



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	32.71	28.46	38.5	PASS
		MCH	32.83	28.58	38.5	PASS
		HCH	32.69	28.44	38.5	PASS
	GSM/TM2	LCH	26.70	22.45	38.5	PASS
		MCH	26.90	22.65	38.5	PASS
		HCH	26.88	22.63	38.5	PASS
Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP [dBm]	Limit [dBm]	Verdict
PCS1900	GSM/TM1	LCH	30.11	31.21	33	PASS
		MCH	30.71	31.81	33	PASS
		HCH	30.74	31.84	33	PASS
	GSM/TM2	LCH	25.82	26.92	33	PASS
		MCH	25.57	26.67	33	PASS
		HCH	25.48	26.58	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	1.68	13	PASS
		MCH	1.96	13	PASS
		HCH	1.74	13	PASS
	GSM/TM2	LCH	4.89	13	PASS
		MCH	4.86	13	PASS
		HCH	5.25	13	PASS
PCS1900	GSM/TM1	LCH	1.83	13	PASS
		MCH	1.89	13	PASS
		HCH	1.83	13	PASS
	GSM/TM2	LCH	4.83	13	PASS
		MCH	4.70	13	PASS
		HCH	4.51	13	PASS

3Appendix_C: Modulation Characteristics

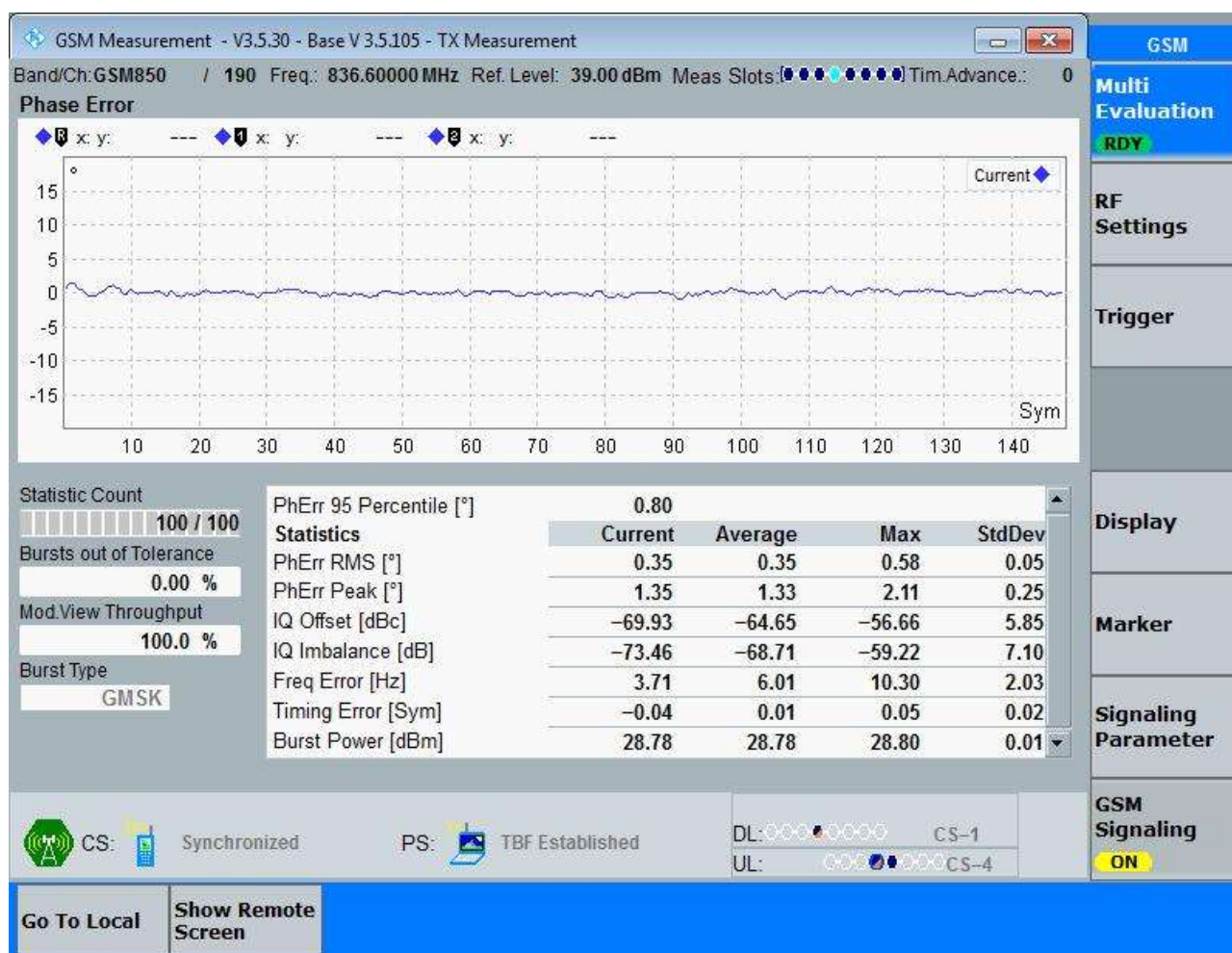
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

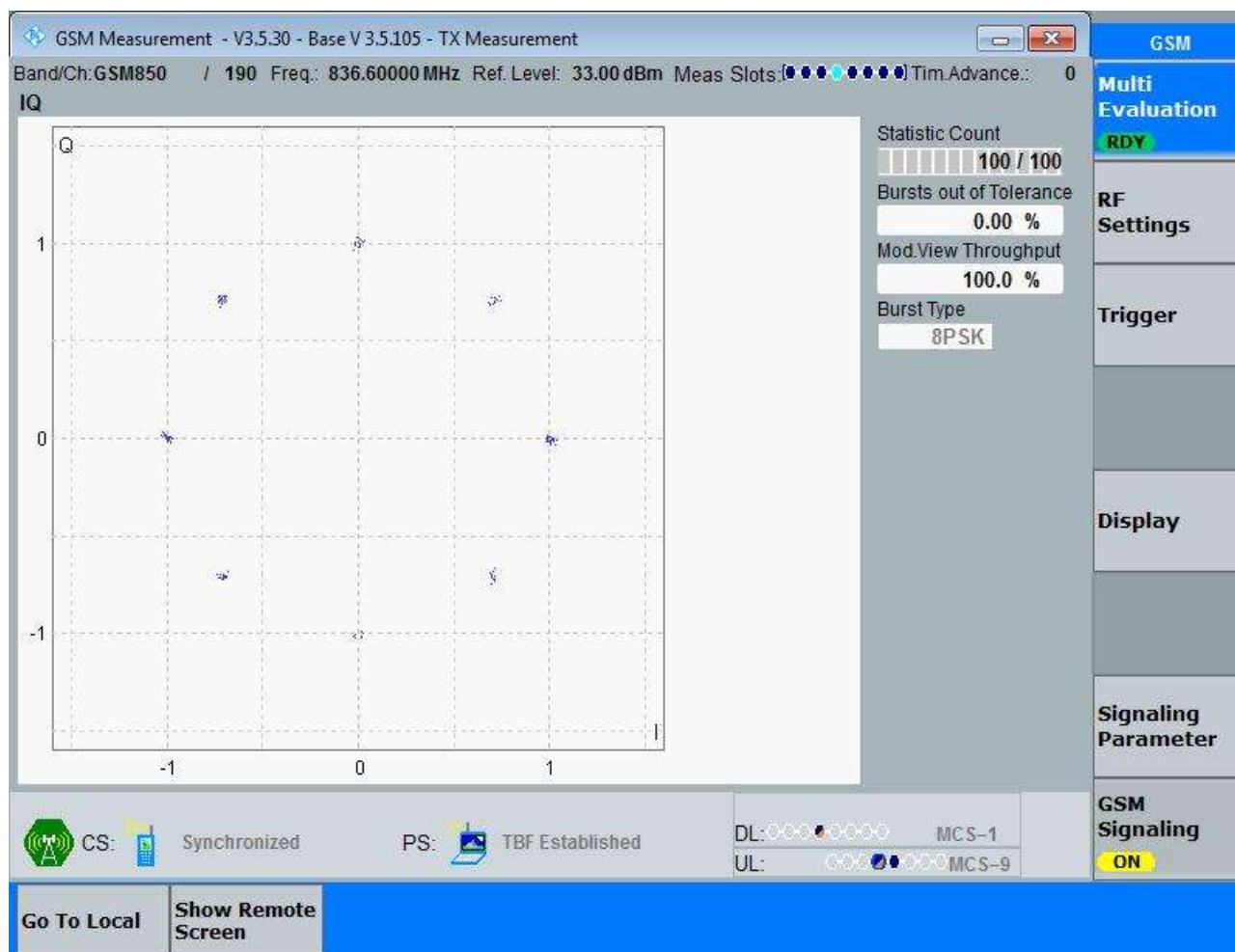
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

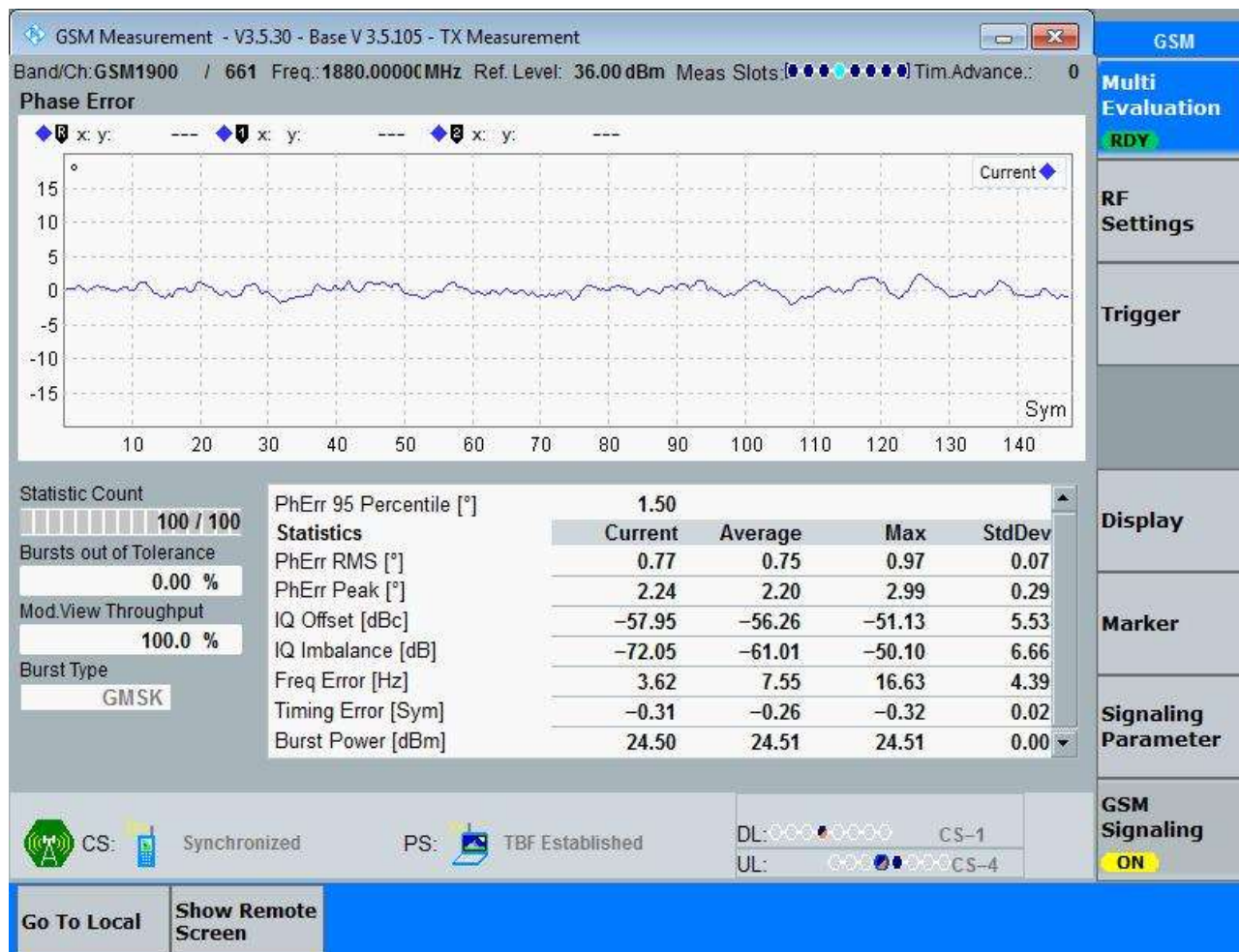
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = PCS1900

