Appendix B

LTE-M1 BAND 13

CONTENT

Page

1 Effective (Isotropic) Radiated Power Output Data

Effective Isotropic Radiated Power of Transmitter (EIRP) for LTE-M1 BAND13

Test Band(LTE)	Test Mode	Test Bandwidth	Test channel	Test RB	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND13	LTE-M1/TM1	5M	LCH	RB1#0	23.06	20.11	34.77	PASS
				RB1#5	22.98	20.03	34.77	PASS
				RB6#0	22.09	19.14	34.77	PASS
			MCH	RB1#0	23.03	20.08	34.77	PASS
				RB1#5	23.07	20.12	34.77	PASS
				RB6#0	22.18	19.23	34.77	PASS
			HCH	RB1#0	22.93	19.98	34.77	PASS
				RB1#5	22.96	20.01	34.77	PASS
				RB6#0	21.99	19.04	34.77	PASS

Test Band(LTE)	Test Mode	Test Bandwidth	Test channel	Test RB	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND13	LTE-M1/TM2	5M	LCH	RB1#0	22.63	19.68	34.77	PASS
				RB1#5	22.65	19.7	34.77	PASS
				RB6#0	21.1	18.15	34.77	PASS
			MCH	RB1#0	22.65	19.7	34.77	PASS
				RB1#5	22.67	19.72	34.77	PASS
				RB6#0	21.11	18.16	34.77	PASS
			HCH	RB1#0	22.46	19.51	34.77	PASS
				RB1#5	22.49	19.54	34.77	PASS
				RB6#0	21.14	18.19	34.77	PASS

Test Band(LTE)	Test Mode	Test Bandwidth	Test channel	Test RB	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND13	LTE-M1/TM1	10M	MCH	RB1#0	23.06	20.11	34.77	PASS
				RB1#5	23.25	20.3	34.77	PASS
				RB6#0	22.12	19.17	34.77	PASS

Test Band(LTE)	Test Mode	Test Bandwidth	Test channel	Test RB	Measured (dBm)	ERP (dBm)	limit (dBm)	Verdict
BAND13	LTE-M1/TM2	10M	MCH	RB1#0	22.71	19.76	34.77	PASS
				RB1#5	22.63	19.68	34.77	PASS
				RB6#0	21.15	18.2	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
BAND13	TM1/5M Full RB	LCH	4.38	13	PASS
		MCH	5.30	13	PASS
		HCH	4.43	13	PASS
	TM1/5M 1 RB	LCH	4.09	13	PASS
		MCH	4.03	13	PASS
		HCH	3.97	13	PASS
	TM2/5M Full RB	LCH	5.25	13	PASS
		MCH	5.25	13	PASS
		HCH	5.57	13	PASS
	TM2/5M 1 RB	LCH	4.49	13	PASS
		MCH	4.87	13	PASS
		HCH	4.78	13	PASS

