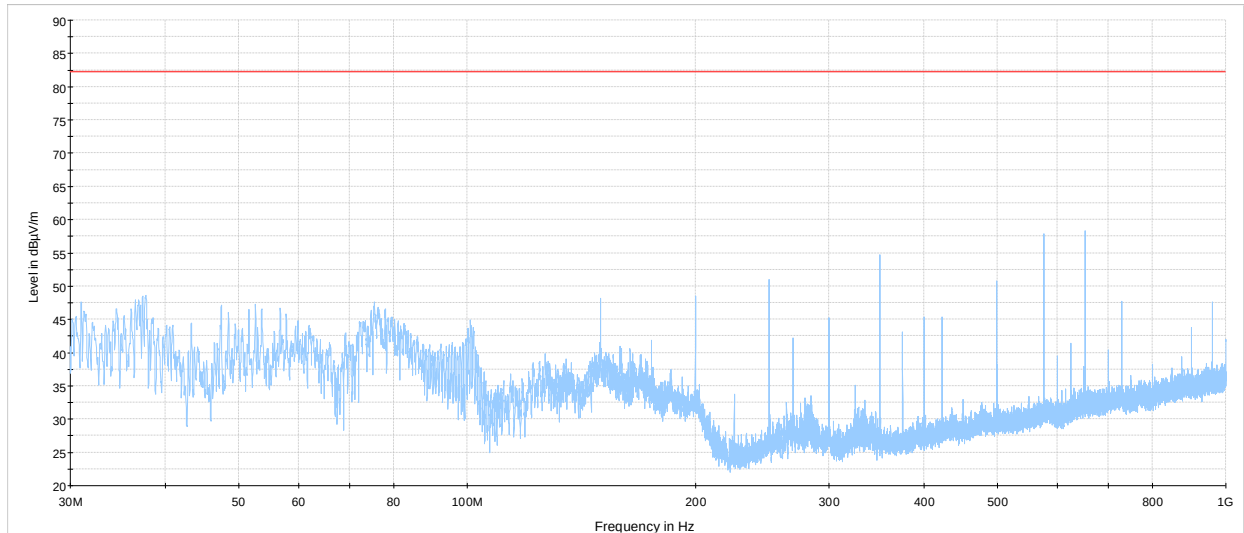


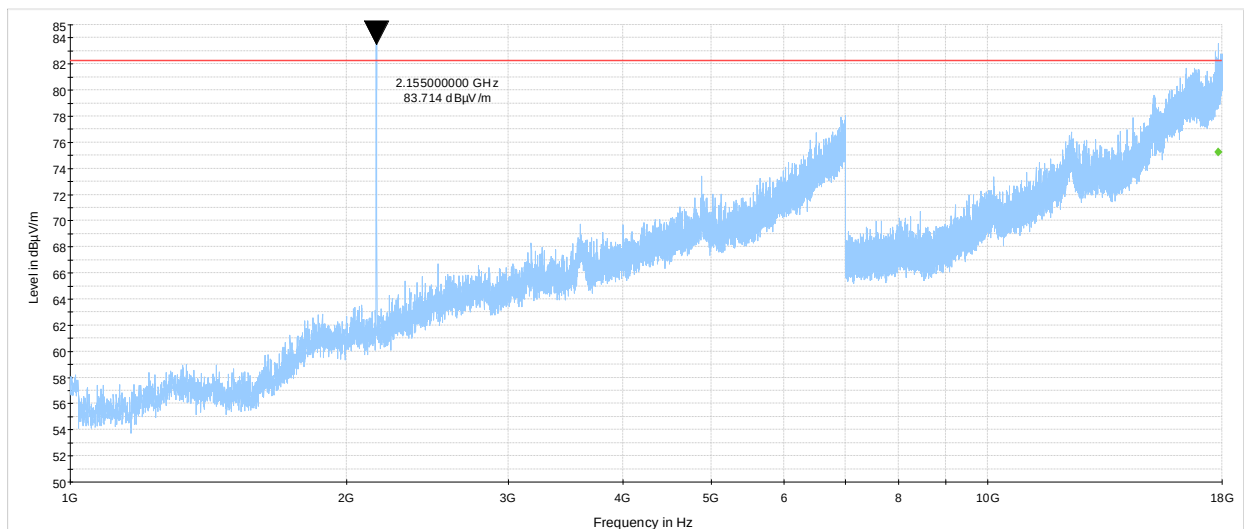
Test data, Radiated Cabinet Spurious Emissions, continued