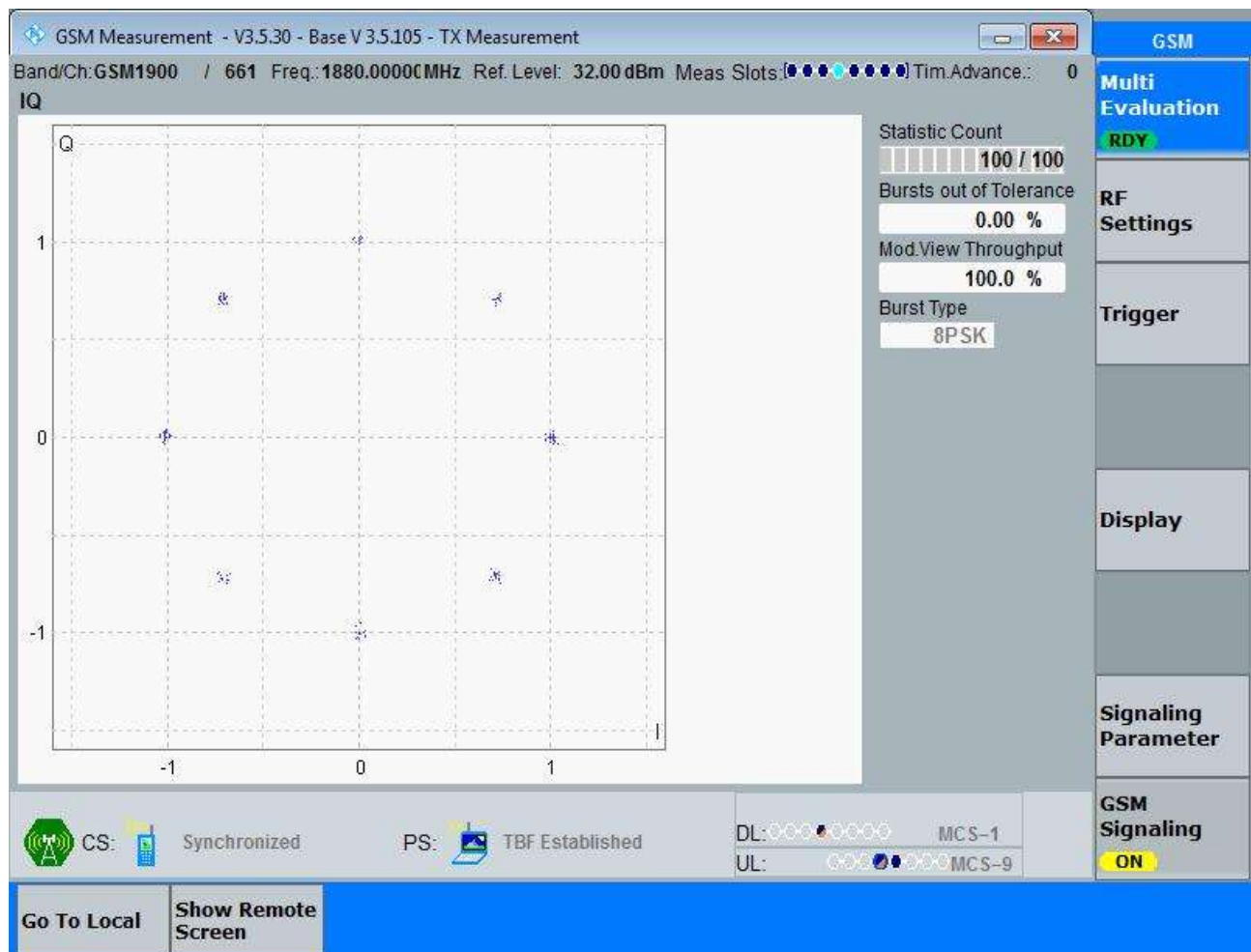
3.1.2.1 Test Mode = GSM/TM1

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	244.90	314.8	Pass
		MCH	244.61	315.7	Pass
		HCH	244.56	315.6	Pass
	GSM/TM2	LCH	248.69	323.0	Pass
		MCH	251.89	310.8	Pass
		HCH	248.63	313.5	Pass
PCS1900	GSM/TM1	LCH	244.43	317.6	Pass
		MCH	243.52	315.8	Pass
		HCH	246.86	317.4	Pass
	GSM/TM2	LCH	244.74	307.9	Pass
		MCH	247.82	308.9	Pass
		HCH	247.20	314.2	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

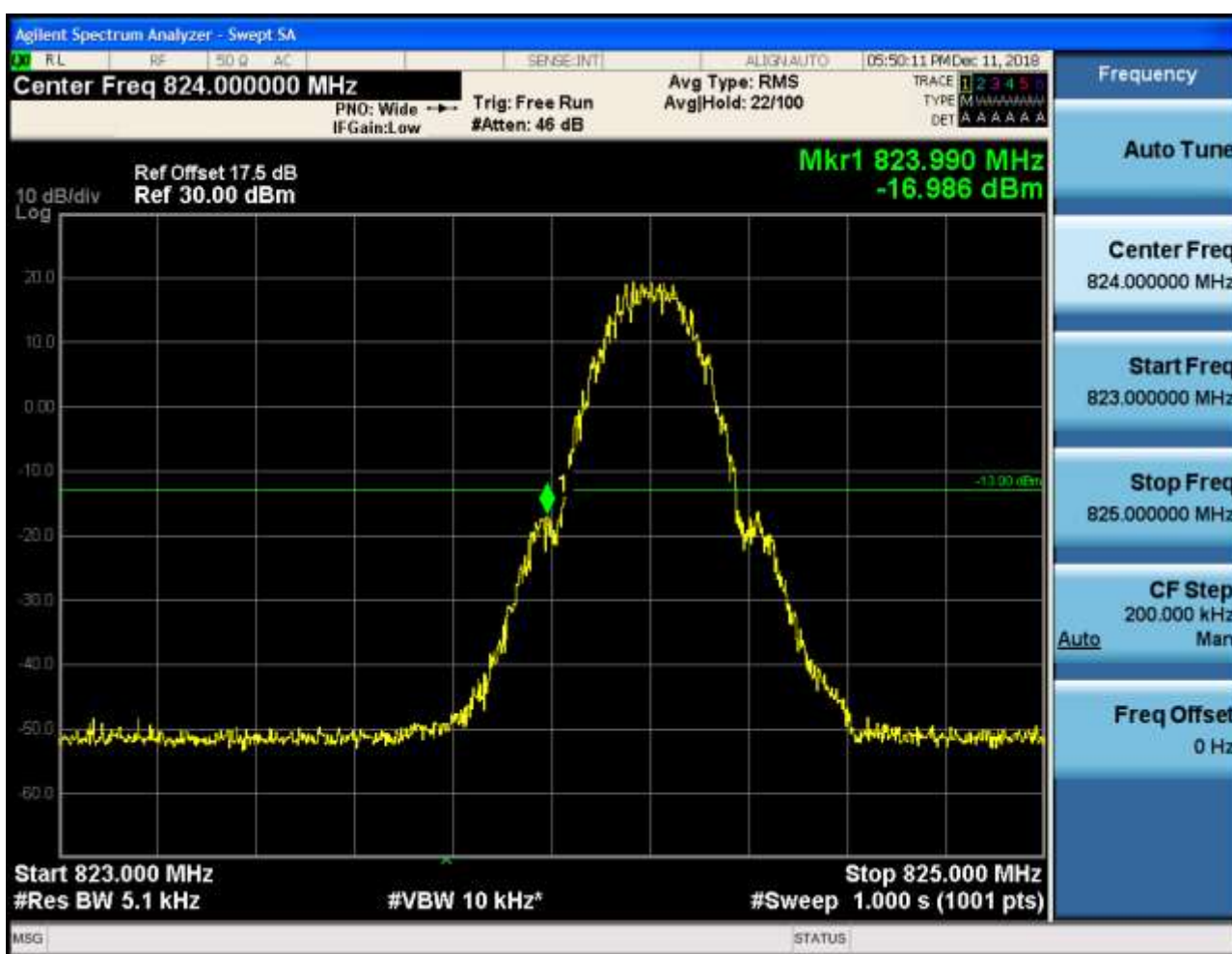
Part I - Test Plots

5.1 For GSM

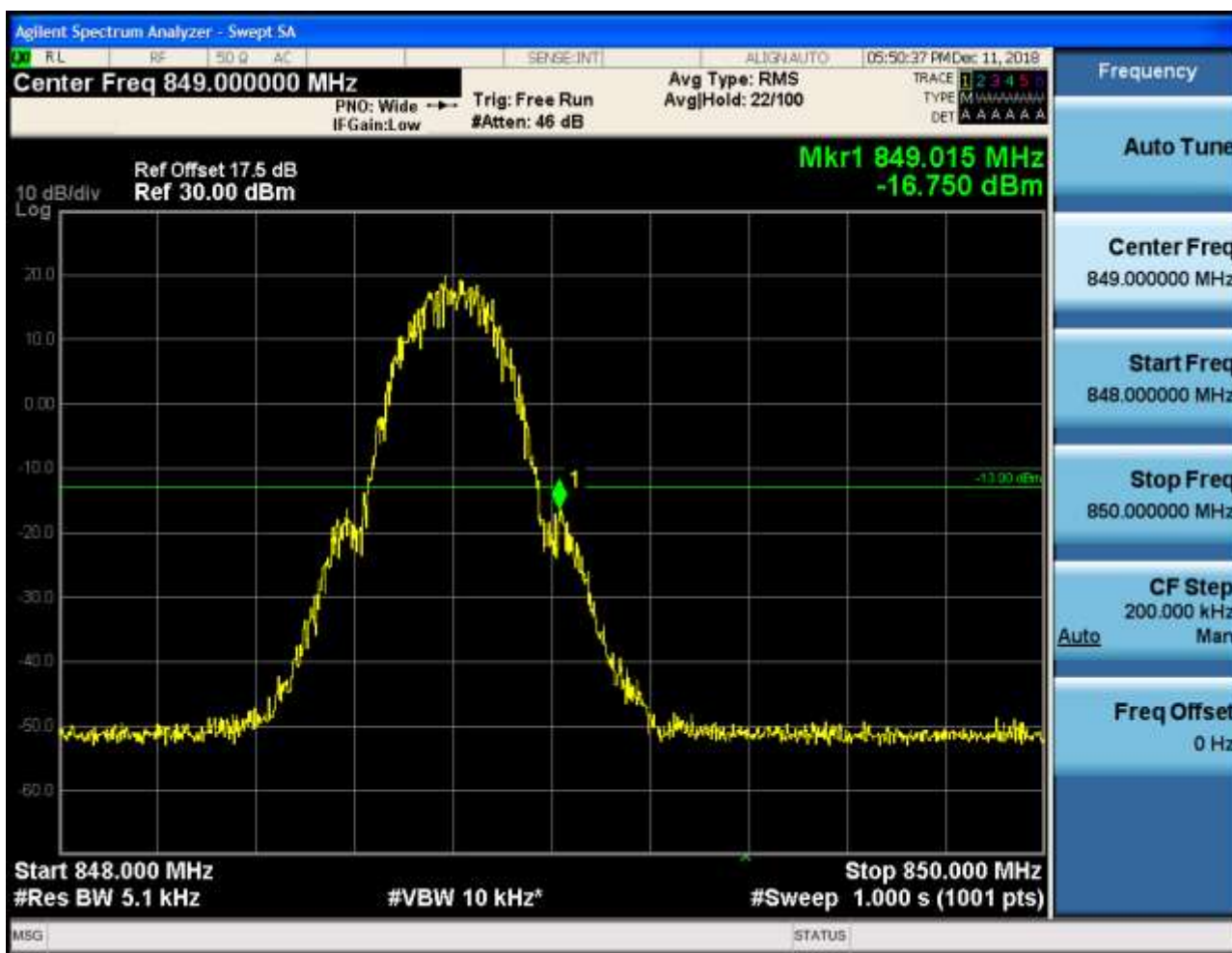
5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH