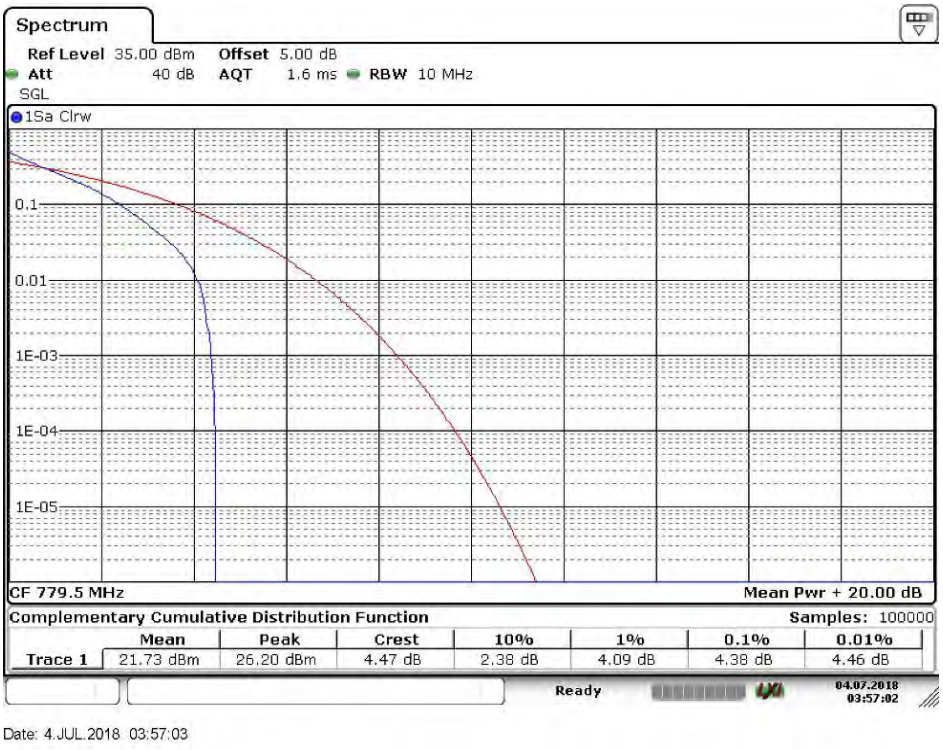
Part II - Test Plots

2.1 For LTE-M1

2.1.1 Test Band = LTE-M1 BAND13

2.1.1.1 Test Mode = LTE-M1/TM1.Bandwidth=5MHz Full RB

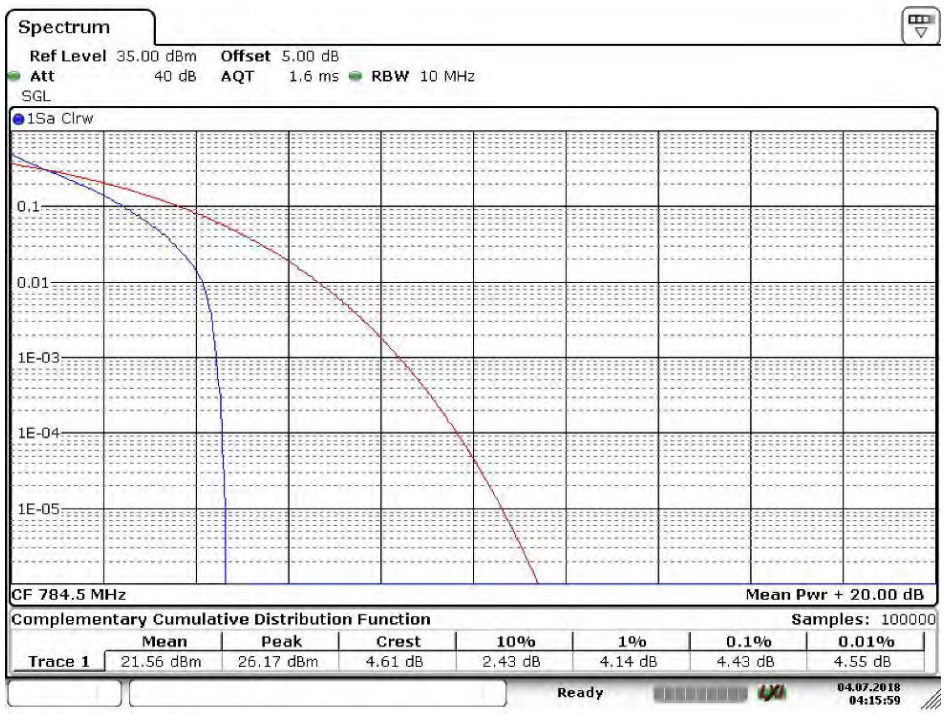
2.1.1.1.1 Test Channel = LCH



2.1.1.1.2 Test Channel = MCH

Date: 4.JUL.2018 04:05:10

2.1.1.1.3 Test Channel = HCH



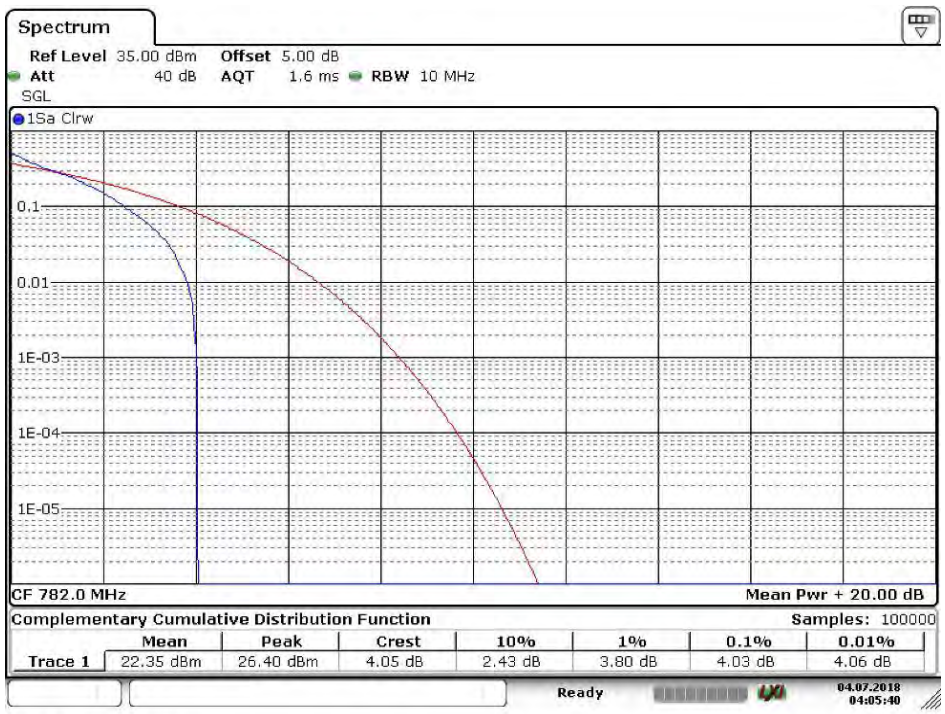
Date: 4.JUL.2018 04:15:59

2.1.1.2 Test Mode = LTE-M1/TM1.Bandwidth=5MHz 1 RB

2.1.1.2.1 Test Channel = LCH

Date: 4.JUL.2018 03:57:25

2.1.1.2.2 Test Channel = MCH



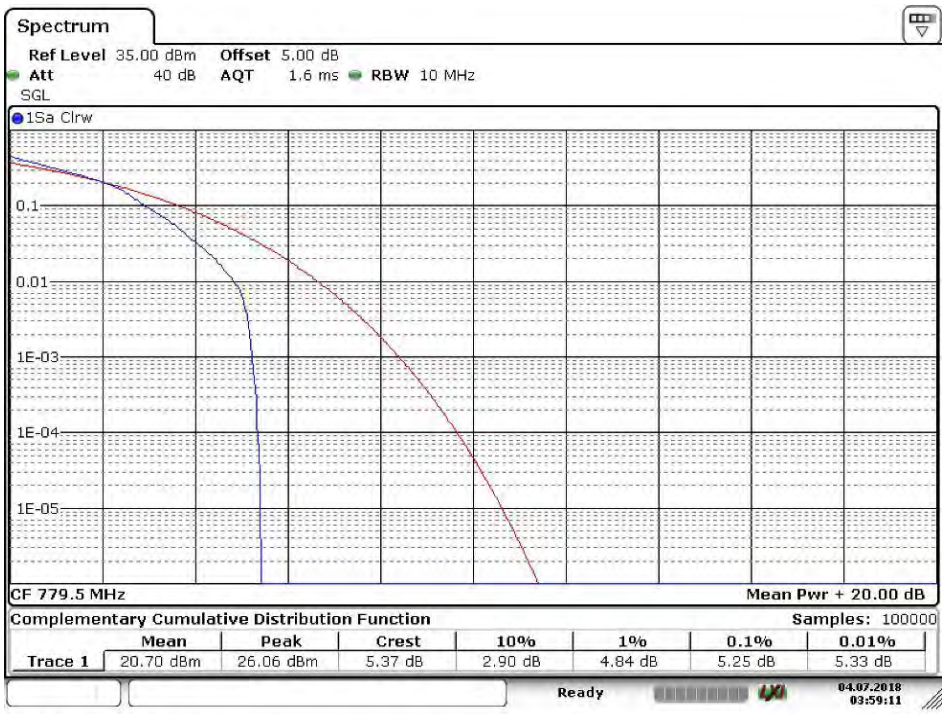
Date: 4.JUL.2018 04:05:41

2.1.1.2.3 Test Channel = HCH

Date: 4.JUL.2018 04:15:23

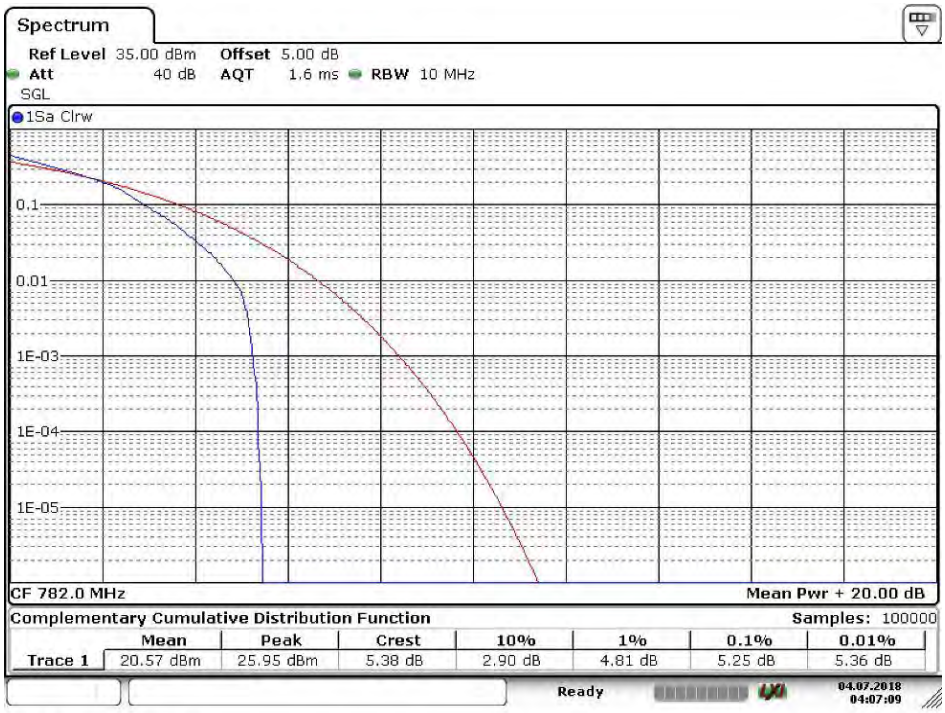
2.1.1.3 Test Mode = LTE-M1/TM2.Bandwidth=5MHz Full RB

2.1.1.3.1 Test Channel = LCH



Date: 4.JUL.2018 03:59:11

2.1.1.3.2 Test Channel = MCH



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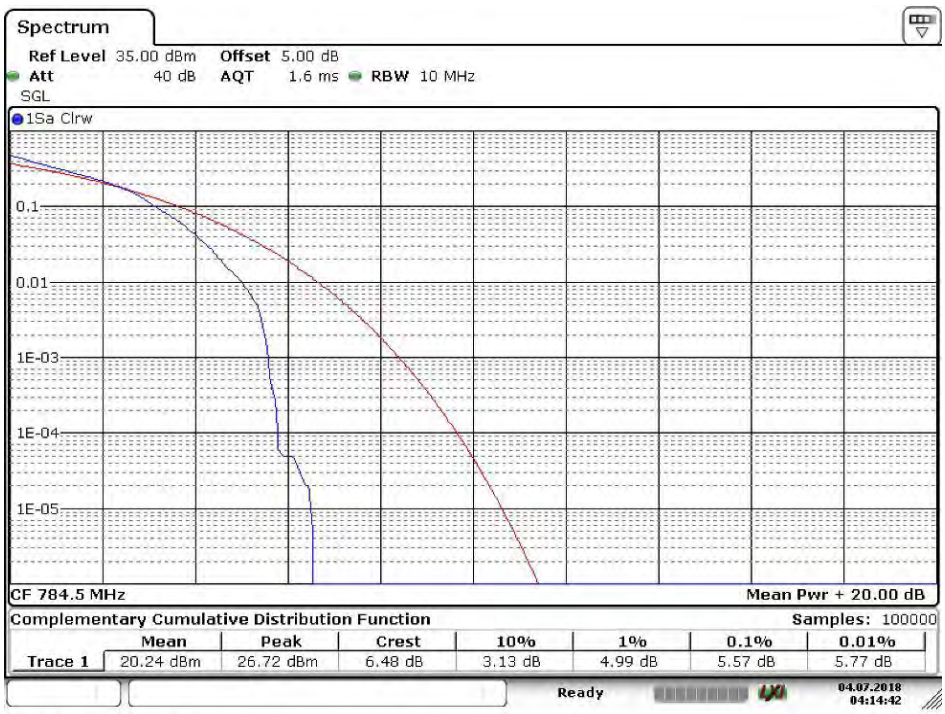
2.1.1.3.3 Test Channel = HCH



