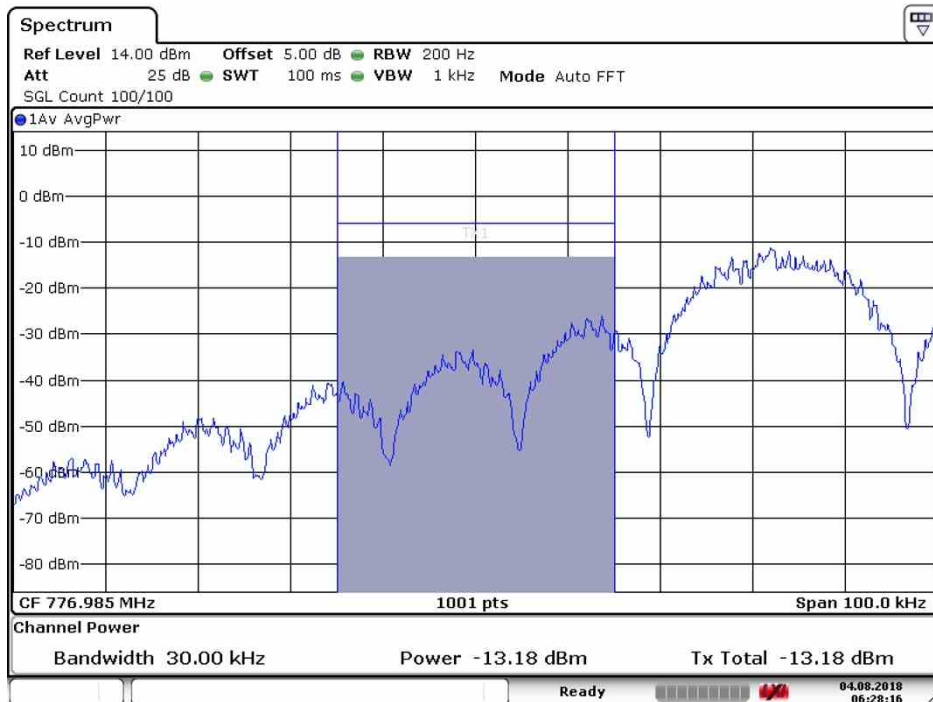


Date: 4.AUG.2018 06:20:01

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

5.1.1.3.1 Test Channel = LCH

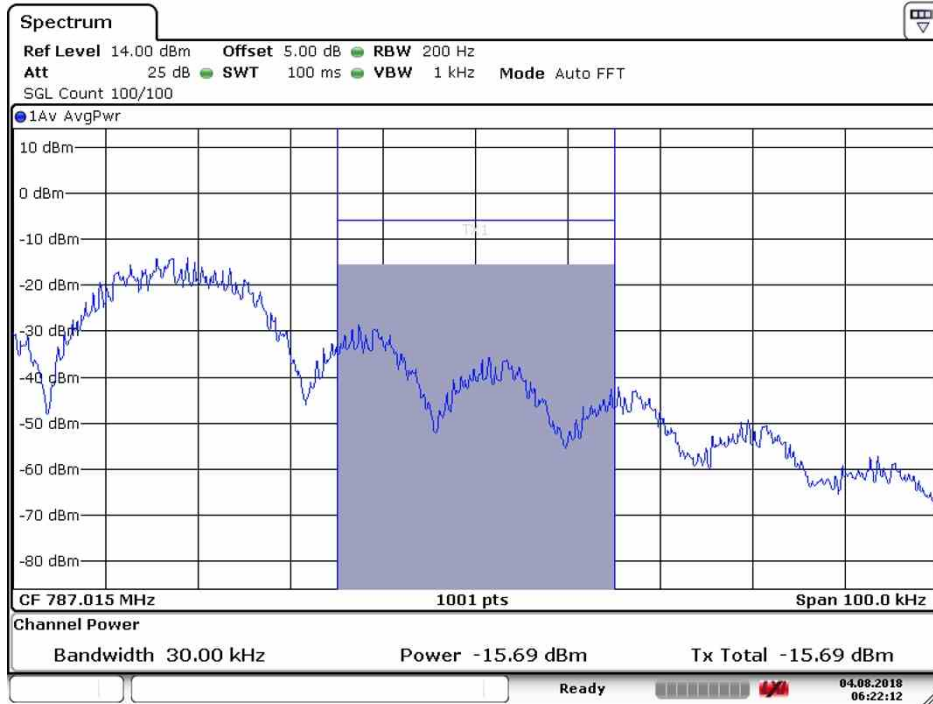
5.1.1.3.1.1 Test T size=1T



Date: 4.AUG.2018 06:28:16

5.1.1.3.2 Test Channel = HCH

5.1.1.3.2.1 Test T size=1T