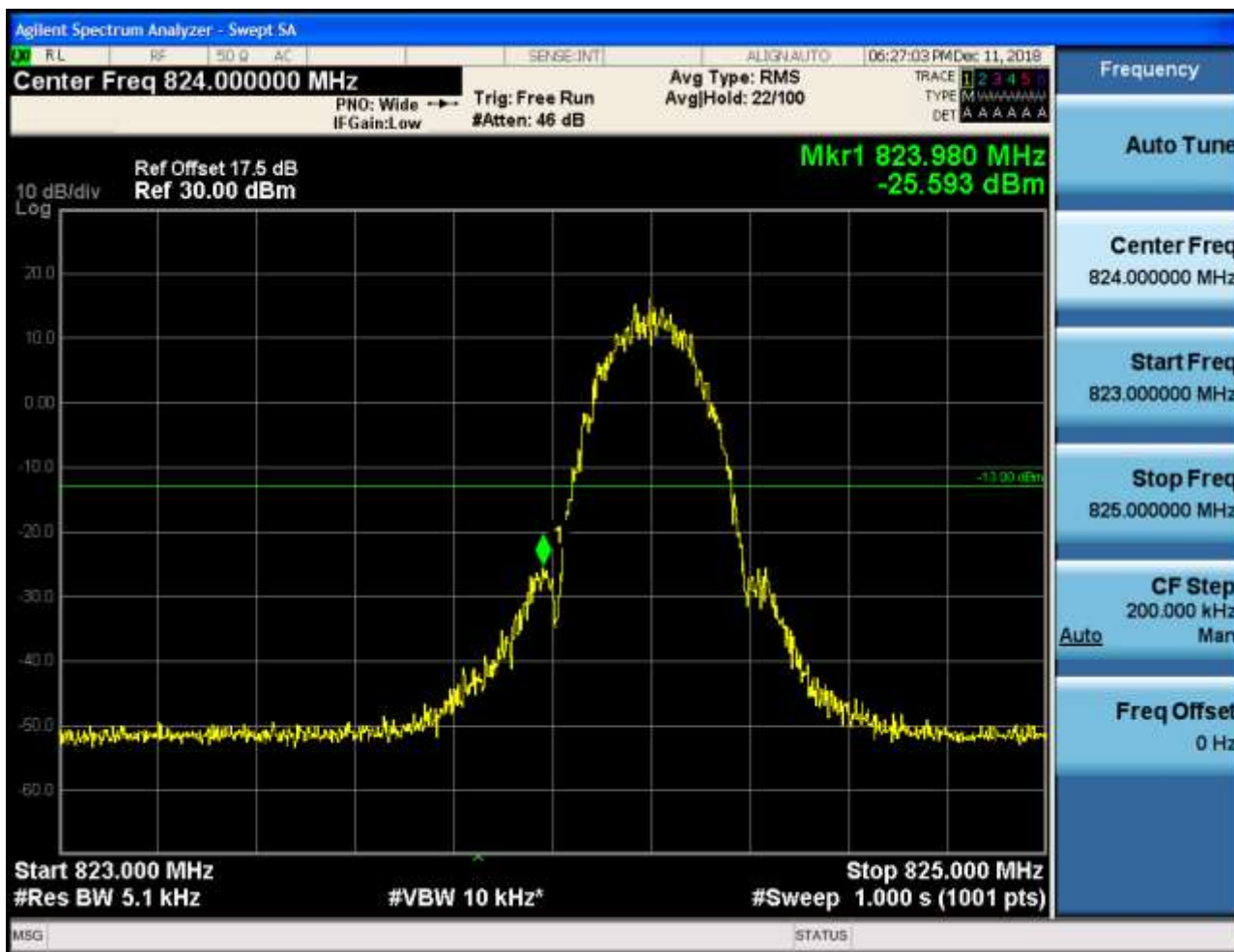


5.1.1.1.2 Test Channel = HCH

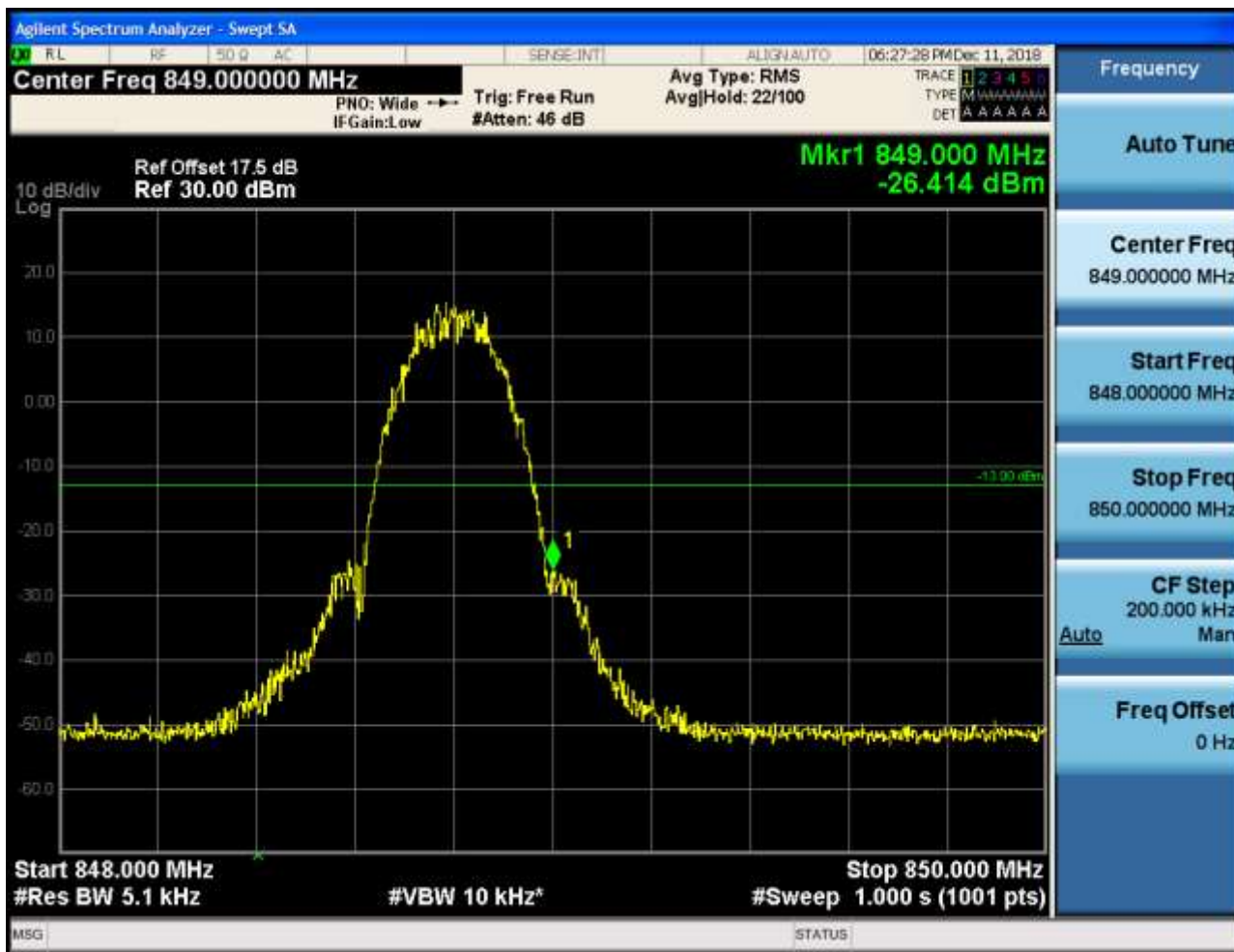


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



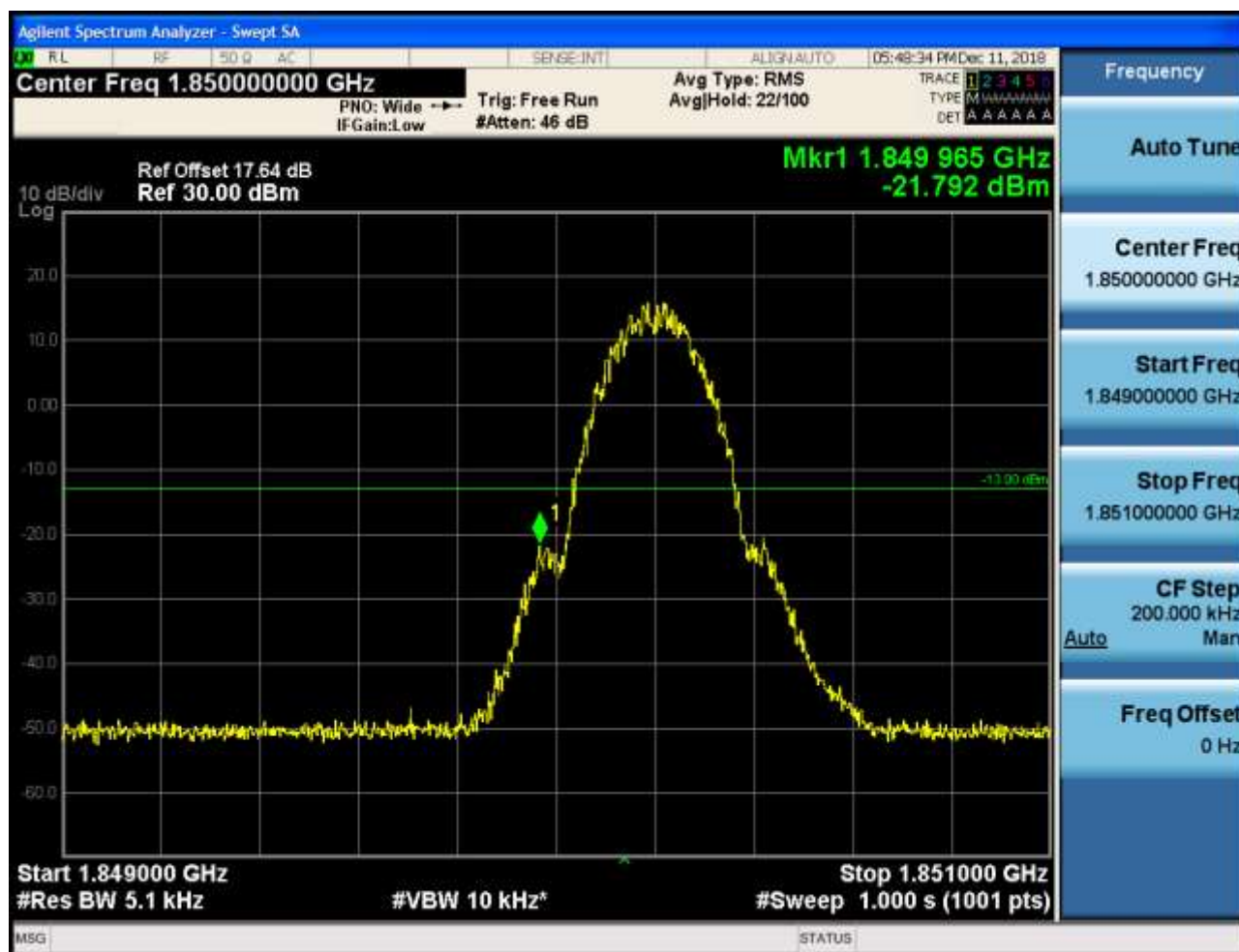
5.1.1.2.2 Test Channel = HCH



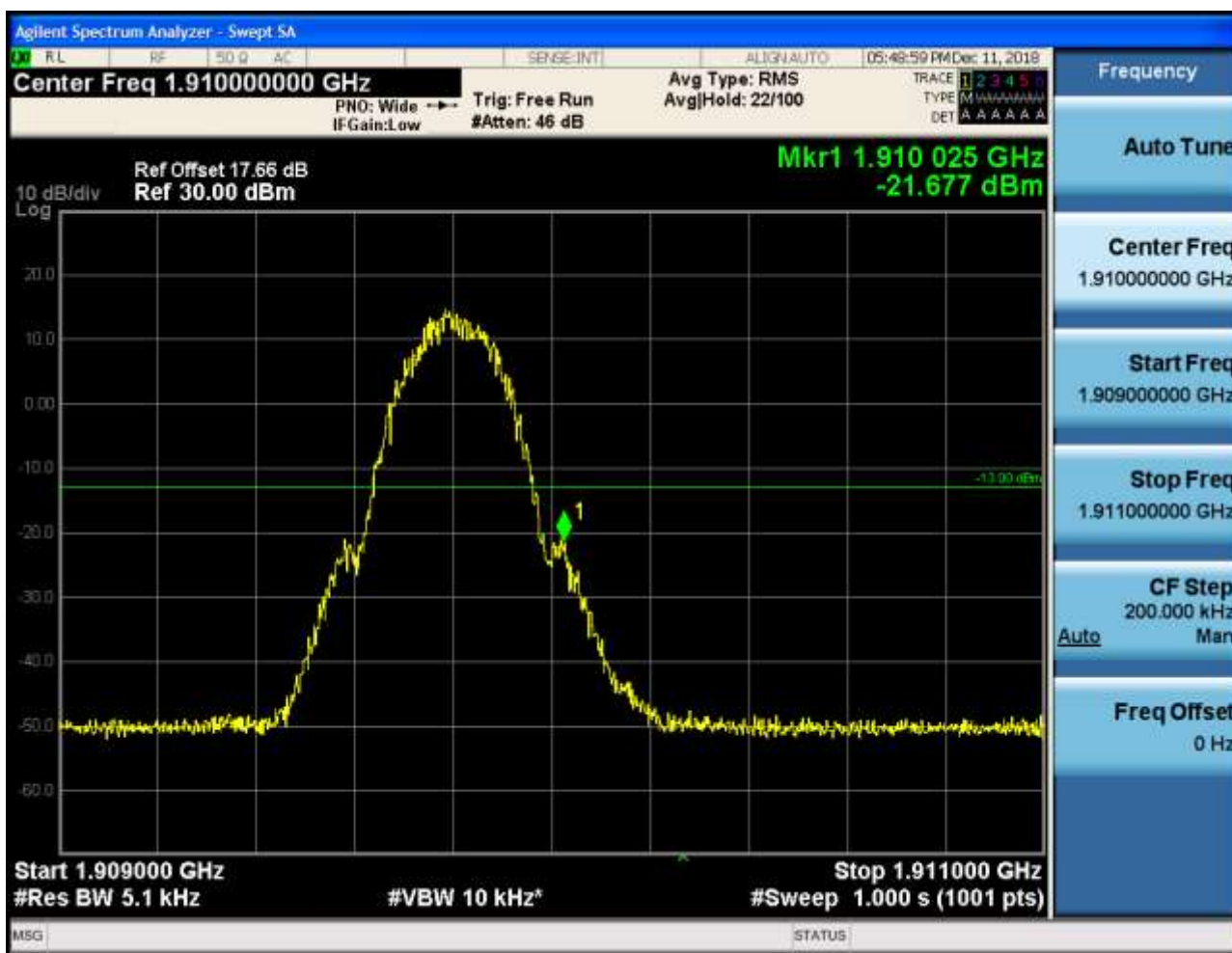
5.1.2 Test Band = PCS1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