Date: 4.JUL.2018 04:14:42

2.1.1.4 Test Mode = LTE-M1/TM2.Bandwidth=5MHz 1 RB

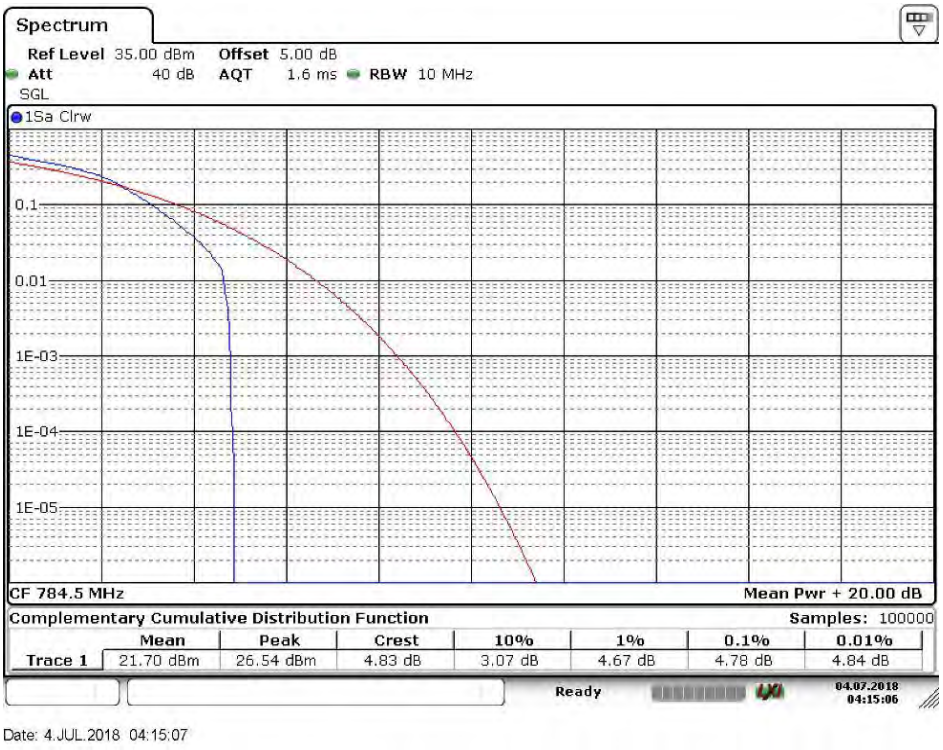
2.1.1.4.1 Test Channel = LCH

Date: 4.JUL.2018 03:57:45

2.1.1.4.2 Test Channel = MCH

Date: 4.JUL.2018 04:06:18

2.1.1.4.3 Test Channel = HCH



3 Modulation Characteristics

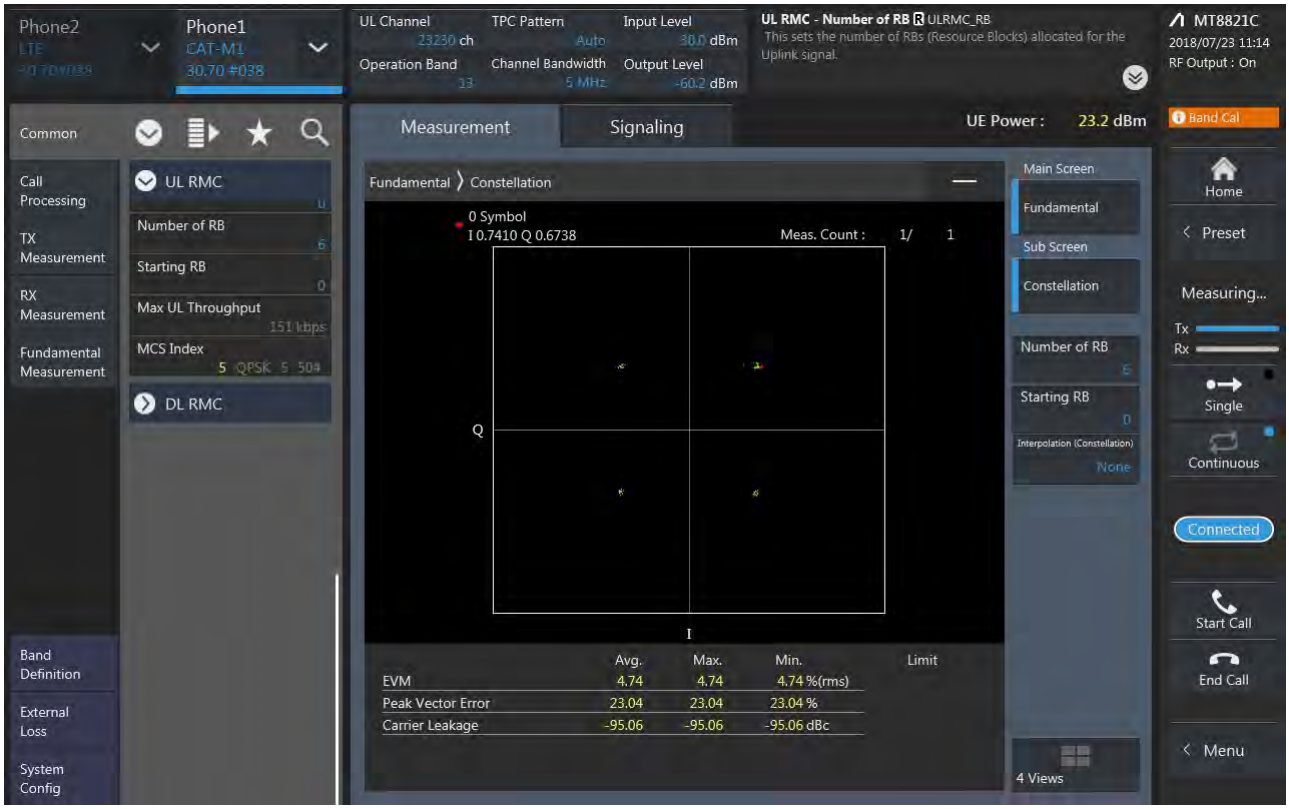
Part I - Test Plots

3.1 For LTE-M1

3.1.1 Test Band = LTE-M1 BAND13

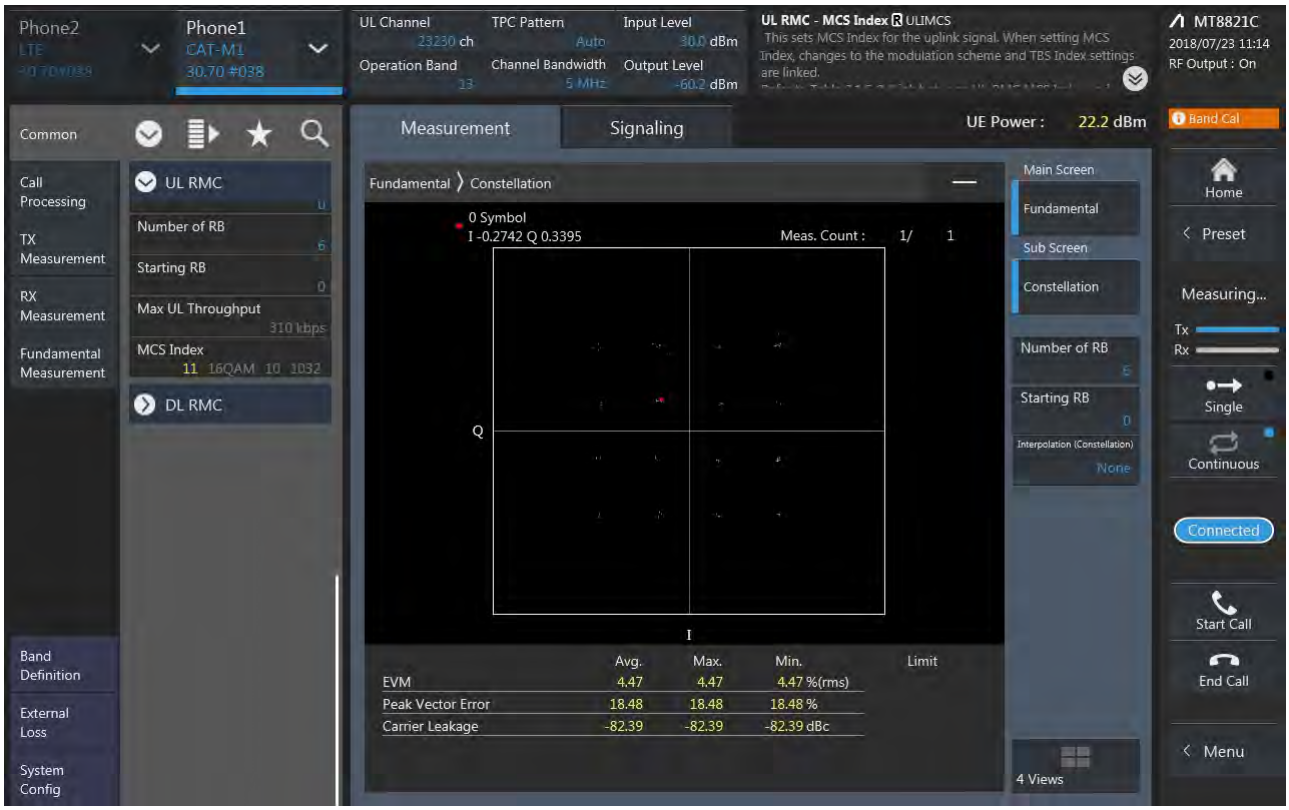
3.1.1.1 Test Mode = LTE-M1 /TM1 5MHz

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = LTE-M1 /TM2 5MHz

3.1.1.2.1 Test Channel = MCH



4 Bandwidth

Part I - Test Results

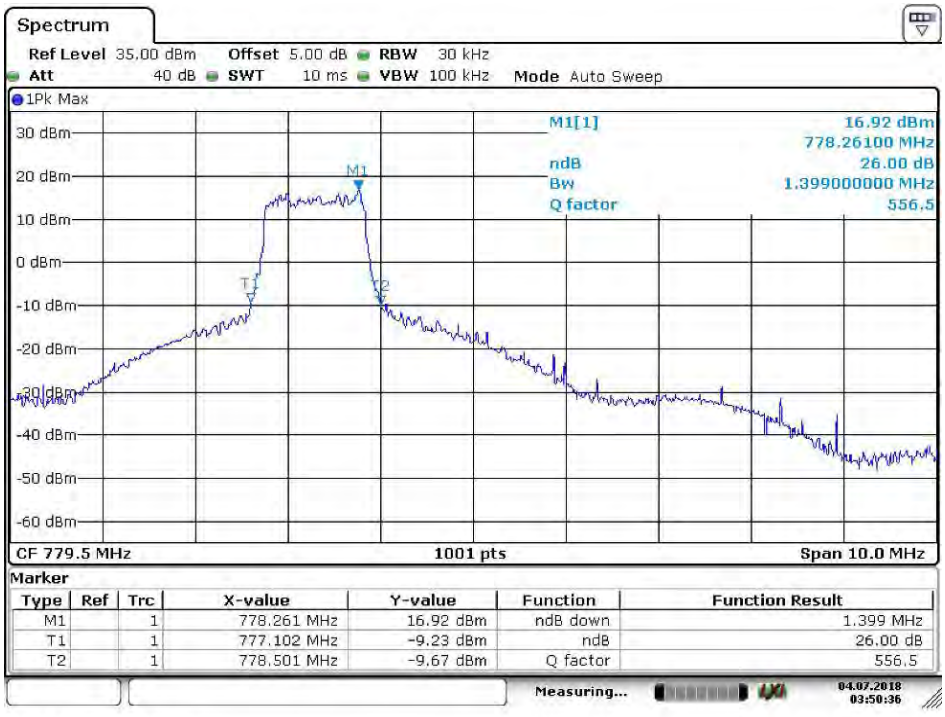
Test Band	Test Mode	Test Channel	Occupied Bandwidth [MHz]	Emission Bandwidth [MHz]	Verdict
BAND13	TM1/ 5MHz	LCH	1.10	1.39	PASS
		MCH	1.10	1.41	PASS
		HCH	1.10	1.42	PASS
	TM2/ 5MHz	LCH	1.11	1.49	PASS
		MCH	1.11	1.49	PASS
		HCH	1.11	1.48	PASS