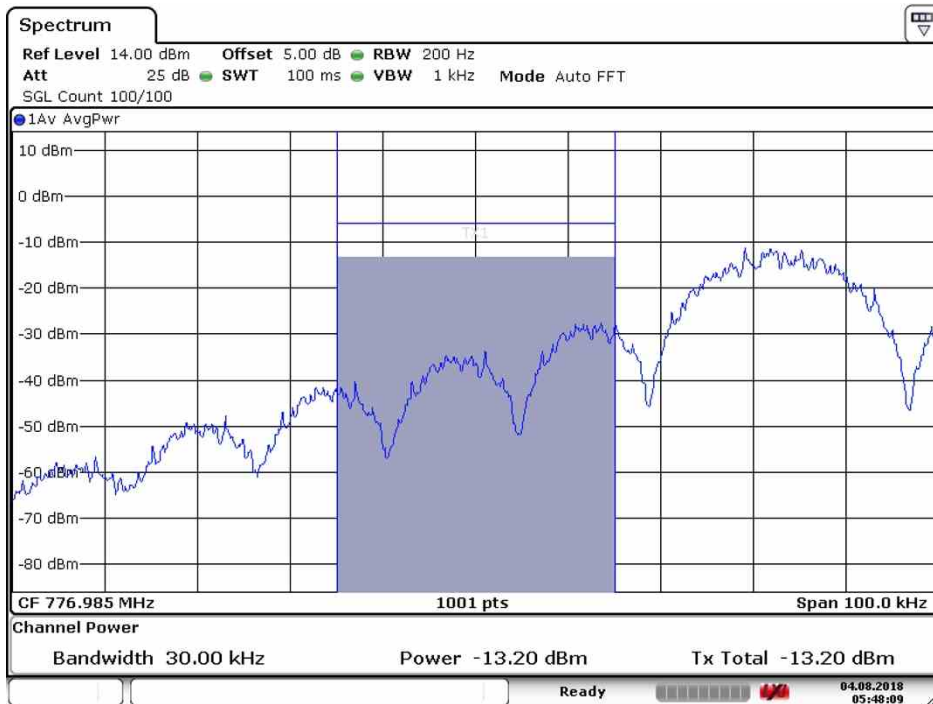


Date: 4.AUG.2018 06:22:12

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

5.1.1.4.1 Test Channel = LCH

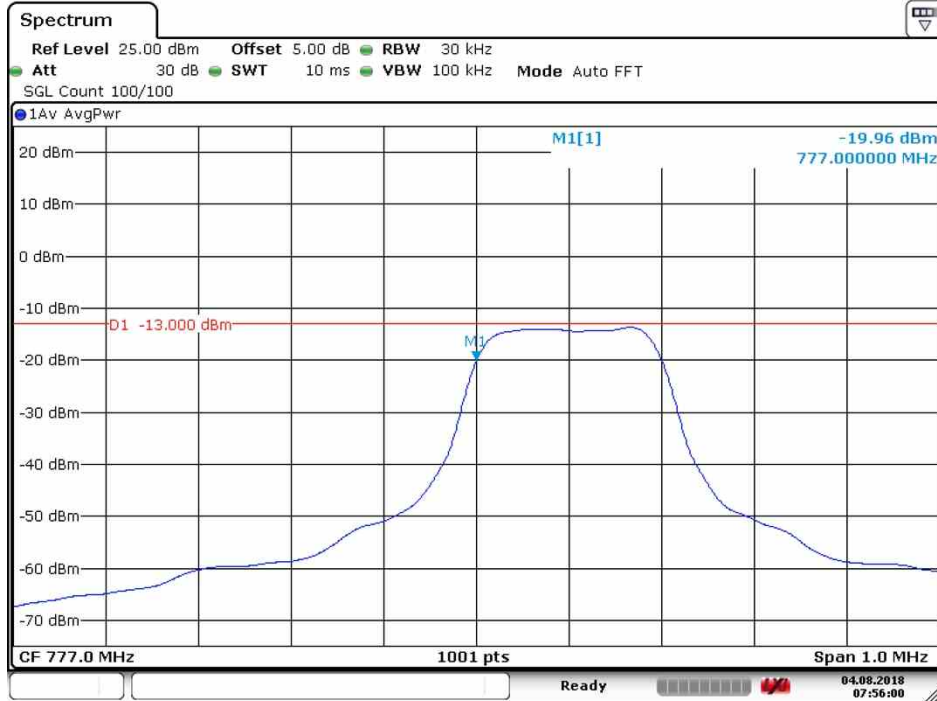
5.1.1.4.1.1 Test T size=1T



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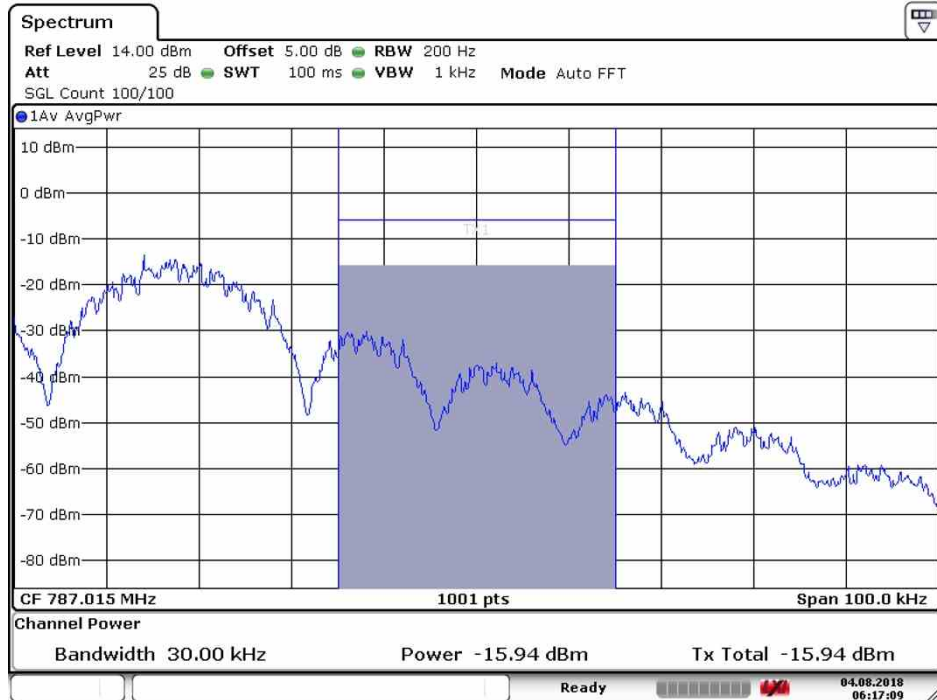
5.1.1.4.1.2 Test T size=Full T