PRJ0042471 RE Tx Spurious 30-1000 MHz, 4G LTE B66

— Preview Result 1-PK+
— -13 dBm E Limit Line

Figure 7.2 136: Radiated Cabinet sp. emissions below 1GHz, LTE, B 66, CH 66886

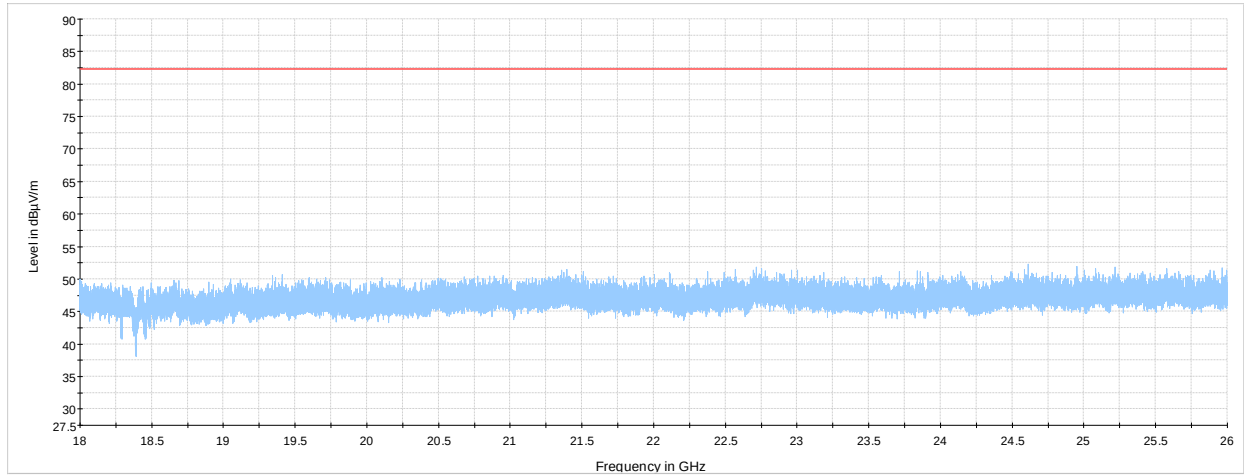


PRJ0042471 RE Tx Spurious 1-18 GHz, LTE, B66 CH66886

— Preview Result 1-PK+
— -13 dBm E Limit Line
◆ Final_Result CAV

Figure 7.2 137: Radiated Cabinet sp. emissions above 1 GHz, LTE, B 66, CH 66886

Test data, Radiated Cabinet Spurious Emissions, continued



PRJ0042471 RE Tx Spurious 18-26 GHz, LTE, B66

Preview Result 1-PK+
-13 dBm E Limit Line

Figure 7.2 138: Radiated Cabinet sp. emissions above 18 GHz, LTE, B 66, CH 66886

7.3 Transmitter frequency stability

References, definitions and limits

FCC §22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within 1.5 (ppm)

FCC §24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

FCC § 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

FCC §90.213

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within 1.5 (ppm).

RSS-119, Clause 5.3

The carrier frequency of each transmitter in the Public Mobile Services must be maintained within 1.5 (ppm).

RSS-130, Clause 4.3

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-132, Clause 5.3

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen.

RSS-133, Clause 5.3

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen.

RSS-139, Clause 5.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS-199, Clause 5.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

Test summary

Verdict	Pass		
Test date	November 27, 2023	Temperature	21 °C
Tested by	Tarek Elkholy	Air pressure	974 mbar
Test location	Cambridge	Relative humidity	33 %

Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.6
26 dBC points including frequency tolerance were assessed to remain within assigned band.

Test data

Table 0-1 : Transmitter frequency stability results – GSM B 02 ch 661

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	1.96000067	583	0.30
+40 °C, Nominal	1.96000080	712	0.36
+30 °C, Nominal	1.96000096	877	0.45
+20 °C, Nominal, 138 V _{AC} , 60 Hz	1.96000128	1196	0.61
+20 °C, Nominal	1.96000008	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	1.96000076	672	0.34
+10 °C, Nominal	1.96000056	479	0.24
0 °C, Nominal	1.96000107	988	0.50

Table 0-2 : Transmitter frequency stability results – GSM B 05 ch 189

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	881.40053595	-119	-0.1354	1.5	1.36
+40 °C, Nominal	881.4000933	-646	-0.7329	1.5	0.77
+30 °C, Nominal	881.40039962	-256	-0.2901	1.5	1.21
+20 °C, Nominal, 138 V _{AC} , 60 Hz	881.40107017	415	0.4707	1.5	1.03
+20 °C, Nominal	881.40065533	Reference	Reference	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	881.40018241	-473	-0.5366	1.5	0.96
+10 °C, Nominal	881.40089910	244	0.2766	1.5	1.22
0 °C, Nominal	881.40031439	-341	-0.3868	1.5	1.11

