



Appendix for test report

1Appendix_A: Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dBm]	ERP [dBm]	Limit [dBm]	Verdict
GSM850	GSM/TM1	LCH	33.81	25.63	38.5	PASS
		MCH	33.78	25.60	38.5	PASS
		HCH	33.72	25.54	38.5	PASS
	GSM/TM2	LCH	26.36	18.18	38.5	PASS
		MCH	26.74	18.56	38.5	PASS
		HCH	26.79	18.61	38.5	PASS
Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP [dBm]	Limit [dBm]	Verdict
PCS1900	GSM/TM1	LCH	29.77	26.72	33	PASS
		MCH	29.79	26.74	33	PASS
		HCH	29.80	26.75	33	PASS
	GSM/TM2	LCH	25.14	22.09	33	PASS
		MCH	25.08	22.03	33	PASS
		HCH	25.09	22.04	33	PASS

Note1:

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

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

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

b, SGP = Signal Generator Level

Note2:

$$\text{SET Span} = 1.5 * \text{OBW}$$

$$\text{SET RBW} = 1\% \text{ of the OBW, not to exceed 1MHz}$$

$$\text{SET VBW} \geq 3 * \text{RBW}$$

SET Sweep time = auto - couple.

Detector: RMS

2Appendix_B: Peak-to-Average Ratio

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM850	GSM/TM1	LCH	1.77	13	PASS
		MCH	1.84	13	PASS
		HCH	1.87	13	PASS
	GSM/TM2	LCH	4.84	13	PASS
		MCH	4.92	13	PASS
		HCH	4.76	13	PASS
PCS1900	GSM/TM1	LCH	1.92	13	PASS
		MCH	1.84	13	PASS
		HCH	1.87	13	PASS
	GSM/TM2	LCH	5.34	13	PASS
		MCH	4.89	13	PASS
		HCH	4.82	13	PASS

3Appendix_C: Modulation Characteristics

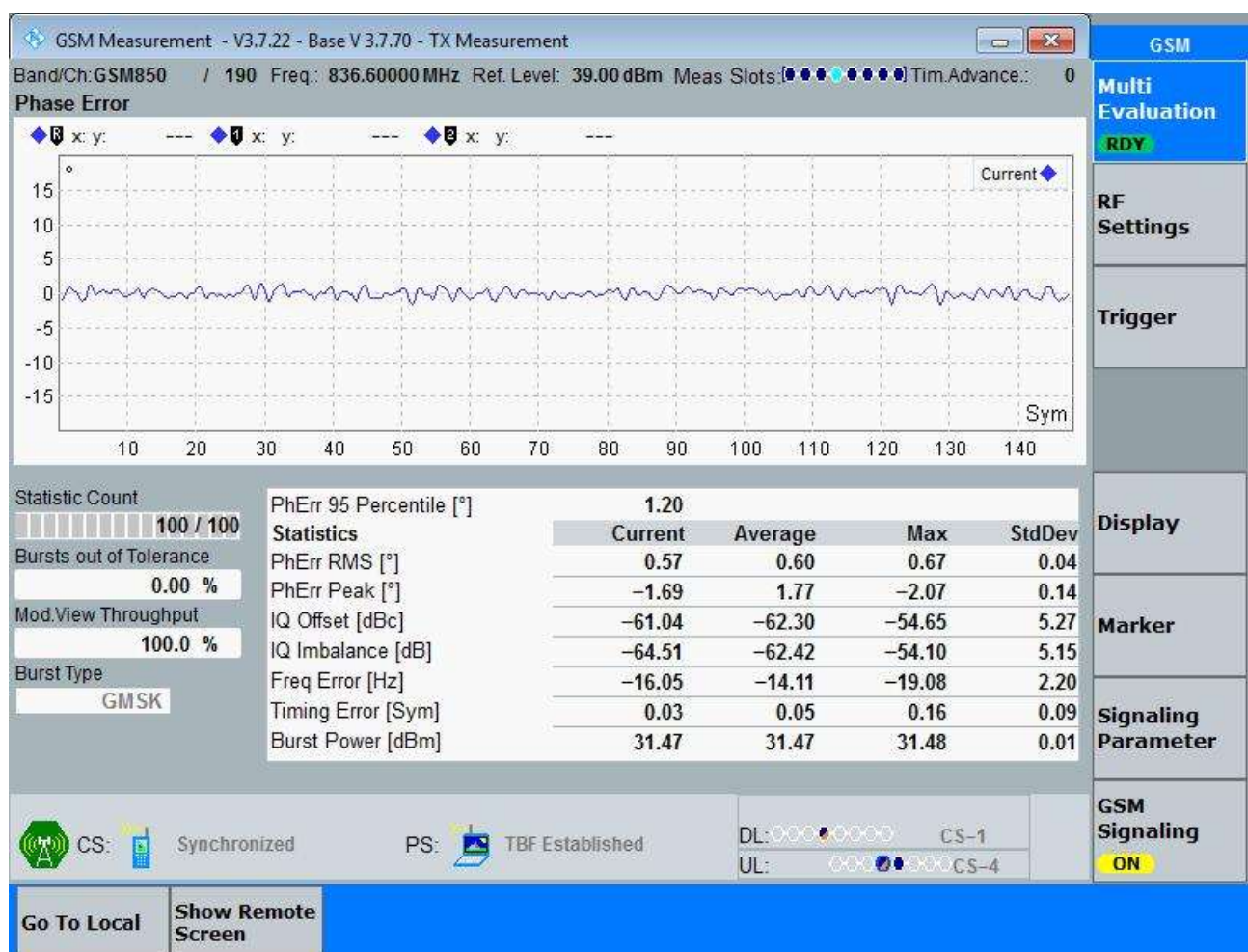
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

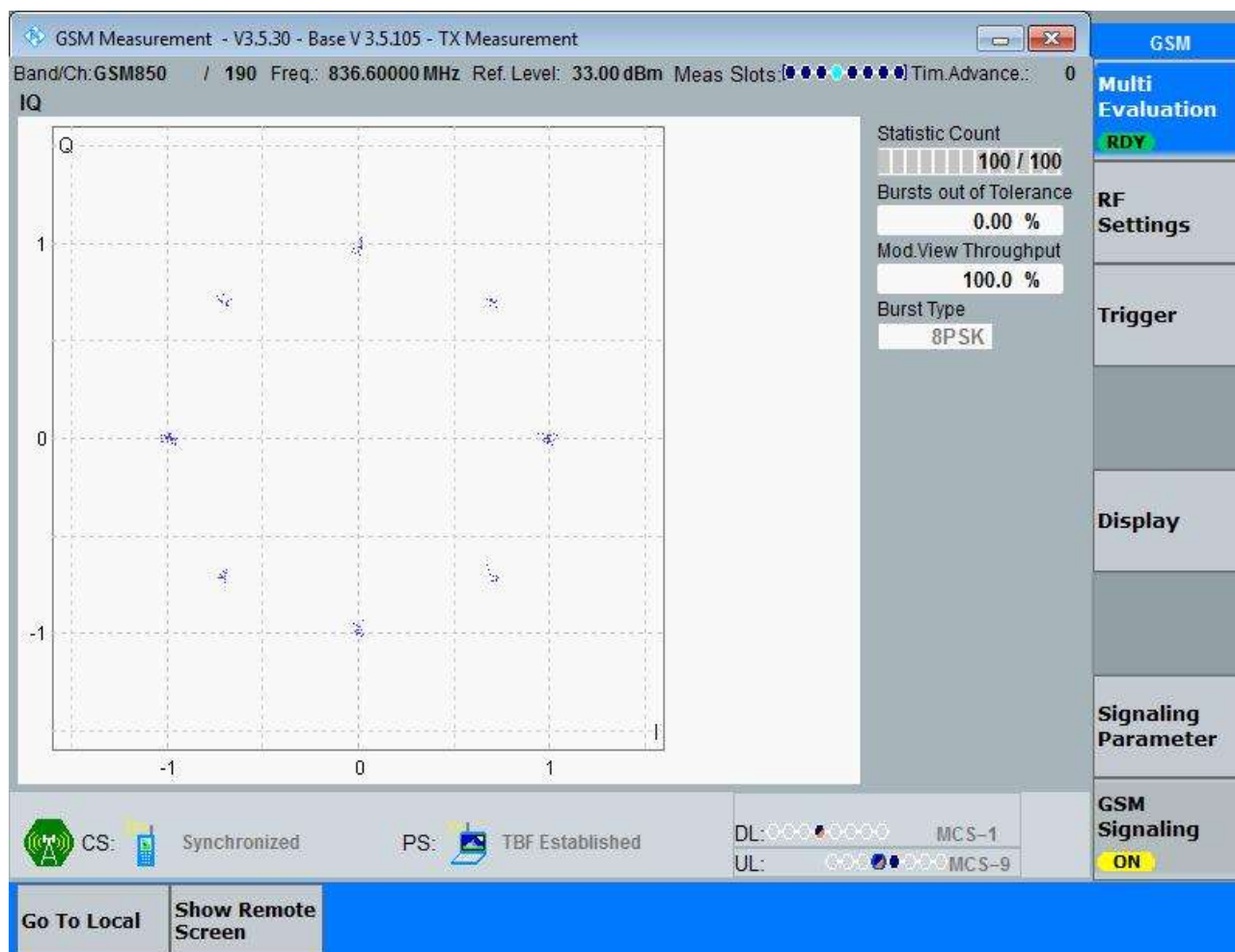
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

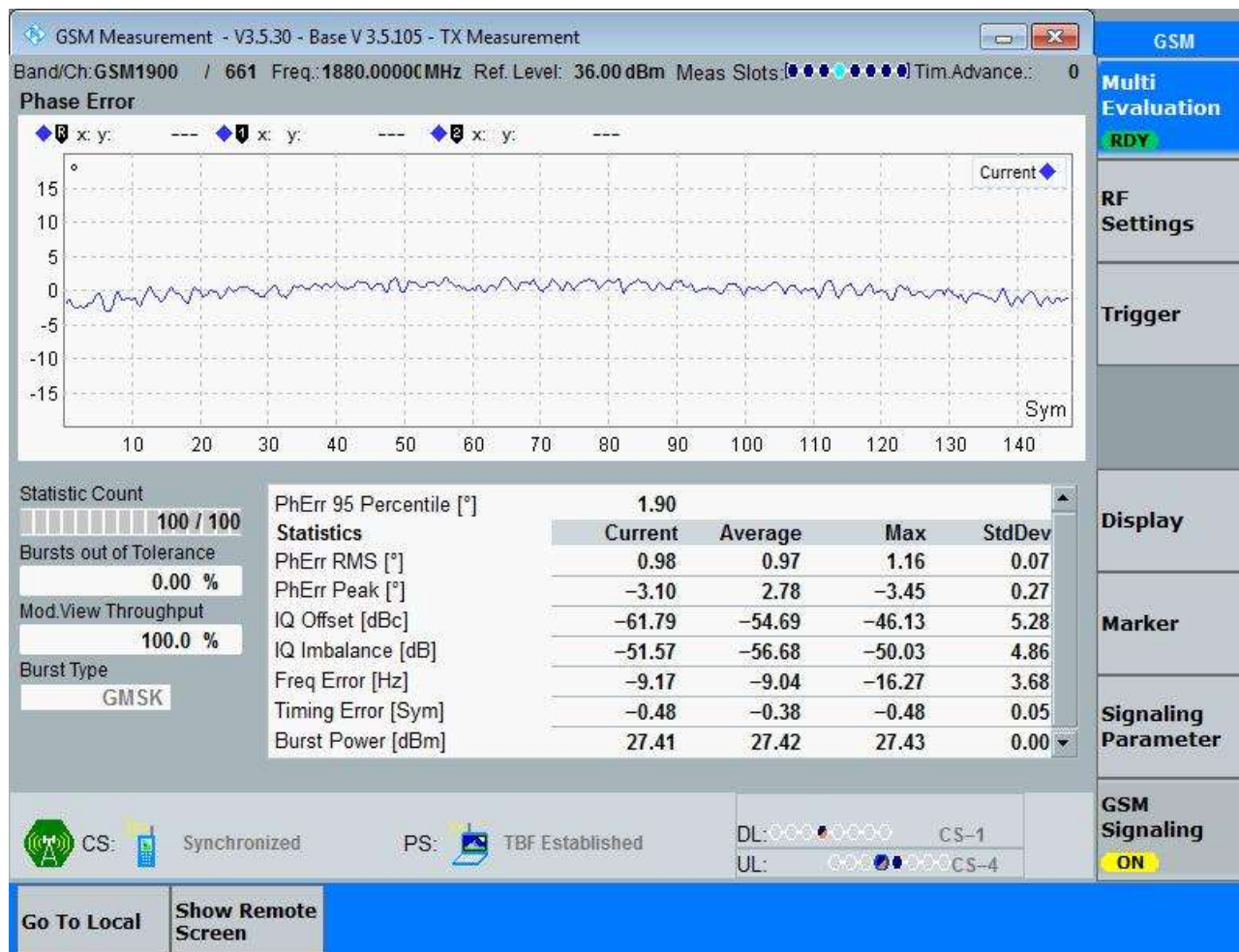
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = PCS1900

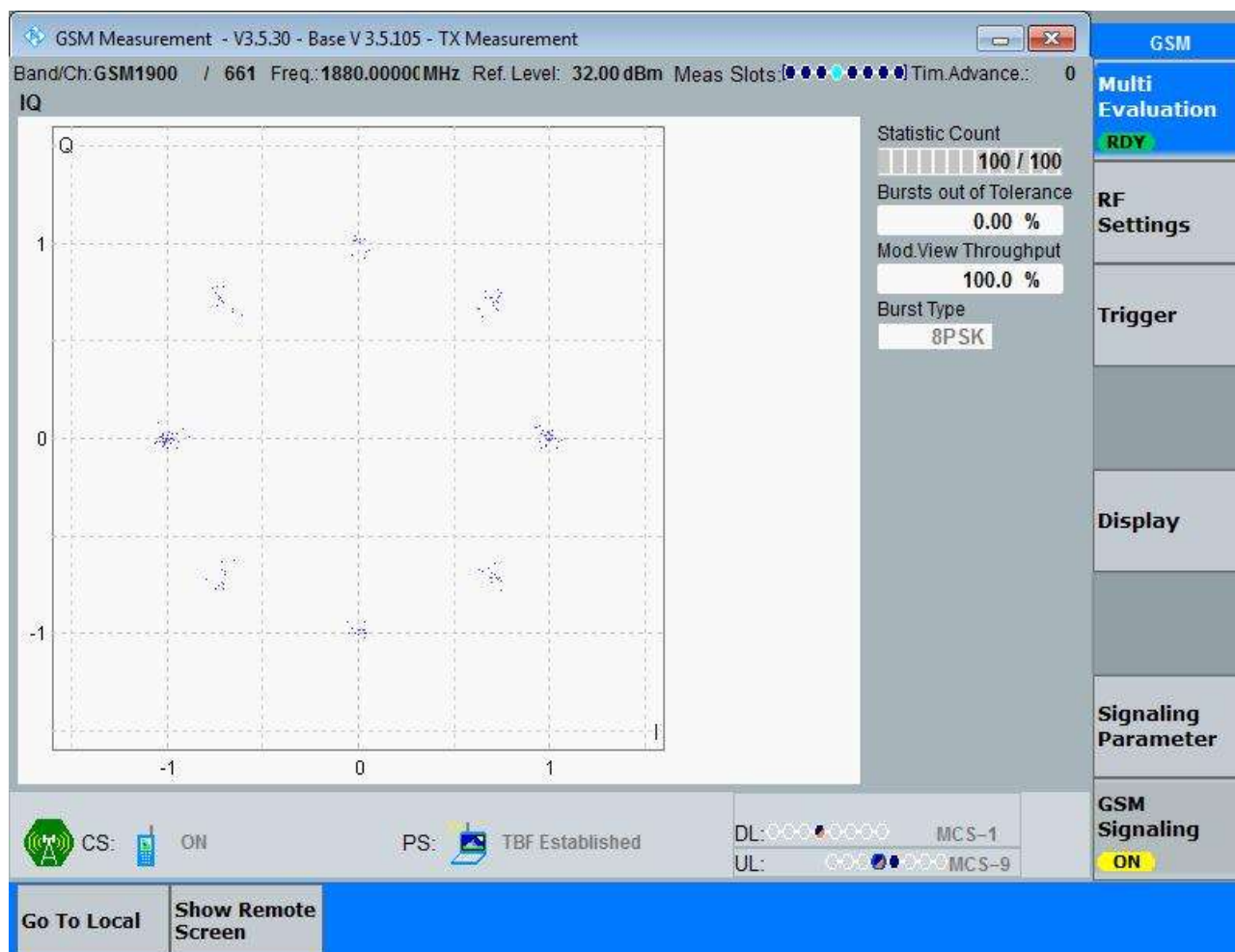
3.1.2.1 Test Mode = GSM/TM1

3.1.2.1.1 Test Channel = MCH



3.1.2.2 Test Mode = GSM/TM2

3.1.2.2.1 Test Channel = MCH



4Appendix_D: Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	247.28	313.6	Pass
		MCH	245.73	318.0	Pass
		HCH	243.69	326.3	Pass
	GSM/TM2	LCH	250.54	320.3	Pass
		MCH	248.43	325.1	Pass
		HCH	253.82	319.0	Pass
PCS1900	GSM/TM1	LCH	246.88	320.5	Pass
		MCH	243.18	313.2	Pass
		HCH	237.59	308.2	Pass
	GSM/TM2	LCH	253.68	316.2	Pass
		MCH	250.22	323.2	Pass
		HCH	252.68	323.4	Pass

Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



4.1.1.1.2 Test Channel = MCH



4.1.1.1.3 Test Channel = HCH



4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



4.1.1.2.2 Test Channel = MCH



4.1.1.2.3 Test Channel = HCH



4.1.2 Test Band = PCS1900

4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



4.1.2.1.2 Test Channel = MCH



4.1.2.1.3 Test Channel = HCH



4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



4.1.2.2.2 Test Channel = MCH



4.1.2.2.3 Test Channel = HCH



5Appendix_E: Band Edges Compliance

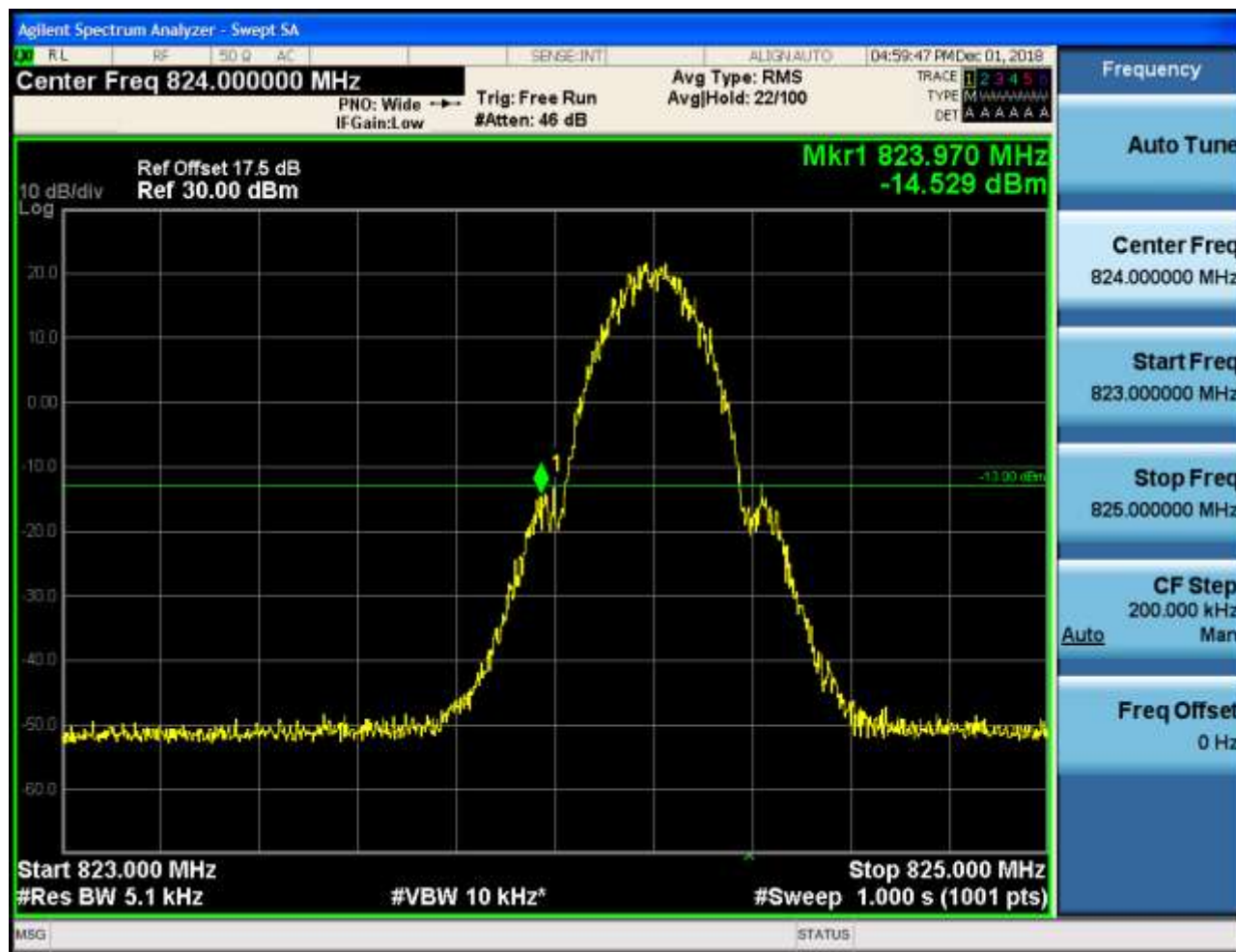
Part I - Test Plots

5.1 For GSM

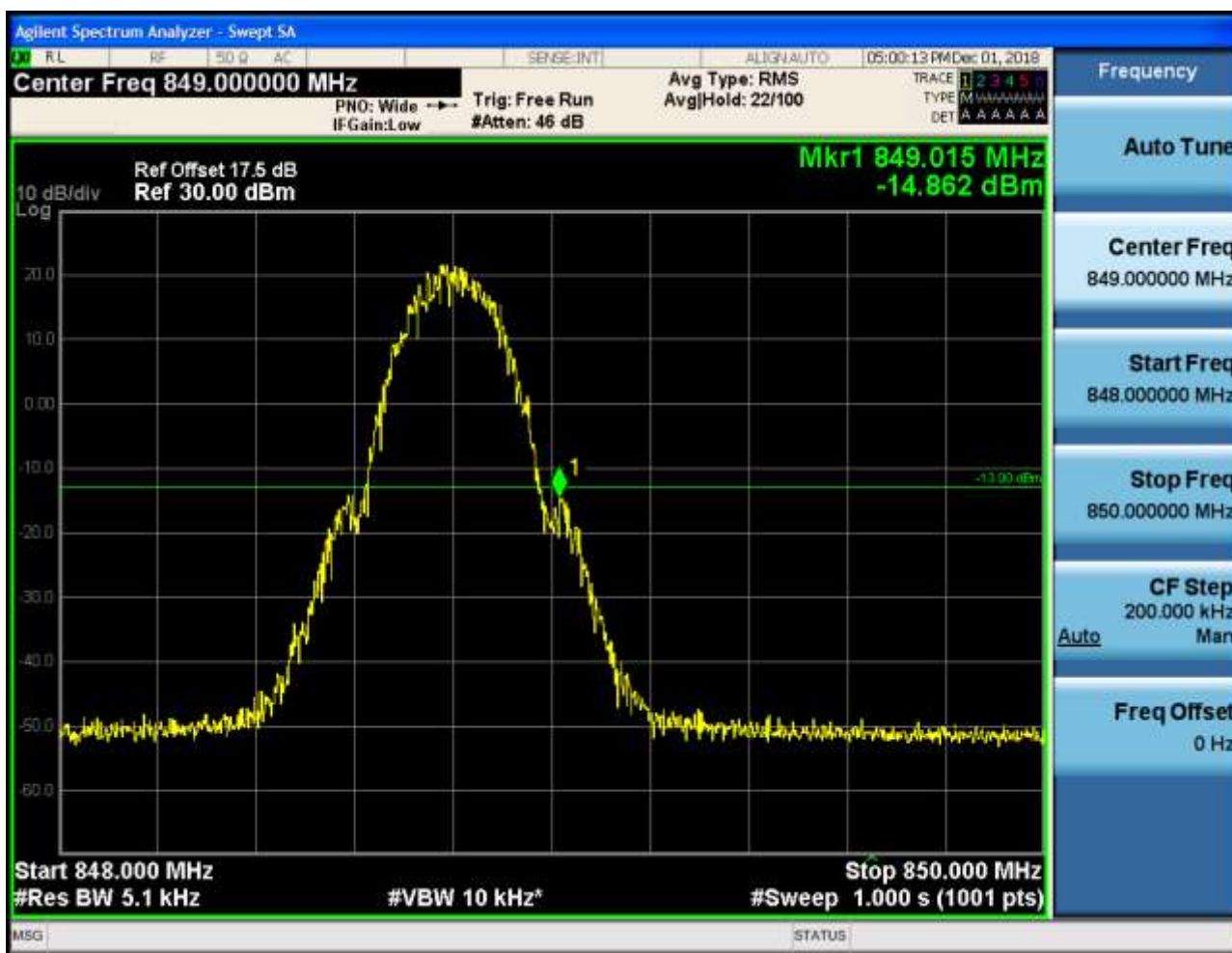
5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH

