Appendix for test report

1Appendix_A: Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	ERP [dBm]	Limit [dBm]	Verdict
WCDMA850	UMTS/TM1	LCH	24.05	18.30	38.5	PASS
		MCH	24.05	18.30	38.5	PASS
		HCH	23.97	18.22	38.5	PASS
Test Band	**Test Mode**	**Test Channel**	**Conducted Power [dBm]**	**EIRP [dBm]**	**Limit [dBm]**	**Verdict**
WCDMA1900	UMTS/TM1	LCH	23.48	21.68	33	PASS
		MCH	23.52	21.72	33	PASS
		HCH	23.49	21.69	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,

ERP [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]

EIRP [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBi]

b, SGP = Signal Generator Level

Note2:

SET Span = 1.5 * OBW

SET RBW = 1% of the OBW, not to exceed 1MHz

SET VBW >= 3 * 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
WCDMA850	UMTS/TM1	LCH	3.870	13	PASS
		MCH	3.620	13	PASS
		HCH	3.060	13	PASS
WCDMA1900	UMTS/TM1	LCH	2.930	13	PASS
		MCH	2.600	13	PASS
		HCH	2.840	13	PASS

3Appendix_C: Modulation Characteristics

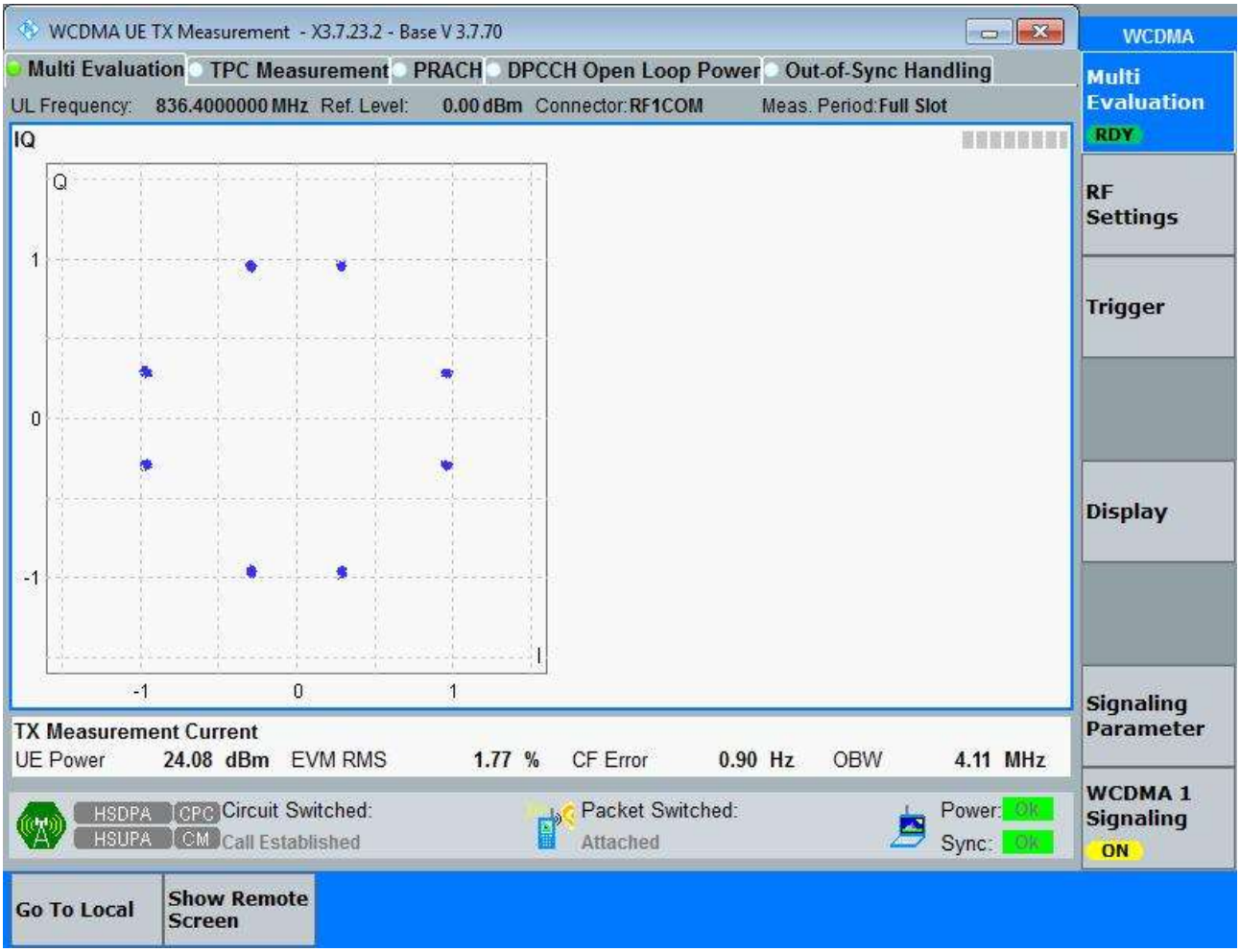
Part I - Test Plots

3.1 For UMTS

3.1.1 Test Band = WCDMA850

3.1.1.1 Test Mode = UMTS/TM1

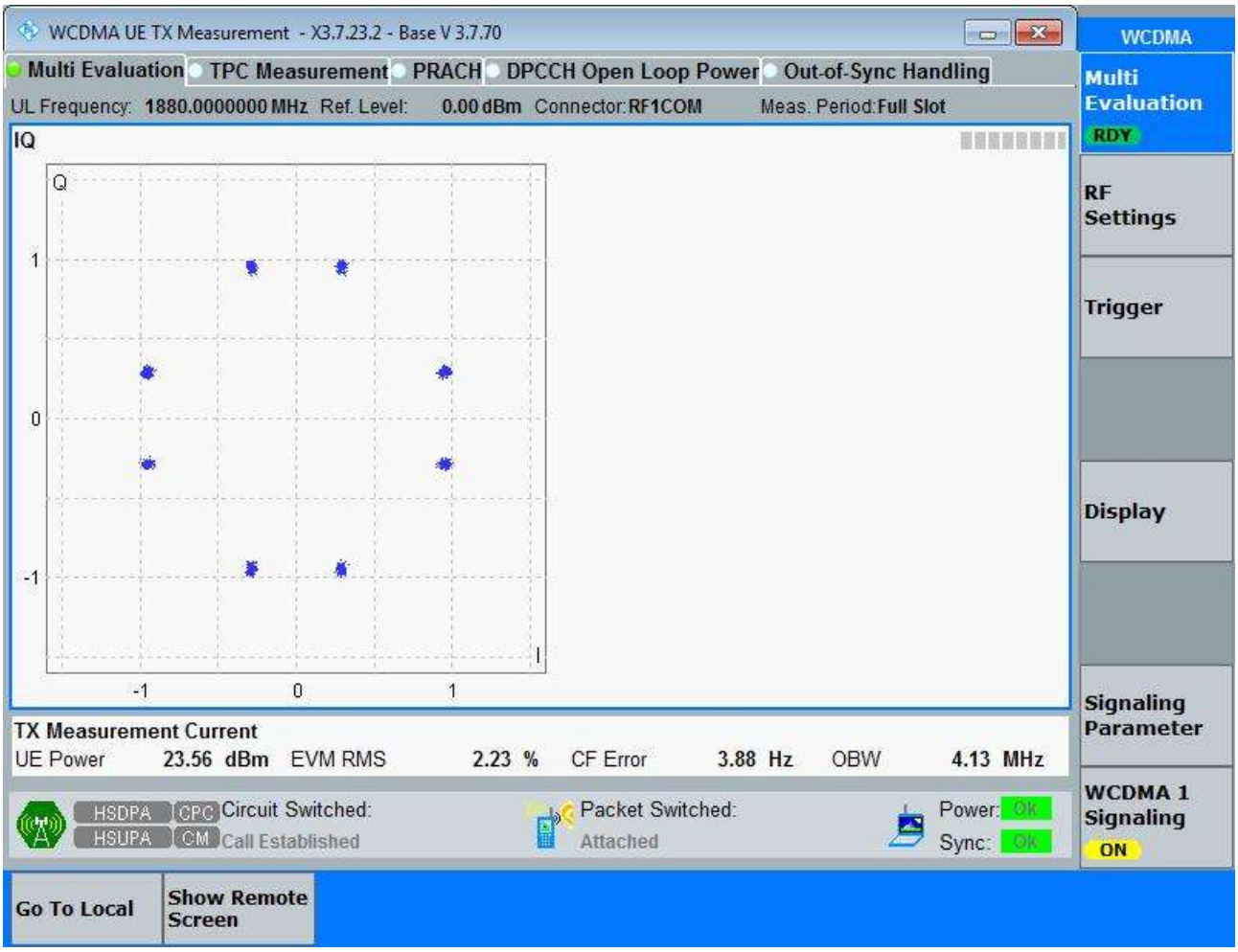
3.1.1.1.1 Test Channel = MCH



3.1.3 Test Band = WCDMA1900

3.1.3.1 Test Mode = UMTS/TM1

3.1.3.1.1 Test Channel = MCH



4Appendix_D: Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [MHz]	Emission Bandwidth [MHz]	Verdict
WCDMA850	UMTS/TM1	LCH	4.18	4.66	Pass
		MCH	4.16	4.68	Pass
		HCH	4.17	4.70	Pass
WCDMA1900	UMTS/TM1	LCH	4.18	4.70	Pass
		MCH	4.16	4.71	Pass
		HCH	4.18	4.68	Pass