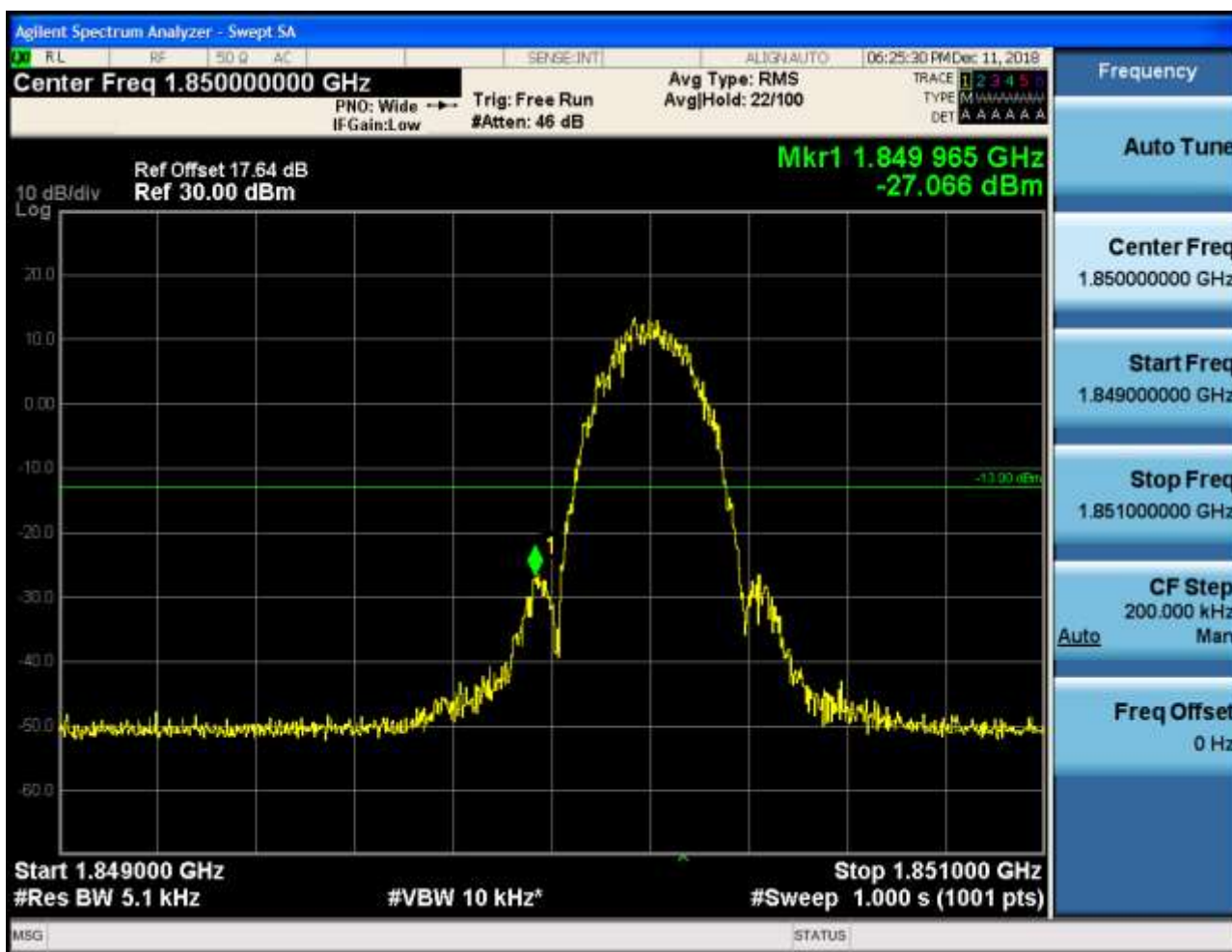


5.1.2.1.2 Test Channel = HCH

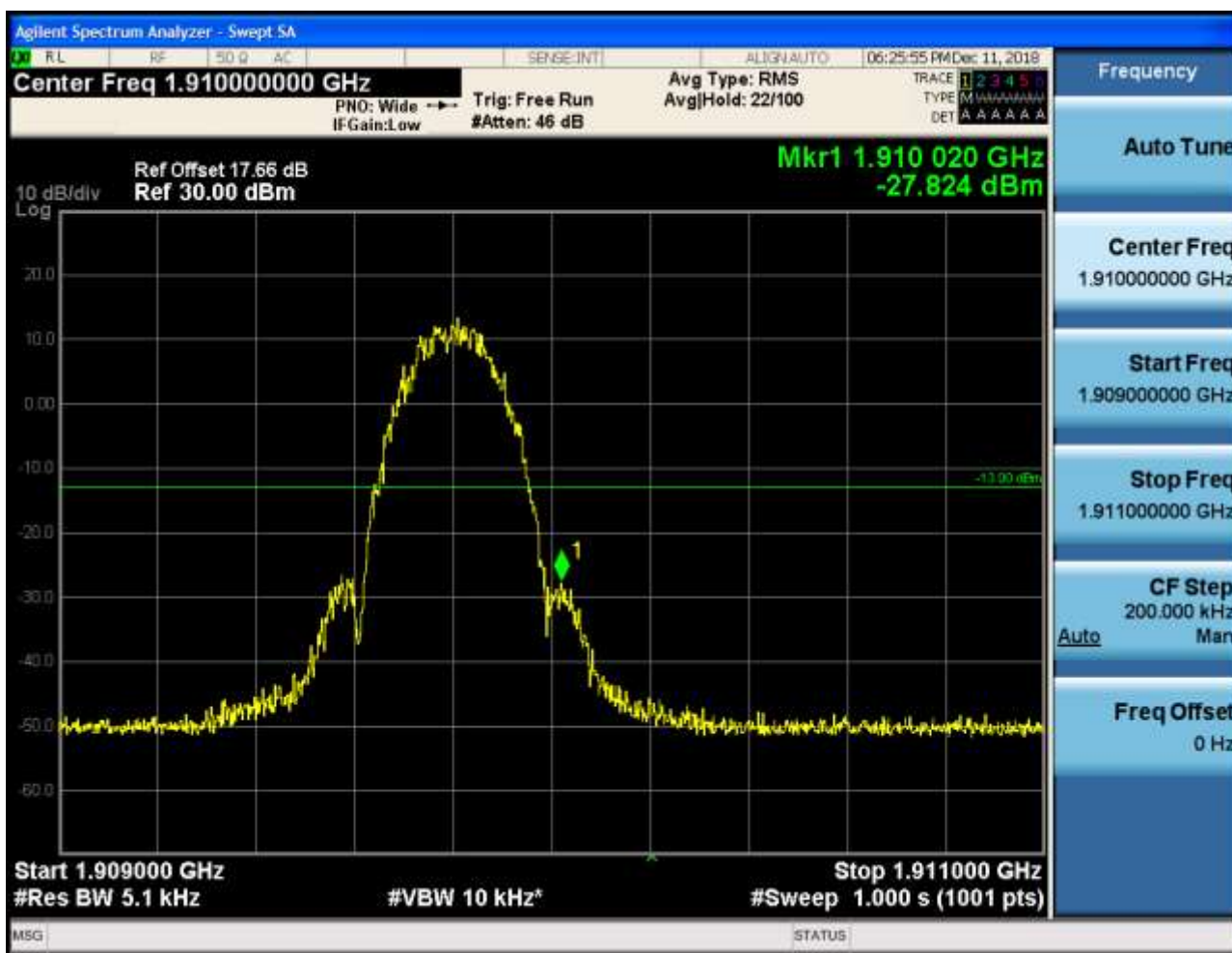


5.1.2.2 Test Mode = GSM/TM2

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

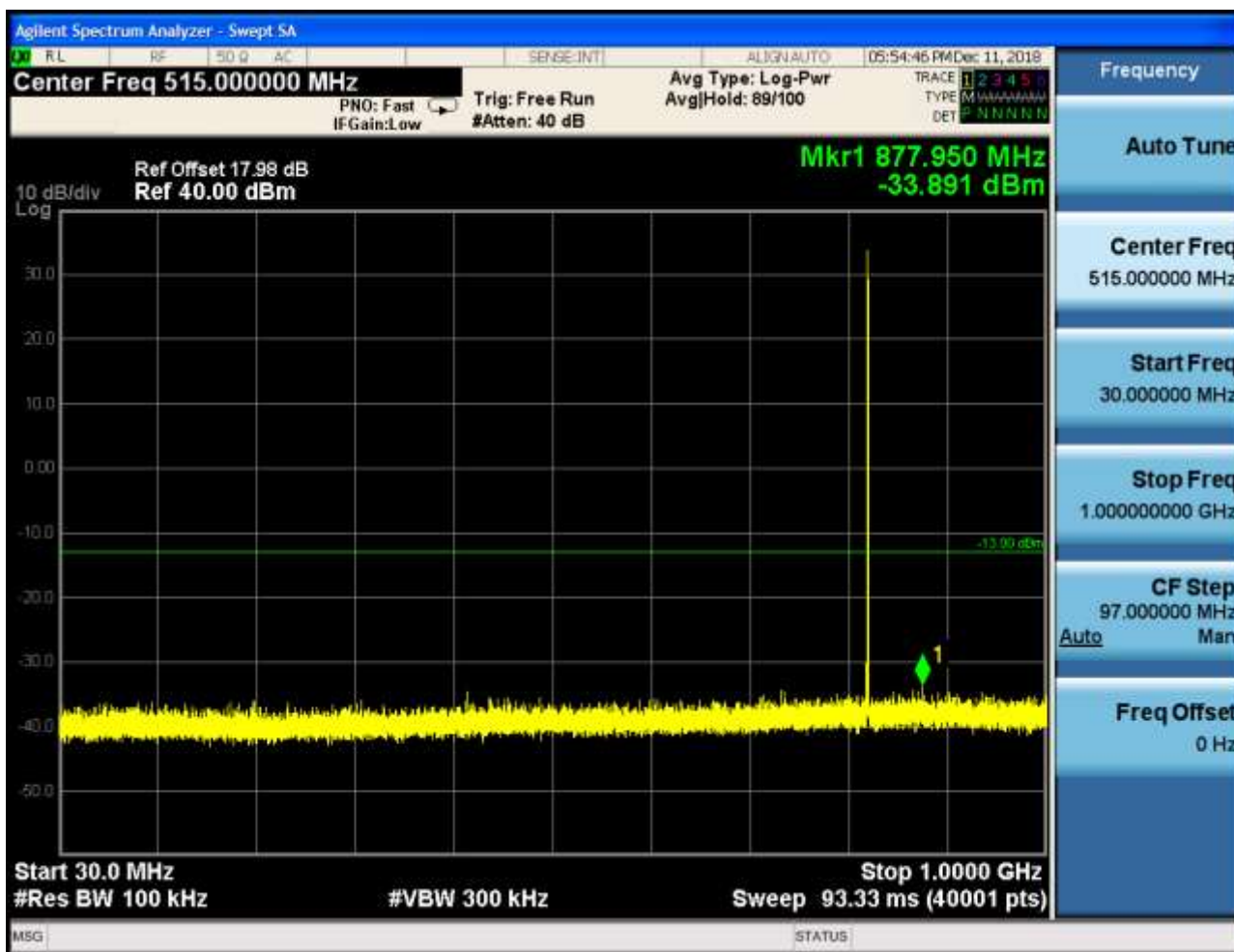
6.1.1 Test Band = GSM850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH





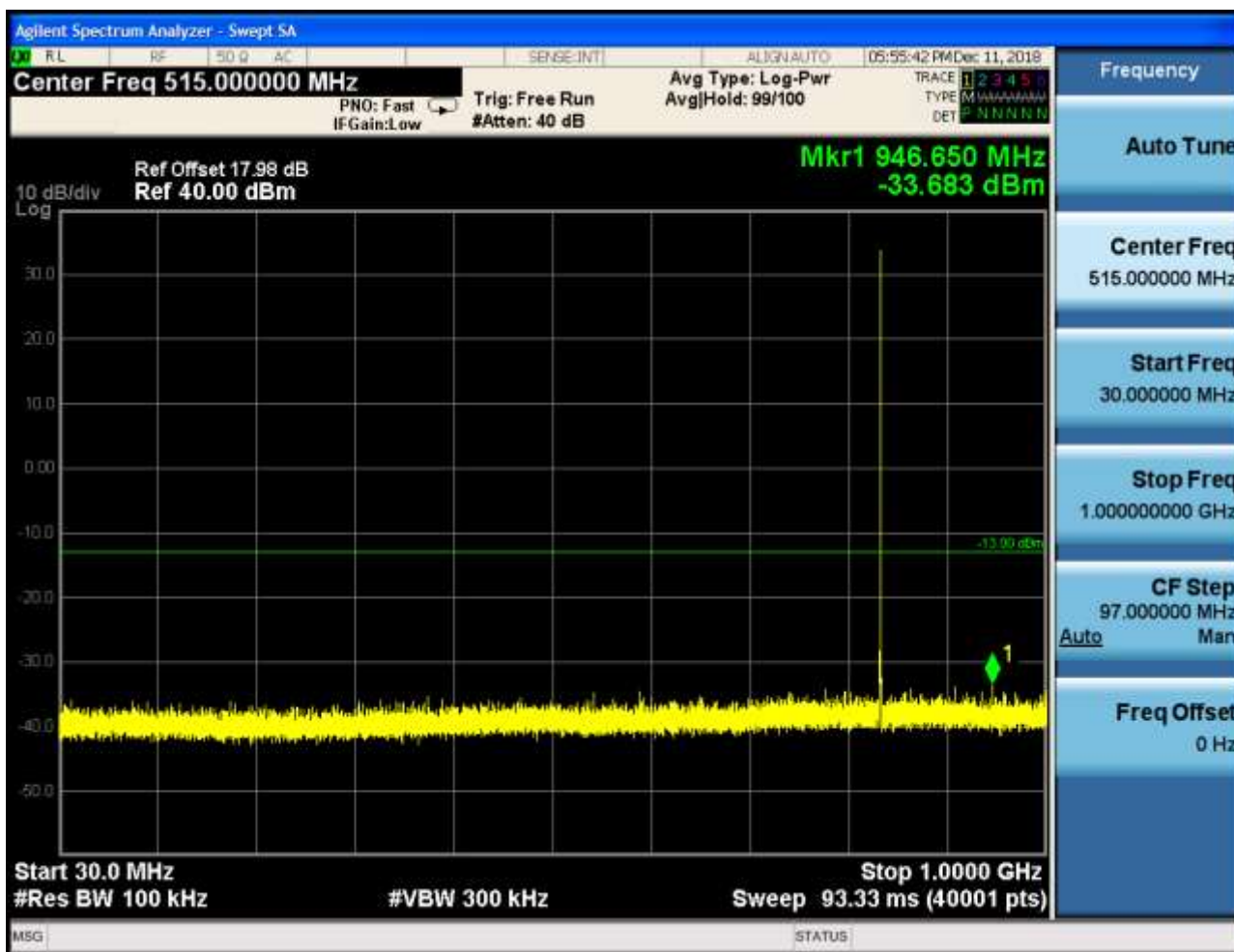




6.1.1.1.2 Test Channel = MCH

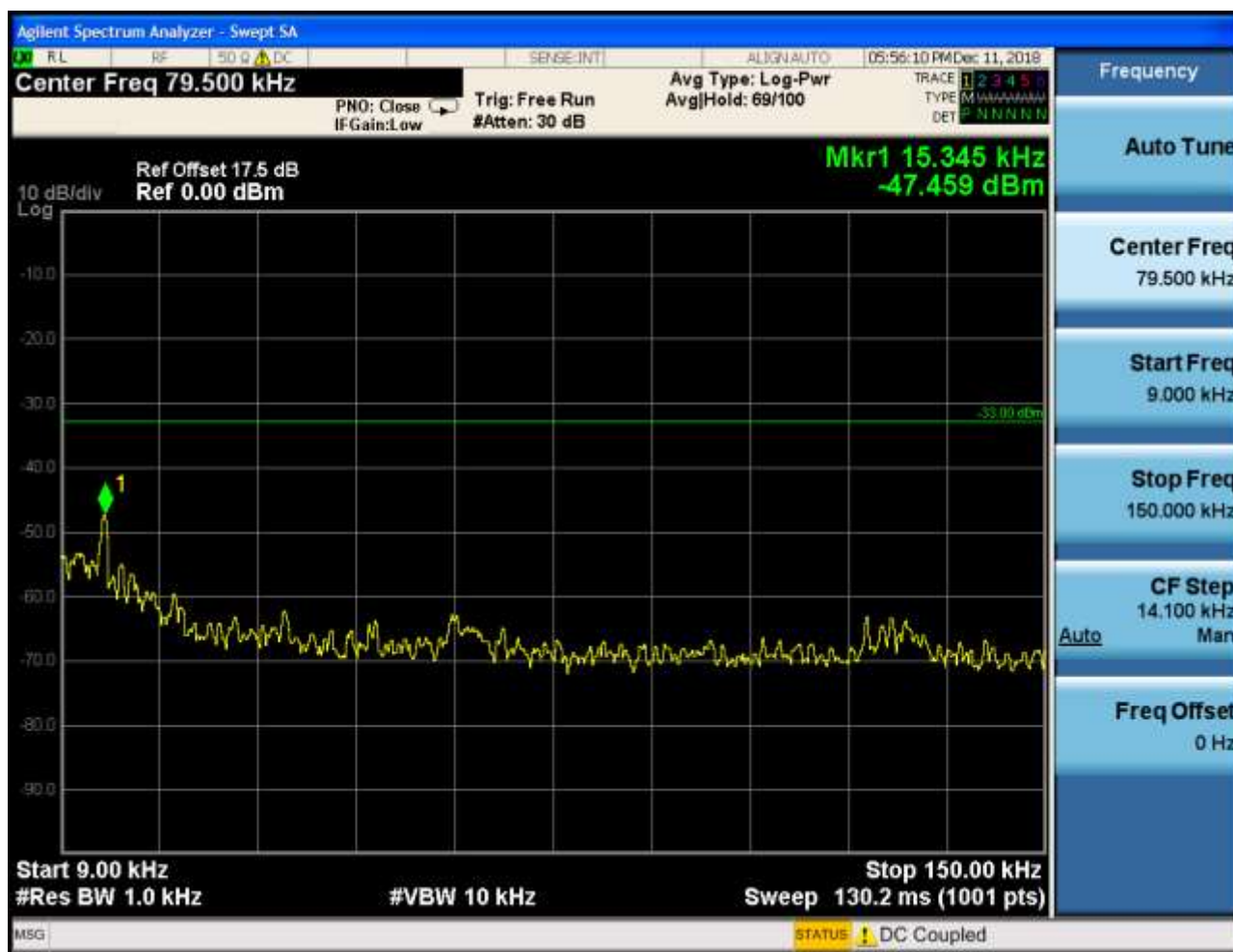




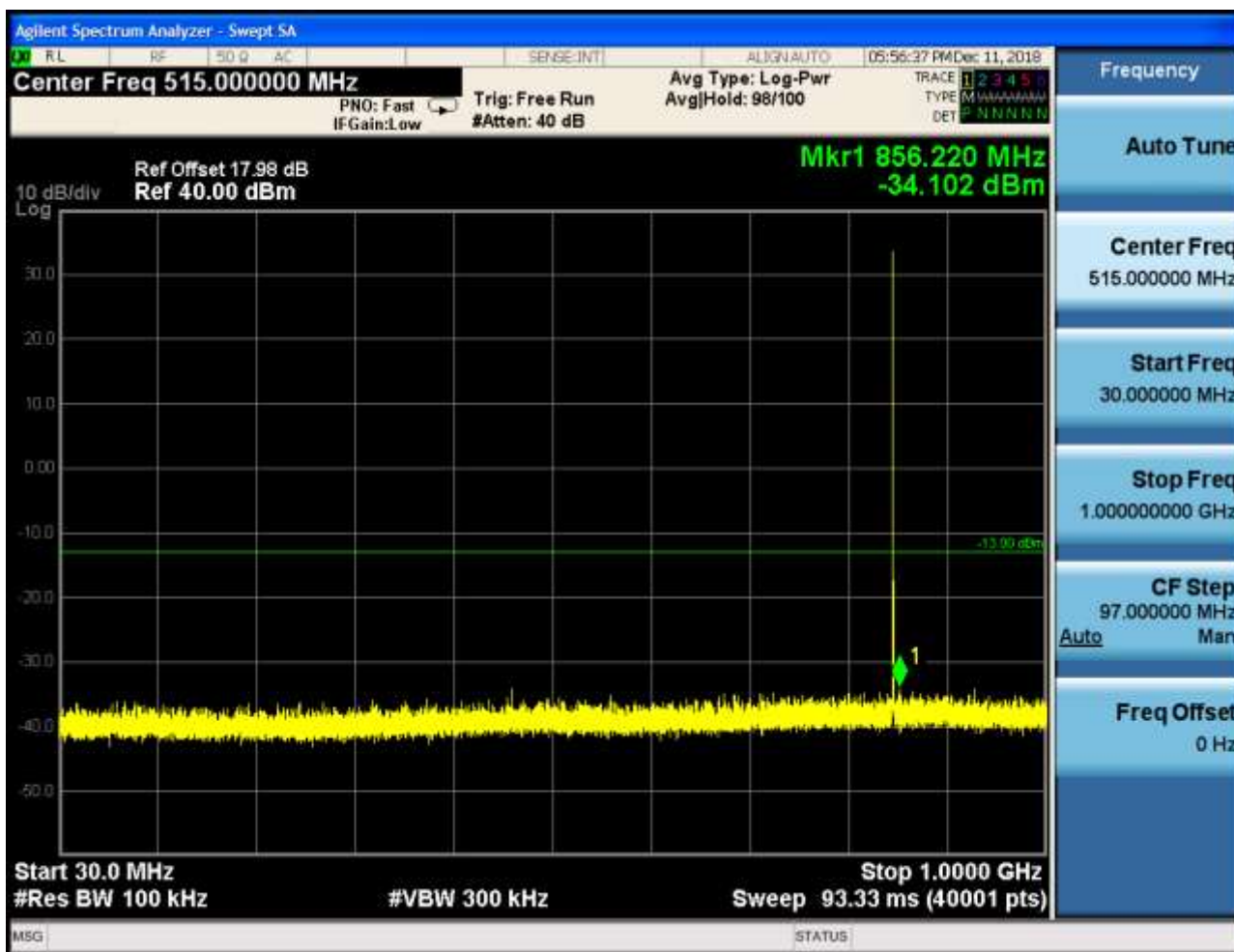




6.1.1.1.3 Test Channel = HCH







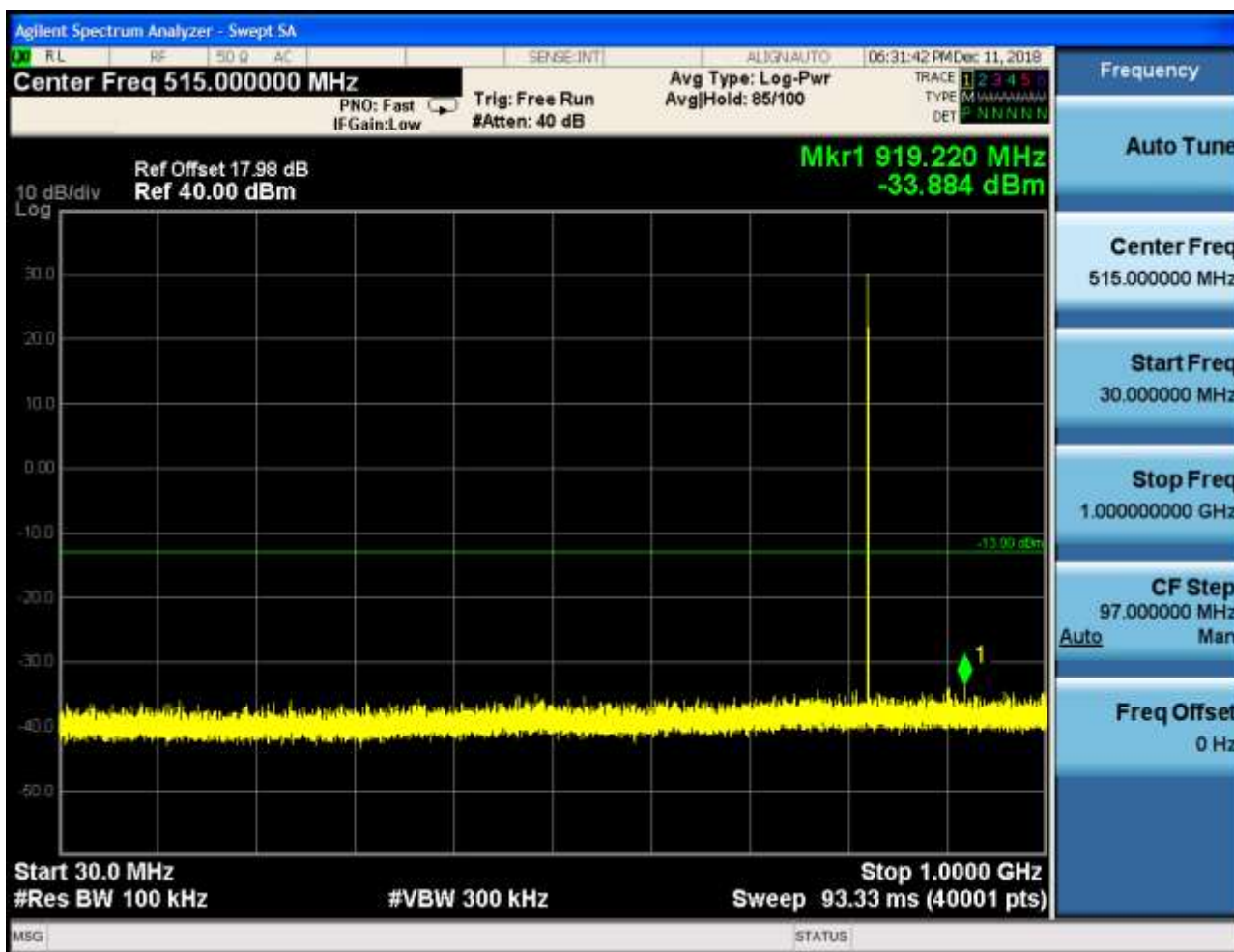


6.1.1.2 Test Mode = GSM/TM2

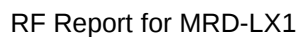
6.1.1.2.1 Test Channel = LCH



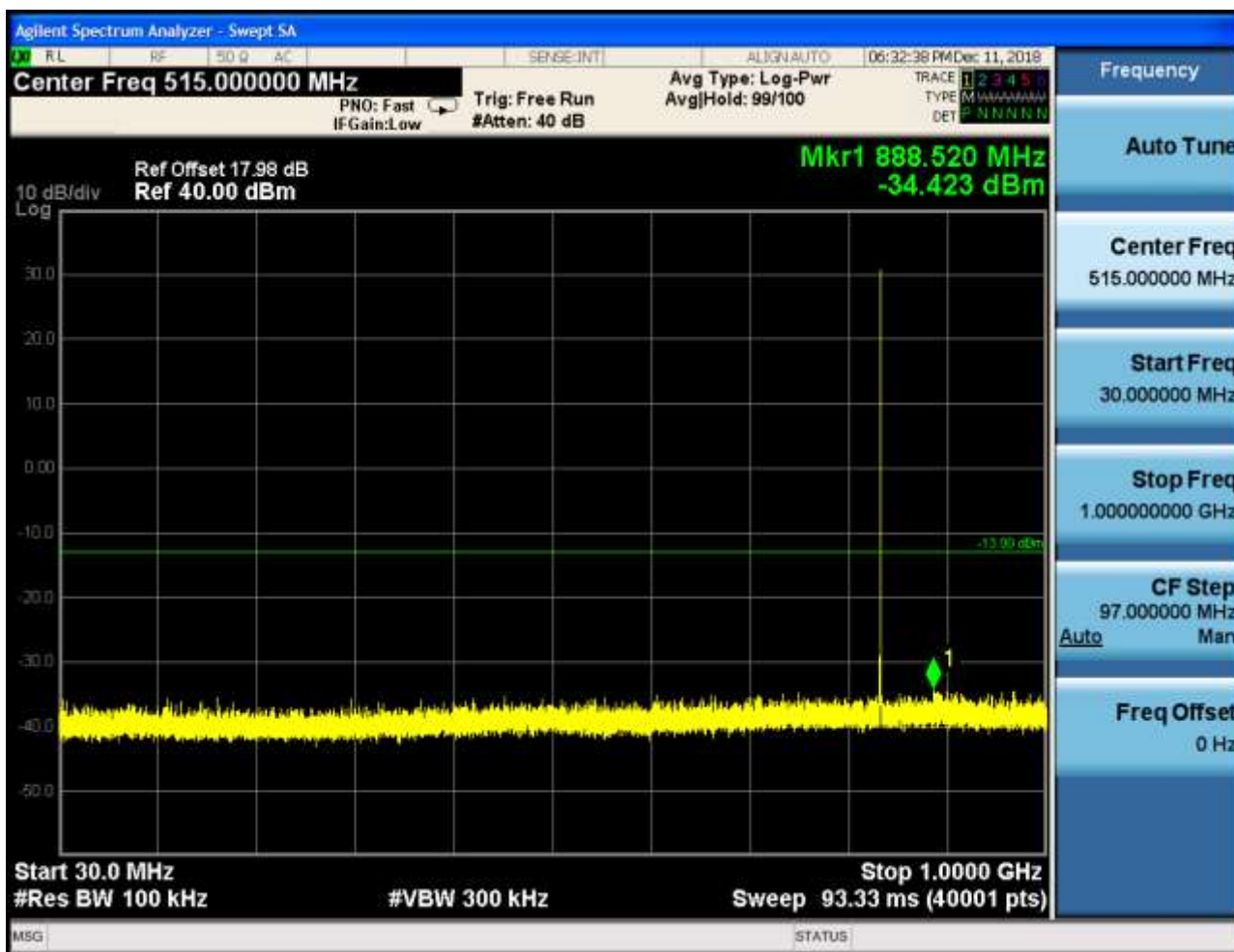