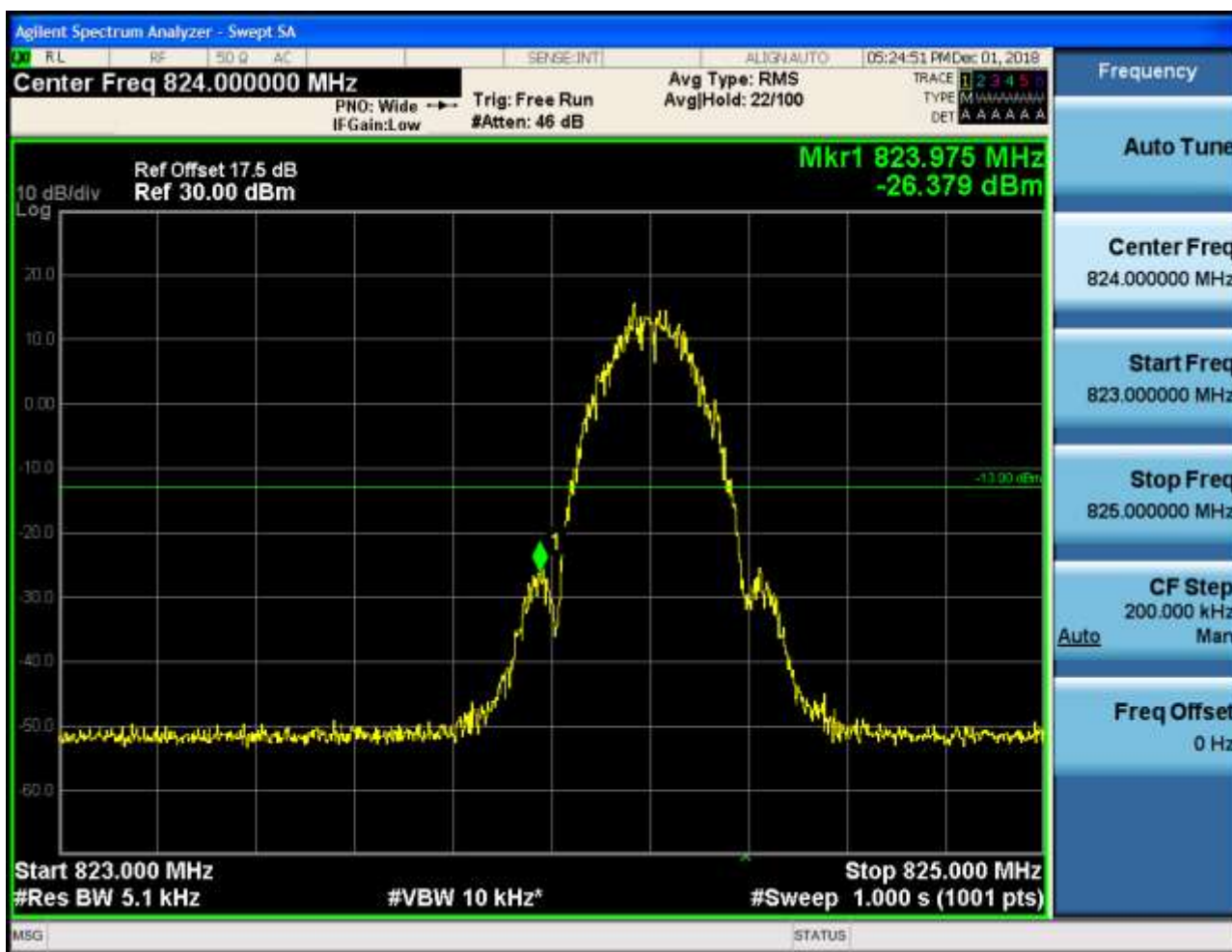


5.1.1.1.2 Test Channel = HCH

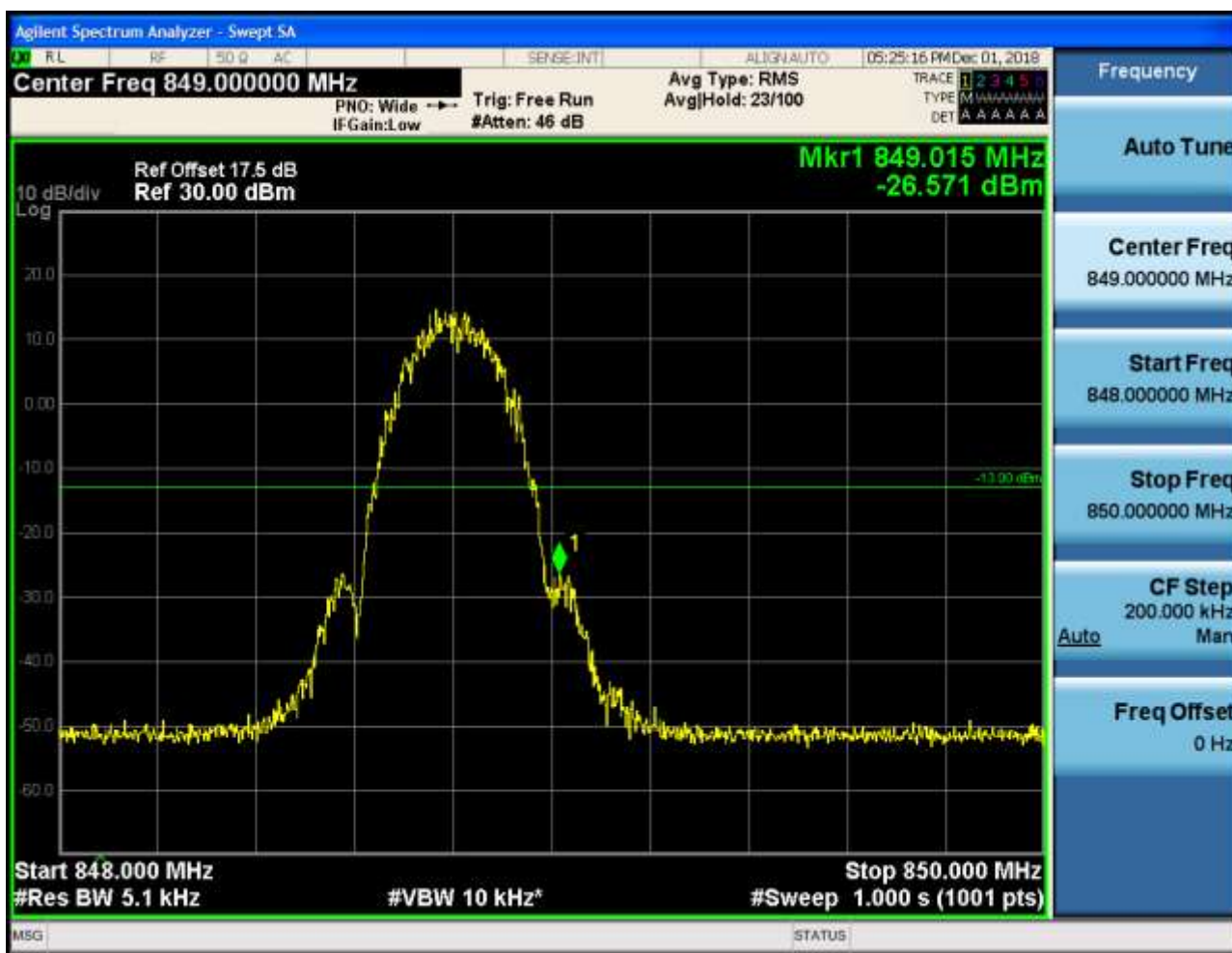


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



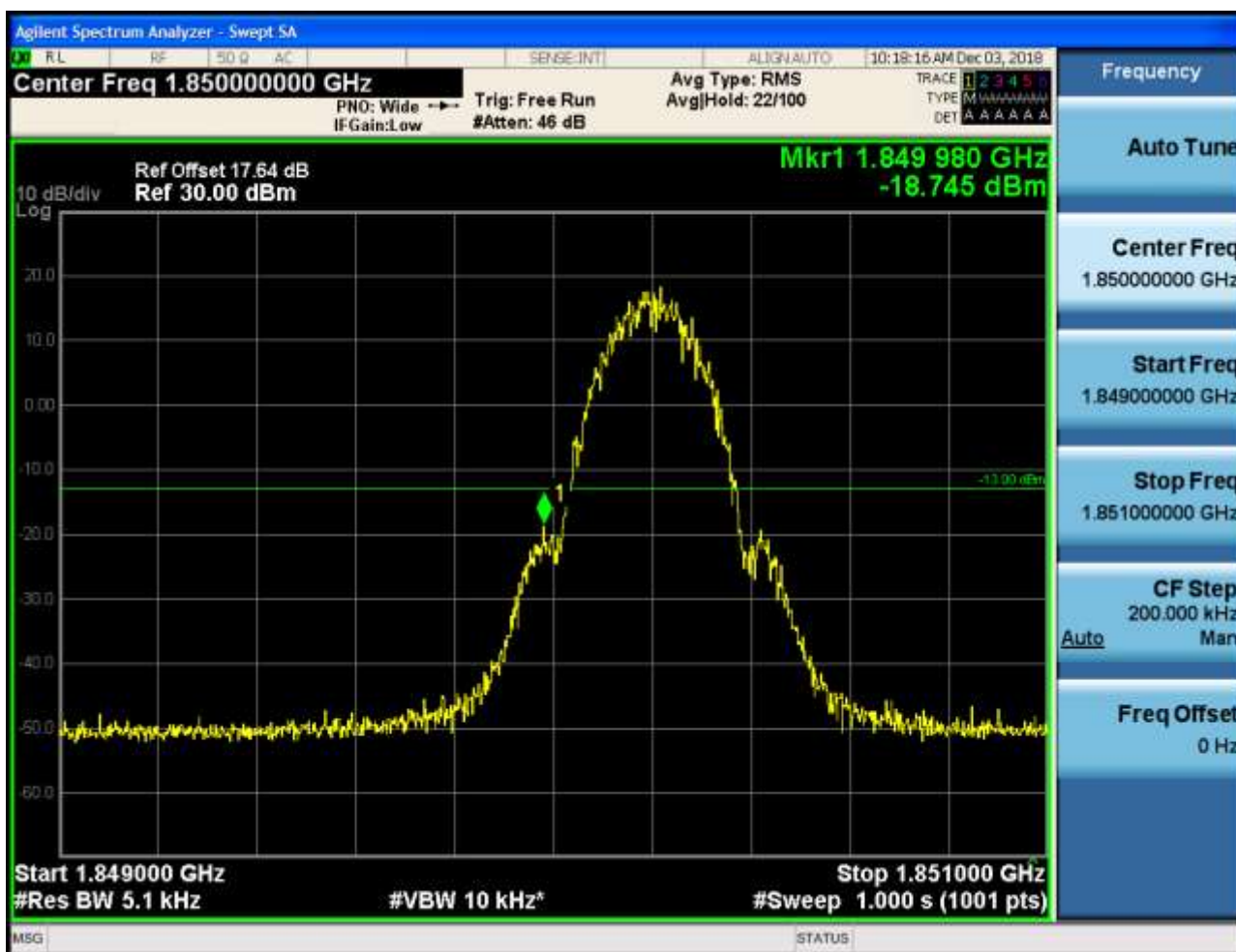
5.1.1.2.2 Test Channel = HCH



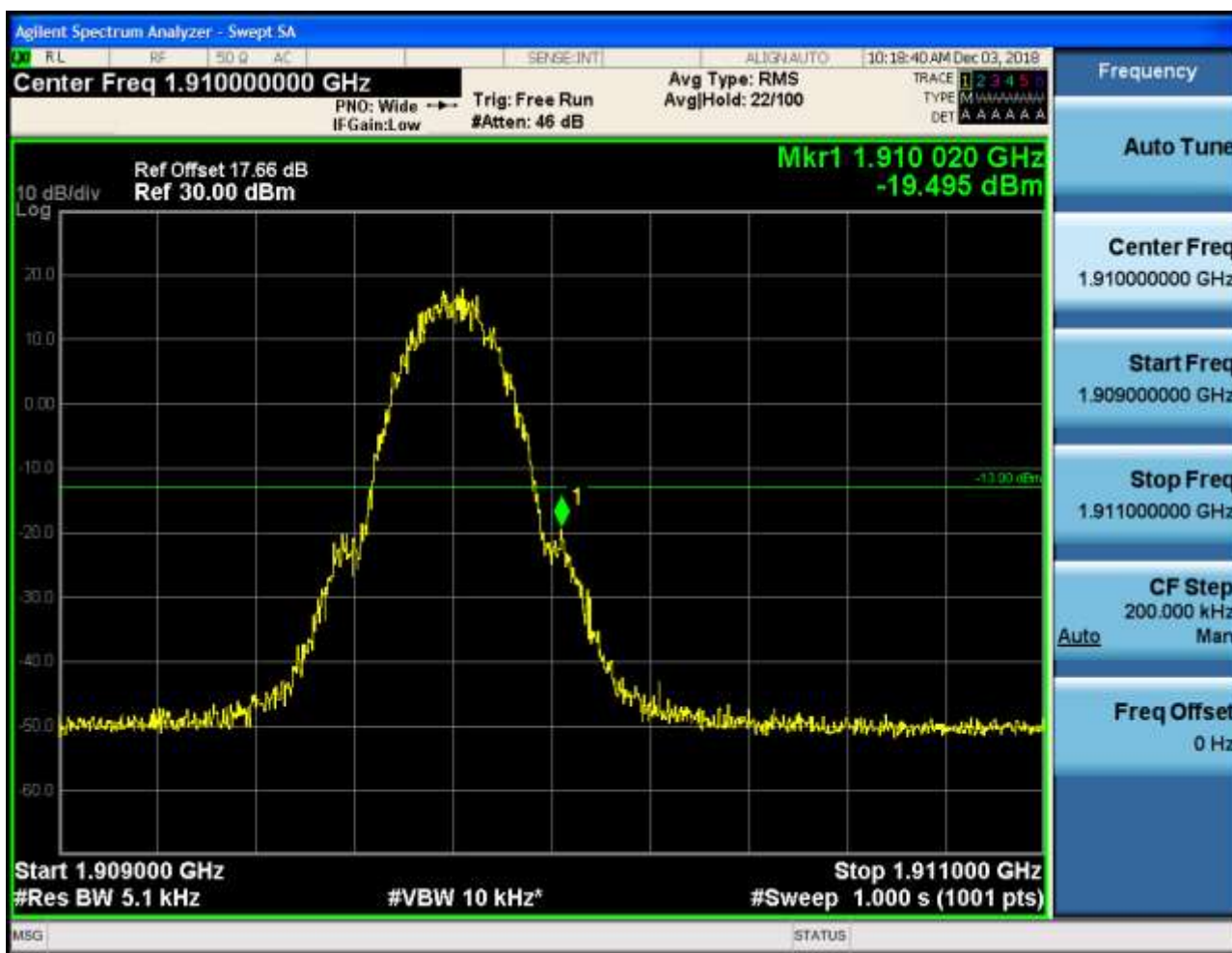
5.1.2 Test Band = PCS1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

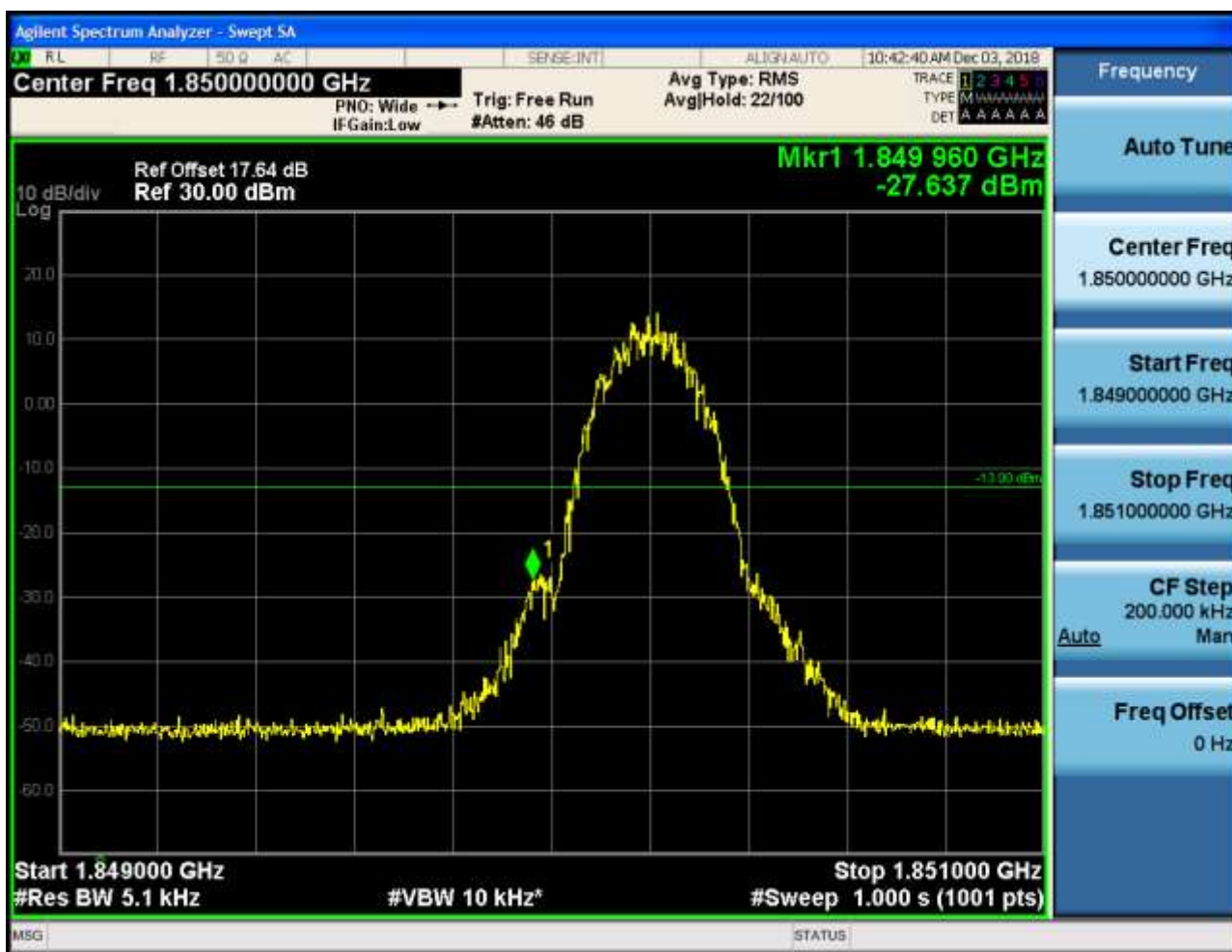


5.1.2.1.2 Test Channel = HCH

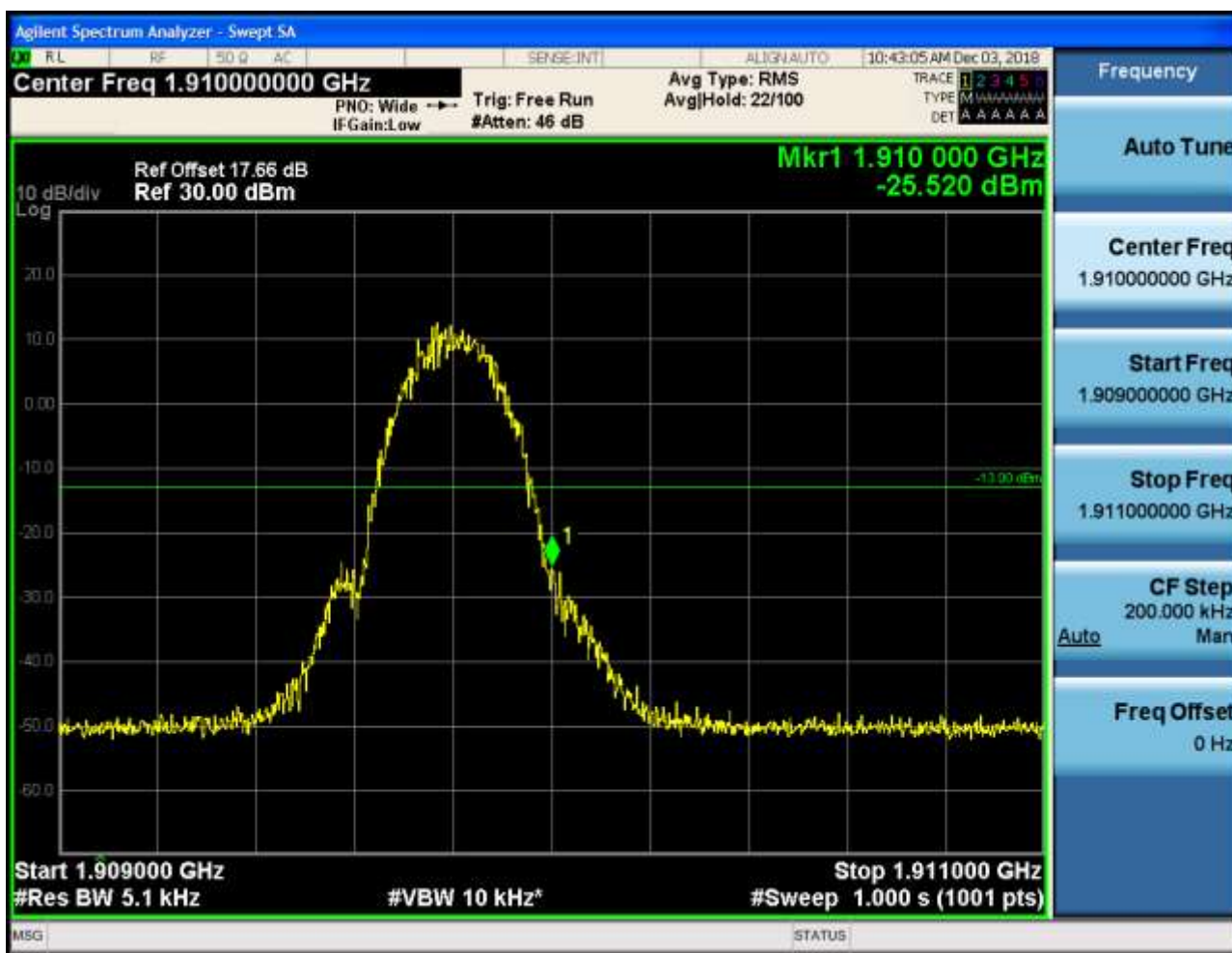


5.1.2.2 Test Mode = GSM/TM2

5.1.2.2.1 Test Channel = LCH



5.1.2.2.2 Test Channel = HCH



6Appendix_F: Spurious Emission at Antenna Terminal

NOTE: 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.

Part I - Test Plots

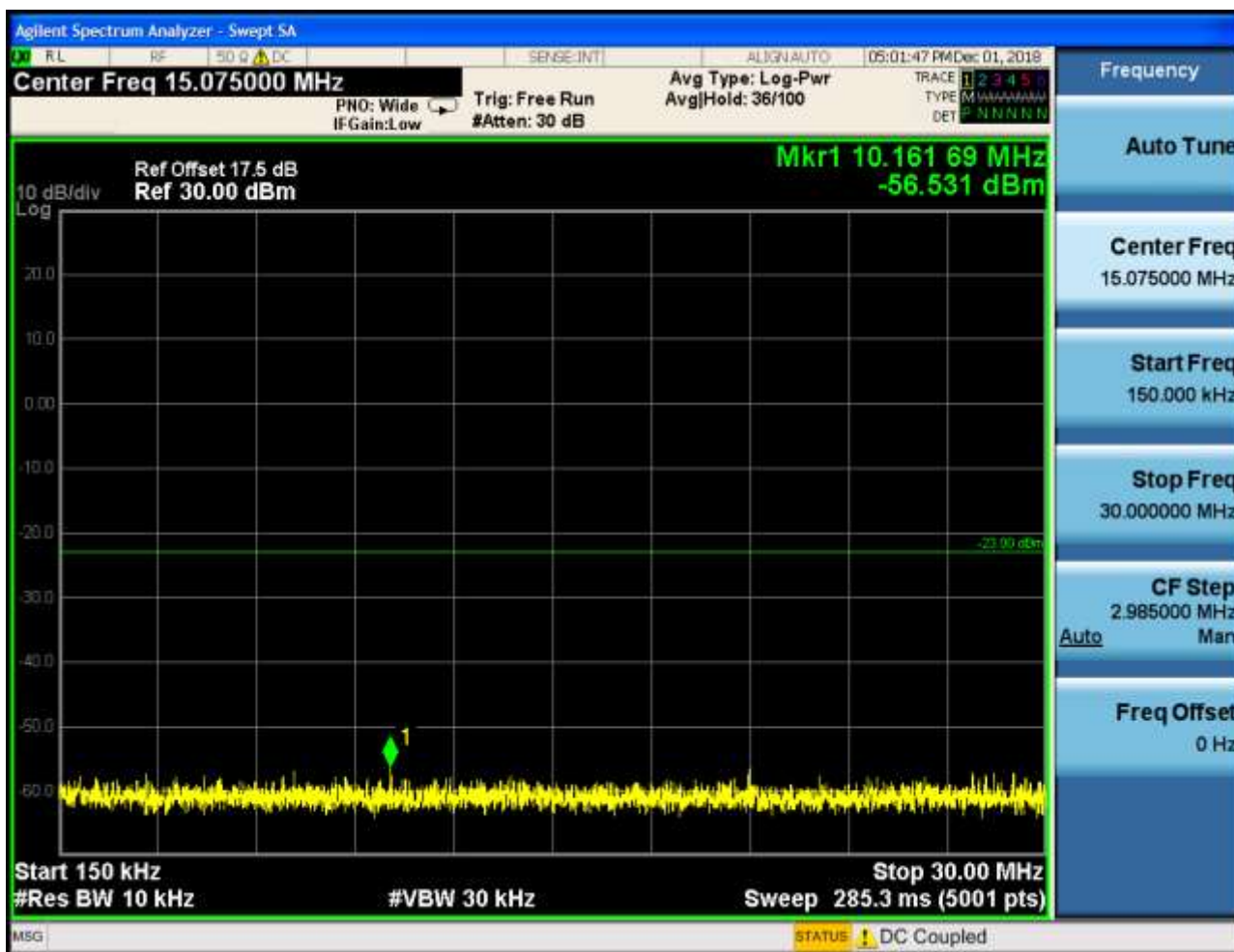
6.1 For GSM

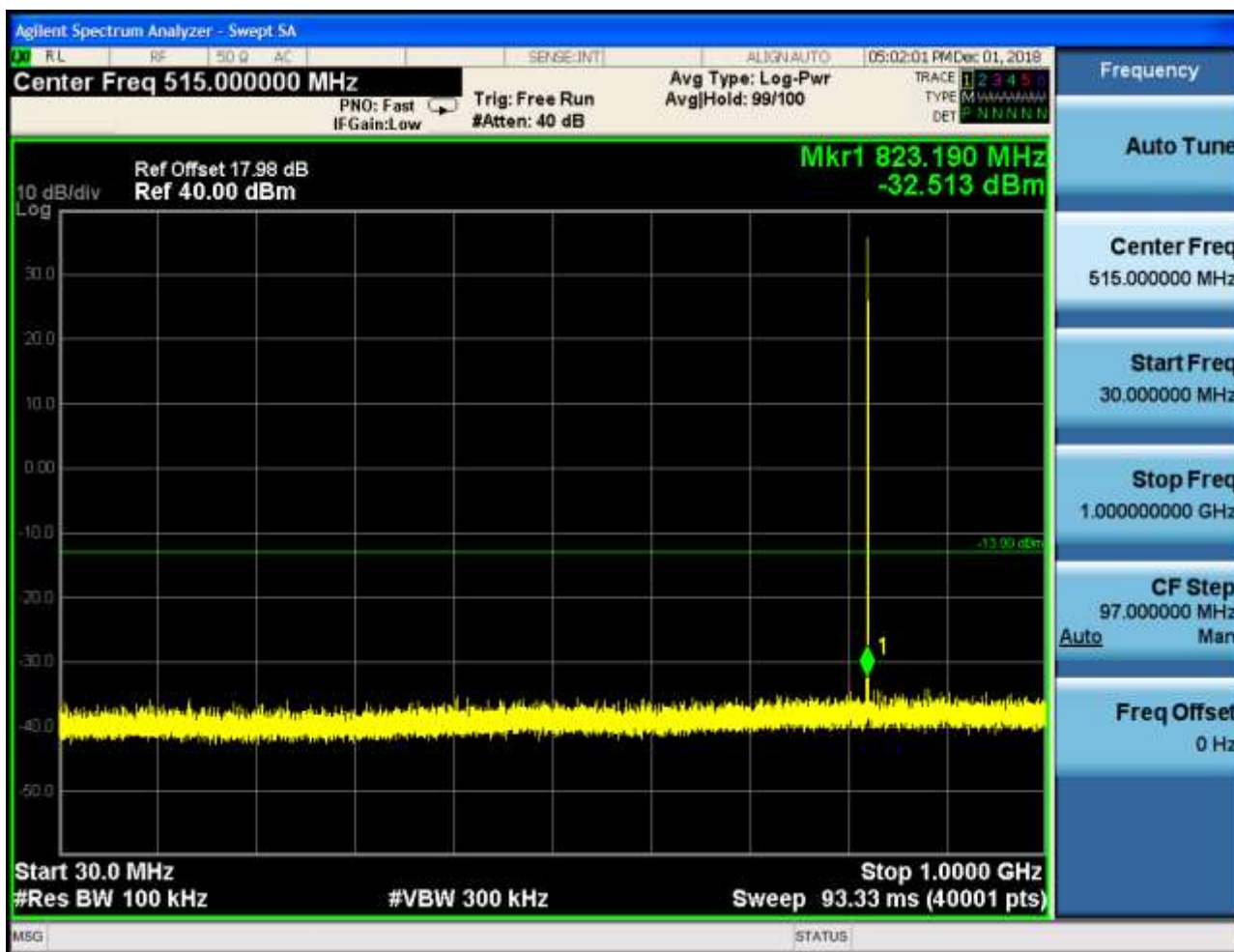
6.1.1 Test Band = GSM850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH



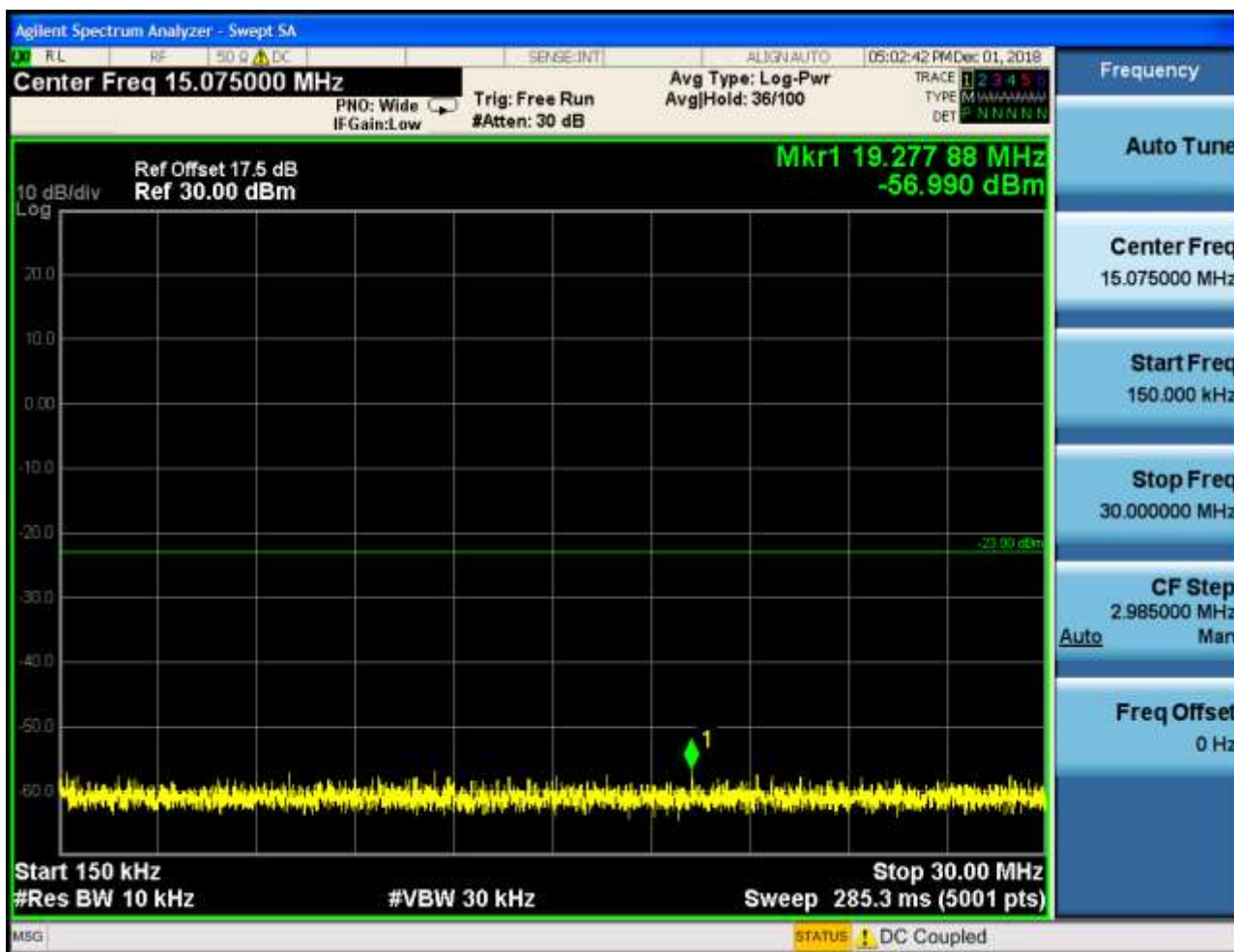


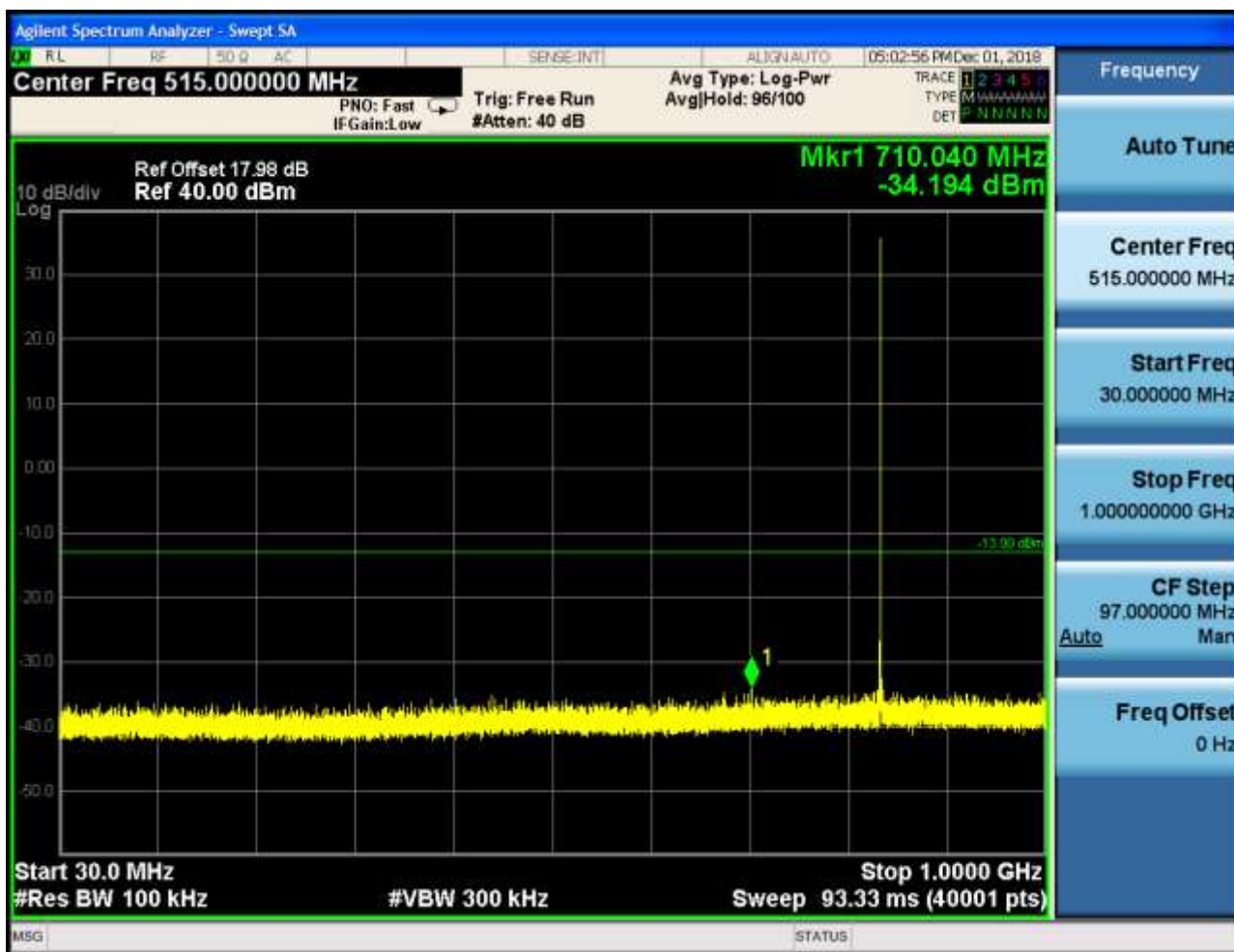




6.1.1.1.2 Test Channel = MCH



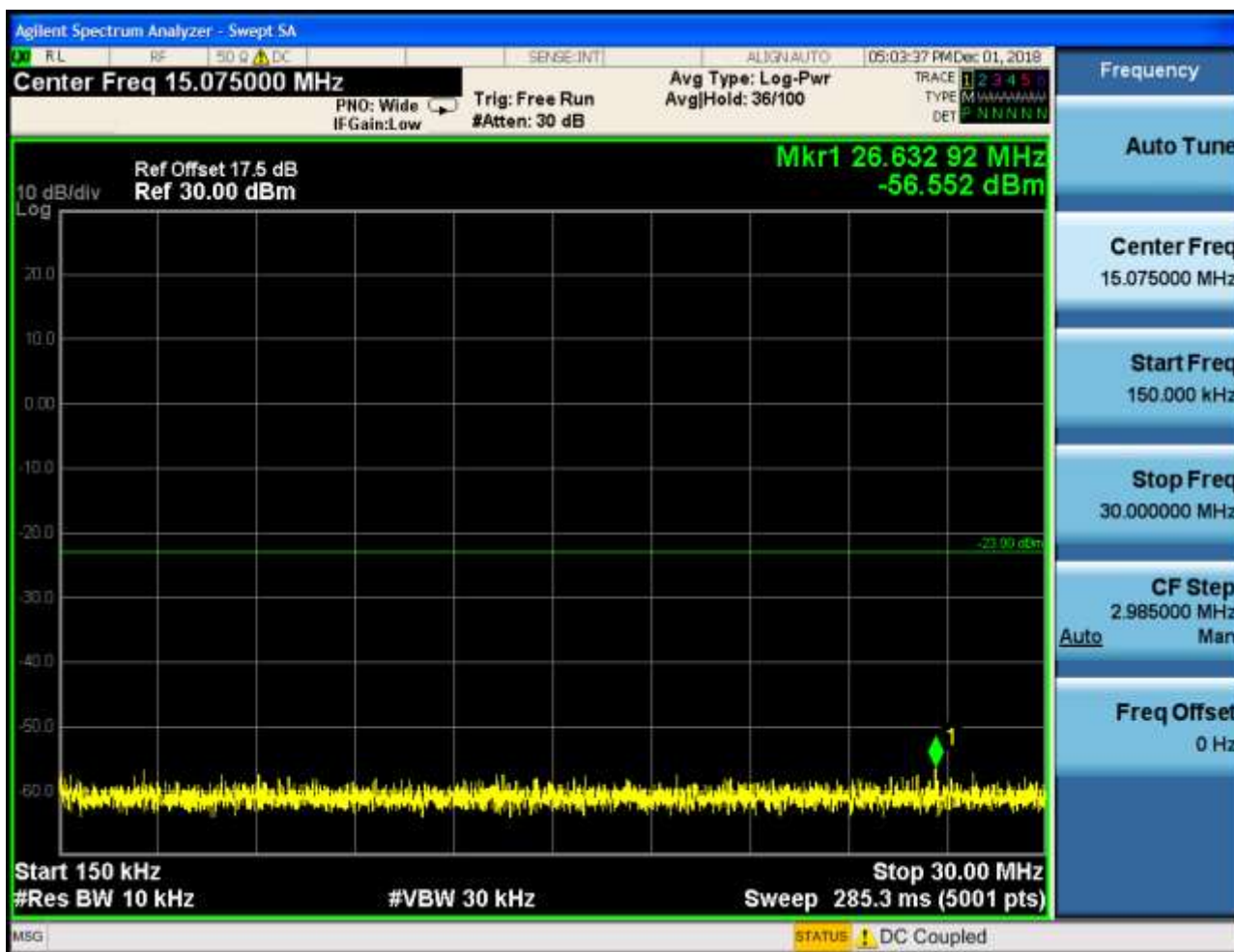


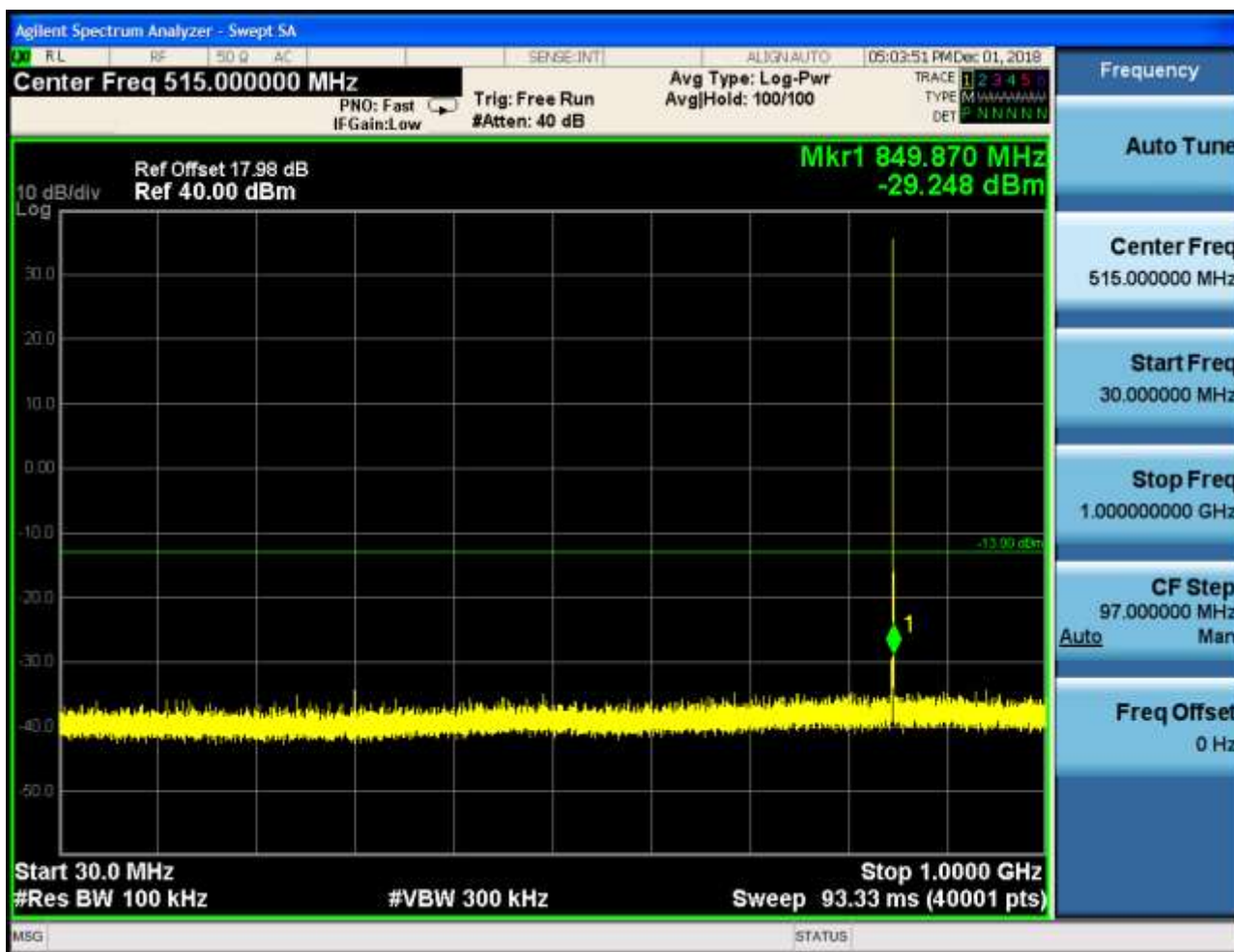




6.1.1.1.3 Test Channel = HCH





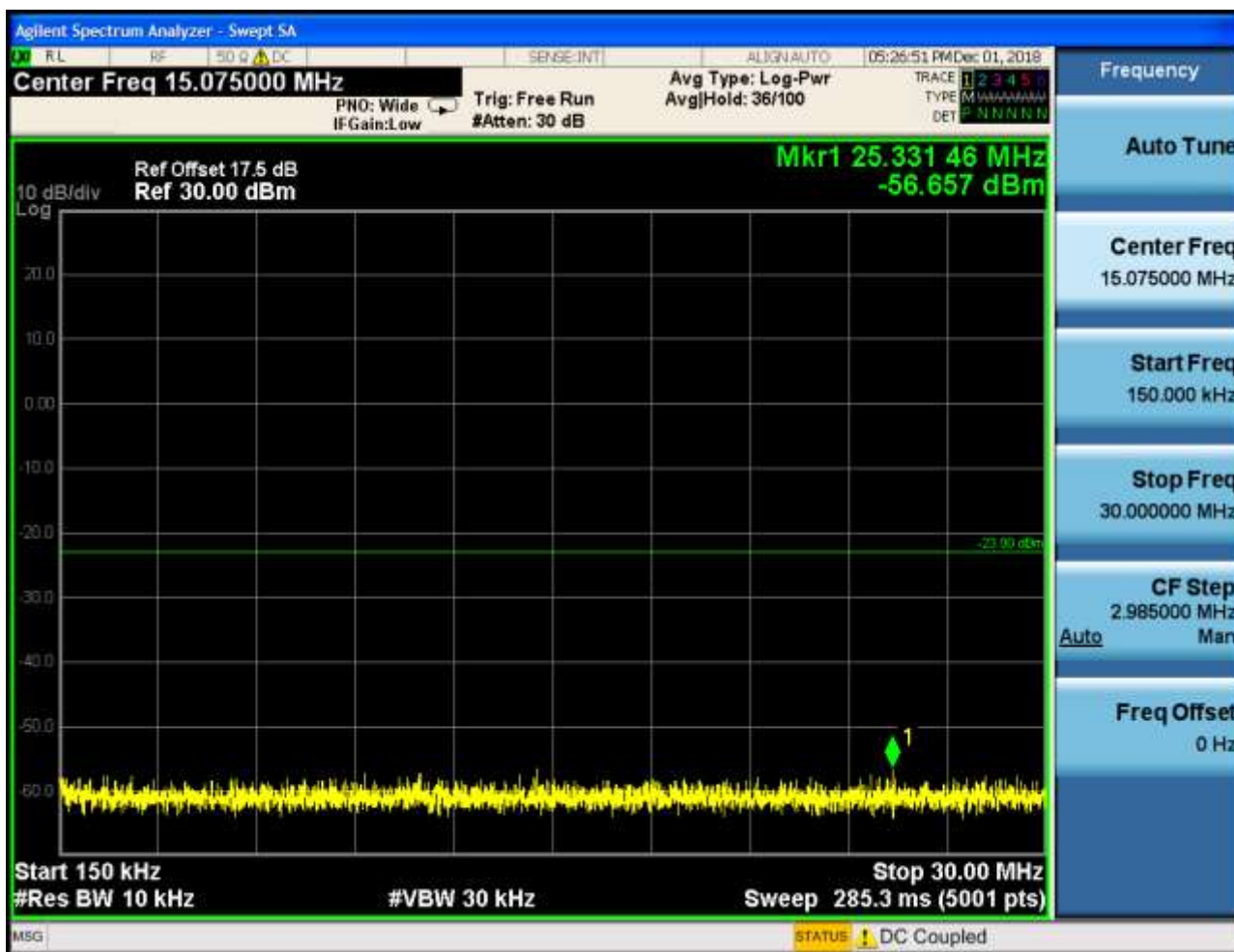


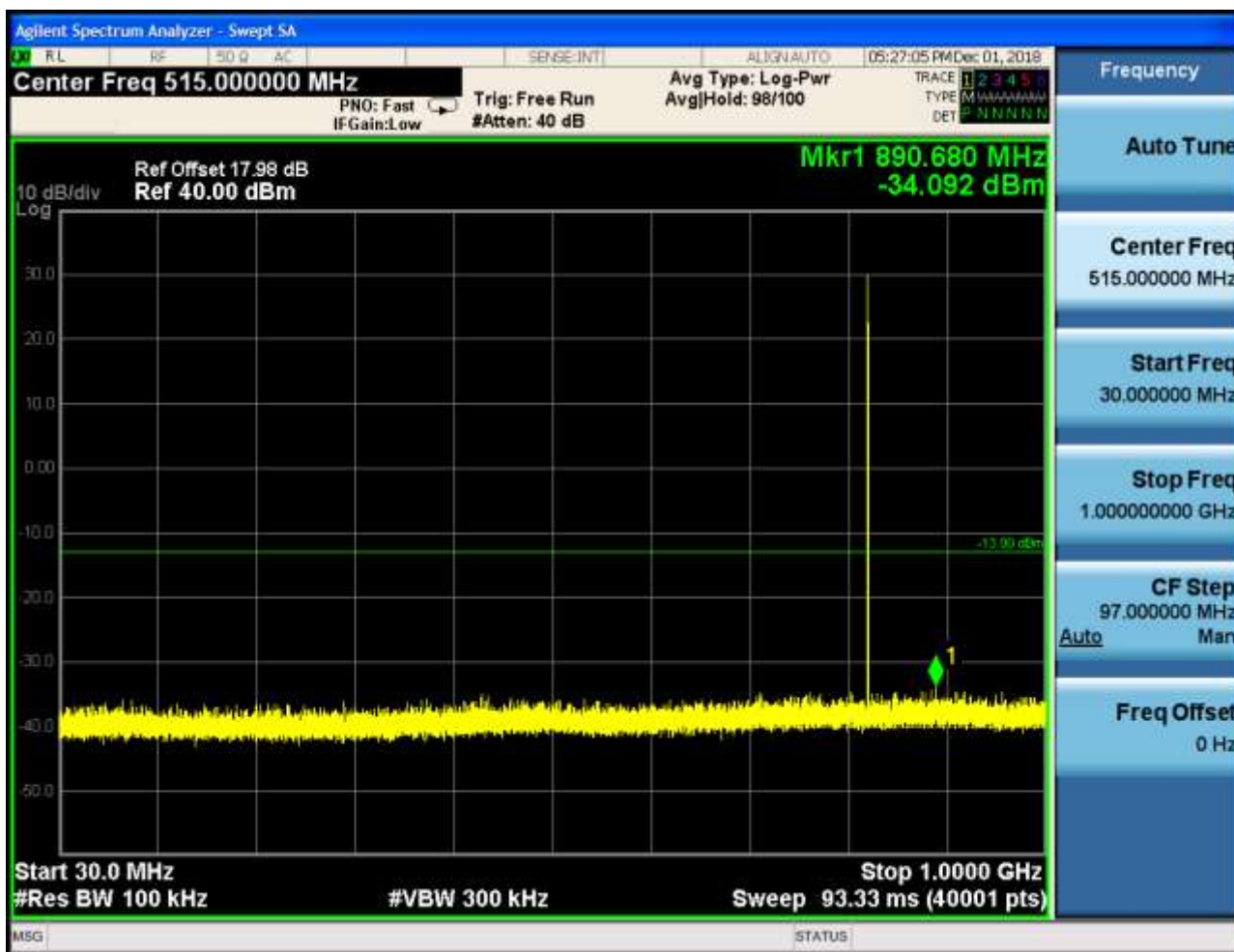


6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH



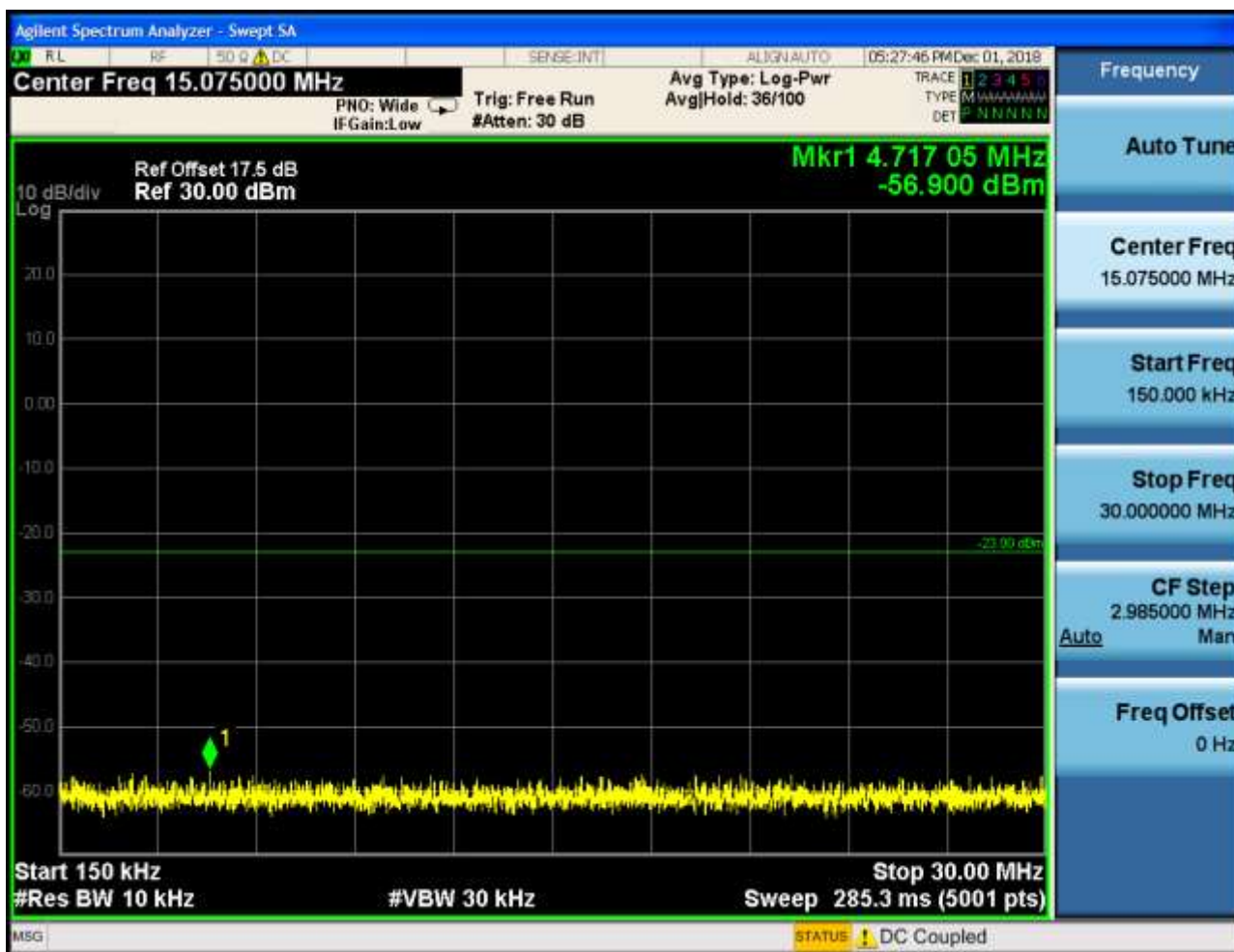


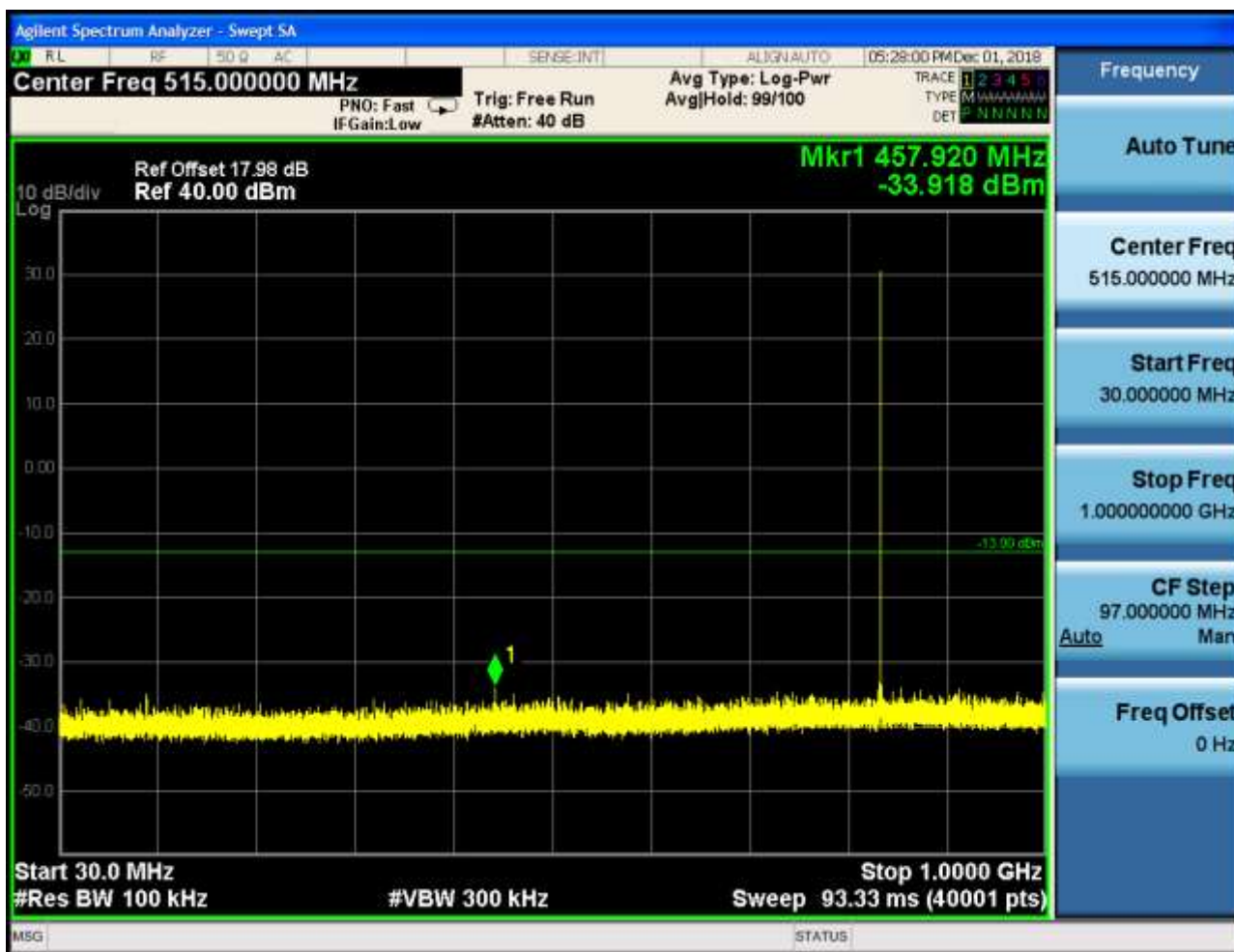




6.1.1.2.2 Test Channel = MCH



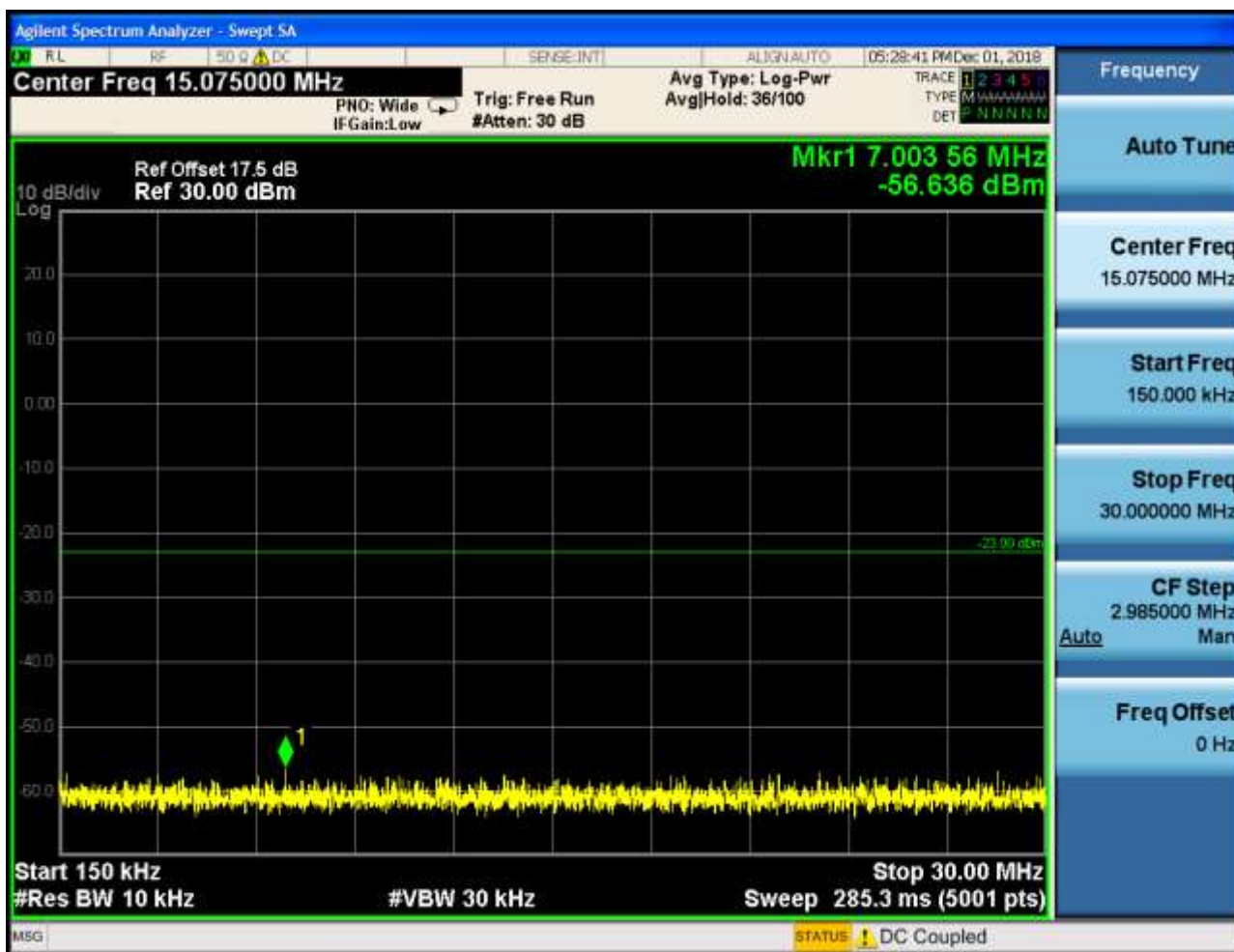


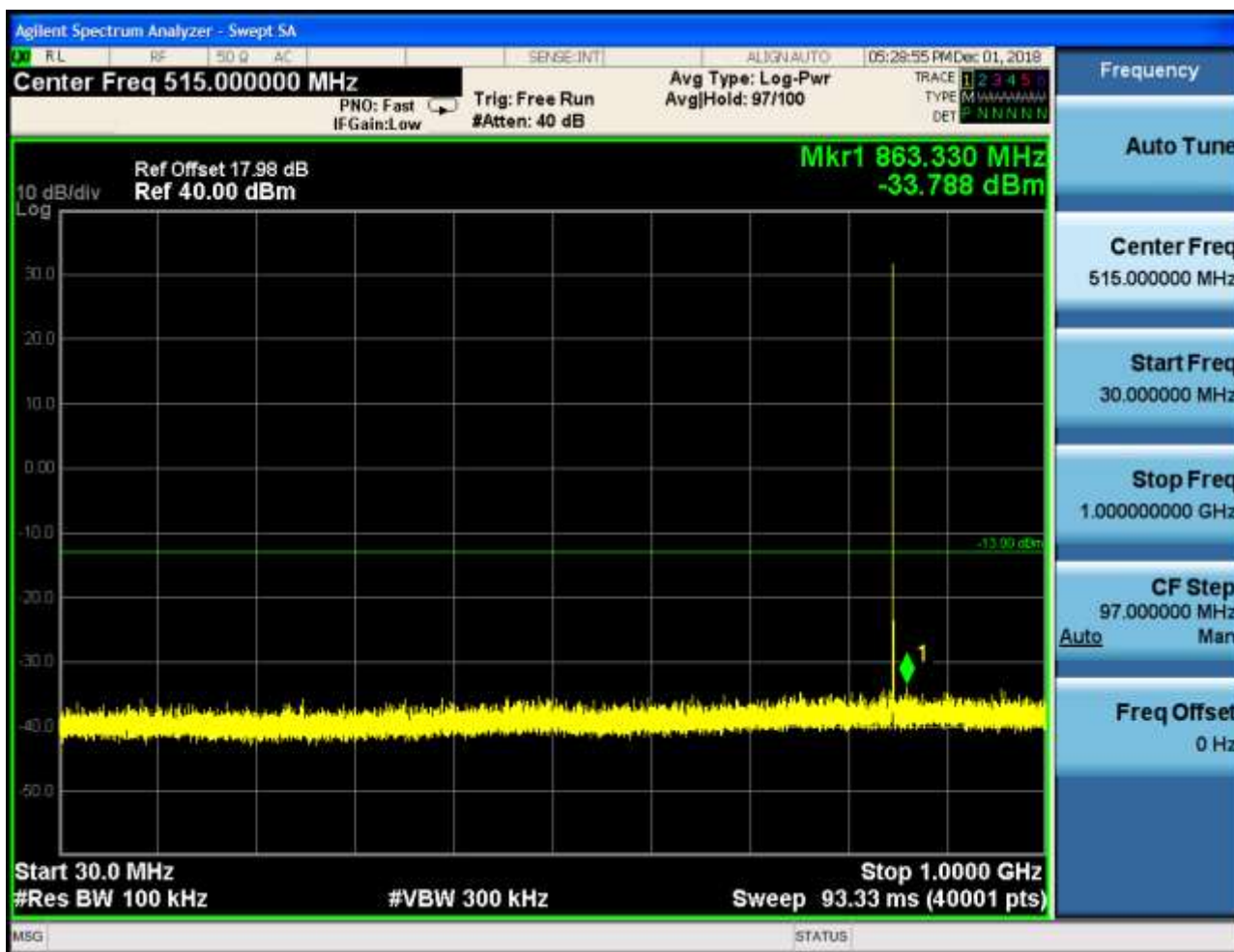




6.1.1.2.3 Test Channel = HCH









6.1.2 Test Band = PCS1900

6.1.2.1 Test Mode = GSM/TM1

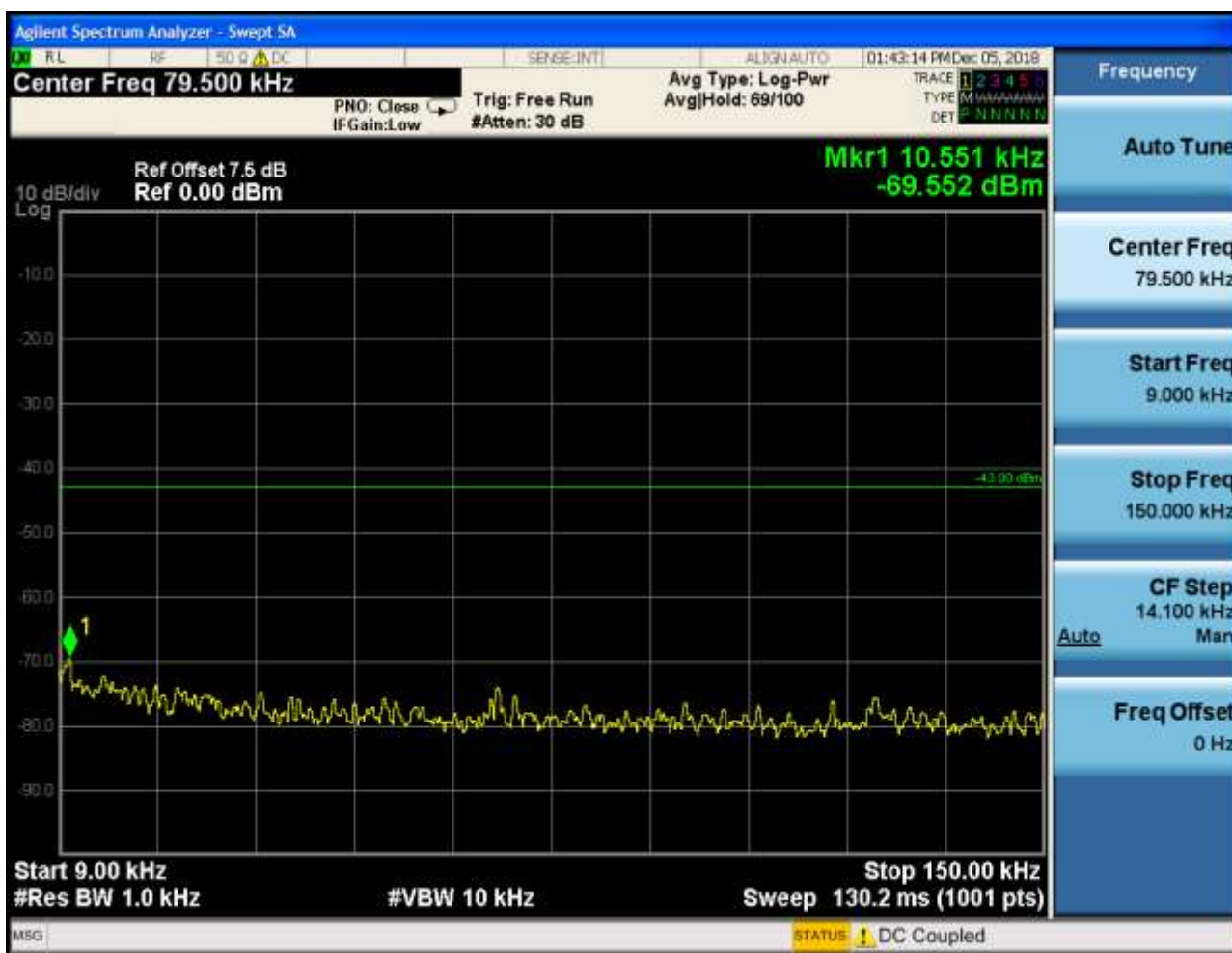
6.1.2.1.1 Test Channel = LCH







6.1.2.1.2 Test Channel = MCH