Date: 4.AUG.2018 07:56:00

5.1.1.4.2 Test Channel = HCH

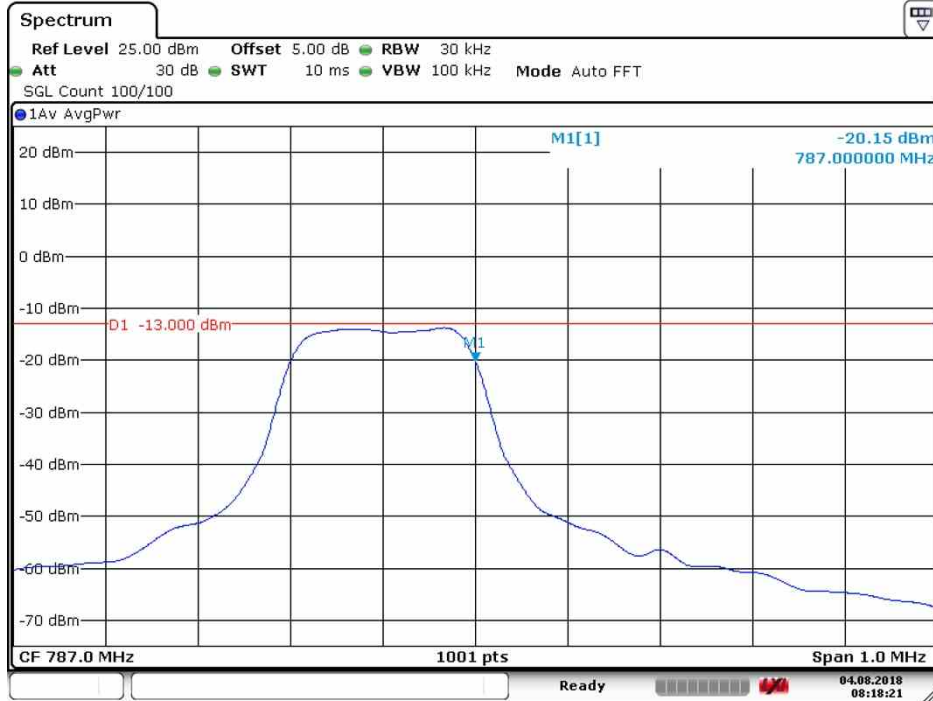
5.1.1.4.2.1 Test T size=1T



Date: 4.AUG.2018 06:17:10

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5.1.1.4.2.2 Test T size=Full T



Date: 4.AUG.2018 08:18:21

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.

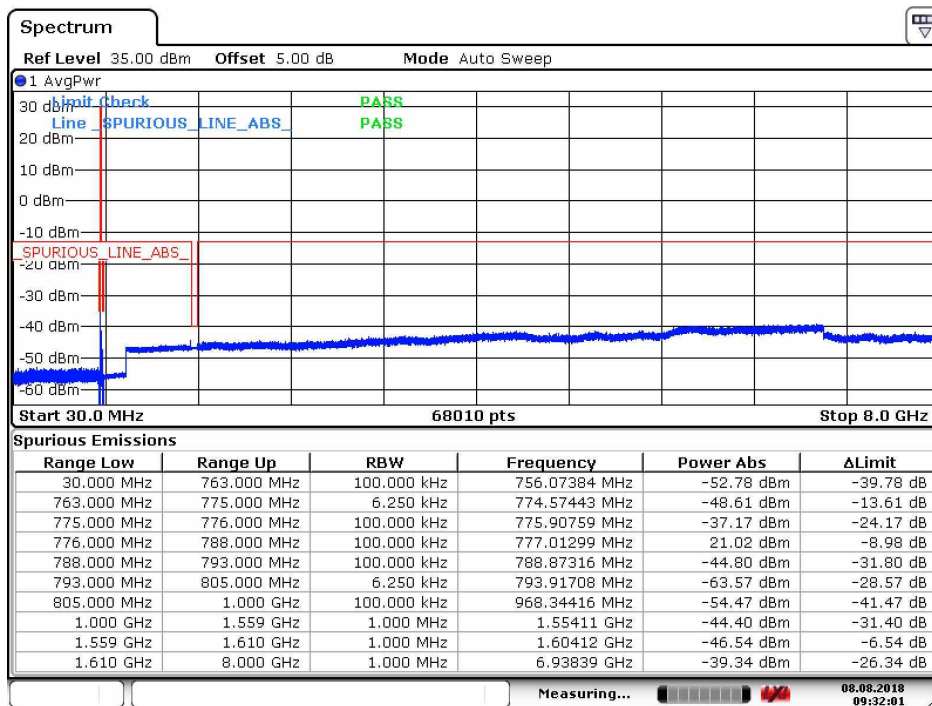
Part I - Test Plots

6.1 For LTE-NB1

6.1.1 Test Band = LTE-NB1 band13

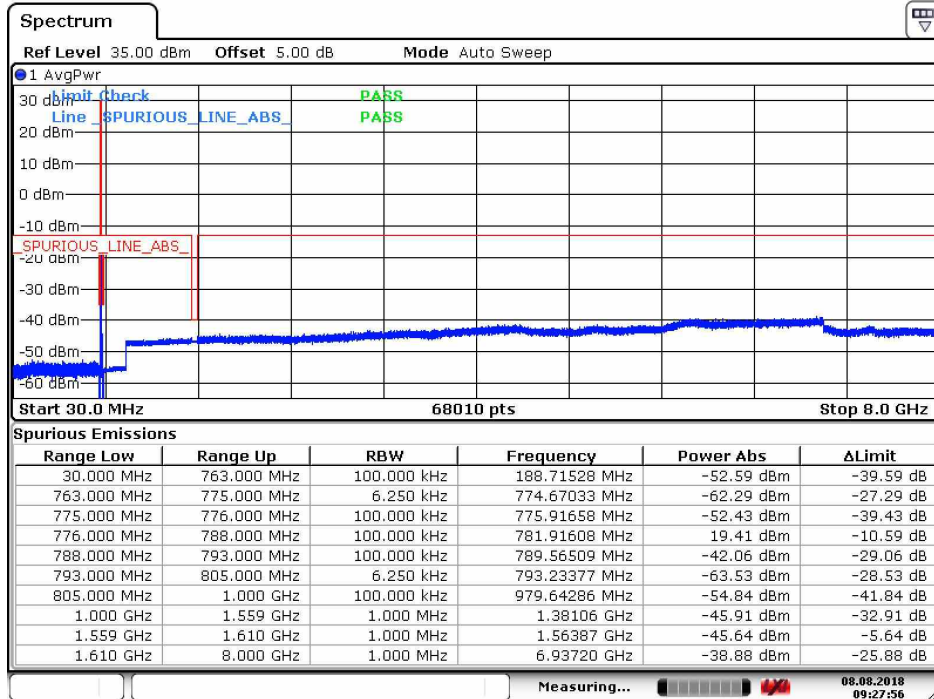
6.1.1.1 Test Mode = LTE-NB1/TM1.Sub-carrier spacing=3.75kHz