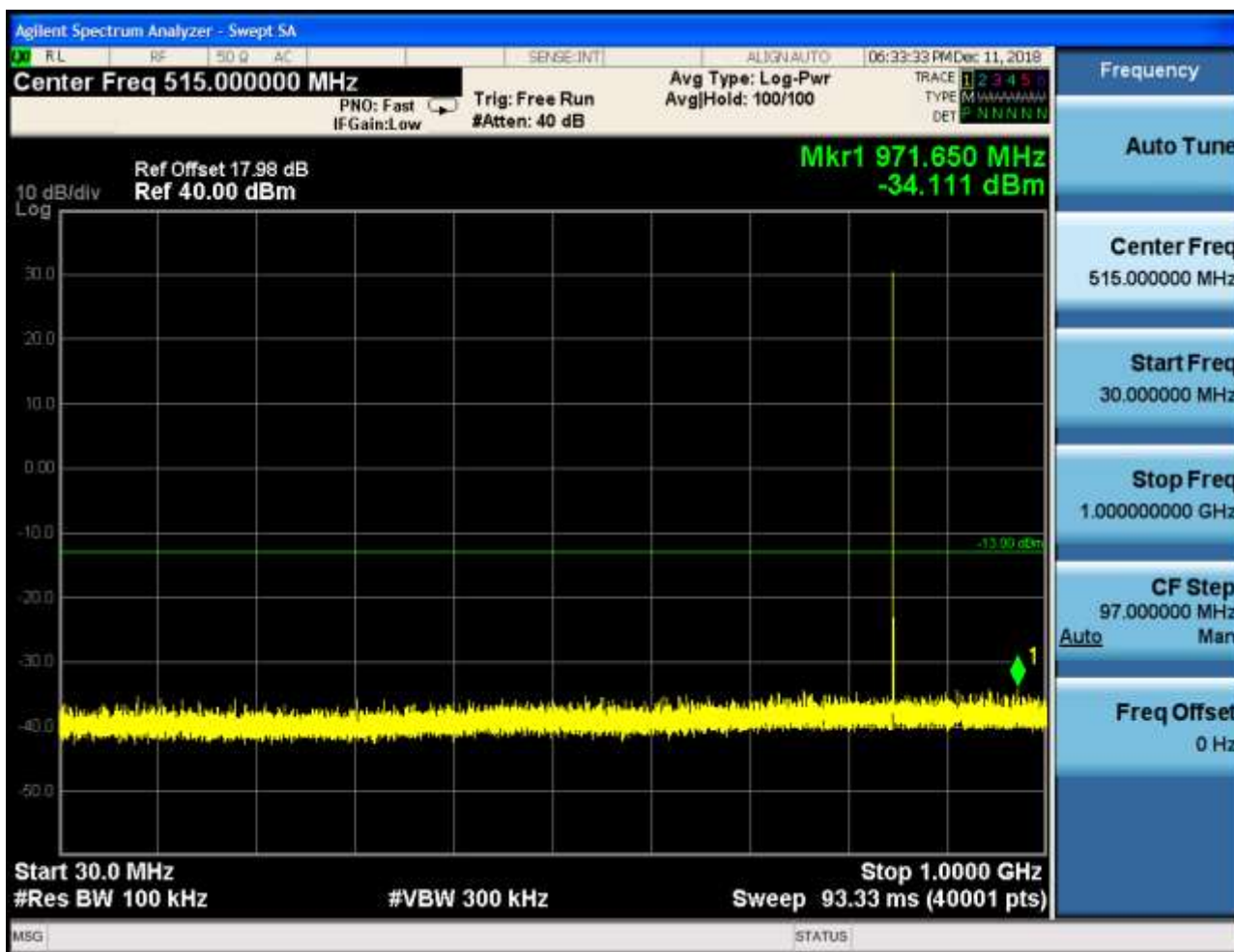




6.1.1.2.3 Test Channel = HCH









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

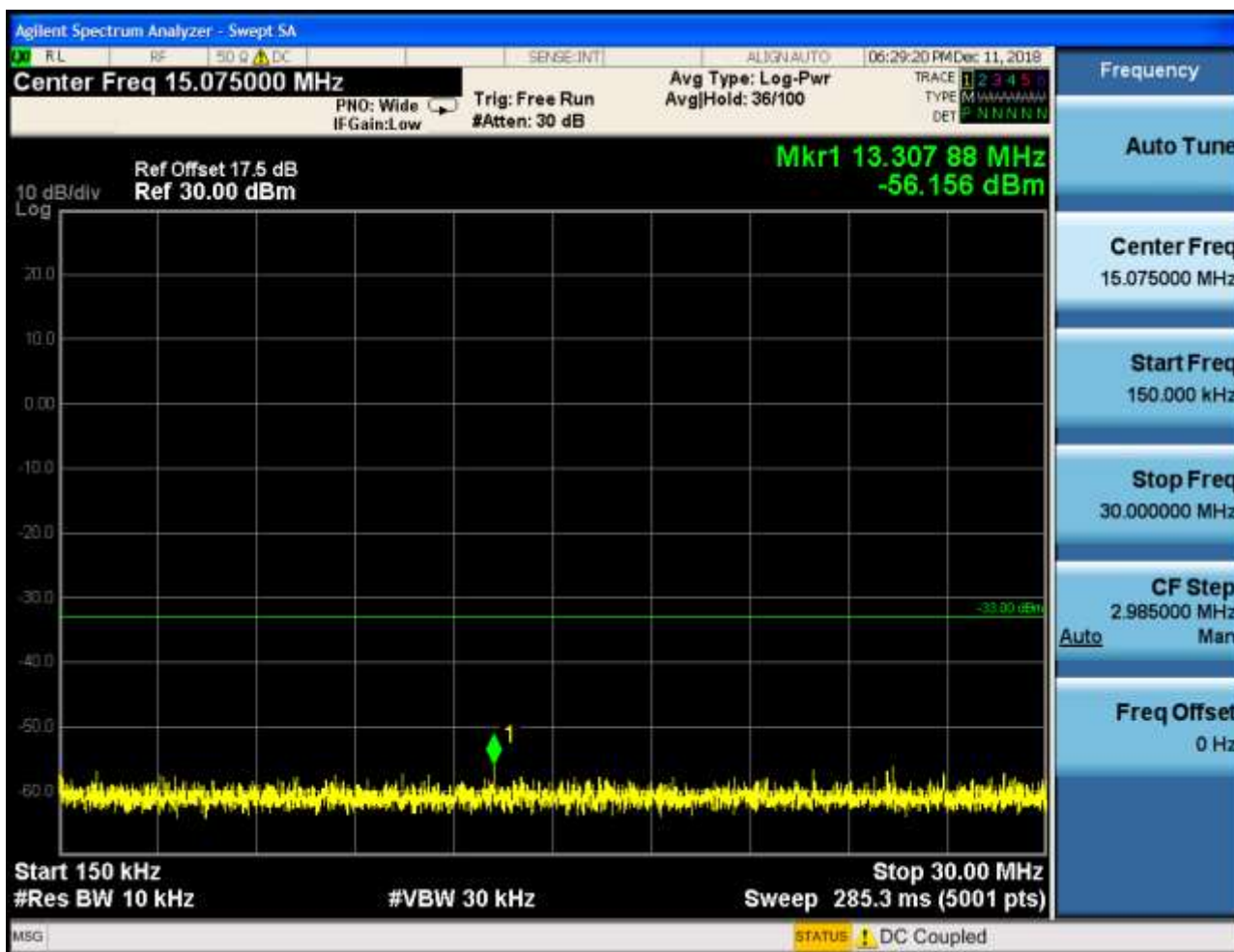






6.1.2.2.2 Test Channel = MCH

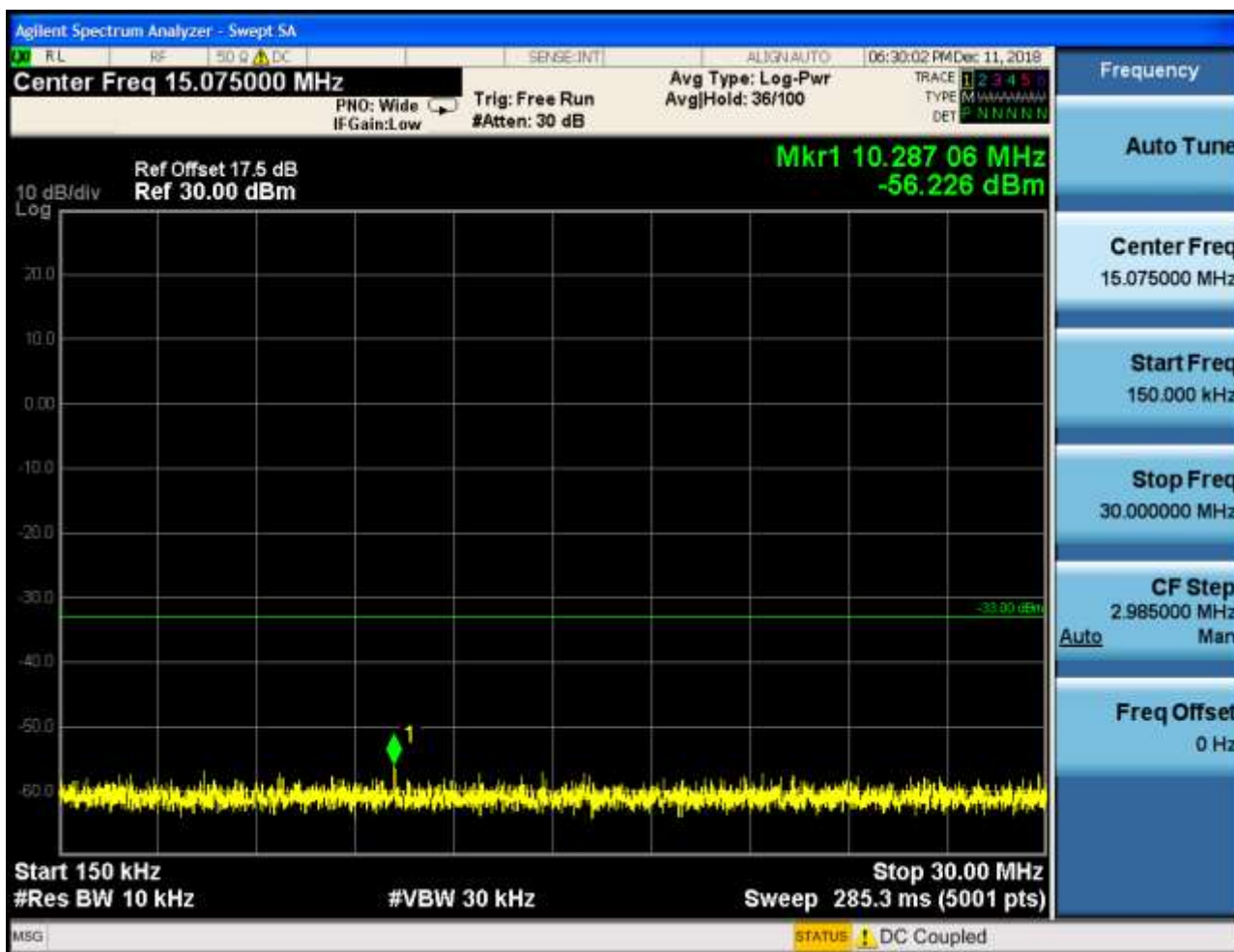






6.1.2.2.3 Test Channel = HCH







7Appendix_G: Field Strength of Spurious Radiation

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