4.1 For LTE

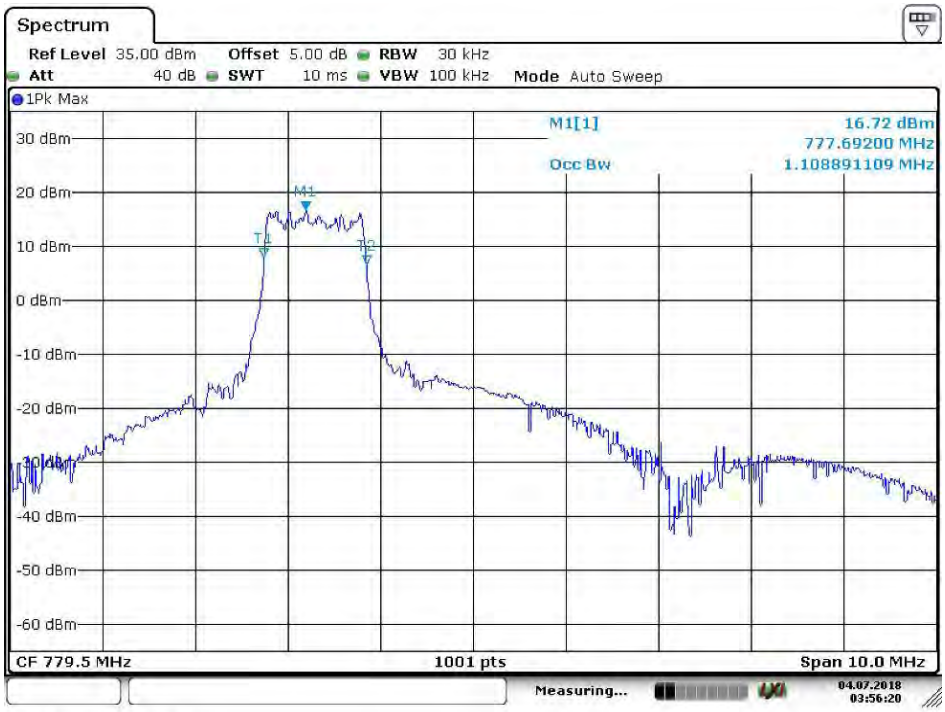
4.1.1 Test Band = LTE-M1 BAND13

4.1.1.1 Test Mode = LTE-M1/TM1 5MHz

4.1.1.1.1 Test Channel = LCH

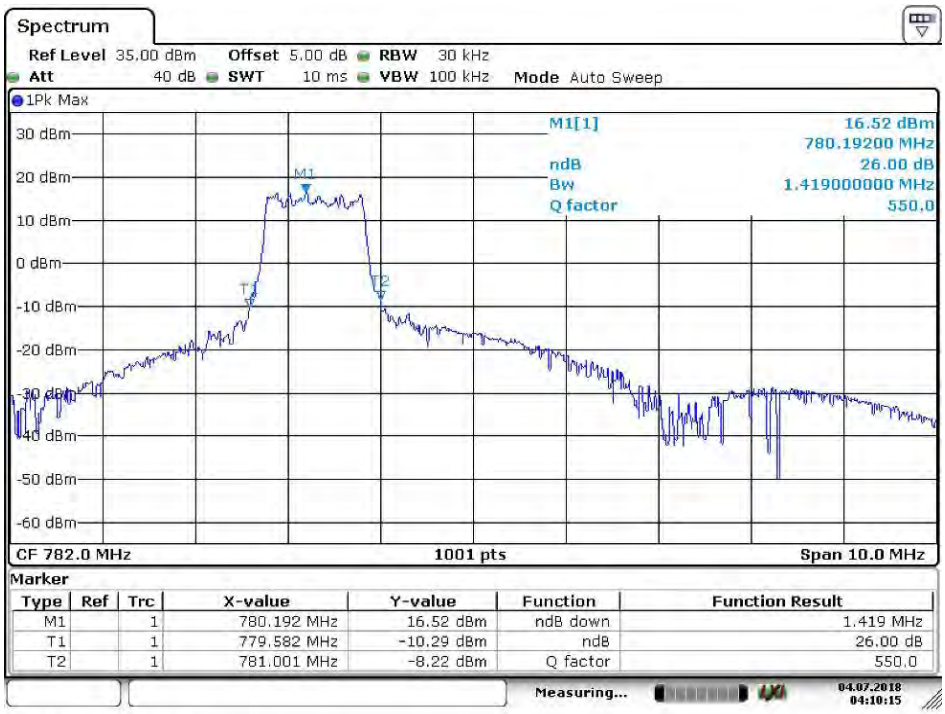


Date: 4.JUL.2018 03:50:37

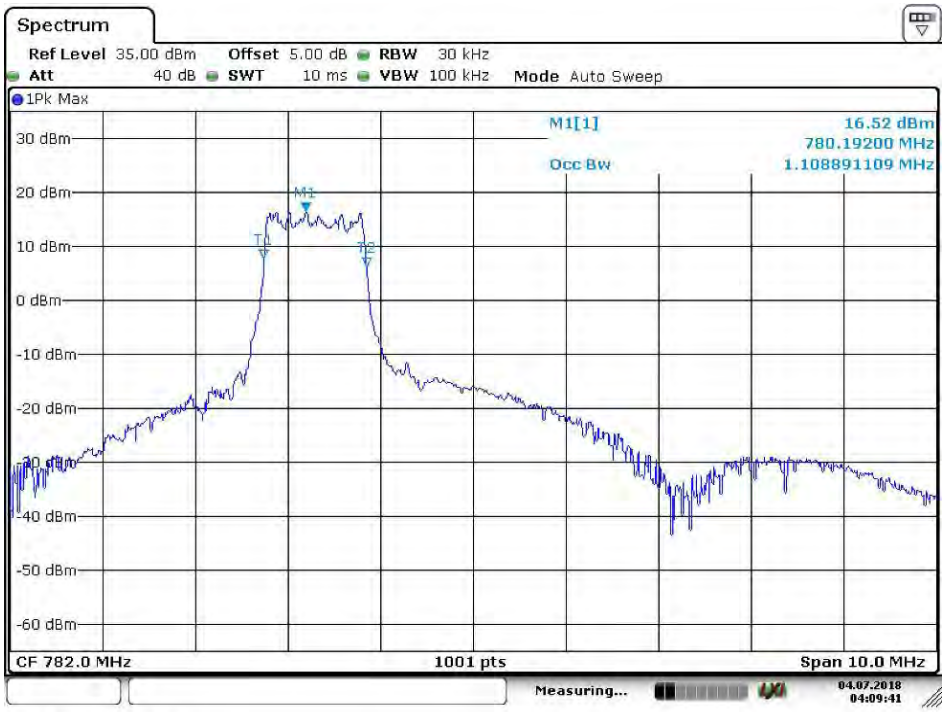


Date: 4.JUL.2018 03:56:20

4.1.1.1.2 Test Channel = MCH

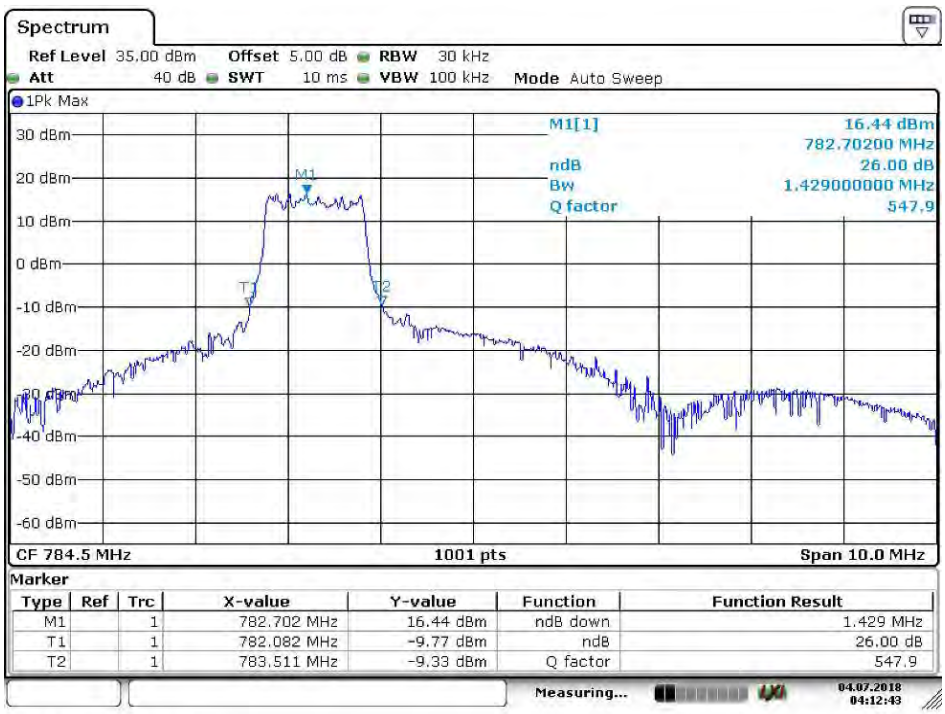


Date: 4.JUL.2018 04:10:15



Date: 4.JUL.2018 04:09:41

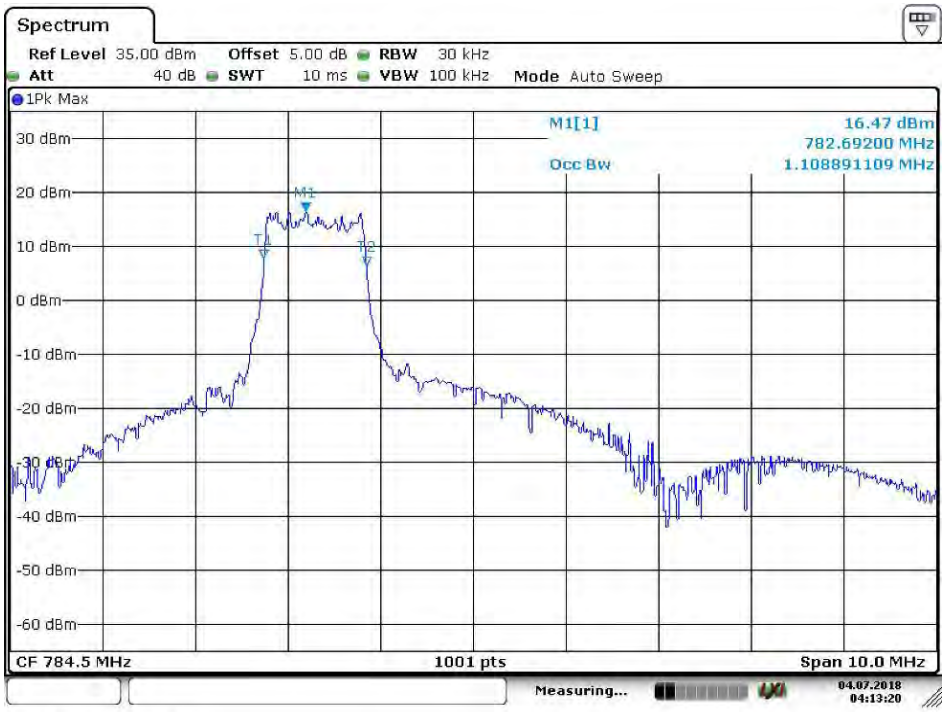
4.1.1.1.3 Test Channel = HCH



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	782.702 MHz	16.44 dBm	ndB down	1.429 MHz
T1		1	782.082 MHz	-9.77 dBm	ndB	26.00 dB
T2		1	783.511 MHz	-9.33 dBm	Q factor	547.9