6.1.1.1.1 Test Channel = LCH



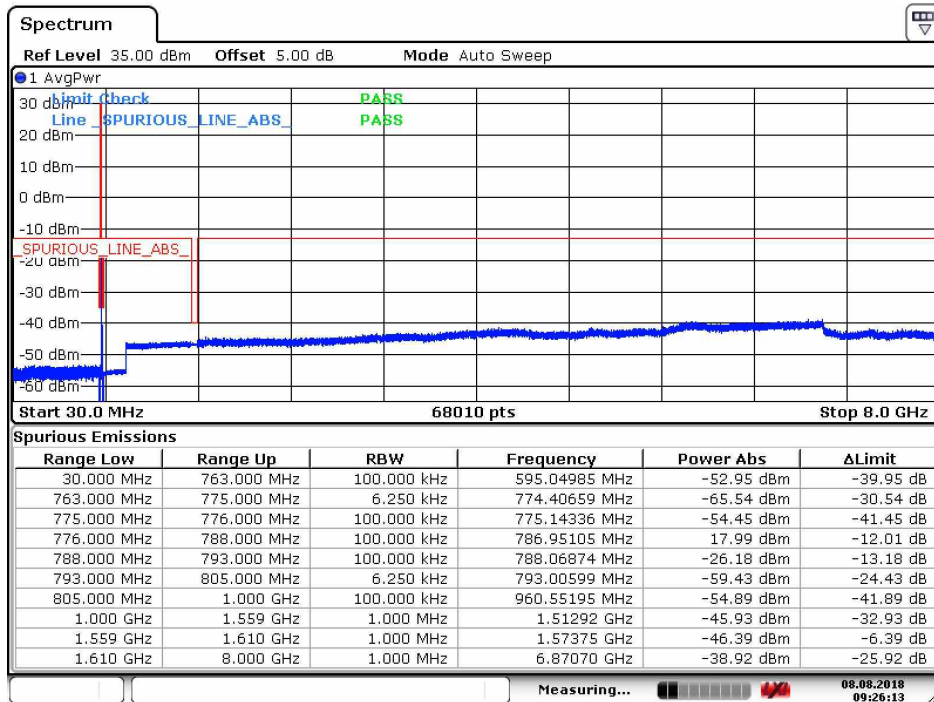
Date: 8.AUG.2018 09:32:01

6.1.1.1.2 Test Channel = MCH



Date: 8.AUG.2018 09:27:56

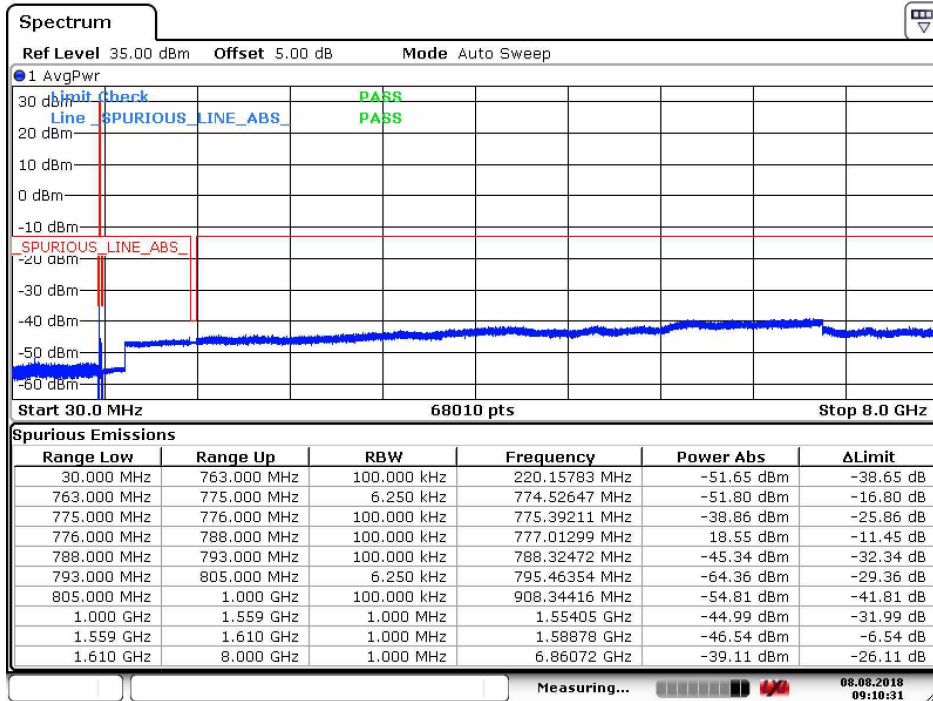
6.1.1.1.3 Test Channel = HCH



Date: 8.AUG.2018 09:26:14

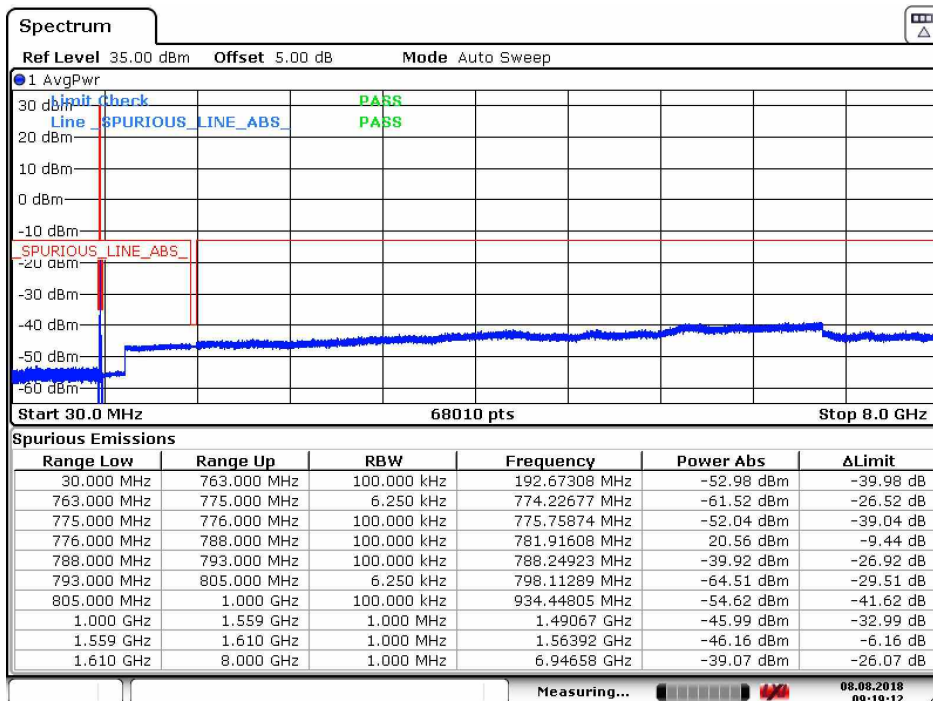