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

150 kHz ~30MHz, RBW = 9 kHz, 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

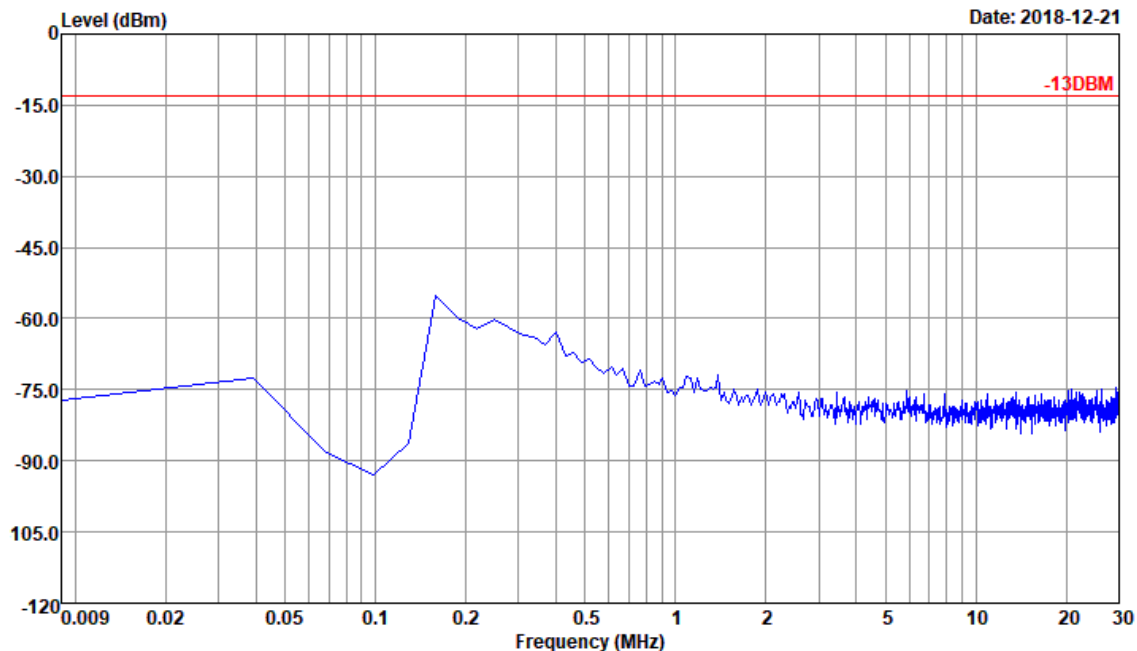
7.1.1 Test Band = GSM850

7.1.1.1 Test Mode = GSM/TM1



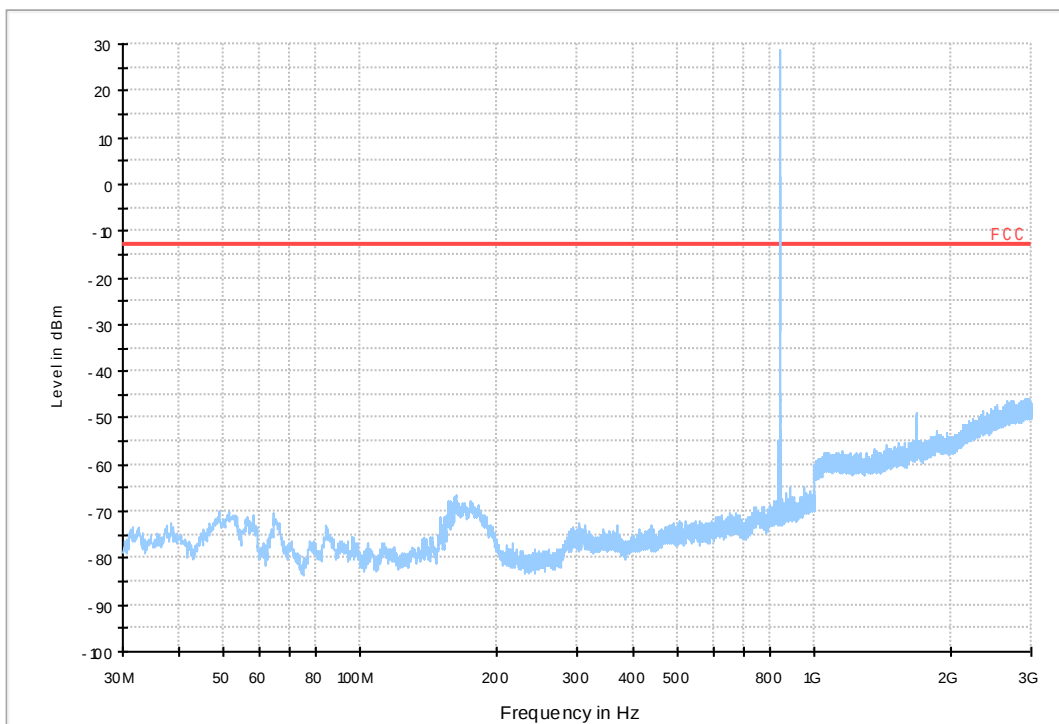
Data: 34

Date: 2018-12-21

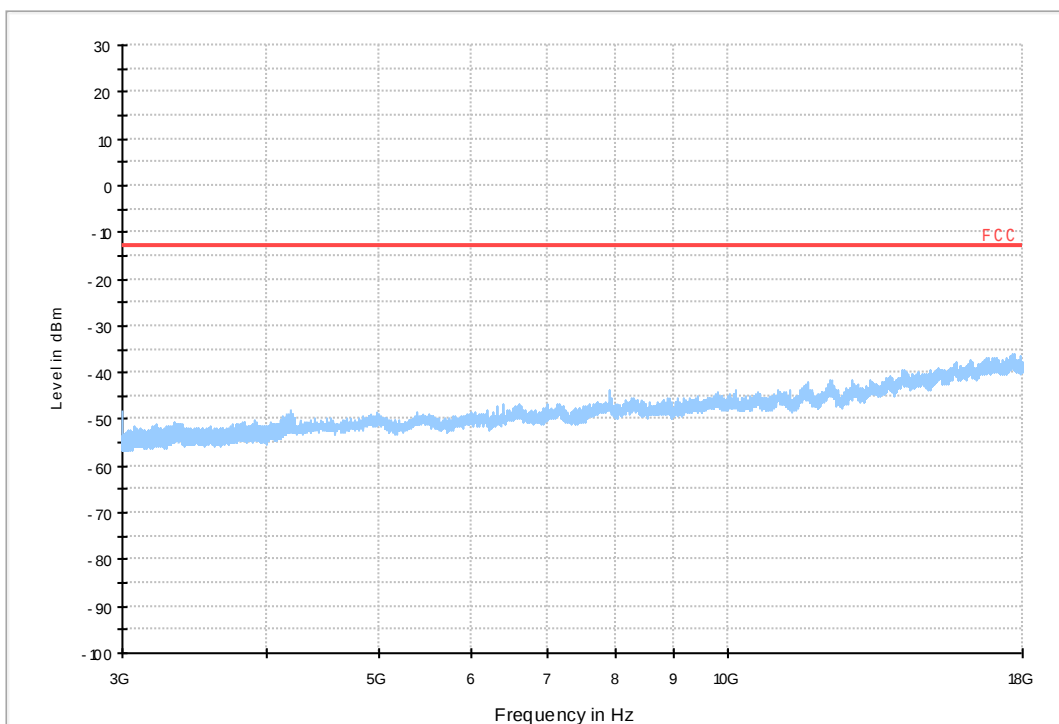


Site : 03CH01-SZ
Condition : -13DBM 9K-30M AMP NEUTRAL
: RBW:9.000KHz VBW:30.000KHz