Part II - Test Plots

4.1 For UMTS

4.1.1 Test Band = WCDMA850

4.1.1.1 Test Mode = UMTS/TM1

4.1.1.1.1 Test Channel = LCH

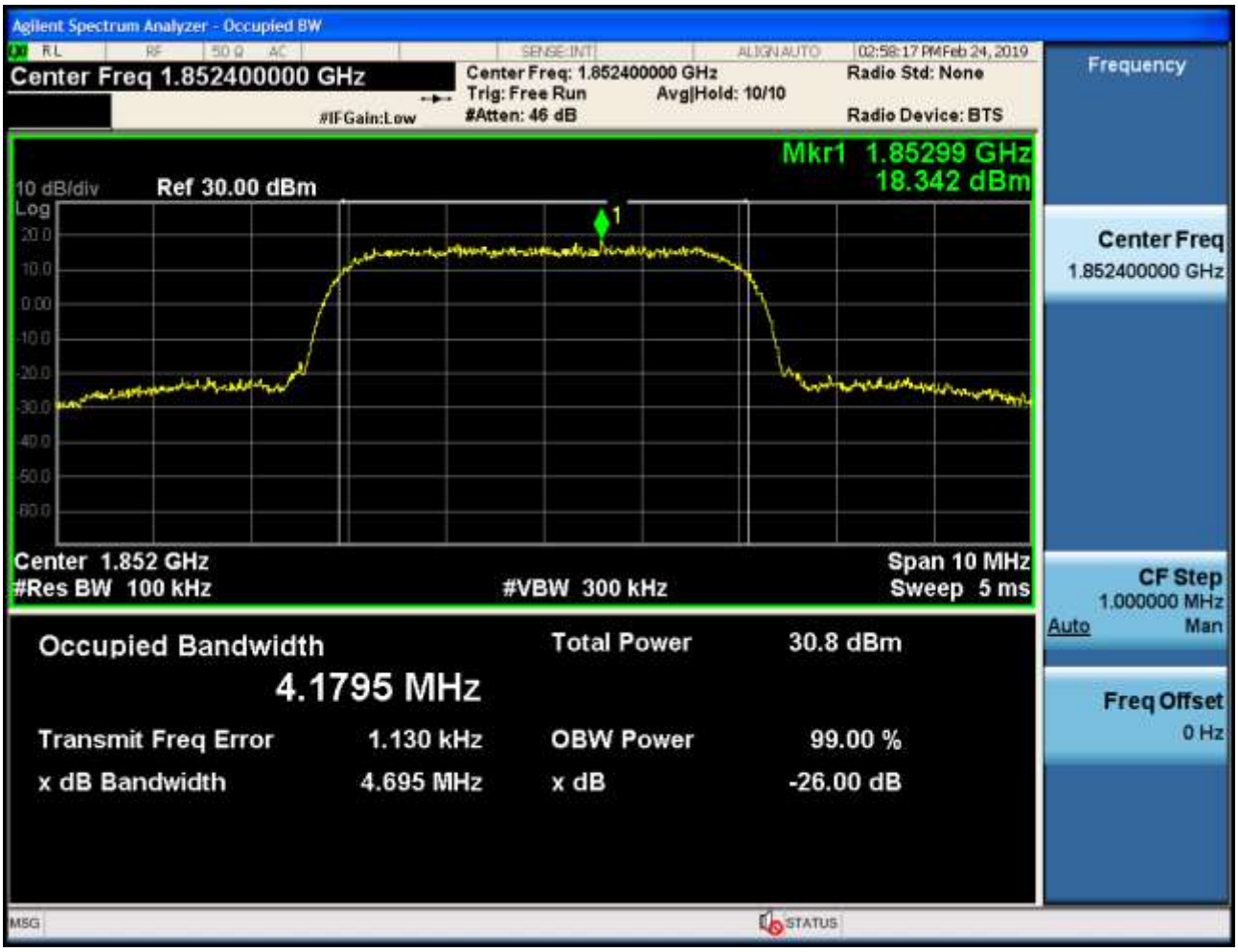
4.1.1.1.2 Test Channel = MCH

4.1.1.1.3 Test Channel = HCH

4.1.3 Test Band = WCDMA1900

4.1.3.1 Test Mode = UMTS/TM1

4.1.3.1.1 Test Channel = LCH



4.1.3.1.2 Test Channel = MCH

4.1.3.1.3 Test Channel = HCH

5Appendix_E: Band Edges Compliance

Part I - Test Plots

5.1 For UMTS

5.1.1 Test Band = WCDMA850

5.1.1.1 Test Mode = UMTS/TM1

5.1.1.1.1 Test Channel = LCH

5.1.1.1.2 Test Channel = HCH

5.1.3 Test Band = WCDMA1900

5.1.3.1 Test Mode = UMTS/TM1

5.1.3.1.1 Test Channel = LCH

5.1.3.1.2 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.