6.1.2.1.3 Test Channel = HCH

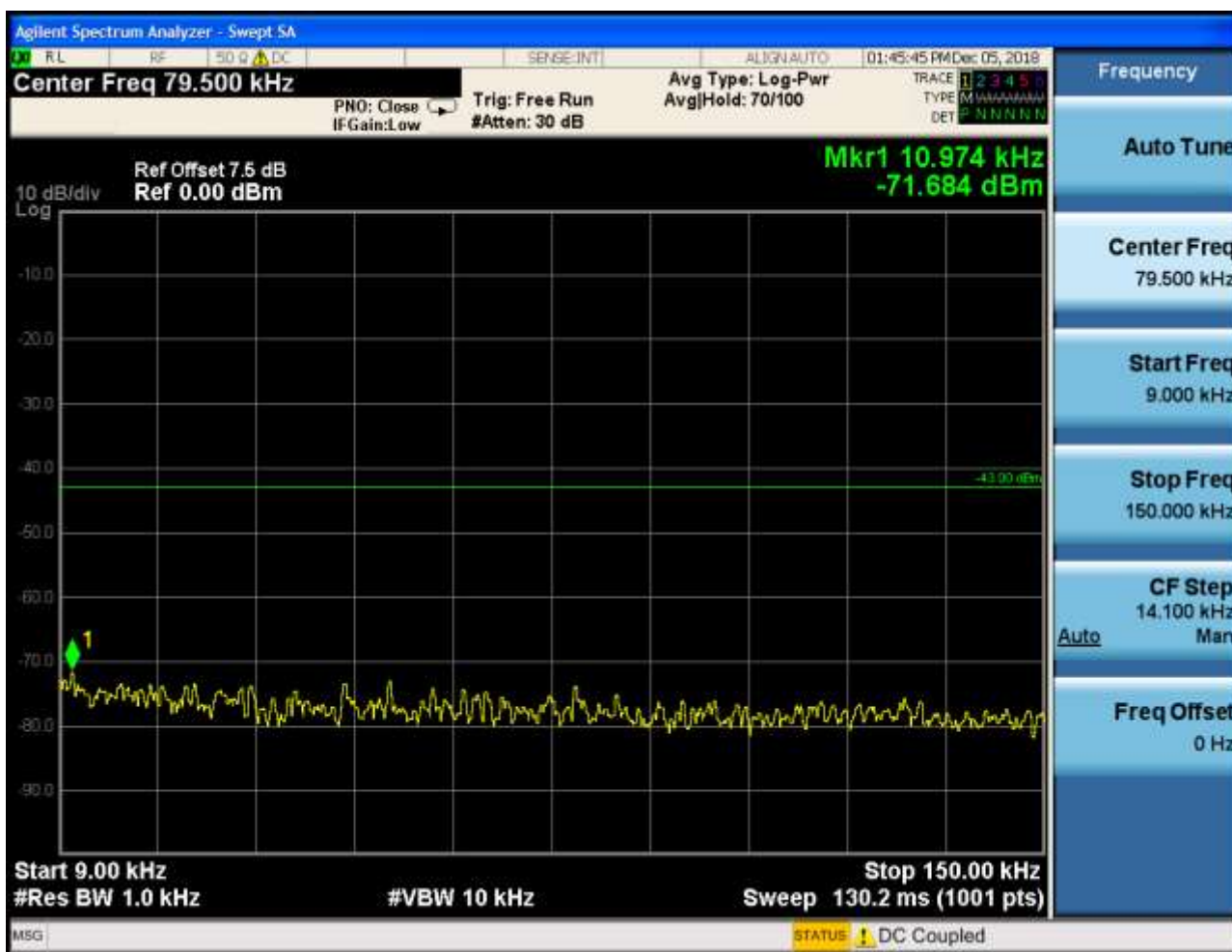






6.1.2.2 Test Mode = GSM/TM2

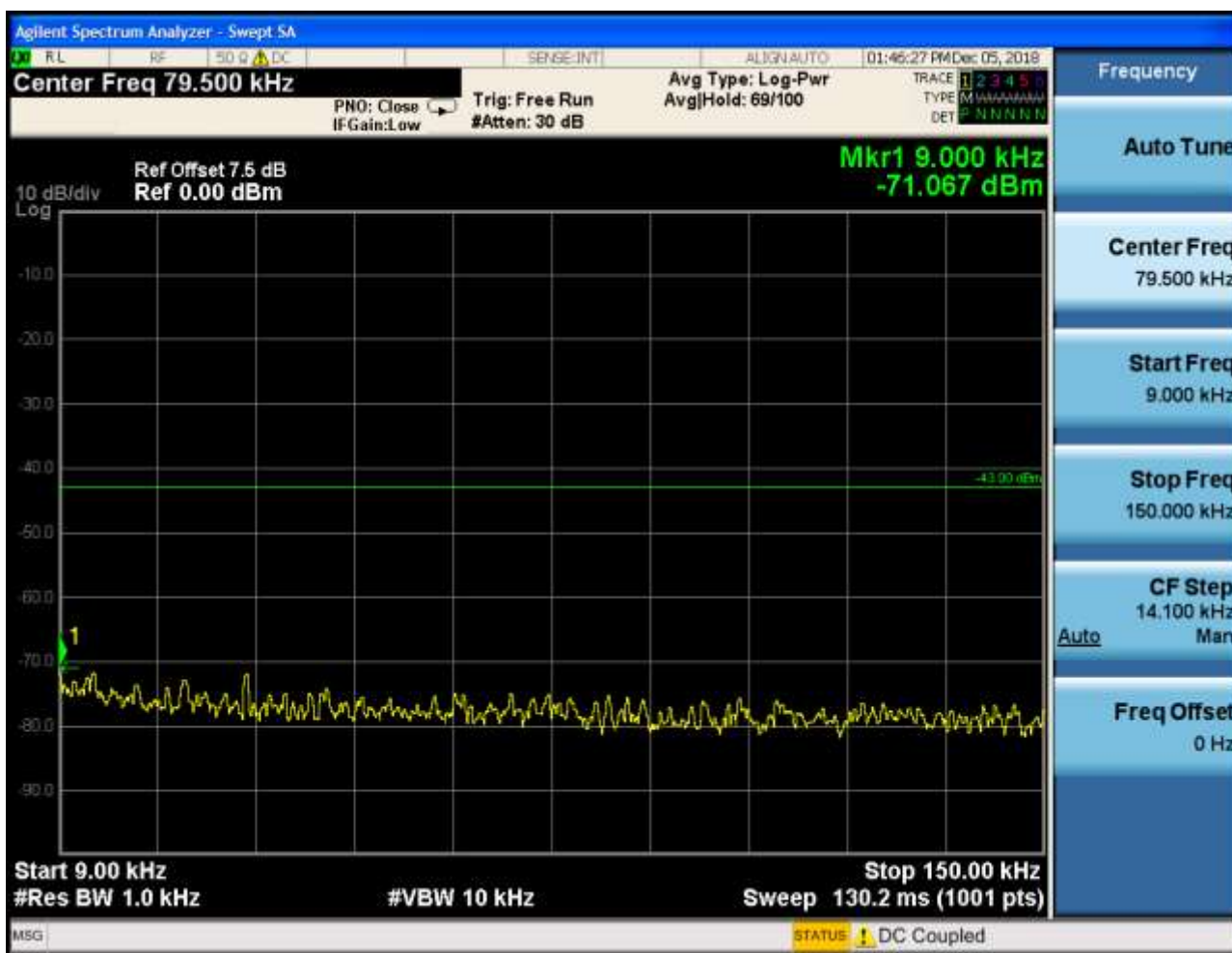
6.1.2.2.1 Test Channel = LCH







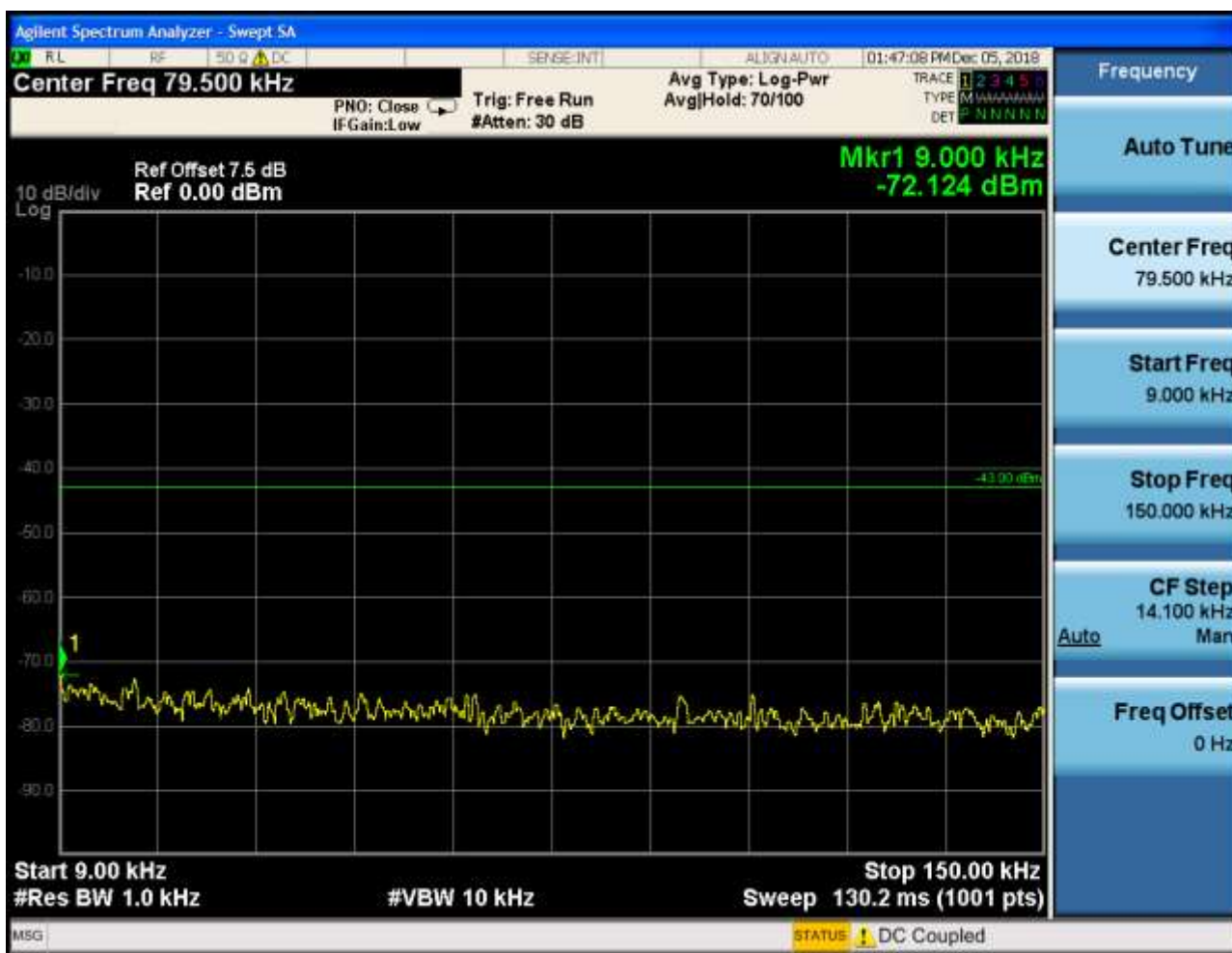
6.1.2.2.2 Test Channel = MCH







6.1.2.2.3 Test Channel = HCH







7Appendix_G: Field Strength of Spurious Radiation

Note: We tested all modes, but the data presented below is the worst case.