04 FCC PART 22 GSM850_L



03 FCC PART 22 GSM850_H

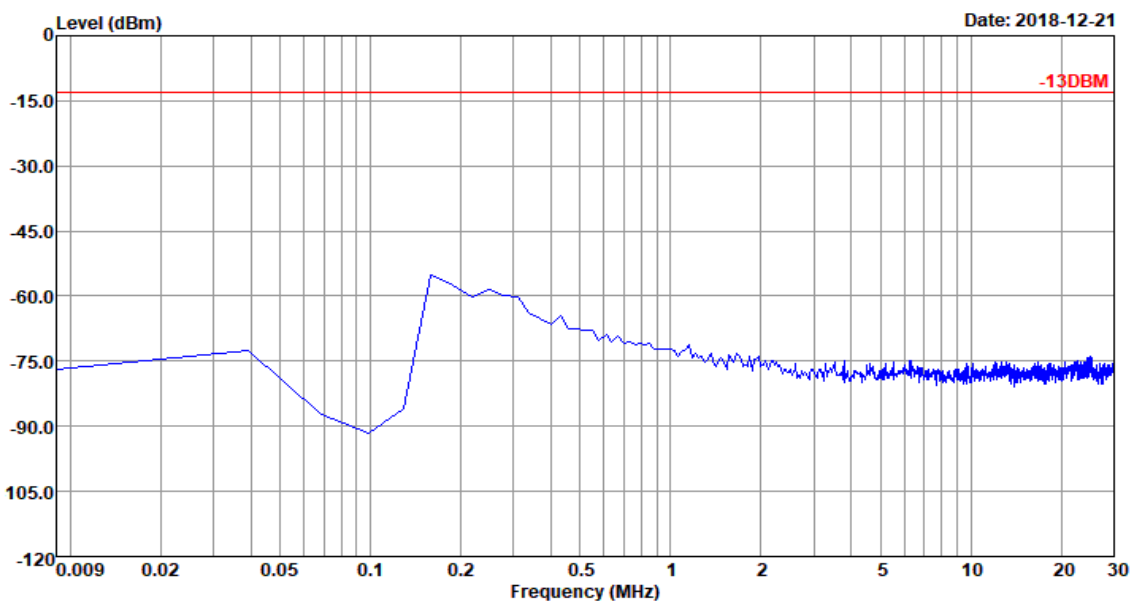


7.1.2 Test Band = PCS1900

7.1.2.1 Test Mode = GSM/TM1

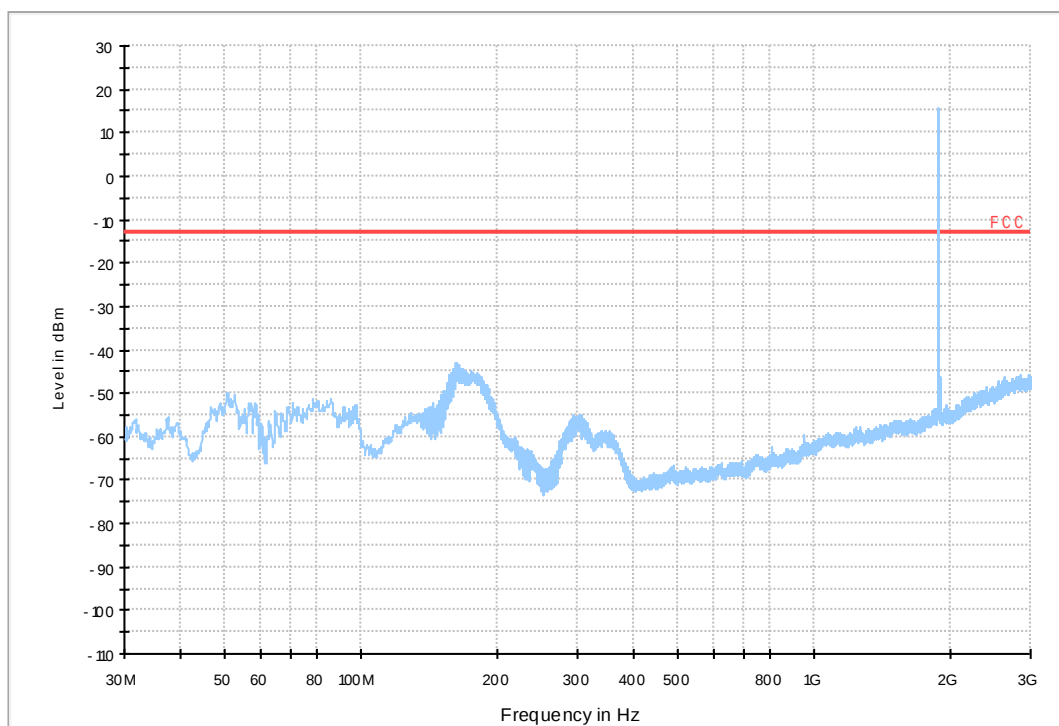


Data: 87

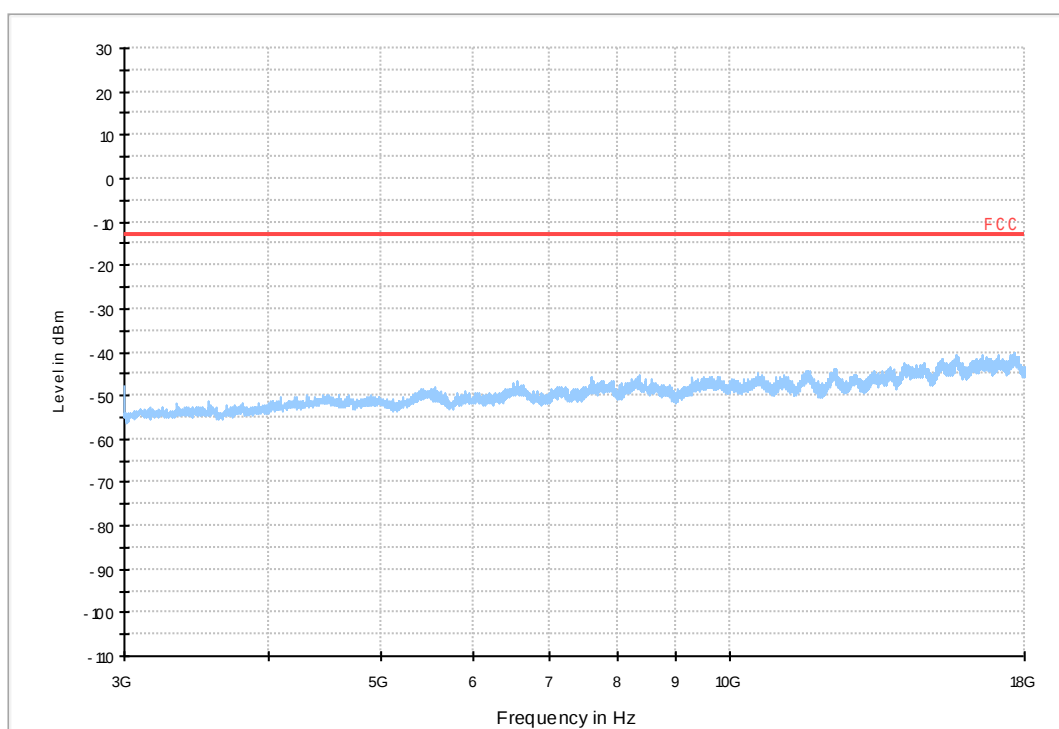


Site : 03CH01-SZ
Condition : -13DBM 9K-30M AMP NEUTRAL
: RBW:9.000KHz VBW:30.000KHz

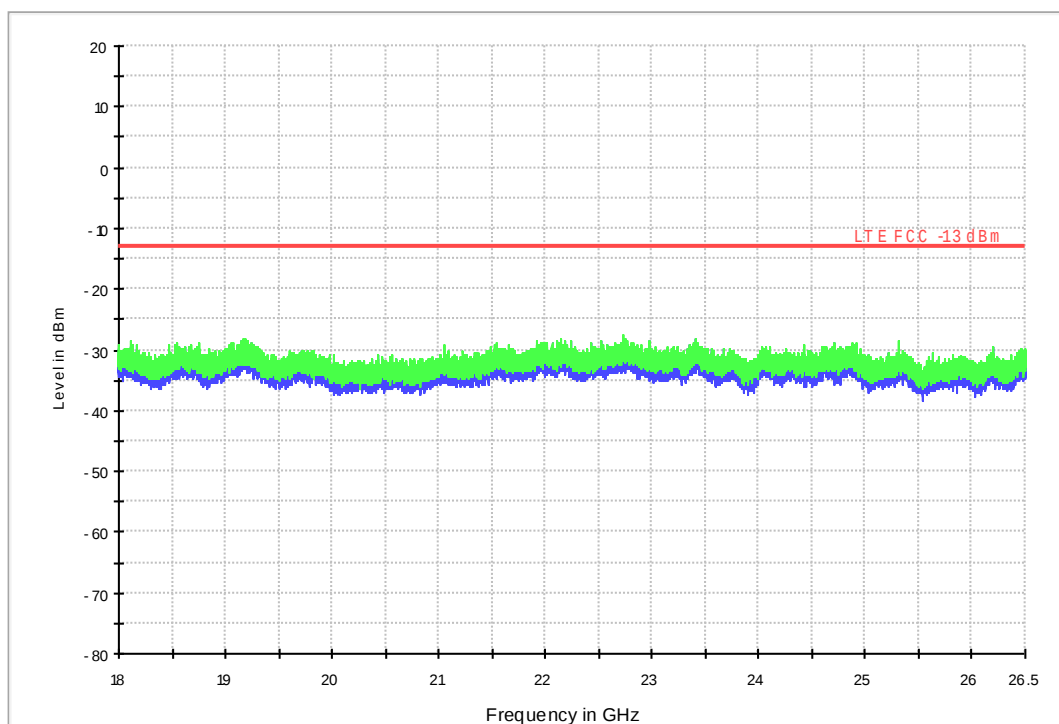
10 FCC PART 24 GSM1900_L



09 FCC PART 24 GSM1900_H



18G~26.5G RSE-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	11.62291	0.01410	PASS
				VN	13.49548	0.01637	PASS
				VH	12.72062	0.01543	PASS
		MCH	TN	VL	12.52691	0.01497	PASS
				VN	14.33492	0.01713	PASS
				VH	11.39690	0.01362	PASS
		HCH	TN	VL	11.04176	0.01301	PASS
				VN	15.43264	0.01818	PASS
				VH	13.04348	0.01537	PASS
	GSM/TM2	LCH	TN	VL	12.62377	0.01532	PASS
				VN	14.23806	0.01728	PASS
				VH	13.68920	0.01661	PASS
		MCH	TN	VL	13.17263	0.01575	PASS
				VN	14.10892	0.01686	PASS
				VH	14.17349	0.01694	PASS
		HCH	TN	VL	16.43350	0.01936	PASS
				VN	15.69092	0.01849	PASS
				VH	15.30349	0.01803	PASS
PCS1900	GSM/TM1	LCH	TN	VL	19.04865	0.01030	PASS
				VN	21.01809	0.01136	PASS
				VH	18.88722	0.01021	PASS
		MCH	TN	VL	18.75808	0.00998	PASS
				VN	20.85666	0.01109	PASS
				VH	17.01464	0.00905	PASS
		HCH	TN	VL	19.88808	0.01030	PASS
				VN	19.01637	0.01136	PASS
				VH	18.17693	0.01021	PASS
	GSM/TM2	LCH	TN	VL	19.62980	0.01061	PASS
				VN	24.27896	0.01312	PASS
				VH	22.24495	0.01202	PASS
		MCH	TN	VL	20.92123	0.01113	PASS
				VN	18.08008	0.00962	PASS
				VH	19.43608	0.01034	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	TN	VL	18.82265	0.01061	PASS
				VN	16.11064	0.01312	PASS
				VH	17.85407	0.01202	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	13.43091	0.01630	PASS
				-20	13.49548	0.01637	PASS
				-10	14.75463	0.01790	PASS
				0	13.17263	0.01598	PASS
				10	12.10719	0.01469	PASS
				20	13.49548	0.01637	PASS
				30	14.62549	0.01775	PASS
				40	14.46406	0.01755	PASS
				50	13.30177	0.01614	PASS
		MCH	VN	-30	14.04434	0.01679	PASS
				-20	14.17349	0.01694	PASS
				-10	13.46320	0.01609	PASS
				0	14.98063	0.01791	PASS
				10	12.07491	0.01443	PASS
				20	14.33492	0.01713	PASS
				30	14.04434	0.01679	PASS
				40	13.91520	0.01663	PASS
				50	13.72149	0.01640	PASS
		HCH	VN	-30	15.43264	0.01818	PASS
				-20	15.07749	0.01776	PASS
				-10	13.62463	0.01605	PASS
				0	14.65778	0.01727	PASS
				10	16.75636	0.01974	PASS
				20	15.43264	0.01818	PASS
				30	15.36806	0.01811	PASS
				40	14.39949	0.01696	PASS
				50	15.01292	0.01769	PASS
	GSM/TM2	LCH	VN	-30	14.56000	0.01767	PASS
				-20	14.39949	0.01747	PASS
				-10	14.78692	0.01794	PASS
				0	9.36290	0.01136	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				10	12.39777	0.01504	PASS
				20	14.23806	0.01728	PASS
				30	12.52691	0.01520	PASS
				40	13.81834	0.01677	PASS
				50	14.27035	0.01731	PASS
		MCH	VN	-30	15.43000	0.01844	PASS
				-20	11.81662	0.01412	PASS
				-10	10.71890	0.01281	PASS
				0	13.75377	0.01644	PASS
				10	13.04348	0.01559	PASS
				20	14.10892	0.01686	PASS
				30	12.59148	0.01505	PASS
				40	13.68920	0.01636	PASS
				50	11.97805	0.01432	PASS
		HCH	VN	-30	13.95001	0.01643	PASS
				-20	14.01206	0.01651	PASS
				-10	14.62549	0.01723	PASS
				0	14.56092	0.01715	PASS
				10	15.07749	0.01776	PASS
				20	15.69092	0.01849	PASS
				30	14.33492	0.01689	PASS
				40	11.71976	0.01381	PASS
				50	14.81920	0.01746	PASS
PCS1900	GSM/TM1	LCH	VN	-30	22.14809	0.01197	PASS
				-20	18.49979	0.01000	PASS
				-10	18.59665	0.01005	PASS
				0	21.01809	0.01136	PASS
				10	22.18038	0.01199	PASS
				20	21.01809	0.01136	PASS
				30	22.18038	0.01199	PASS
				40	19.56522	0.01057	PASS
				50	22.56781	0.01220	PASS
		MCH	VN	-30	18.17693	0.00967	PASS
				-20	20.01723	0.01065	PASS
				-10	18.37065	0.00977	PASS
				0	20.53380	0.01092	PASS
				10	18.62894	0.00991	PASS
				20	20.85666	0.01109	PASS
				30	18.49979	0.00984	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				40	23.14895	0.01231	PASS
				50	17.95093	0.00955	PASS
		HCH	VN	-30	18.72579	0.00981	PASS
				-20	20.53380	0.01075	PASS
				-10	20.01723	0.01048	PASS
				0	16.14292	0.00845	PASS
				10	20.08180	0.01052	PASS
				20	19.01637	0.00996	PASS
				30	19.24237	0.01008	PASS
				40	20.69523	0.01084	PASS
				50	17.56350	0.00920	PASS
	GSM/TM2	LCH	VN	-30	21.63152	0.01169	PASS
				-20	19.43608	0.01050	PASS
				-10	20.01724	0.01048	PASS
				0	18.08008	0.00977	PASS
				10	20.27551	0.01096	PASS
				20	24.27896	0.01312	PASS
				30	19.88808	0.01075	PASS
				40	22.79381	0.01232	PASS
				50	17.85407	0.00965	PASS
		MCH	VN	-30	20.56609	0.01094	PASS
				-20	18.04779	0.00960	PASS
				-10	18.59665	0.01005	PASS
				0	18.11236	0.00963	PASS
				10	17.33750	0.00922	PASS
				20	18.08008	0.00962	PASS
				30	19.27465	0.01025	PASS
				40	19.24237	0.01024	PASS
				50	16.95007	0.00902	PASS
		HCH	VN	-30	17.95093	0.00940	PASS
				-20	19.95265	0.01045	PASS
				-10	20.24323	0.01060	PASS
				0	17.14379	0.00898	PASS
				10	16.40121	0.00859	PASS
				20	16.11064	0.00844	PASS
				30	14.78692	0.00774	PASS
				40	18.40293	0.00964	PASS
				50	18.53208	0.00970	PASS



END