6.1.1.2 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=3.75kHz

6.1.1.2.1 Test Channel = LCH



Date: 8.AUG.2018 09:10:31

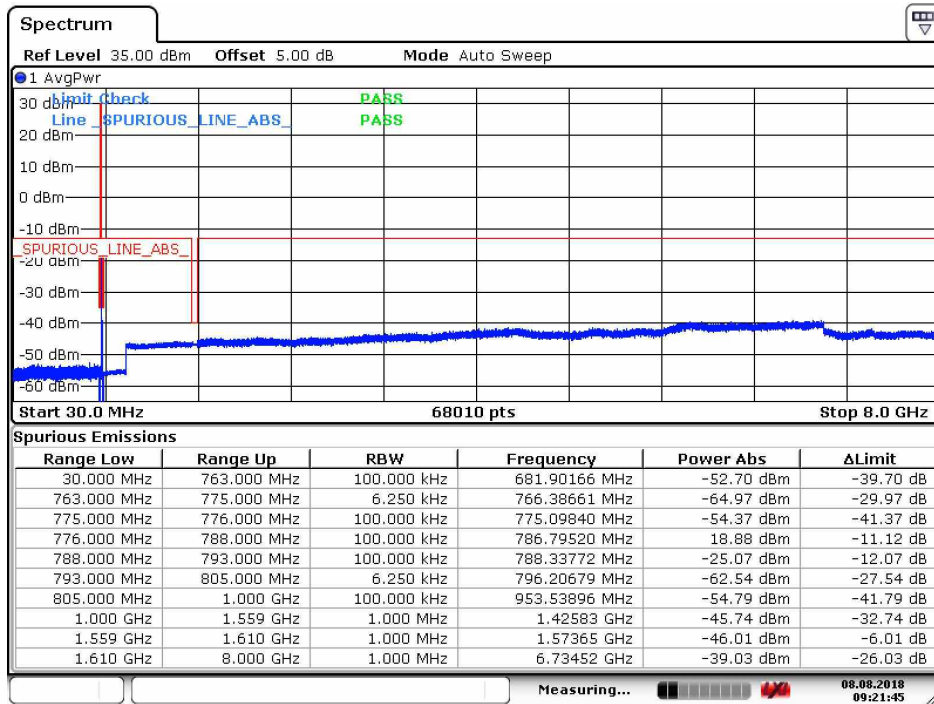
6.1.1.2.2 Test Channel = MCH



Date: 8.AUG.2018 09:19:12

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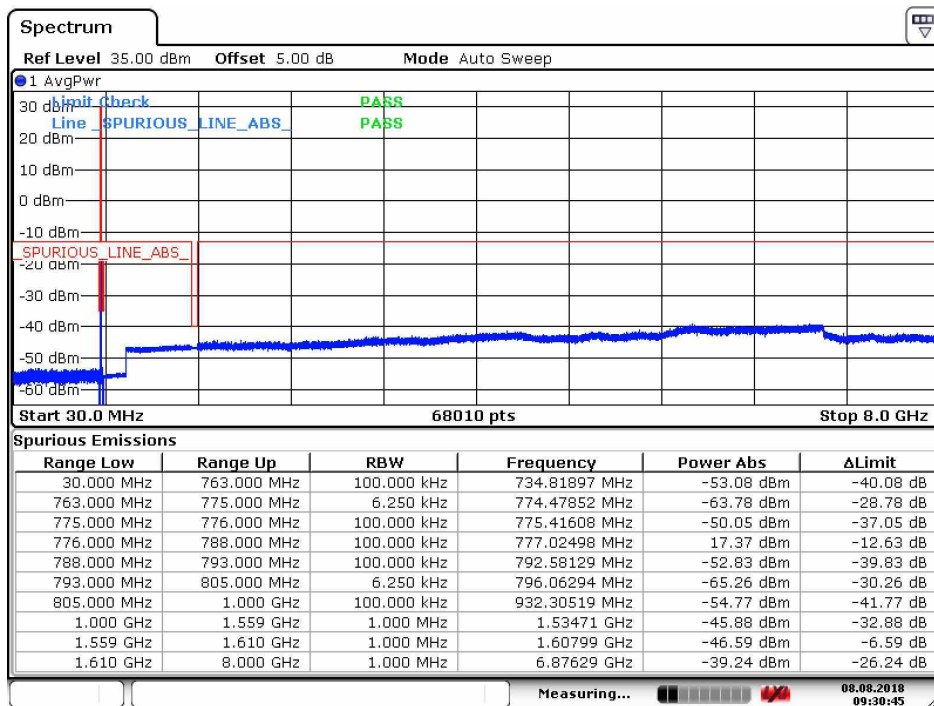
6.1.1.2.3 Test Channel = HCH