Table 0-3 : Transmitter frequency stability results – WCDMA B 02 ch 9800

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	1.95998227	2605	1.3291
+40 °C, Nominal	1.95997960	-69	-0.0352
+30 °C, Nominal	1.95998201	2341	1.1944
+20 °C, Nominal, 138 V _{AC} , 60 Hz	1.95997990	237	0.1209
+20 °C, Nominal	1.95997967	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	1.95998157	1909	0.9740
+10 °C, Nominal	1.95997629	-3376	-1.7225
0 °C, Nominal	1.95998520	5530	2.8215

Table 0-4 : Transmitter frequency stability results – WCDMA B 04 ch 1638

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	2.13258474	6846	3.2102
+40 °C, Nominal	2.13259176	13869	6.5034
+30 °C, Nominal	2.13258541	7518	3.5253
+20 °C, Nominal, 138 V _{AC} , 60 Hz	2.13258364	5745	2.6939
+20 °C, Nominal	2.13257790	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	2.13258023	2337	1.0959
+10 °C, Nominal	2.13258383	5930	2.7807
0 °C, Nominal	2.13258271	4818	2.2592

Test data

Table 0-5 : Transmitter frequency stability results – WCDMA B 05 ch 4408

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	881.58478266	-877	-0.9945	1.5	0.51
+40 °C, Nominal	881.58521703	-442	-0.5018	1.5	1.00
+30 °C, Nominal	881.58511077	-549	-0.6223	1.5	0.88
+20 °C, Nominal, 138 VAC, 60 Hz	881.58567011	11	0.0121	1.5	1.49
+20 °C, Nominal	881.58565942	Reference	Reference	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	881.58567950	20	0.0228	1.5	1.48
+10 °C, Nominal	881.58510974	-550	-0.6235	1.5	0.88
0 °C, Nominal	881.58510787	-552	-0.6256	1.5	0.87

Table 0-6 : Transmitter frequency stability results – LTE B 02 ch 900

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	1.95999670	-920	-0.4694
+40 °C, Nominal	1.95999615	-1475	-0.7526
+30 °C, Nominal	1.95999753	-94	-0.0480
+20 °C, Nominal, 138 VAC, 60 Hz	1.95999791	288	0.1469
+20 °C, Nominal	1.95999762	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	1.95999479	-2830	-1.4439
+10 °C, Nominal	1.95999360	-4026	-2.0541
0 °C, Nominal	1.95999712	-499	-0.2546

Table 0-7 : Transmitter frequency stability results – LTE B 04 ch 2175

Test conditions	Frequency GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	2.13249845	-1319	-0.6185
+40 °C, Nominal	2.13249828	-1494	-0.7006
+30 °C, Nominal	2.13249736	-2410	-1.1301
+20 °C, Nominal, 138 VAC, 60 Hz	2.13249554	-4234	-1.9855
+20 °C, Nominal	2.13249977	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	2.13249576	-4010	-1.8804
+10 °C, Nominal	2.13249702	-2753	-1.2910
0 °C, Nominal	2.13250094	1164	0.5458

Table 0-8 : Transmitter frequency stability results – LTE B 05 ch 2525

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	881.49947487	345	0.3915	1.5	1.11
+40 °C, Nominal	881.49937770	248	0.2813	1.5	1.22
+30 °C, Nominal	881.49800000	-1130	-1.2816	1.5	0.22
+20 °C, Nominal, 138 VAC, 60 Hz	881.49913697	7	0.0082	1.5	1.49
+20 °C, Nominal	881.49912973	Reference	Reference	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	881.49914177	12	0.0137	1.5	1.49
+10 °C, Nominal	881.49802303	-1107	-1.2555	1.5	0.24
0 °C, Nominal	881.49813861	-991	-1.1244	1.5	0.38

Test data
Table 0-9 : Transmitter frequency stability results – LTE B 10 ch 4450

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	2.13999947	1892	0.8841
+40 °C, Nominal	2.13999711	-468	-0.2187
+30 °C, Nominal	2.13999668	-896	-0.4187
+20 °C, Nominal, 138 V _{AC} , 60 Hz	2.13999719	-380	-0.1776
+20 °C, Nominal	2.13999757	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	2.13999727	-303	-0.1416
+10 °C, Nominal	2.13999307	-4506	-2.1056
0 °C, Nominal	2.13999777	191	0.0893