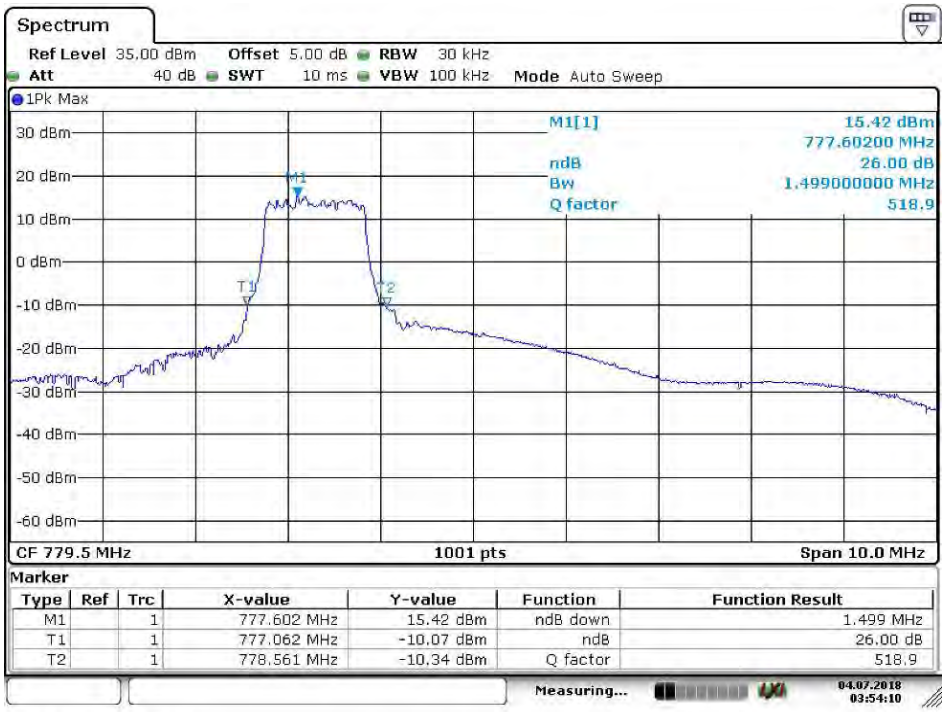
Date: 4.JUL.2018 04:12:43



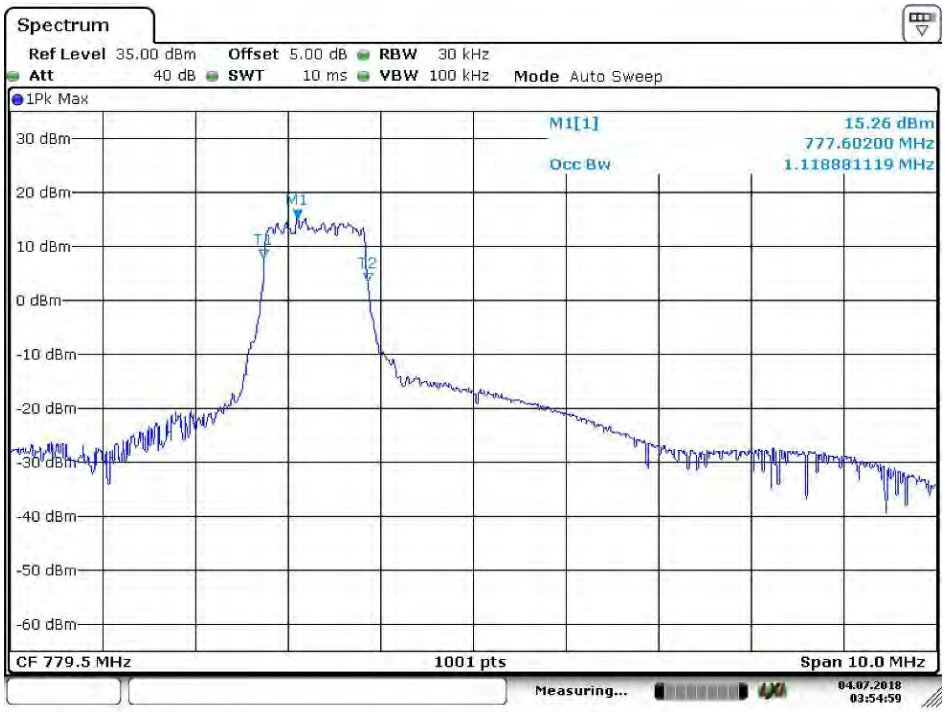
Date: 4.JUL.2018 04:13:20

4.1.1.2 Test Mode = LTE-M1/TM2 5MHz

4.1.1.2.1 Test Channel = LCH

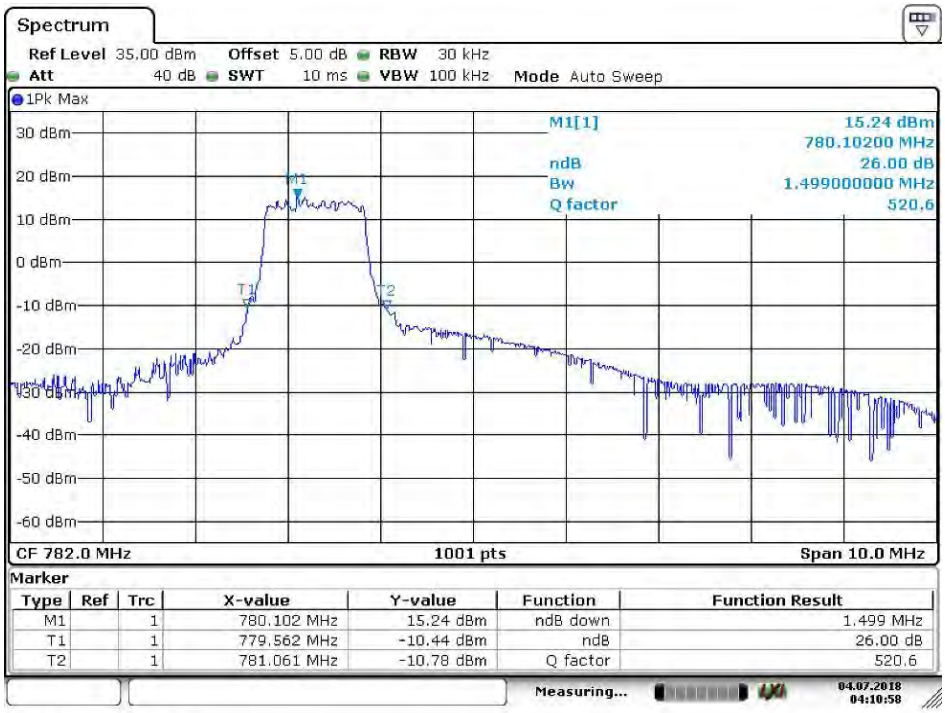


Date: 4.JUL.2018 03:54:10



Date: 4.JUL.2018 03:55:00

4.1.1.2.2 Test Channel = MCH



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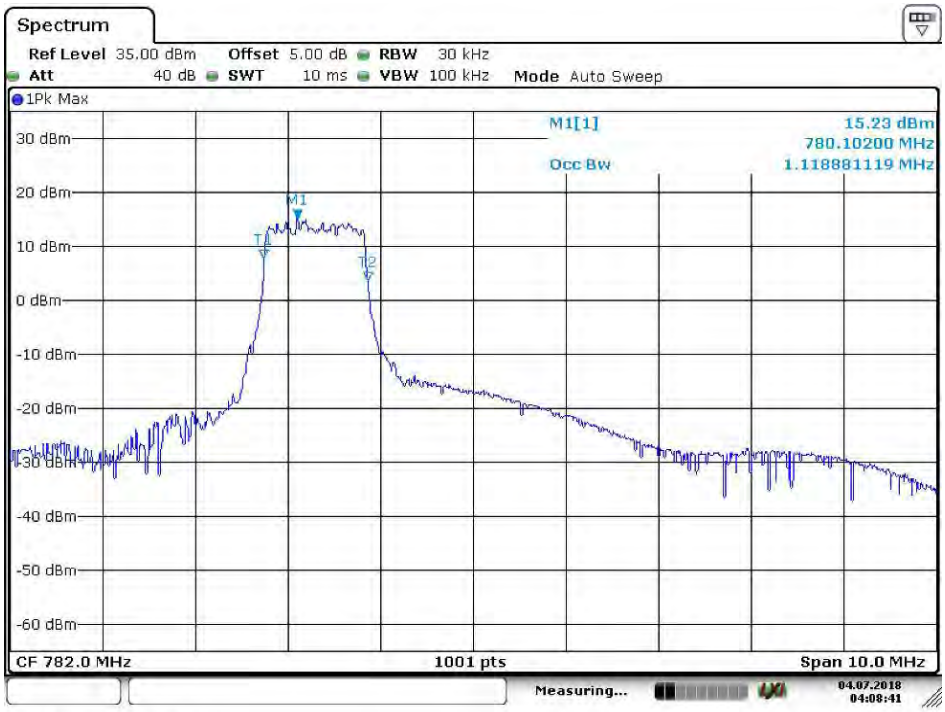
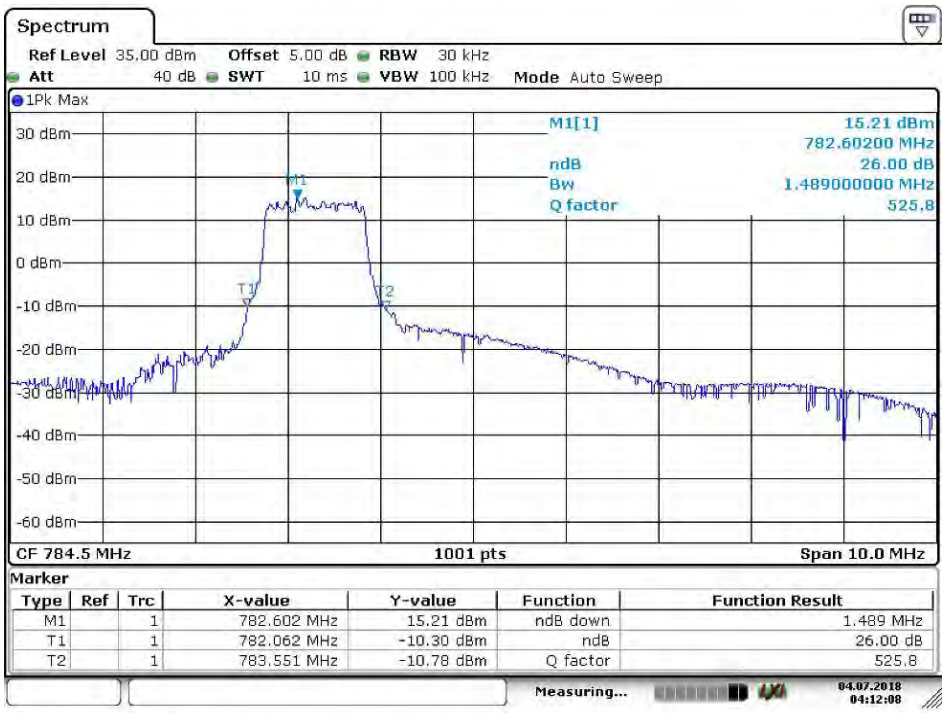


Date: 4.JUL.2018 04:08:41

4.1.1.2.3 Test Channel = HCH



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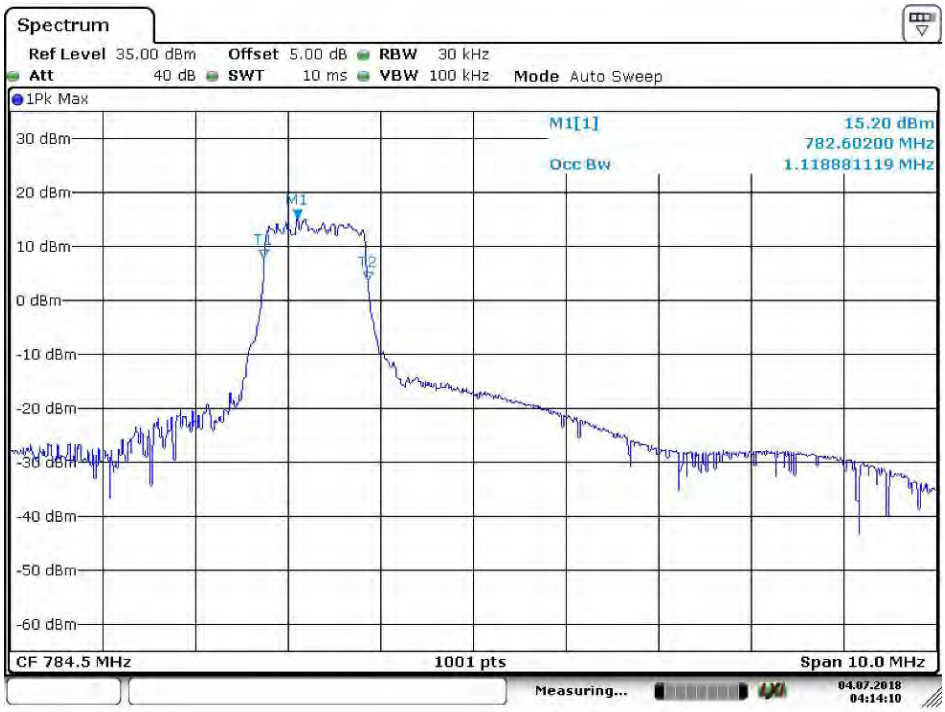