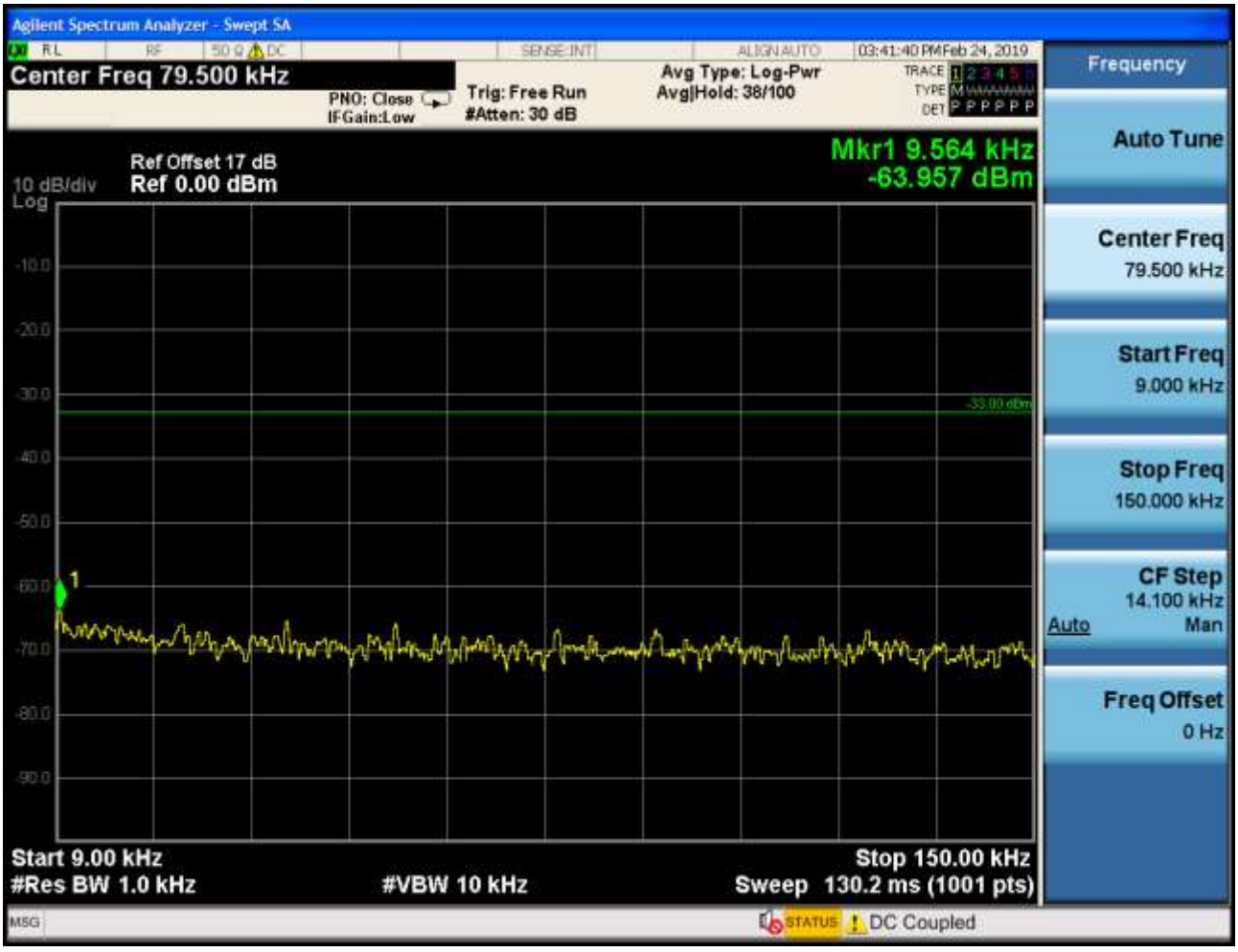
Part I - Test Plots