Date: 8.AUG.2018 09:21:45

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

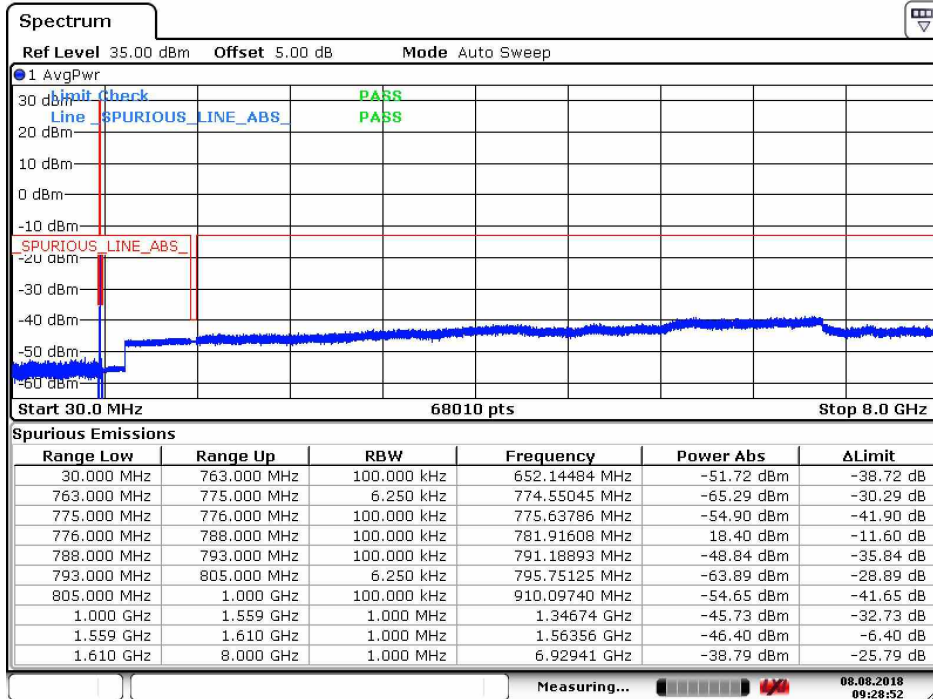
6.1.1.3.1 Test Channel = LCH



Date: 8.AUG.2018 09:30:45

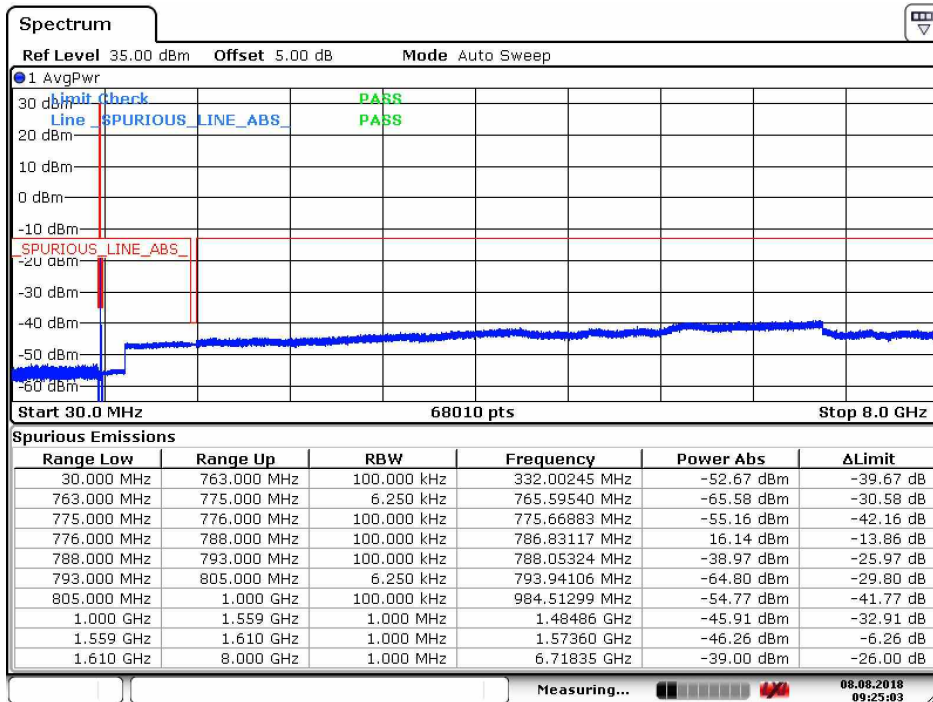
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6.1.1.3.2 Test Channel = MCH