Table 0-10 : Transmitter frequency stability results – LTE B 12 ch 5095

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	737.49767162	-773	-1.0482
+40 °C, Nominal	737.49752234	-922	-1.2506
+30 °C, Nominal	737.49783406	-611	-0.8279
+20 °C, Nominal, 138 V _{AC} , 60 Hz	737.49846986	25	0.0342
+20 °C, Nominal	737.49844465	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	737.49681747	-1627	-2.2064
+10 °C, Nominal	737.49831531	-129	-0.1754
0 °C, Nominal	737.49291640	-5528	-7.4960

Table 0-11 : Transmitter frequency stability results – LTE B 17 ch 5790

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	739.99710277	-1526	-2.0621
+40 °C, Nominal	739.99757186	-1057	-1.4282
+30 °C, Nominal	739.99761262	-1016	-1.3731
+20 °C, Nominal, 138 V _{AC} , 60 Hz	739.99468762	-3941	-5.3258
+20 °C, Nominal	739.99862872	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	739.99712675	-1502	-2.0297
+10 °C, Nominal	739.99636192	-2267	-3.0632
0 °C, Nominal	739.99564103	-2988	-4.0374

Table 0-12 : Transmitter frequency stability results – LTE B 25 ch 8365

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	1.96249482	-896	-0.4566
+40 °C, Nominal	1.96249625	535	0.2726
+30 °C, Nominal	1.96249482	-897	-0.4571
+20 °C, Nominal, 138 V _{AC} , 60 Hz	1.96249780	2087	1.0634
+20 °C, Nominal	1.96249571	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	1.96249512	-592	-0.3017
+10 °C, Nominal	1.96249517	-548	-0.2792
0 °C, Nominal	1.96249406	-1658	-0.8448

Test data

Table 0-13 : Transmitter frequency stability results – LTE B 26_1 ch 8740

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	864.00464290	-1065	-1.2323	1.5	0.27
+40 °C, Nominal	864.00570601	-2	-0.0019	1.5	1.50
+30 °C, Nominal	864.00548418	-223	-0.2586	1.5	1.24
+20 °C, Nominal, 138 VAC, 60 Hz	864.00619086	483	0.5593	1.5	0.94
+20 °C, Nominal	864.00570764	Reference	Reference	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	864.00570870	1	0.0012	1.5	1.50
+10 °C, Nominal	864.00526689	-441	-0.5101	1.5	0.99
0 °C, Nominal	864.00532525	-382	-0.4426	1.5	1.06

Table 0-14 : Transmitter frequency stability results – LTE B 26_2 ch 8914

Test conditions	Frequency, MHz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	881.39862731	1078	1.2231	1.5	0.28
+40 °C, Nominal	881.39844379	895	1.0149	1.5	0.49
+30 °C, Nominal	881.39770614	157	0.1780	1.5	1.32
+20 °C, Nominal, 138 VAC, 60 Hz	881.39756108	12	0.0134	1.5	1.49
+20 °C, Nominal	881.39754924	Reference	Reference	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	881.39777316	224	0.2541	1.5	1.25
+10 °C, Nominal	881.39859431	1045	1.1857	1.5	0.31
0 °C, Nominal	881.39838669	837	0.9501	1.5	0.55

Table 0-15 : Transmitter frequency stability results – LTE B 41 ch 40620

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	2.59299820	-578	-0.2229
+40 °C, Nominal	2.59300189	3118	1.2025
+30 °C, Nominal	2.59300228	3509	1.3533
+20 °C, Nominal, 138 V _{AC} , 60 Hz	2.59299905	279	0.1076
+20 °C, Nominal	2.59299877	Reference	Reference
+20 °C, Nominal, 98 V _{AC} , 60 Hz	2.59300435	5579	2.1516
+10 °C, Nominal	2.59303355	34772	13.4100
0 °C, Nominal	2.59338036	381584	147.1593

Table 0-16 : Transmitter frequency stability results – LTE B 66 ch 66886

Test conditions	Frequency, GHz	Drift, Hz	Drift, ppm
+50 °C, Nominal	2.15499655	849	0.3940
+40 °C, Nominal	2.15499871	3003	1.3935
+30 °C, Nominal	2.15499911	3409	1.5819
+20 °C, Nominal, 138 VAC, 60 Hz	2.15499705	1342	0.6227
+20 °C, Nominal	2.15499570	Reference	Reference
+20 °C, Nominal, 98 VAC, 60 Hz	2.15499842	2713	1.2589
+10 °C, Nominal	2.15500168	5978	2.7740
0 °C, Nominal	2.15499362	-2084	-0.9671

7.4 Receiver spurious emissions

References, definitions and limits

RSS-133, Clause 6.6:

Receiver spurious emissions shall comply with the limits specified in RSS-Gen.