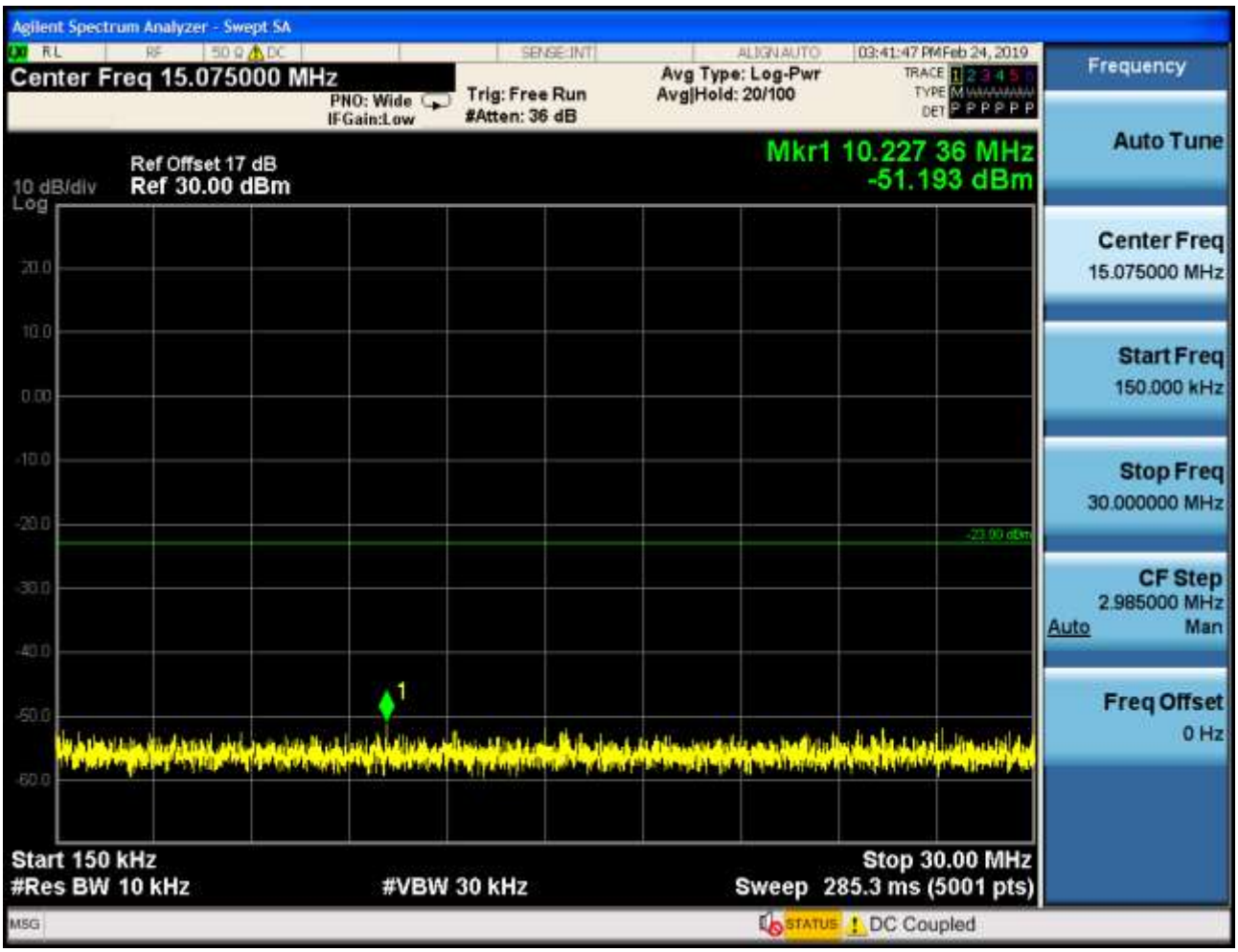
6.1 For UMTS

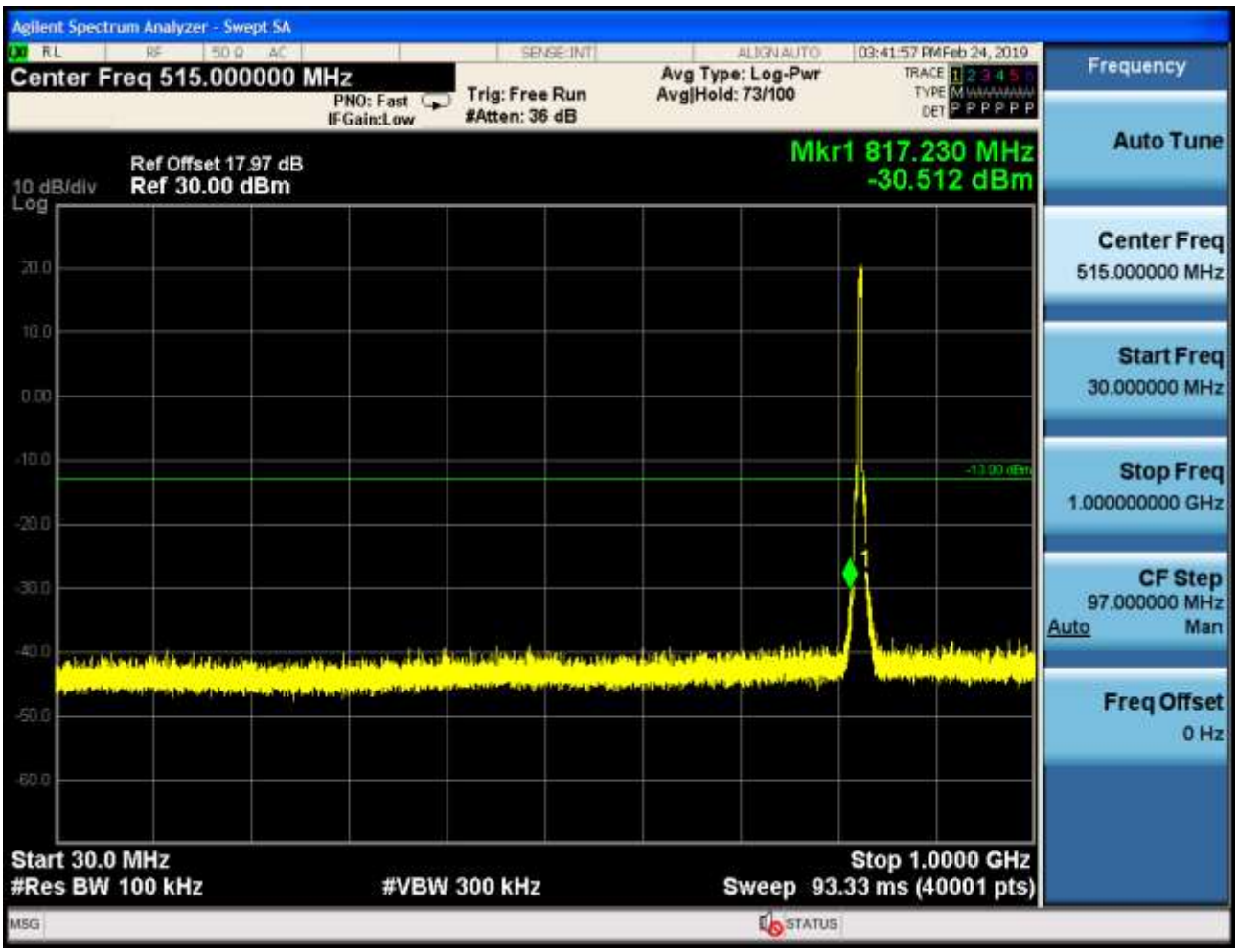