Date: 8.AUG.2018 09:28:52

6.1.1.3.3 Test Channel = HCH

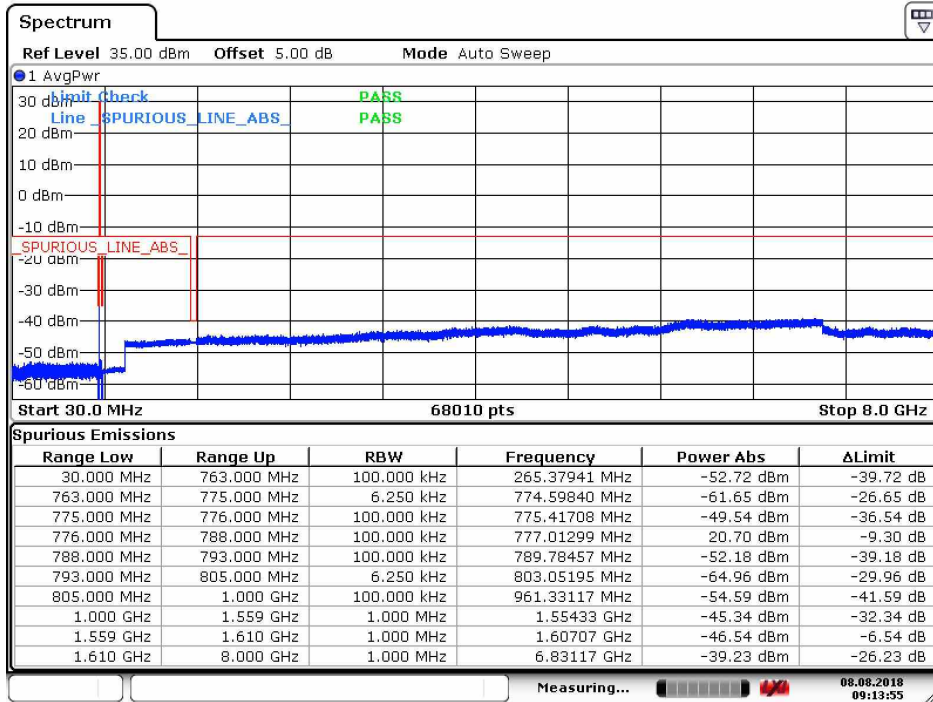


Date: 8.AUG.2018 09:25:03

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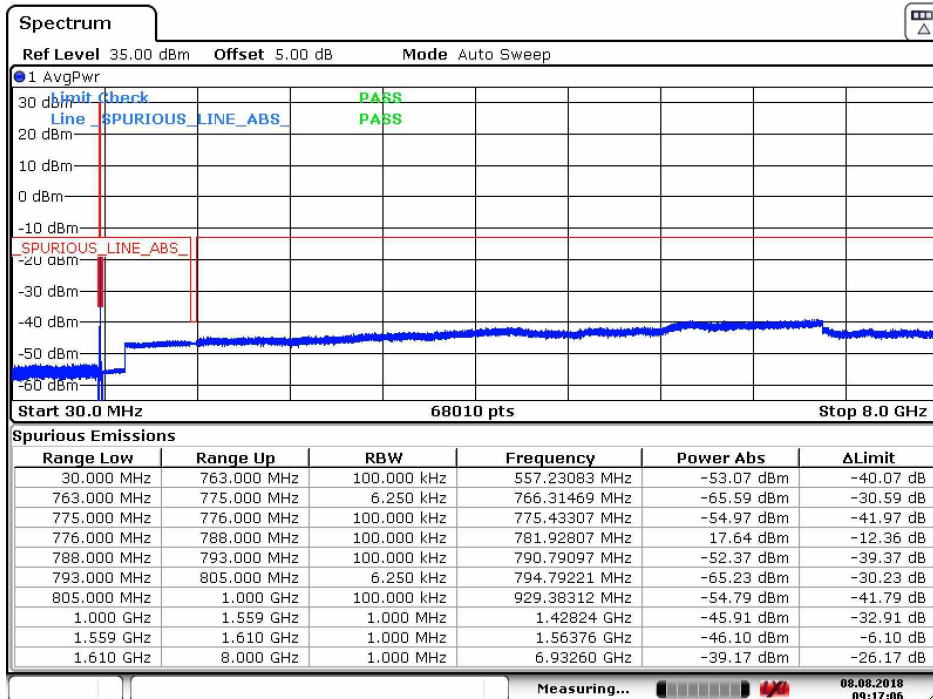
6.1.1.4 Test Mode = LTE-NB1/TM2.Sub-carrier spacing=15kHz

6.1.1.4.1 Test Channel = LCH



Date: 8.AUG.2018 09:13:56

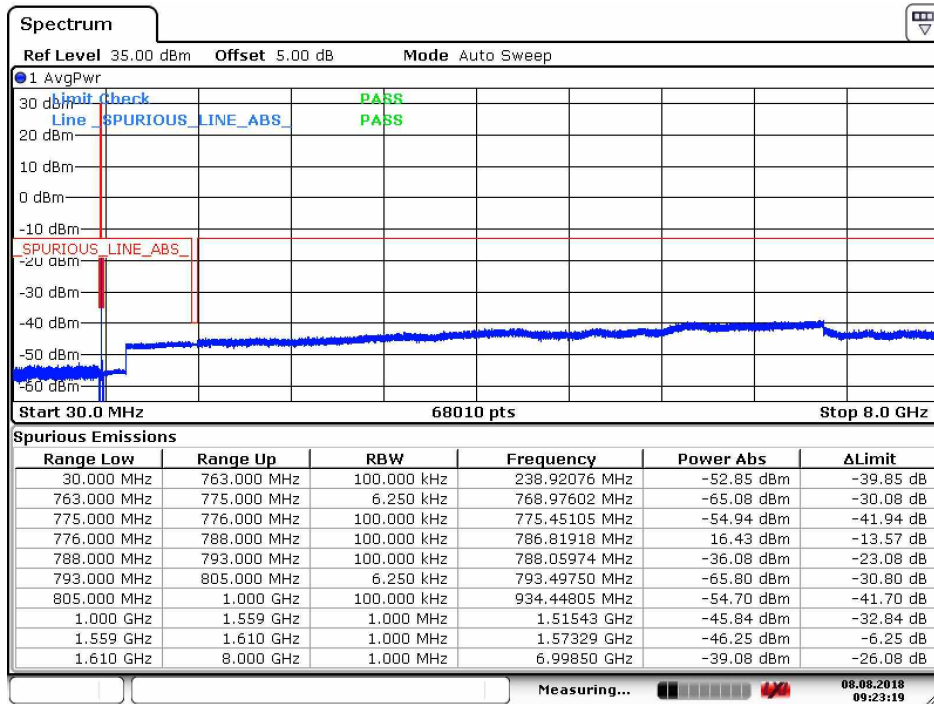
6.1.1.4.2 Test Channel = MCH



Date: 8.AUG.2018 09:17:06

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6.1.1.4.3 Test Channel = HCH