9kHz~150kHz, RBW = 200Hz, VBW = 600 Hz, Detector: PK

150kHz~30MHz, RBW = 9kHz, VBW = 30k Hz, Detector: PK

30MHz~1GHz, RBW = 100 kHz, VBW = 300 kHz. Detector: PK

Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

Part I - Test Plots

7.1 For GSM_ANT1

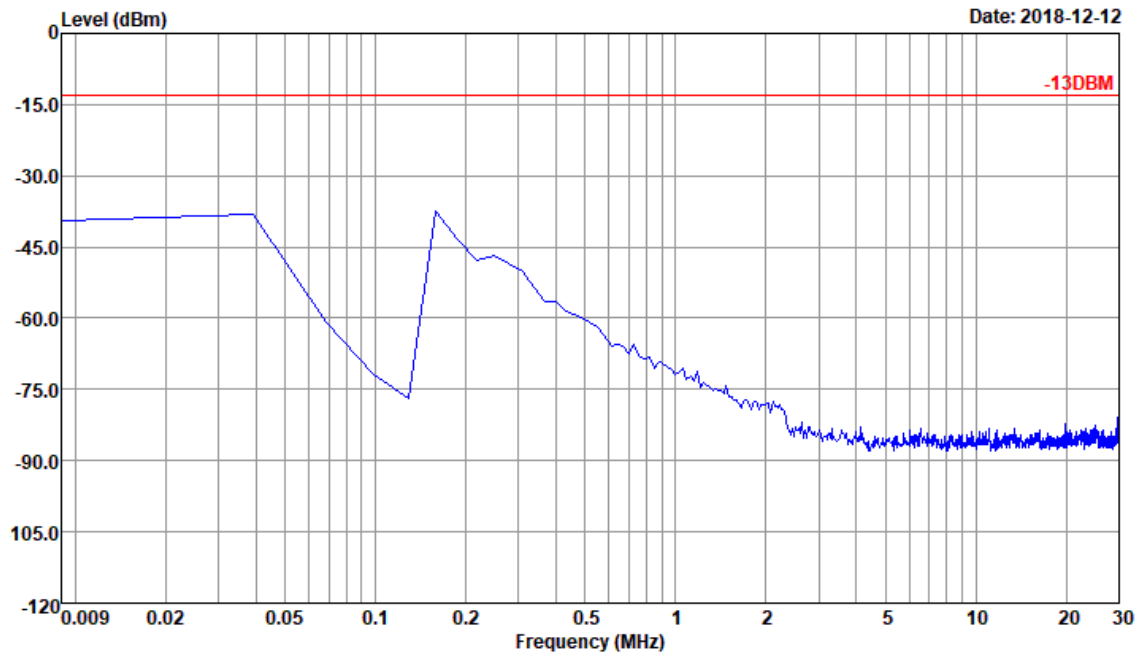
7.1.1 Test Band = GSM850

7.1.1.1 Test Mode = GSM/TM1



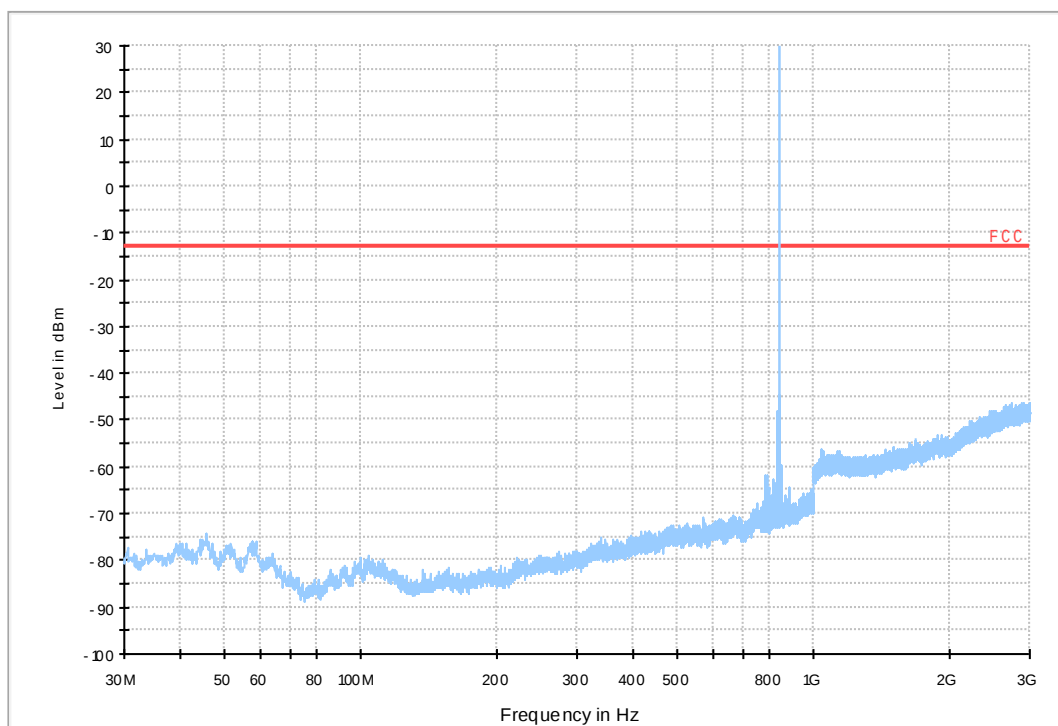
Data: 71

Date: 2018-12-12

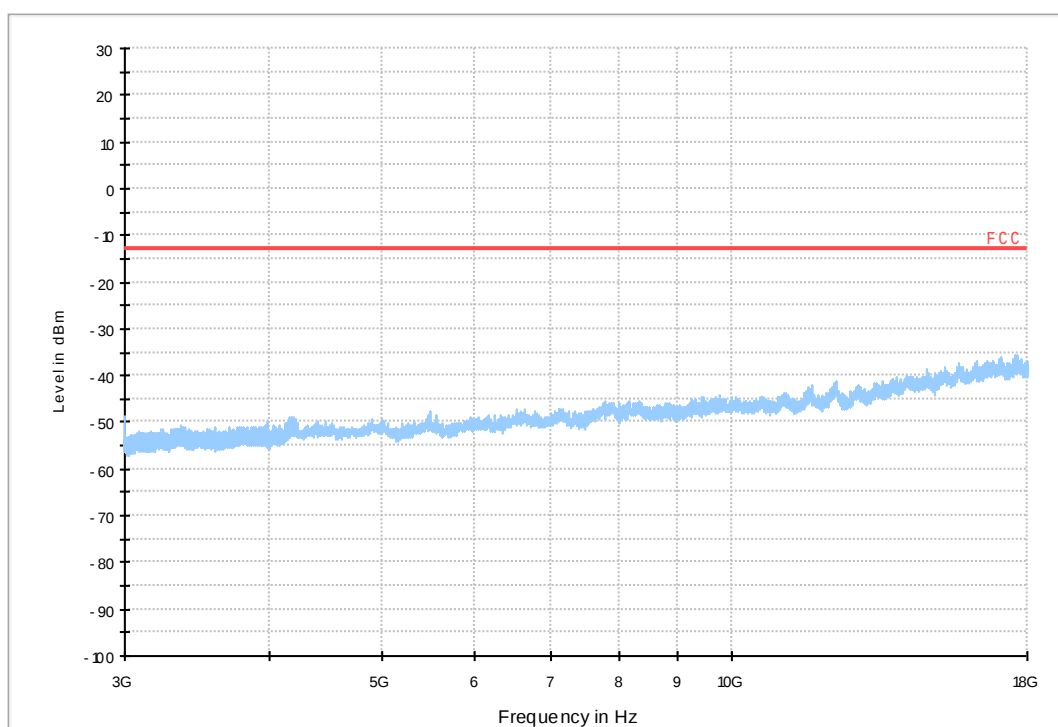


Site : 03CH01-SZ
Condition : -13DBM
: RBW:9.000KHz VBW:30.000KHz

04 FCC PART 22 GSM850_L

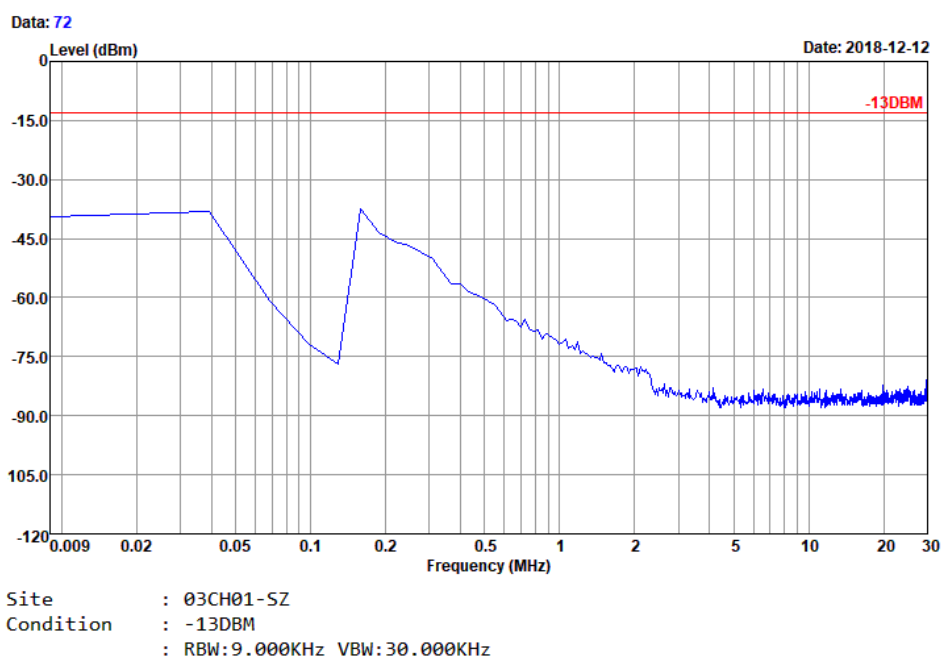


03 FCC PART 22 GSM850_H

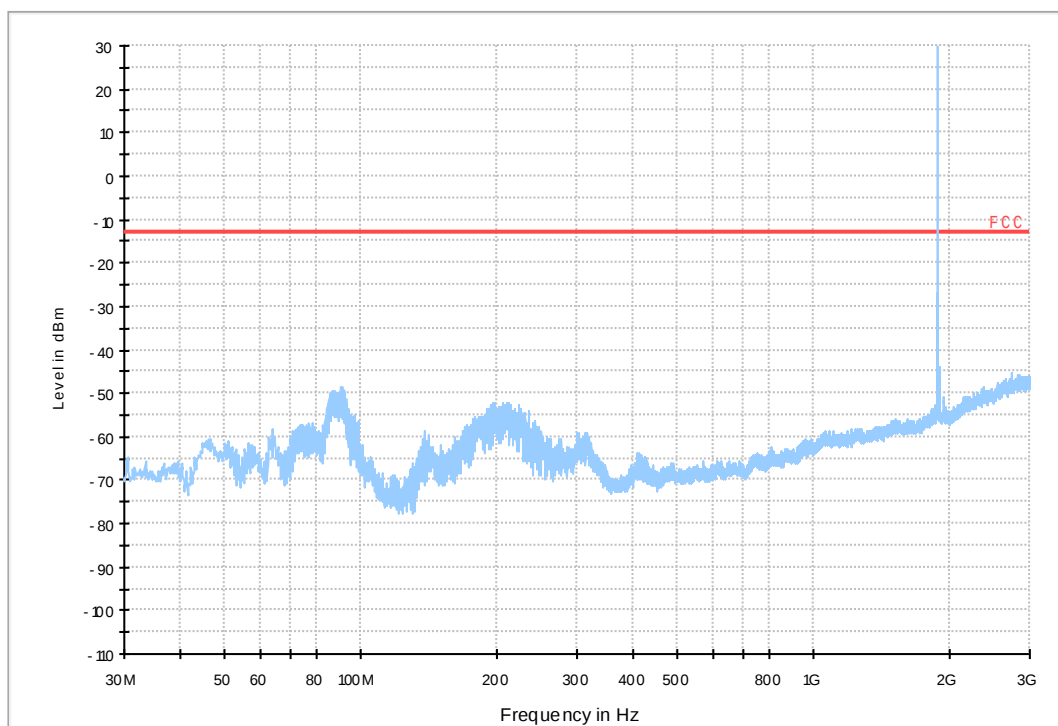


7.1.2 Test Band = PCS1900

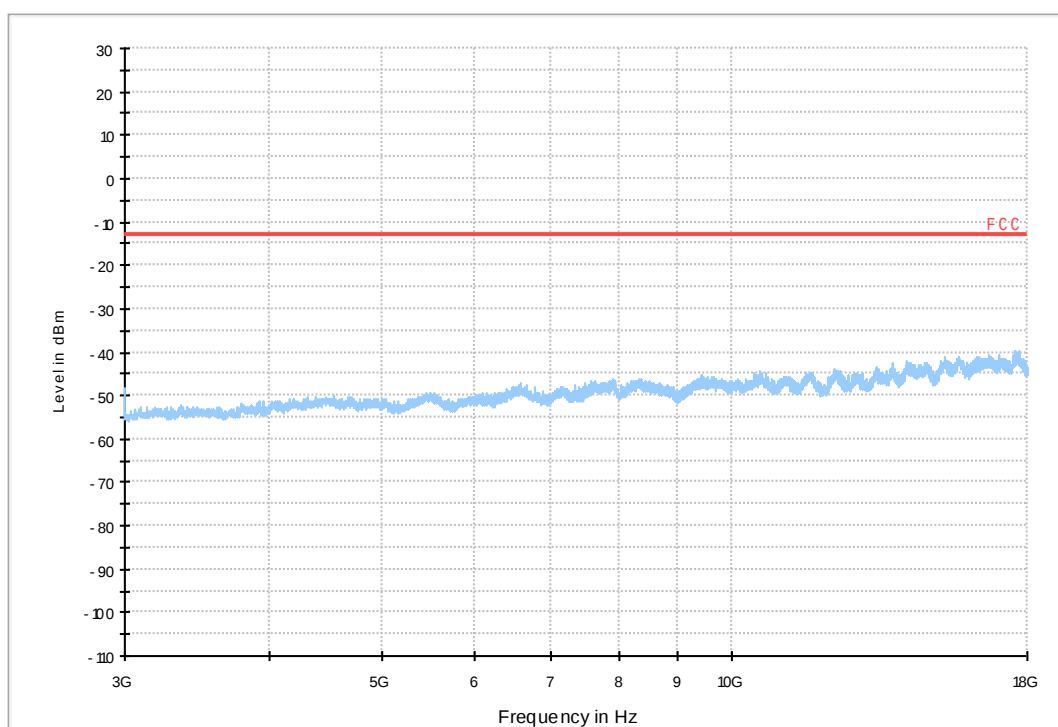
7.1.2.1 Test Mode = GSM/TM1



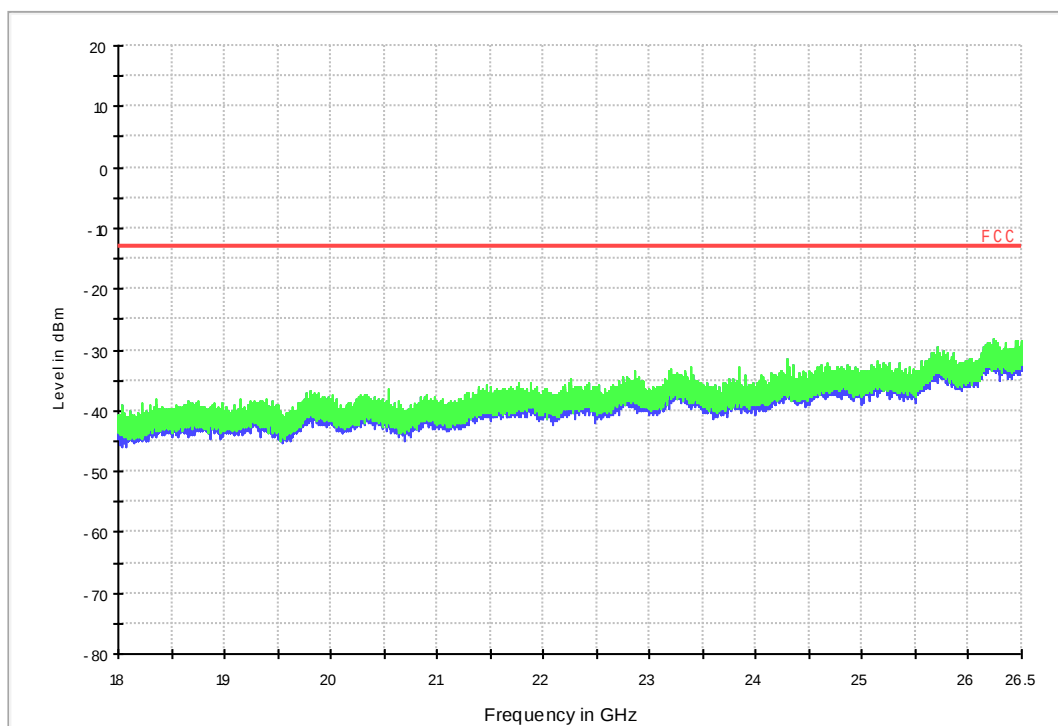
10 FCC PART 24 GSM1900_L



09 FCC PART 24 GSM1900_H



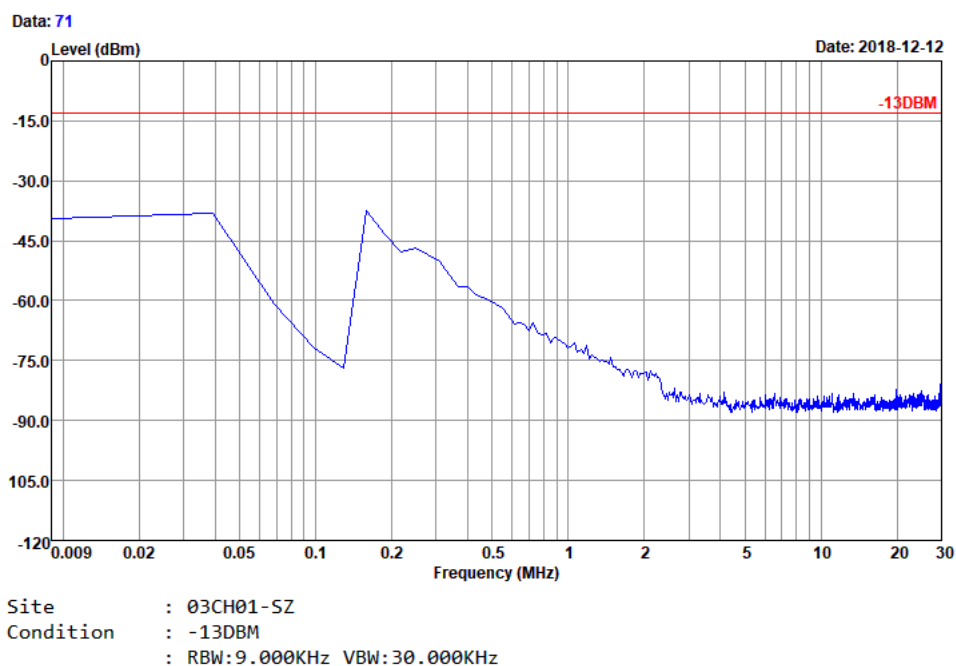
18G~26.5G R SE-TX-DIRECTOR ABOVE 1.5G PK