Date: 4.JUL.2018 04:14:11

5 Band Edges Compliance

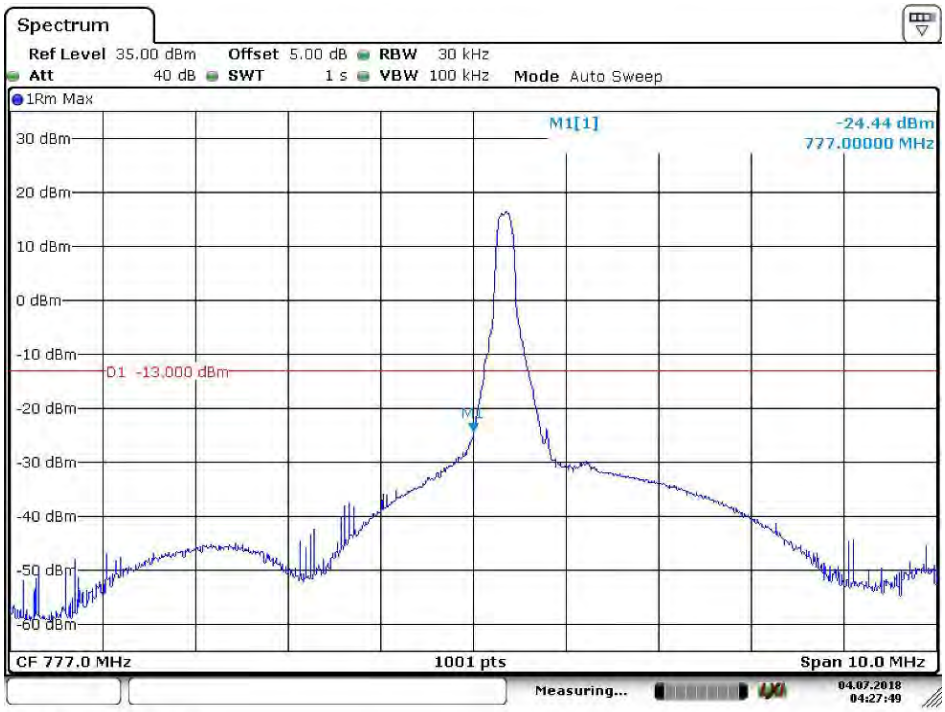
5.1 For LTE-M1

5.1.1 Test Band = LTE-M1 BAND13

5.1.1.1 Test Mode = LTE-M1/TM1 5MHz

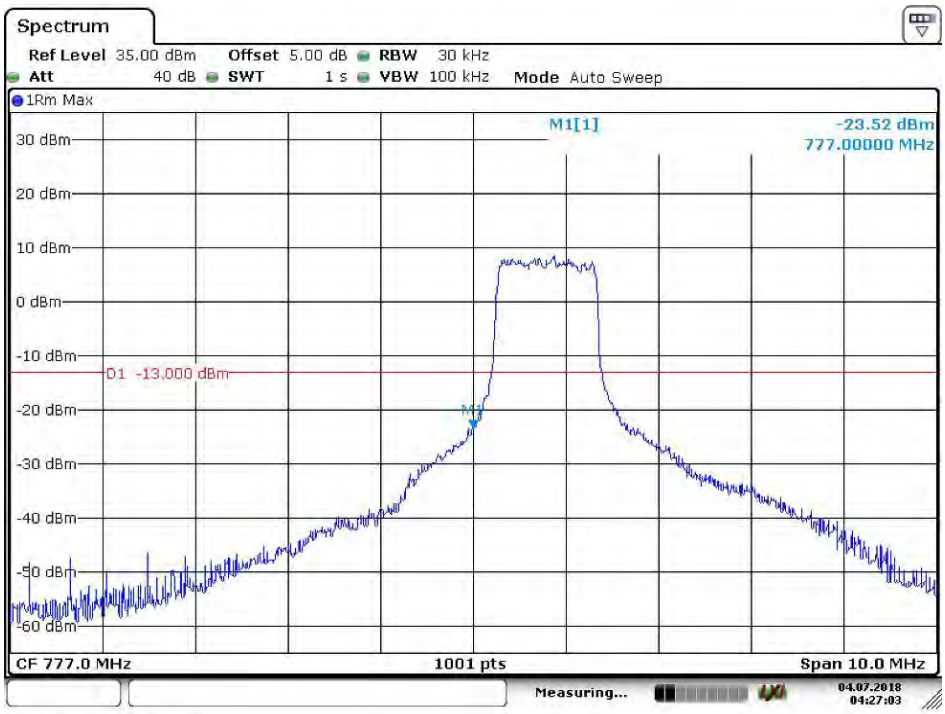
5.1.1.1.1 Test Channel = LCH

5.1.1.1.1.1 Test RB=1RB



Date: 4.JUL.2018 04:27:49

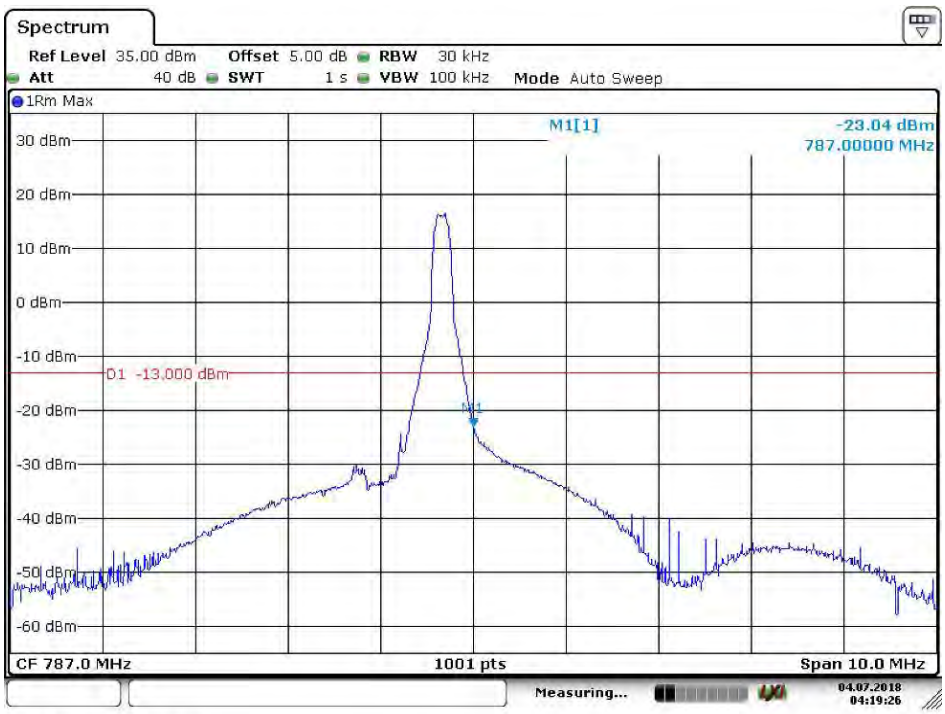
5.1.1.1.1.2 Test RB=6RB



Date: 4.JUL.2018 04:27:04

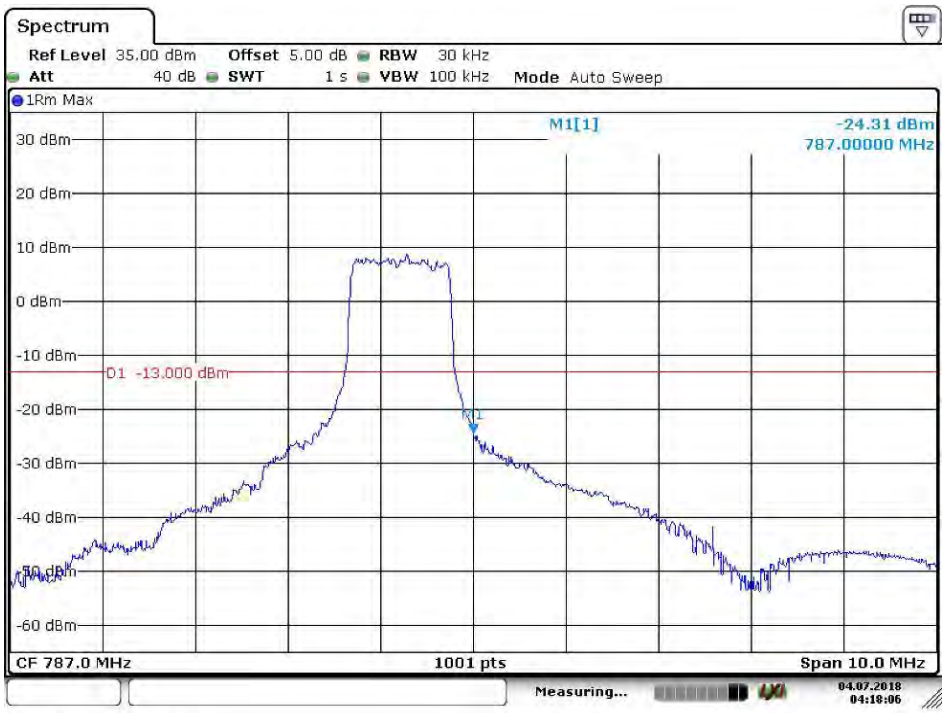
5.1.1.1.2 Test Channel = HCH

5.1.1.1.2.1 Test RB=1RB



Date: 4.JUL.2018 04:19:26

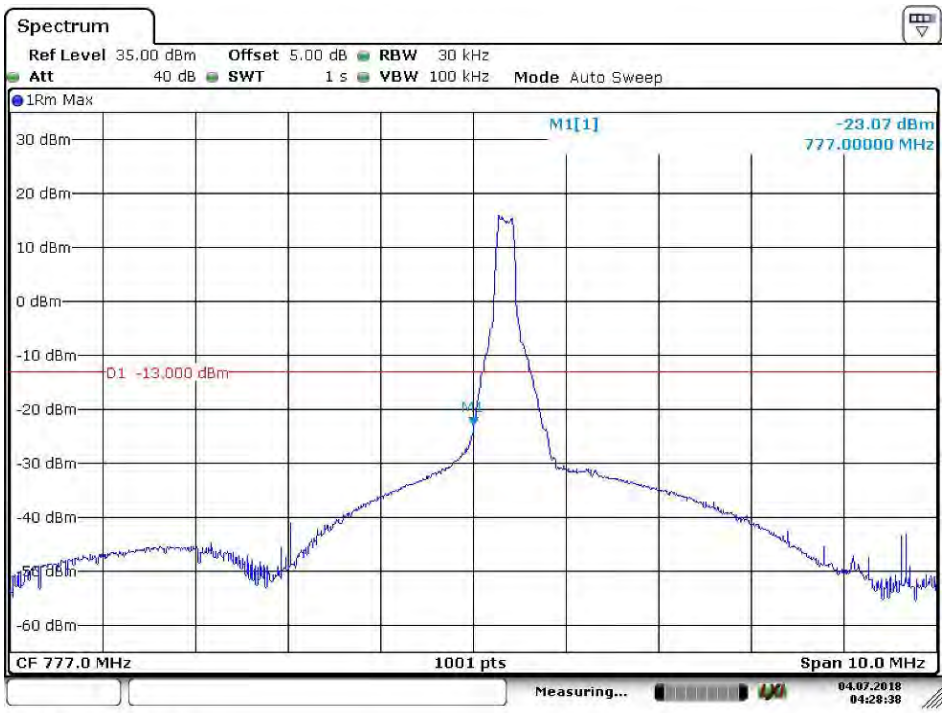
5.1.1.1.2.2 Test RB=6RB



Date: 4.JUL.2018 04:18:06

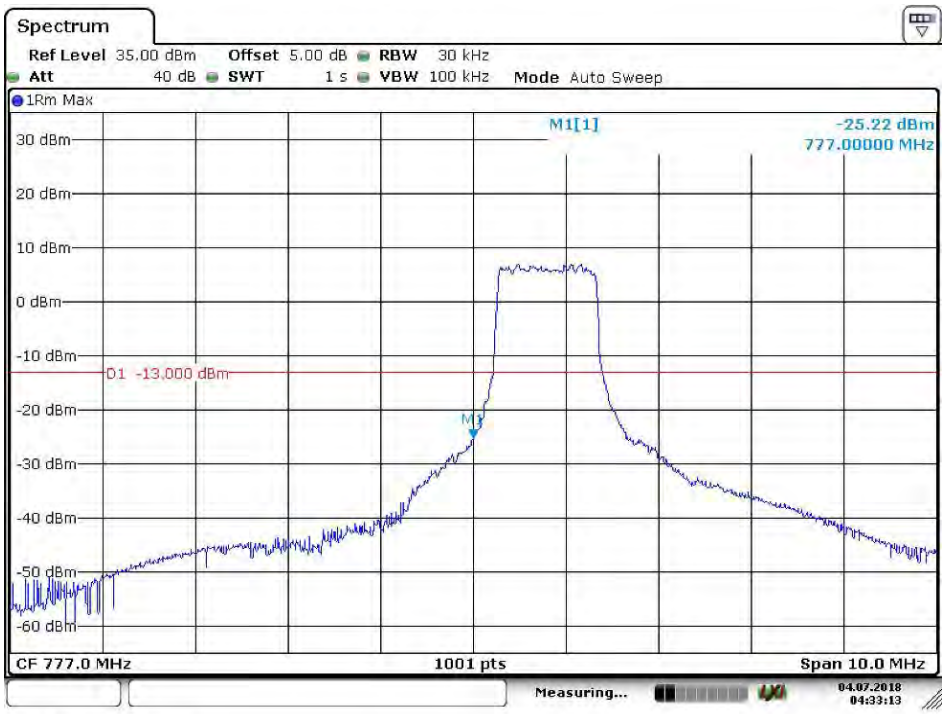
5.1.1.1.3 Test Channel = LCH

5.1.1.1.3.1 Test RB=1RB



Date: 4.JUL.2018 04:28:38

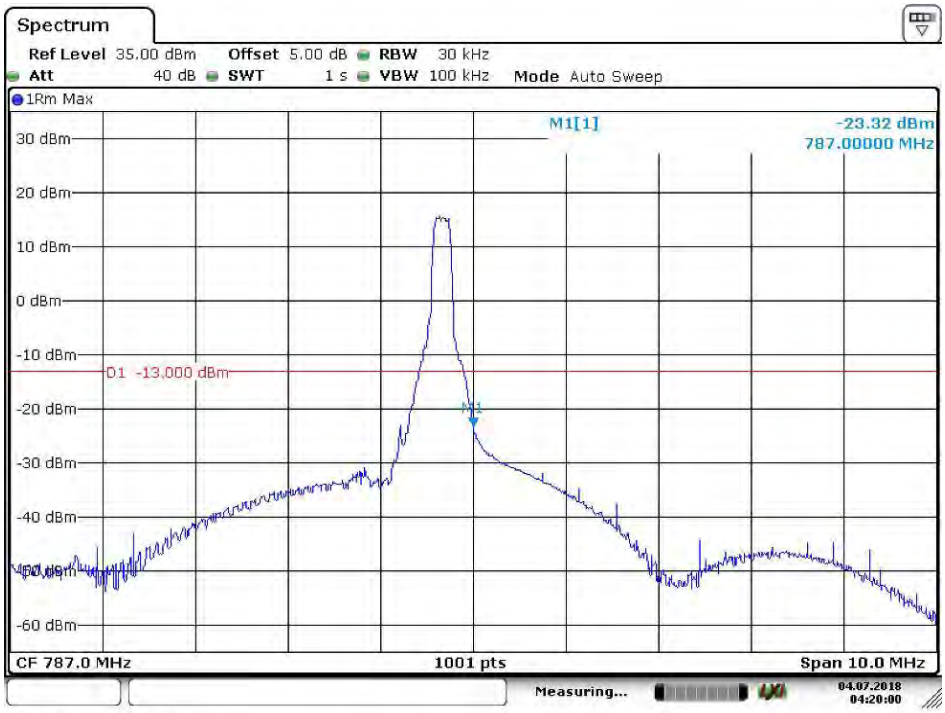
5.1.1.1.3.2 Test RB=6RB



Date: 4.JUL.2018 04:33:13

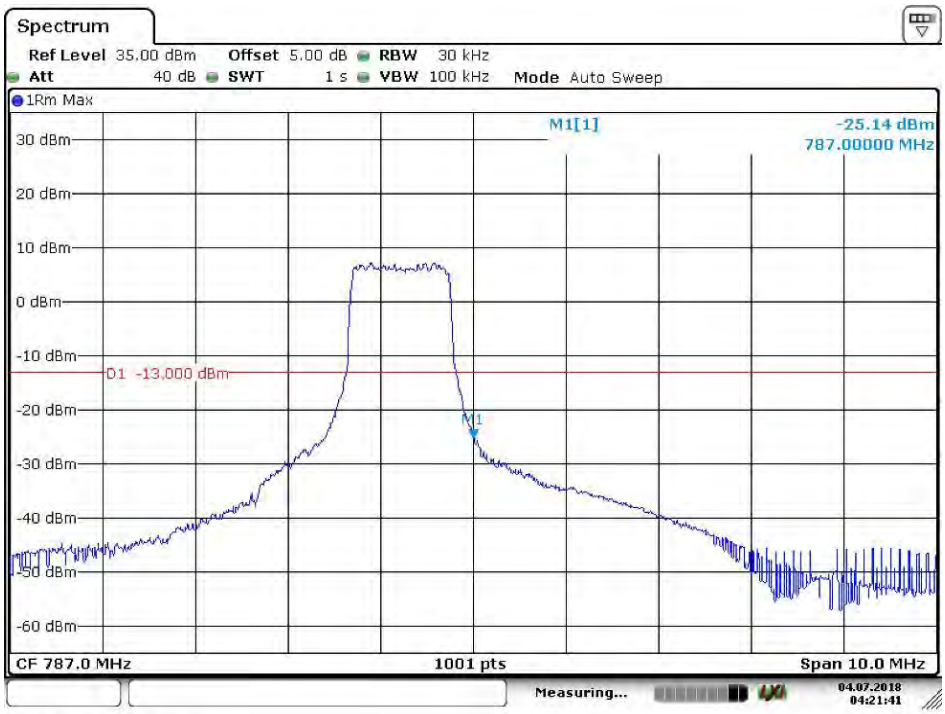
5.1.1.1.4 Test Channel = HCH

5.1.1.1.4.1 Test RB=1RB



Date: 4.JUL.2018 04:20:00

5.1.1.1.4.2 Test RB=6RB



Date: 4.JUL.2018 04:21:40

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.