Date: 8.AUG.2018 09:23:19



7 Field Strength of Spurious Radiation

7.1 For LTE-NB1

7.1.1 Test Band = LTE-NB1 band13

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
64.813333	-81.67	-13.00	-68.67	Vertical
90.480000	-80.91	-13.00	-67.91	Vertical
590.891667	-80.43	-13.00	-67.43	Vertical
1559.000000	-55.74	-40.00	-15.74	Vertical
3221.812500	-68.94	-13.00	-55.94	Vertical
6040.050000	-65.53	-13.00	-52.53	Vertical
63.366667	-77.59	-13.00	-64.59	Horizontal
104.293333	-83.50	-13.00	-70.50	Horizontal
1039.000000	-61.18	-13.00	-48.18	Horizontal
1558.500000	-49.94	-13.00	-36.94	Horizontal
3117.487500	-63.67	-13.00	-50.67	Horizontal
6057.112500	-65.56	-13.00	-52.56	Horizontal

7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
64.066667	-82.05	-13.00	-69.05	Vertical
90.480000	-83.97	-13.00	-70.97	Vertical
651.620833	-78.69	-13.00	-65.69	Vertical
1564.000000	-56.06	-40.00	-16.06	Vertical
2802.000000	-57.76	-13.00	-44.76	Vertical
6050.287500	-65.29	-13.00	-52.29	Vertical
63.226667	-77.96	-13.00	-64.96	Horizontal
104.293333	-85.33	-13.00	-72.33	Horizontal
1042.500000	-60.72	-13.00	-47.72	Horizontal
1563.500000	-50.22	-40.00	-10.22	Horizontal
3127.725000	-64.06	-13.00	-51.06	Horizontal
7829.662500	-64.56	-13.00	-51.56	Horizontal



7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.553333	-81.85	-13.00	-68.85	Vertical
104.293333	-84.81	-13.00	-71.81	Vertical
344.486667	-86.72	-13.00	-73.72	Vertical
1569.000000	-51.55	-40.00	-11.55	Vertical
3137.475000	-68.77	-13.00	-55.77	Vertical
5515.012500	-66.86	-13.00	-53.86	Vertical
62.993333	-78.12	-13.00	-65.12	Horizontal
104.293333	-88.81	-13.00	-75.81	Horizontal
268.560000	-87.81	-13.00	-74.81	Horizontal
1569.000000	-46.09	-40.00	-6.09	Horizontal
3136.987500	-69.02	-13.00	-56.02	Horizontal
6490.500000	-65.37	-13.00	-52.37	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
BAND13	TM1/15k	LCH	TN	VL	5.51	0.007089	PASS
				VN	-8.99	-0.011572	PASS
				VH	-6.82	-0.008781	PASS
		MCH	TN	VL	8.05	0.010300	PASS
				VN	6.91	0.008835	PASS
				VH	3.09	0.003951	PASS
		HCH	TN	VL	-9.73	-0.012369	PASS
				VN	0.75	0.000947	PASS
				VH	-2.79	-0.003546	PASS
	TM2/15k	LCH	TN	VL	0.62	0.000799	PASS
				VN	-9.39	-0.012085	PASS
				VH	9.08	0.011686	PASS
		MCH	TN	VL	-3.87	-0.004949	PASS
				VN	6.44	0.008240	PASS
				VH	-5.40	-0.006908	PASS
		HCH	TN	VL	4.58	0.005815	PASS
				VN	-9.97	-0.012670	PASS
				VH	1.86	0.002365	PASS

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8.2 Frequency Error VS. Temperature

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
BAND13	TM1 15kHz	LCH	VN	-30	-7.60	-0.009786	PASS
				-20	-4.75	-0.006118	PASS
				-10	-4.61	-0.005927	PASS
				0	3.49	0.004485	PASS
				10	-8.32	-0.010702	PASS
				20	-8.64	-0.011122	PASS
				30	-5.72	-0.007364	PASS
				40	2.82	0.003623	PASS
				50	9.88	0.012708	PASS
		MCH	VN	-30	8.80	0.011250	PASS
				-20	-8.52	-0.010894	PASS
				-10	6.68	0.008548	PASS
				0	-4.94	-0.006316	PASS
				10	7.59	0.009707	PASS
				20	7.04	0.008996	PASS
				30	6.09	0.007784	PASS
				40	-3.00	-0.003834	PASS
				50	-0.14	-0.000175	PASS
		HCH	VN	-30	2.68	0.003407	PASS
				-20	1.07	0.001356	PASS
				-10	-4.40	-0.005595	PASS
				0	7.29	0.009265	PASS
				10	-7.04	-0.008949	PASS
				20	9.61	0.012214	PASS
				30	-5.50	-0.006988	PASS
				40	0.04	0.000048	PASS
				50	6.34	0.008060	PASS



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Report No.: SZEM180400321702

Page: 32 of 32

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
BAND13	TM2 15kHz	LCH	VN	-30	-4.56	-0.005862	PASS
				-20	-1.53	-0.001967	PASS
				-10	-4.98	-0.006410	PASS
				0	-3.46	-0.004448	PASS
				10	-6.30	-0.008109	PASS
				20	-1.73	-0.002232	PASS
				30	-8.27	-0.010645	PASS
				40	0.66	0.000844	PASS
				50	-2.66	-0.003424	PASS
		MCH	VN	-30	-0.23	-0.000293	PASS
				-20	9.60	0.012280	PASS
				-10	1.55	0.001983	PASS
				0	-7.07	-0.009046	PASS
				10	-1.28	-0.001634	PASS
				20	-6.77	-0.008660	PASS
				30	8.53	0.010910	PASS
				40	-8.68	-0.011100	PASS
				50	-9.13	-0.011669	PASS
		HCH	VN	-30	-4.61	-0.005857	PASS
				-20	-5.81	-0.007385	PASS
				-10	-5.69	-0.007231	PASS
				0	-1.60	-0.002037	PASS
				10	-6.27	-0.007964	PASS
				20	-5.29	-0.006718	PASS
				30	-9.23	-0.011733	PASS
				40	-6.37	-0.008089	PASS
				50	-8.92	-0.011330	PASS

The End

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