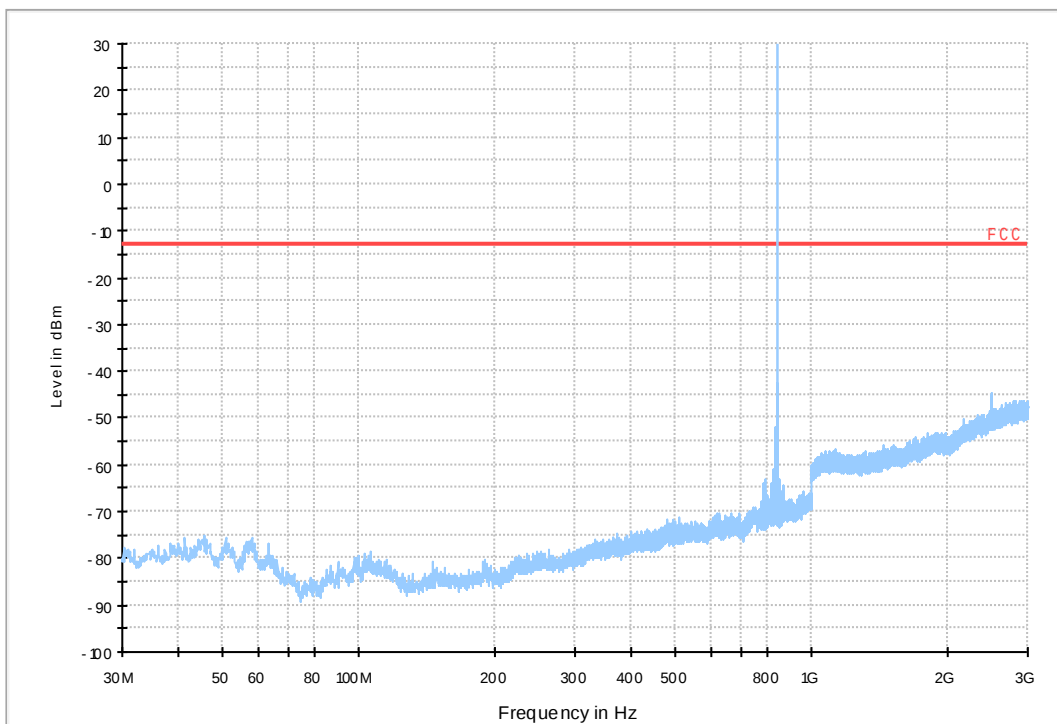
7.2 For GSM_ANT2

7.2.1 Test Band = GSM850

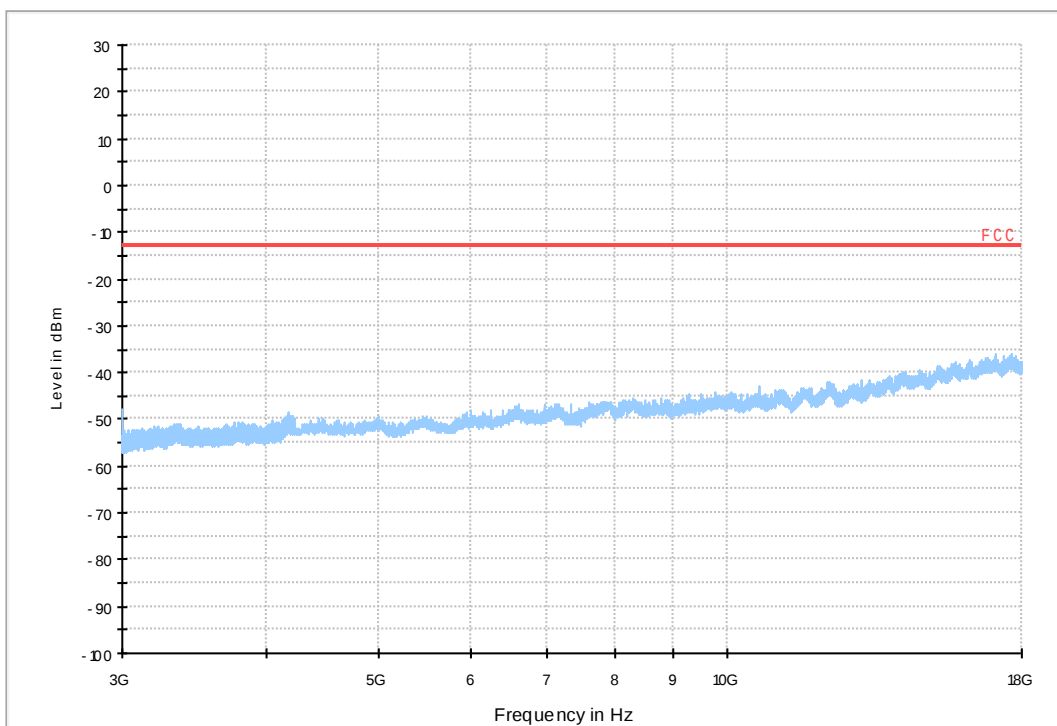
7.2.1.1 Test Mode = GSM/TM1



04 FCC PART 22 GSM850_L

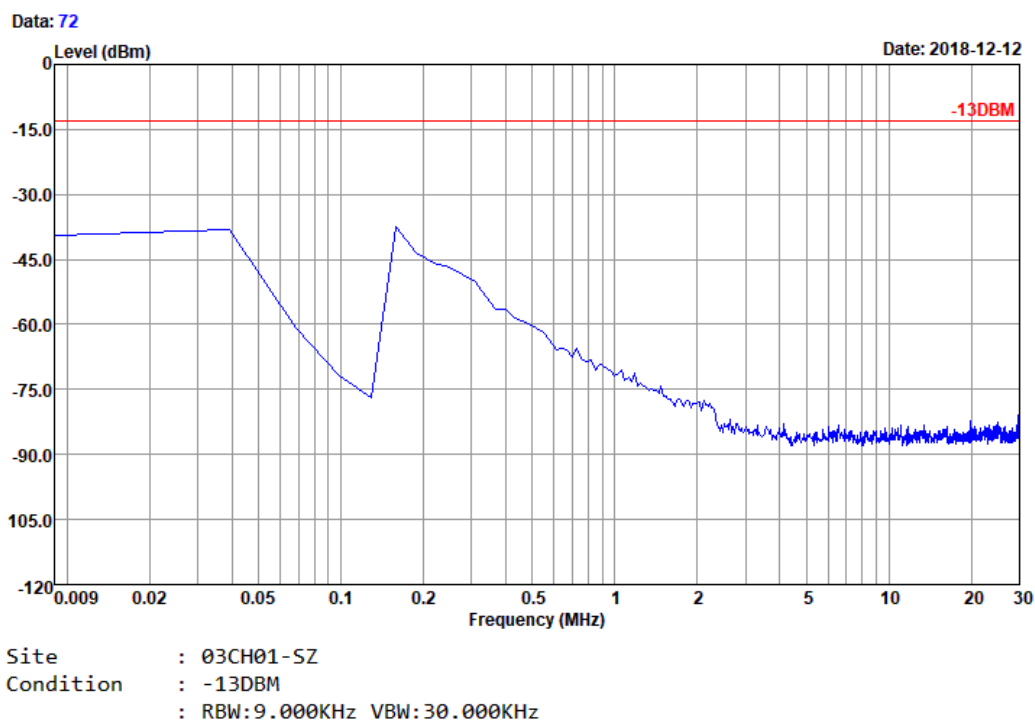


03 FCC PART 22 GSM850_H

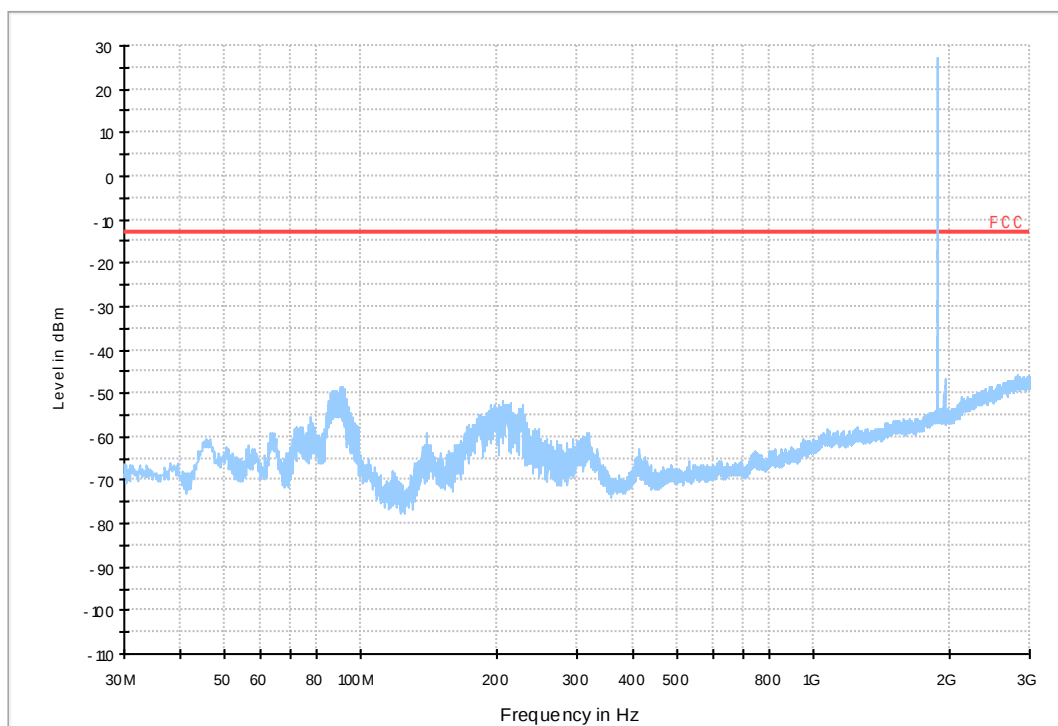


7.2.2 Test Band = PCS1900

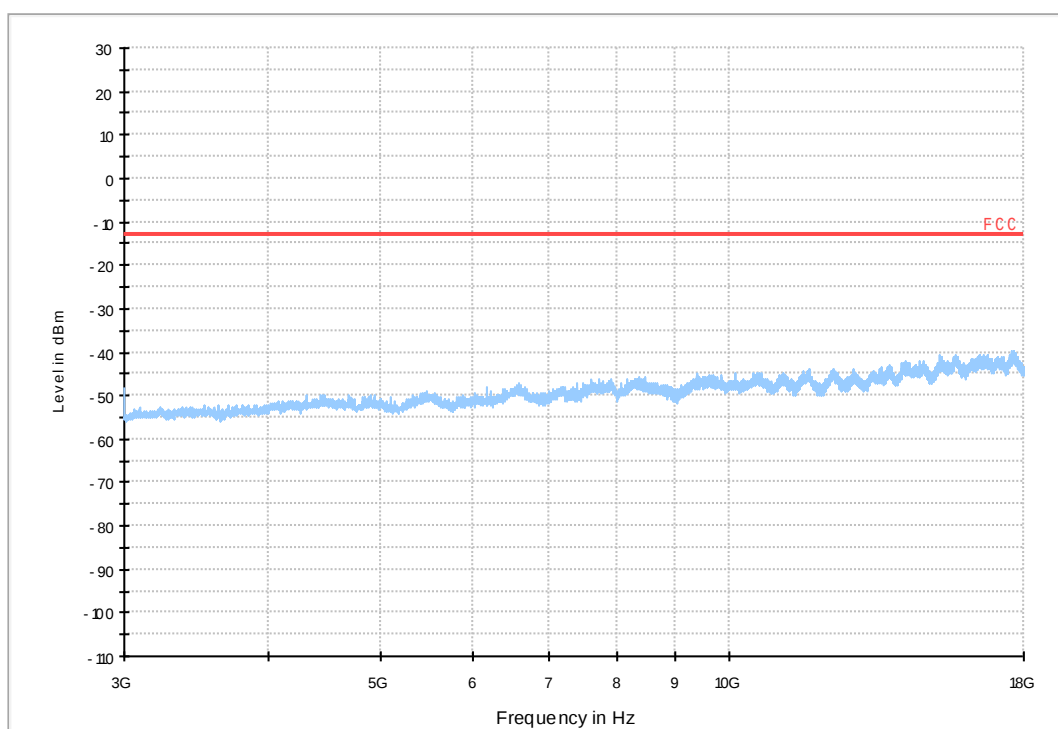
7.2.2.1 Test Mode = GSM/TM1



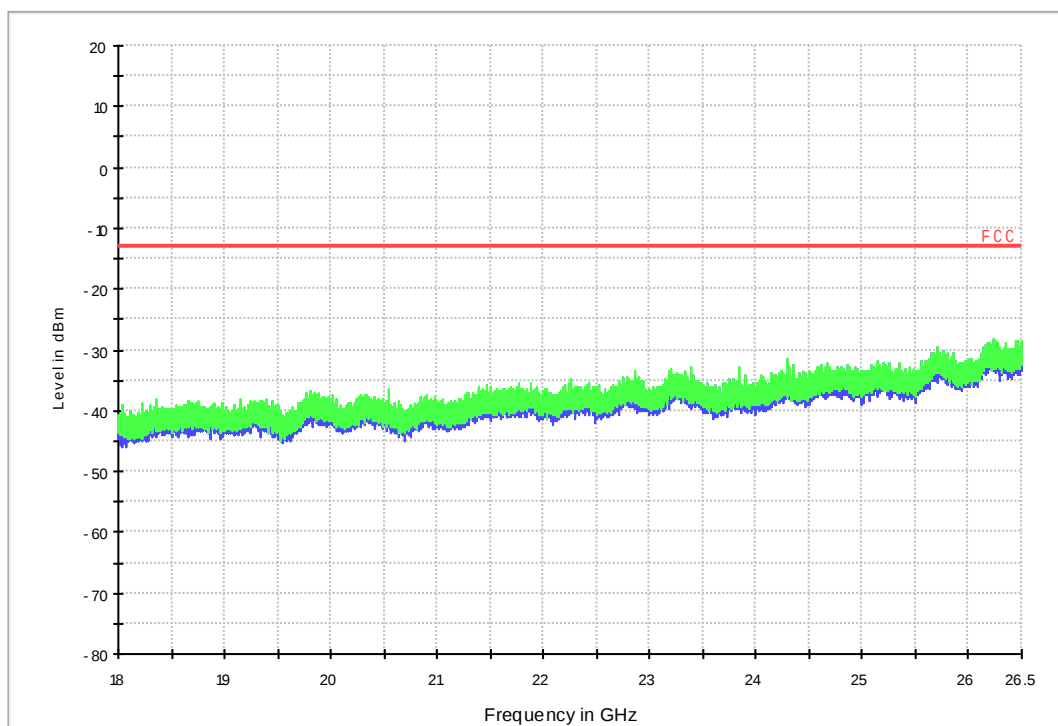
10 FCC PART 24 GSM1900_L



09 FCC PART 24 GSM1900_H



18G~26.5G R SE-TX-DIRECTOR ABOVE 1.5G PK



8Appendix_H: Frequency Stability

8.1 For GSM

8.1.1Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM850	GSM/TM1	LCH	TN	VL	-15.85235	-0.01923	PASS
				VN	-14.81920	-0.01798	PASS
				VH	-17.62807	-0.02139	PASS
		MCH	TN	VL	-17.95093	-0.02146	PASS
				VN	-16.75636	-0.02003	PASS
				VH	-17.88636	-0.02138	PASS
		HCH	TN	VL	-13.78606	-0.01624	PASS
				VN	-11.52605	-0.01358	PASS
				VH	-12.68834	-0.01495	PASS
	GSM/TM2	LCH	TN	VL	-8.07146	-0.00979	PASS
				VN	-11.33233	-0.01375	PASS
				VH	-9.23375	-0.01120	PASS
		MCH	TN	VL	-10.20233	-0.01219	PASS
				VN	-13.33406	-0.01594	PASS
				VH	-12.88205	-0.01540	PASS
		HCH	TN	VL	-8.00689	-0.00943	PASS
				VN	-6.45717	-0.00761	PASS
				VH	-8.71718	-0.01027	PASS
PCS1900	GSM/TM1	LCH	TN	VL	-2.03401	-0.00110	PASS
				VN	-7.97461	-0.00431	PASS
				VH	-1.22686	-0.00066	PASS
		MCH	TN	VL	-9.91176	-0.00527	PASS
				VN	-2.74430	-0.00146	PASS
				VH	-8.84632	-0.00471	PASS
		HCH	TN	VL	-5.32716	-0.00110	PASS
				VN	-9.68576	-0.00431	PASS
				VH	-6.45717	-0.00066	PASS
	GSM/TM2	LCH	TN	VL	-1.13000	-0.00061	PASS
				VN	-9.39518	-0.00508	PASS
				VH	-5.13345	-0.00277	PASS
		MCH	TN	VL	-6.81231	-0.00362	PASS
				VN	-4.26173	-0.00227	PASS
				VH	-6.97374	-0.00371	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	TN	VL	-8.16832	-0.00061	PASS
				VN	-11.84891	-0.00508	PASS
				VH	-7.29660	-0.00277	PASS

8.1.2 Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM850	GSM/TM1	LCH	VN	-30	-14.01206	-0.01700	PASS
				-20	-14.23806	-0.01728	PASS
				-10	-12.26862	-0.01489	PASS
				0	-14.72235	-0.01786	PASS
				10	-15.59407	-0.01892	PASS
				20	-14.81920	-0.01798	PASS
				30	-13.81834	-0.01677	PASS
				40	-11.91348	-0.01445	PASS
				50	-13.94749	-0.01692	PASS
		MCH	VN	-30	-16.20750	-0.01937	PASS
				-20	-17.40207	-0.02080	PASS
				-10	-16.20750	-0.01937	PASS
				0	-18.27379	-0.02184	PASS
				10	-18.20922	-0.02177	PASS
				20	-16.75636	-0.02003	PASS
				30	-15.98150	-0.01910	PASS
				40	-12.75291	-0.01524	PASS
				50	-17.59579	-0.02103	PASS
		HCH	VN	-30	-12.78520	-0.01506	PASS
				-20	-11.00947	-0.01297	PASS
				-10	-8.58804	-0.01012	PASS
				0	-12.68834	-0.01495	PASS
				10	-11.88119	-0.01400	PASS
				20	-11.52605	-0.01358	PASS
				30	-8.78175	-0.01035	PASS
				40	-12.01034	-0.01415	PASS
				50	-10.26690	-0.01210	PASS
	GSM/TM2	LCH	VN	-30	-12.75291	-0.01547	PASS
				-20	-12.62377	-0.01532	PASS
				-10	-13.85063	-0.01680	PASS
				0	-11.30005	-0.01371	PASS
				10	-12.43005	-0.01508	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				20	-11.33233	-0.01375	PASS
				30	-12.20405	-0.01481	PASS
				40	-12.49462	-0.01516	PASS
				50	-14.39949	-0.01747	PASS
		MCH	VN	-30	-16.04607	-0.01918	PASS
				-20	-16.69178	-0.01995	PASS
				-10	-16.53035	-0.01976	PASS
				0	-11.10633	-0.01328	PASS
				10	-10.26690	-0.01227	PASS
				20	-13.33406	-0.01594	PASS
				30	-15.01292	-0.01795	PASS
				40	-14.01206	-0.01675	PASS
				50	-16.59493	-0.01984	PASS
		HCH	VN	-30	-10.68662	-0.01259	PASS
				-20	-9.49204	-0.01118	PASS
				-10	-8.32975	-0.00981	PASS
				0	-6.71546	-0.00791	PASS
				10	-5.06888	-0.00597	PASS
				20	-6.45717	-0.00761	PASS
				30	-9.10461	-0.01073	PASS
				40	-8.52346	-0.01004	PASS
				50	-12.20405	-0.01438	PASS
PCS1900	GSM/TM1	LCH	VN	-30	-2.19544	-0.00119	PASS
				-20	-3.55144	-0.00192	PASS
				-10	-3.64830	-0.00197	PASS
				0	-6.13431	-0.00332	PASS
				10	-8.39432	-0.00454	PASS
				20	-7.97461	-0.00431	PASS
				30	-6.71546	-0.00363	PASS
				40	-9.62118	-0.00520	PASS
				50	-9.23375	-0.00499	PASS
		MCH	VN	-30	-2.29230	-0.00122	PASS
				-20	-2.19544	-0.00117	PASS
				-10	-0.06457	-0.00003	PASS
				0	-2.22772	-0.00118	PASS
				10	-1.45286	-0.00077	PASS
				20	-2.74430	-0.00146	PASS
				30	-2.55058	-0.00136	PASS
				40	-1.84029	-0.00098	PASS
				50	-2.77658	-0.00148	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	-30	-4.10030	-0.00215	PASS
				-20	-7.39346	-0.00387	PASS
				-10	-7.26432	-0.00380	PASS
				0	-10.23461	-0.00536	PASS
				10	-10.68662	-0.00560	PASS
				20	-9.68576	-0.00507	PASS
				30	-7.00603	-0.00367	PASS
				40	-9.65347	-0.00505	PASS
				50	-10.94490	-0.00573	PASS
	GSM/TM2	LCH	VN	-30	-6.84460	-0.00370	PASS
				-20	-2.32458	-0.00126	PASS
				-10	-6.39260	-0.00346	PASS
				0	-5.29488	-0.00286	PASS
				10	-10.84805	-0.00586	PASS
				20	-9.39518	-0.00508	PASS
				30	-11.42919	-0.00618	PASS
				40	-9.84718	-0.00532	PASS
				50	-10.17004	-0.00550	PASS
		MCH	VN	-30	-6.36031	-0.00338	PASS
				-20	-2.19544	-0.00117	PASS
				-10	-5.39174	-0.00287	PASS
				0	-1.06543	-0.00057	PASS
				10	-4.58459	-0.00244	PASS
				20	-4.26173	-0.00227	PASS
				30	-3.77744	-0.00201	PASS
				40	-3.64830	-0.00194	PASS
				50	-3.19630	-0.00170	PASS
		HCH	VN	-30	-10.88033	-0.00570	PASS
				-20	-4.48773	-0.00235	PASS
				-10	-9.97633	-0.00522	PASS
				0	-9.07232	-0.00475	PASS
				10	-13.07577	-0.00685	PASS
				20	-11.84891	-0.00620	PASS
				30	-13.78606	-0.00722	PASS
				40	-11.39690	-0.00597	PASS
				50	-13.91520	-0.00729	PASS

END