RSS-Gen, Clause 7.4:

Receiver conducted emissions limits

If the receiver has a detachable antenna of known impedance, an antenna-conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method of section 7.3 is preferred.

The antenna-conducted test shall be performed with the antenna disconnected and with the receiver antenna port connected to a measuring instrument having equal input impedance to that specified for the antenna. The RF cable connecting the receiver under test to the measuring instrument shall also have the same impedance to that specified for the receiver's antenna.

The spurious emissions from the receiver at any discrete frequency, measured at the antenna port by the antenna-conducted method, shall not exceed 2 nW (-57 dBm) in the frequency range 30-1000 MHz and 5 nW (-53 dBm) above 1 GHz.

Test summary

Verdict	Pass		
Test date	November 30, 2023	Temperature	22 °C
Tested by	Tarek Elkholy	Air pressure	976 mbar
Test location	Cambridge	Relative humidity	42 %

Observations, settings and special notes

The spectrum was searched from 30 MHz to 22 GHz.

All measurements were performed in conducted method using an average (RMS) detector.

Test data

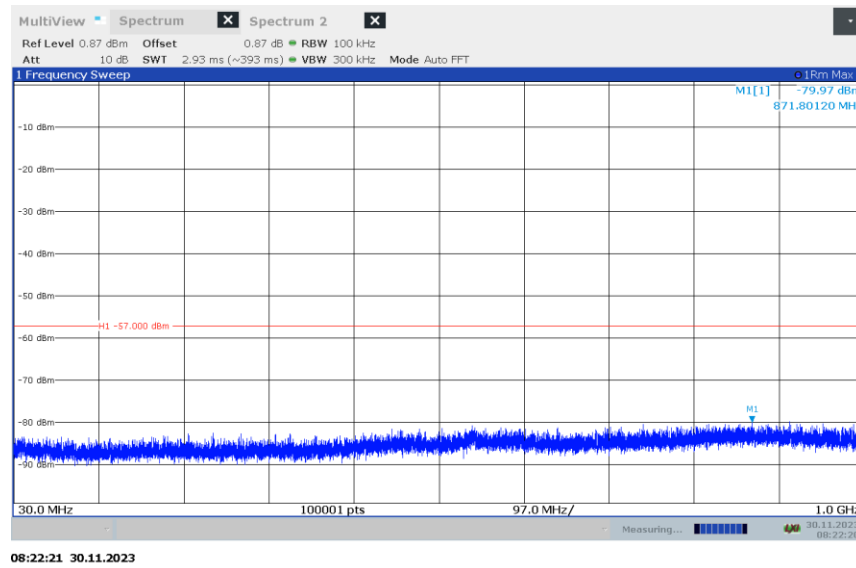


Figure 7.4-1: Receiver spurious emissions 30-1000 MHz

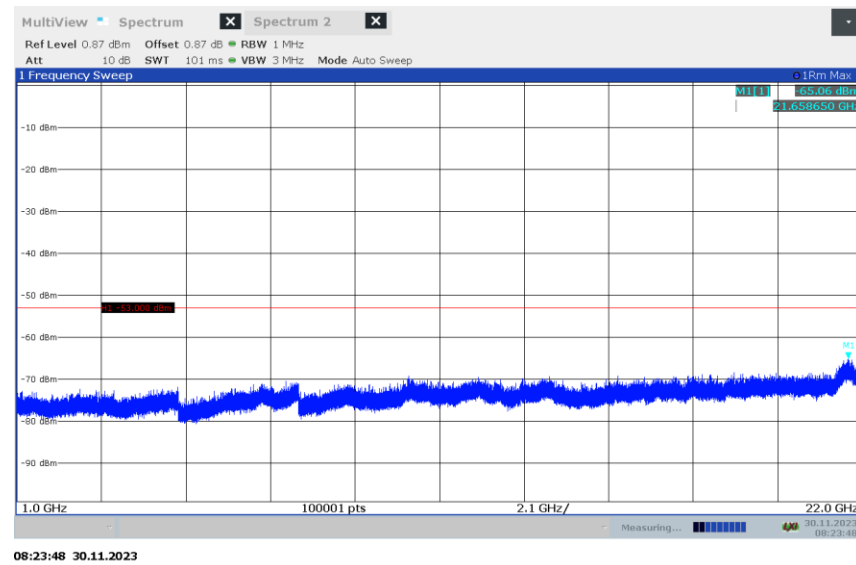


Figure 7.4-2: Receiver spurious emissions 1-22 GHz

End of the test report