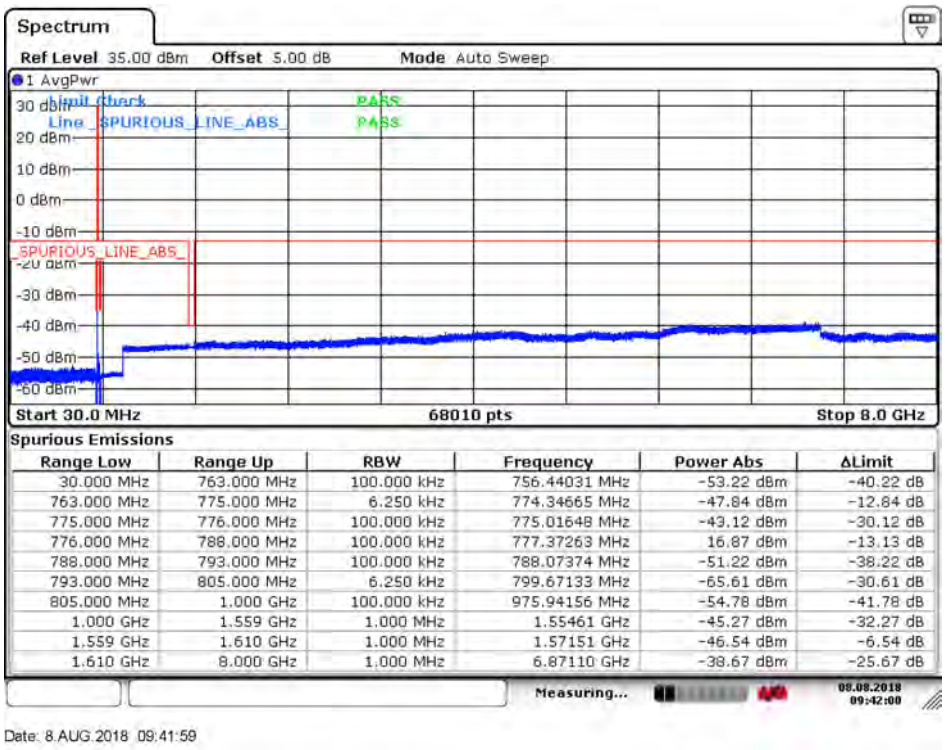
Part I - Test Plots

6.1 For LTE-M1

6.1.1 Test Band = LTE-M1 BAND13

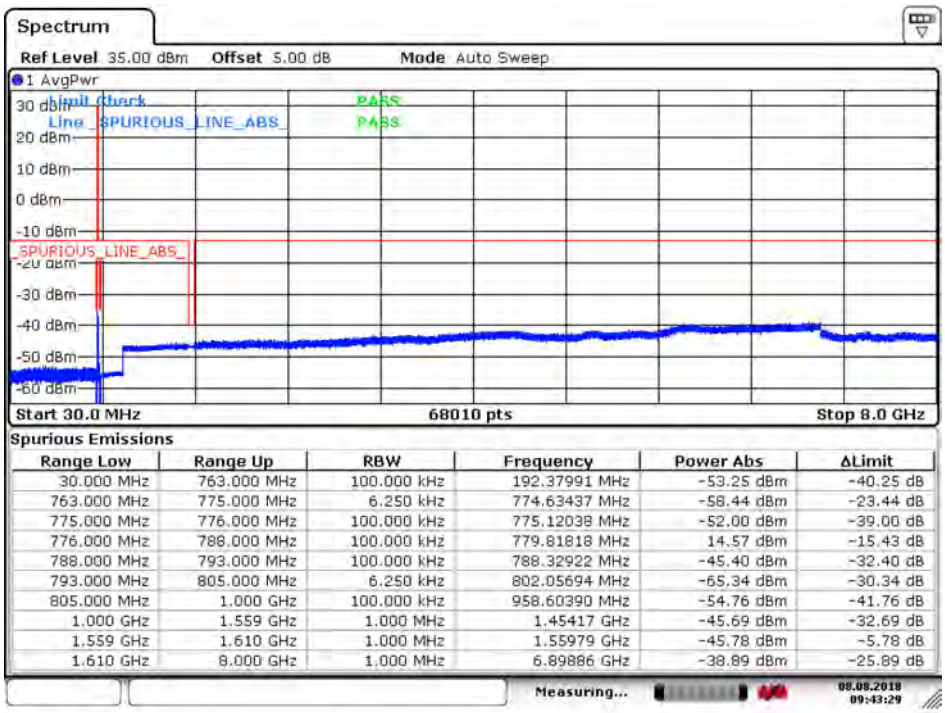
6.1.1.1 Test Mode = LTE-M1 / TM1 5MHz RB1#0

6.1.1.1.1 Test Channel = LCH



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	763.000 MHz	100.000 kHz	756.44031 MHz	-53.22 dBm	-40.22 dB
763.000 MHz	775.000 MHz	6.250 kHz	774.34665 MHz	-47.84 dBm	-12.84 dB
775.000 MHz	776.000 MHz	100.000 kHz	775.01648 MHz	-43.12 dBm	-30.12 dB
776.000 MHz	788.000 MHz	100.000 kHz	777.37263 MHz	16.87 dBm	-13.13 dB
788.000 MHz	793.000 MHz	100.000 kHz	788.07374 MHz	-51.22 dBm	-38.22 dB
793.000 MHz	805.000 MHz	6.250 kHz	799.67133 MHz	-65.61 dBm	-30.61 dB
805.000 MHz	1.000 GHz	100.000 kHz	975.94156 MHz	-54.78 dBm	-41.78 dB
1.000 GHz	1.559 GHz	1.000 MHz	1.55461 GHz	-45.27 dBm	-32.27 dB
1.559 GHz	1.610 GHz	1.000 MHz	1.57151 GHz	-46.54 dBm	-6.54 dB
1.610 GHz	8.000 GHz	1.000 MHz	6.87110 GHz	-38.67 dBm	-25.67 dB

6.1.1.1.2 Test Channel = MCH

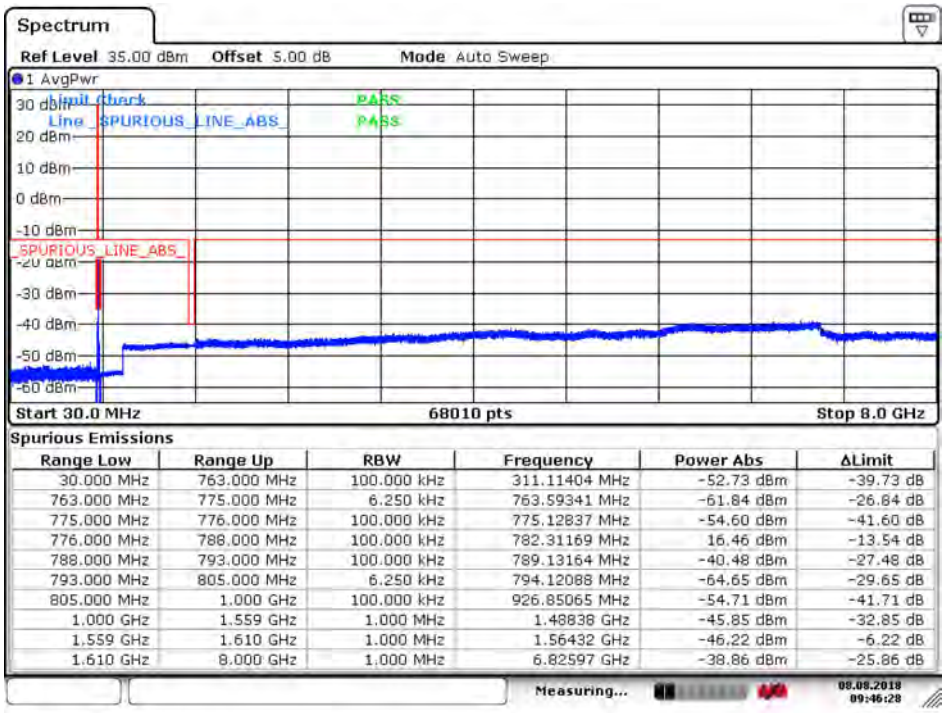


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	763.000 MHz	100.000 kHz	192.37991 MHz	-53.25 dBm	-40.25 dB
763.000 MHz	775.000 MHz	6.250 kHz	774.63437 MHz	-58.44 dBm	-23.44 dB
775.000 MHz	776.000 MHz	100.000 kHz	775.12038 MHz	-52.00 dBm	-39.00 dB
776.000 MHz	788.000 MHz	100.000 kHz	779.81818 MHz	14.57 dBm	-15.43 dB
788.000 MHz	793.000 MHz	100.000 kHz	788.32922 MHz	-45.40 dBm	-32.40 dB
793.000 MHz	805.000 MHz	6.250 kHz	802.05694 MHz	-65.34 dBm	-30.34 dB
805.000 MHz	1.000 GHz	100.000 kHz	958.60390 MHz	-54.76 dBm	-41.76 dB
1.000 GHz	1.559 GHz	1.000 MHz	1.45417 GHz	-45.69 dBm	-32.69 dB
1.559 GHz	1.610 GHz	1.000 MHz	1.55979 GHz	-45.78 dBm	-5.78 dB
1.610 GHz	8.000 GHz	1.000 MHz	6.89886 GHz	-38.89 dBm	-25.89 dB

Date: 8.AUG.2018 09:43:29

6.1.1.1.3 Test Channel = HCH



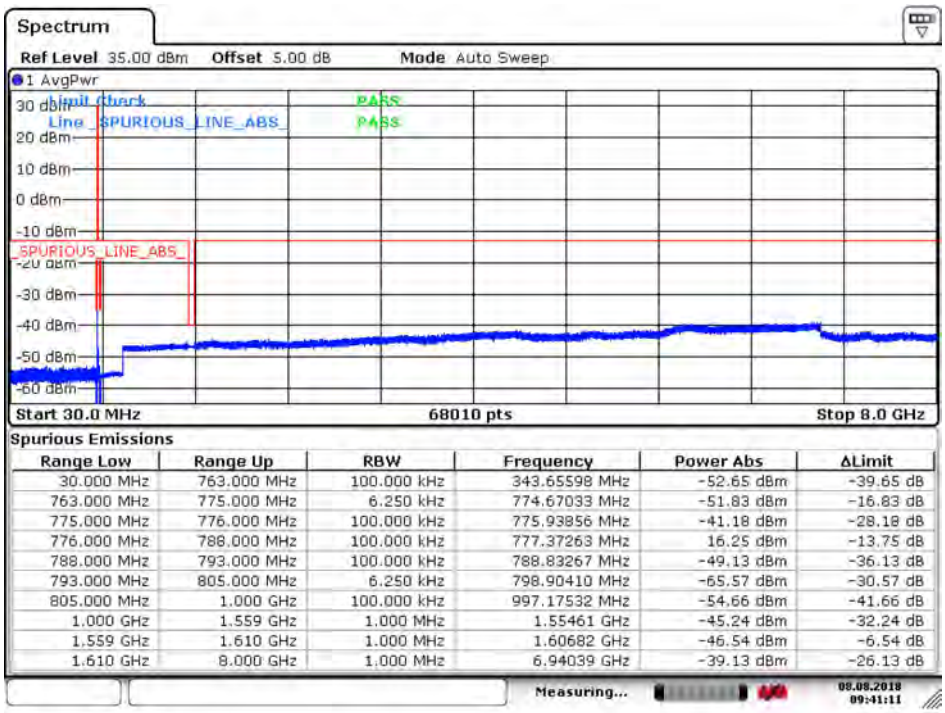
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	763.000 MHz	100.000 kHz	311.11404 MHz	-52.73 dBm	-39.73 dB
763.000 MHz	775.000 MHz	6.250 kHz	763.59341 MHz	-61.84 dBm	-26.84 dB
775.000 MHz	776.000 MHz	100.000 kHz	775.12837 MHz	-54.60 dBm	-41.60 dB
776.000 MHz	788.000 MHz	100.000 kHz	782.31169 MHz	16.46 dBm	-13.54 dB
788.000 MHz	793.000 MHz	100.000 kHz	789.13164 MHz	-40.48 dBm	-27.48 dB
793.000 MHz	805.000 MHz	6.250 kHz	794.12088 MHz	-64.65 dBm	-29.65 dB
805.000 MHz	1.000 GHz	100.000 kHz	926.85065 MHz	-54.71 dBm	-41.71 dB
1.000 GHz	1.559 GHz	1.000 MHz	1.48838 GHz	-45.85 dBm	-32.85 dB
1.559 GHz	1.610 GHz	1.000 MHz	1.56432 GHz	-46.22 dBm	-6.22 dB
1.610 GHz	8.000 GHz	1.000 MHz	6.82597 GHz	-38.86 dBm	-25.86 dB

Date: 8.AUG.2018 09:46:28

6.1.1.2 Test Mode = LTE-M1 / TM2 5MHz RB1#0

6.1.1.2.1 Test Channel = LCH



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	763.000 MHz	100.000 kHz	343.65598 MHz	-52.65 dBm	-39.65 dB
763.000 MHz	775.000 MHz	6.250 kHz	774.67033 MHz	-51.83 dBm	-16.83 dB
775.000 MHz	776.000 MHz	100.000 kHz	775.93856 MHz	-41.18 dBm	-28.18 dB
776.000 MHz	788.000 MHz	100.000 kHz	777.37263 MHz	16.25 dBm	-13.75 dB
788.000 MHz	793.000 MHz	100.000 kHz	788.83267 MHz	-49.13 dBm	-36.13 dB
793.000 MHz	805.000 MHz	6.250 kHz	798.90410 MHz	-65.57 dBm	-30.57 dB
805.000 MHz	1.000 GHz	100.000 kHz	997.17532 MHz	-54.66 dBm	-41.66 dB
1.000 GHz	1.559 GHz	1.000 MHz	1.55461 GHz	-45.24 dBm	-32.24 dB
1.559 GHz	1.610 GHz	1.000 MHz	1.60682 GHz	-46.54 dBm	-6.54 dB
1.610 GHz	8.000 GHz	1.000 MHz	6.94039 GHz	-39.13 dBm	-26.13 dB

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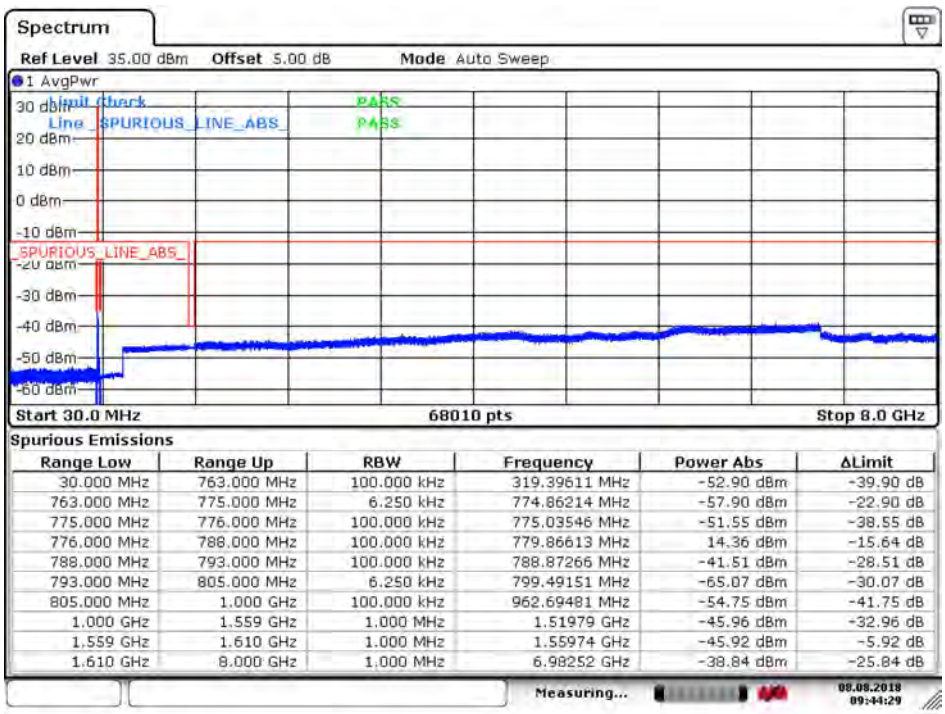
6.1.1.2.2 Test Channel = MCH



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	763.000 MHz	100.000 kHz	319.39611 MHz	-52.90 dBm	-39.90 dB
763.000 MHz	775.000 MHz	6.250 kHz	774.86214 MHz	-57.90 dBm	-22.90 dB
775.000 MHz	776.000 MHz	100.000 kHz	775.03546 MHz	-51.55 dBm	-38.55 dB
776.000 MHz	788.000 MHz	100.000 kHz	779.86613 MHz	14.36 dBm	-15.64 dB
788.000 MHz	793.000 MHz	100.000 kHz	788.87266 MHz	-41.51 dBm	-28.51 dB
793.000 MHz	805.000 MHz	6.250 kHz	799.49151 MHz	-65.07 dBm	-30.07 dB
805.000 MHz	1.000 GHz	100.000 kHz	962.69481 MHz	-54.75 dBm	-41.75 dB
1.000 GHz	1.559 GHz	1.000 MHz	1.51979 GHz	-45.96 dBm	-32.96 dB
1.559 GHz	1.610 GHz	1.000 MHz	1.55974 GHz	-45.92 dBm	-5.92 dB
1.610 GHz	8.000 GHz	1.000 MHz	6.98252 GHz	-38.84 dBm	-25.84 dB

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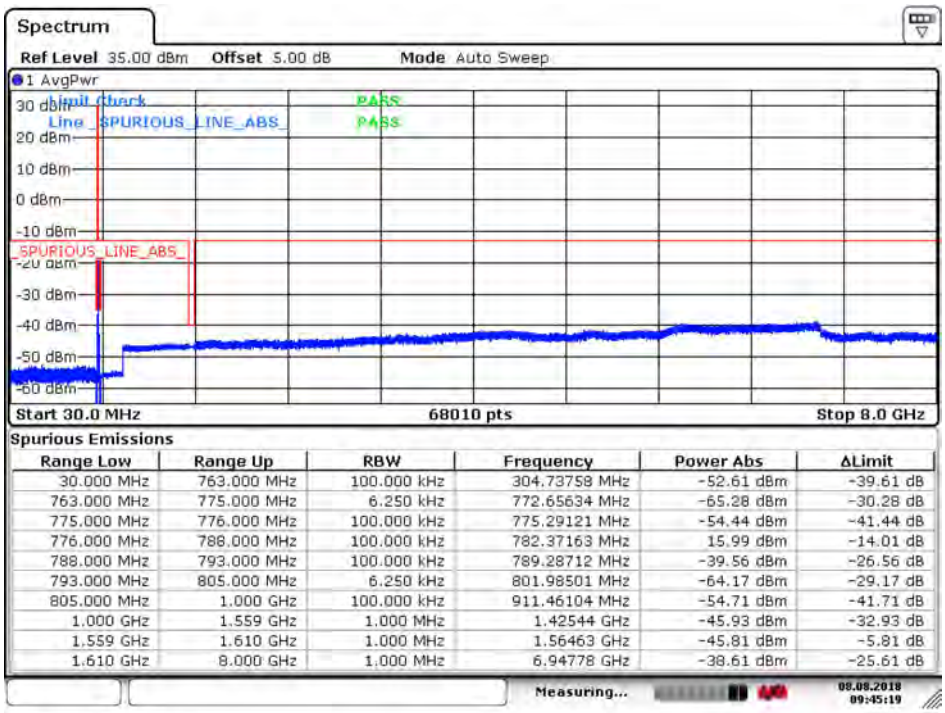
6.1.1.2.3 Test Channel = HCH



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7 Field Strength of Spurious Radiation

7.1 For LTE-M1

7.1.1 Test Band = LTE-M1 BAND13

7.1.1.1 Test Mode =LTE-M1/TM1 5MHz RB1#0

7.1.1.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.693333	-82.27	-13.00	-69.27	Vertical
90.480000	-84.74	-13.00	-71.74	Vertical
1554.500000	-53.20	-13.00	-40.20	Vertical
2332.000000	-59.12	-13.00	-46.12	Vertical
3109.200000	-67.75	-13.00	-54.75	Vertical
6486.112500	-65.23	-13.00	-52.23	Vertical
63.553333	-78.21	-13.00	-65.21	Horizontal
104.293333	-84.38	-13.00	-71.38	Horizontal
1554.500000	-52.64	-13.00	-39.64	Horizontal
2332.500000	-58.92	-13.00	-45.92	Horizontal
3109.200000	-65.06	-13.00	-52.06	Horizontal
7451.362500	-66.14	-13.00	-53.14	Horizontal

7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.693333	-81.51	-13.00	-68.51	Vertical
104.246667	-83.92	-13.00	-70.92	Vertical
1559.500000	-54.36	-40.00	-14.36	Vertical
2339.000000	-58.22	-13.00	-45.22	Vertical
4298.212500	-67.09	-13.00	-54.09	Vertical
7919.850000	-63.99	-13.00	-50.99	Vertical
57.113333	-77.57	-13.00	-64.57	Horizontal
104.293333	-84.75	-13.00	-71.75	Horizontal
1560.000000	-50.80	-40.00	-10.80	Horizontal
2339.500000	-53.22	-13.00	-40.22	Horizontal
3118.950000	-65.09	-13.00	-52.09	Horizontal
7034.550000	-65.23	-13.00	-52.23	Horizontal

7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
63.880000	-82.02	-13.00	-69.02	Vertical
104.246667	-85.19	-13.00	-72.19	Vertical
1565.000000	-54.61	-40.00	-14.61	Vertical
2347.000000	-59.20	-13.00	-46.20	Vertical
3129.187500	-67.68	-13.00	-54.68	Vertical
6486.600000	-65.26	-13.00	-52.26	Vertical
62.433333	-77.72	-13.00	-64.72	Horizontal
104.293333	-85.03	-13.00	-72.03	Horizontal
1564.500000	-50.78	-40.00	-10.78	Horizontal
2346.500000	-57.13	-13.00	-44.13	Horizontal
3129.675000	-67.45	-13.00	-54.45	Horizontal
7051.612500	-65.22	-13.00	-52.22	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
LTE-M1 BAND13	LTE-M1/TM1 5MHz	LCH	TN	VL	-13.81	-0.017711	PASS
				VN	8.77	0.011255	PASS
				VH	3.89	0.004992	PASS
		MCH	TN	VL	-0.63	-0.000803	PASS
				VN	-8.99	-0.011493	PASS
				VH	-9.38	-0.011997	PASS
		HCH	TN	VL	0.38	0.000490	PASS
				VN	-0.35	-0.000443	PASS
				VH	-3.82	-0.004872	PASS
	LTE-M1/TM2 5MHz	LCH	TN	VL	4.56	0.005845	PASS
				VN	1.54	0.001978	PASS
				VH	-6.47	-0.008306	PASS
		MCH	TN	VL	6.67	0.008530	PASS
				VN	-7.23	-0.009247	PASS
				VH	7.01	0.008963	PASS
		HCH	TN	VL	5.69	0.007256	PASS
				VN	-2.49	-0.003168	PASS
				VH	1.70	0.002170	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
LTE-M1 BAND13	LTE-M1/TM1 5MHz	LCH	VN	-30	-3.32	-0.004261	PASS
				-20	1.48	0.001905	PASS
				-10	-3.11	-0.003986	PASS
				0	-6.58	-0.008447	PASS
				10	1.12	0.001434	PASS
				20	-7.66	-0.009822	PASS
				30	-3.43	-0.004396	PASS
				40	-6.51	-0.008354	PASS
				50	0.56	0.000721	PASS
		MCH	VN	-30	-0.04	-0.000049	PASS
				-20	2.49	0.003178	PASS
				-10	-0.86	-0.001101	PASS
				0	9.97	0.012744	PASS
				10	-3.33	-0.004253	PASS
				20	-0.68	-0.000872	PASS
				30	2.61	0.003332	PASS
				40	4.46	0.005705	PASS
				50	9.00	0.011511	PASS
		HCH	VN	-30	-2.52	-0.003212	PASS
				-20	-2.30	-0.002937	PASS
				-10	-2.88	-0.003673	PASS
				0	-5.00	-0.006375	PASS
				10	2.69	0.003433	PASS
				20	9.29	0.011840	PASS
				30	3.10	0.003949	PASS
				40	2.45	0.003117	PASS
				50	-5.04	-0.006422	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
LTE-M1 BAND13	LTE-M1/TM2 5MHz	LCH	VN	-30	-0.98	-0.001261	PASS
				-20	4.57	0.005858	PASS
				-10	-2.68	-0.003437	PASS
				0	-8.96	-0.011501	PASS
				10	1.43	0.001834	PASS
				20	6.54	0.008386	PASS
				30	-2.27	-0.002914	PASS
				40	0.56	0.000717	PASS
				50	4.88	0.006263	PASS
		MCH	VN	-30	7.50	0.009592	PASS
				-20	-9.97	-0.012754	PASS
				-10	-8.08	-0.010339	PASS
				0	8.28	0.010584	PASS
				10	4.56	0.005835	PASS
				20	-0.39	-0.000503	PASS
				30	-3.50	-0.004470	PASS
				40	-3.84	-0.004917	PASS
				50	3.56	0.004552	PASS
		HCH	VN	-30	-8.87	-0.011306	PASS
				-20	-6.30	-0.008025	PASS
				-10	0.22	0.000279	PASS
				0	-0.99	-0.001259	PASS
				10	0.77	0.000983	PASS
				20	4.44	0.005659	PASS
				30	1.39	0.001770	PASS
				40	6.38	0.008131	PASS
				50	-0.12	-0.000148	PASS

The End