6.1.1 Test Band = WCDMA850

6.1.1.1 Test Mode = UMTS/TM1

6.1.1.1.1 Test Channel = LCH

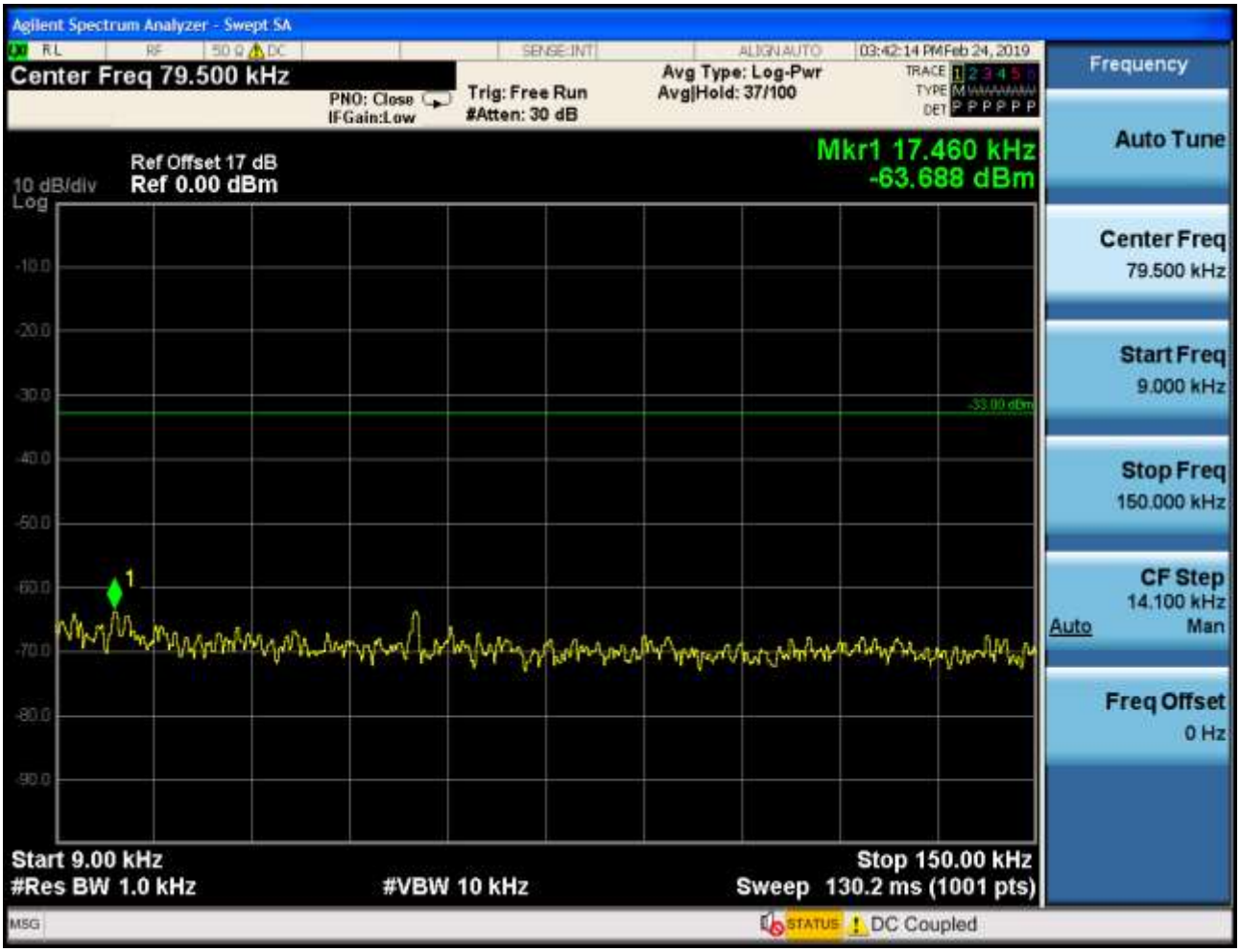


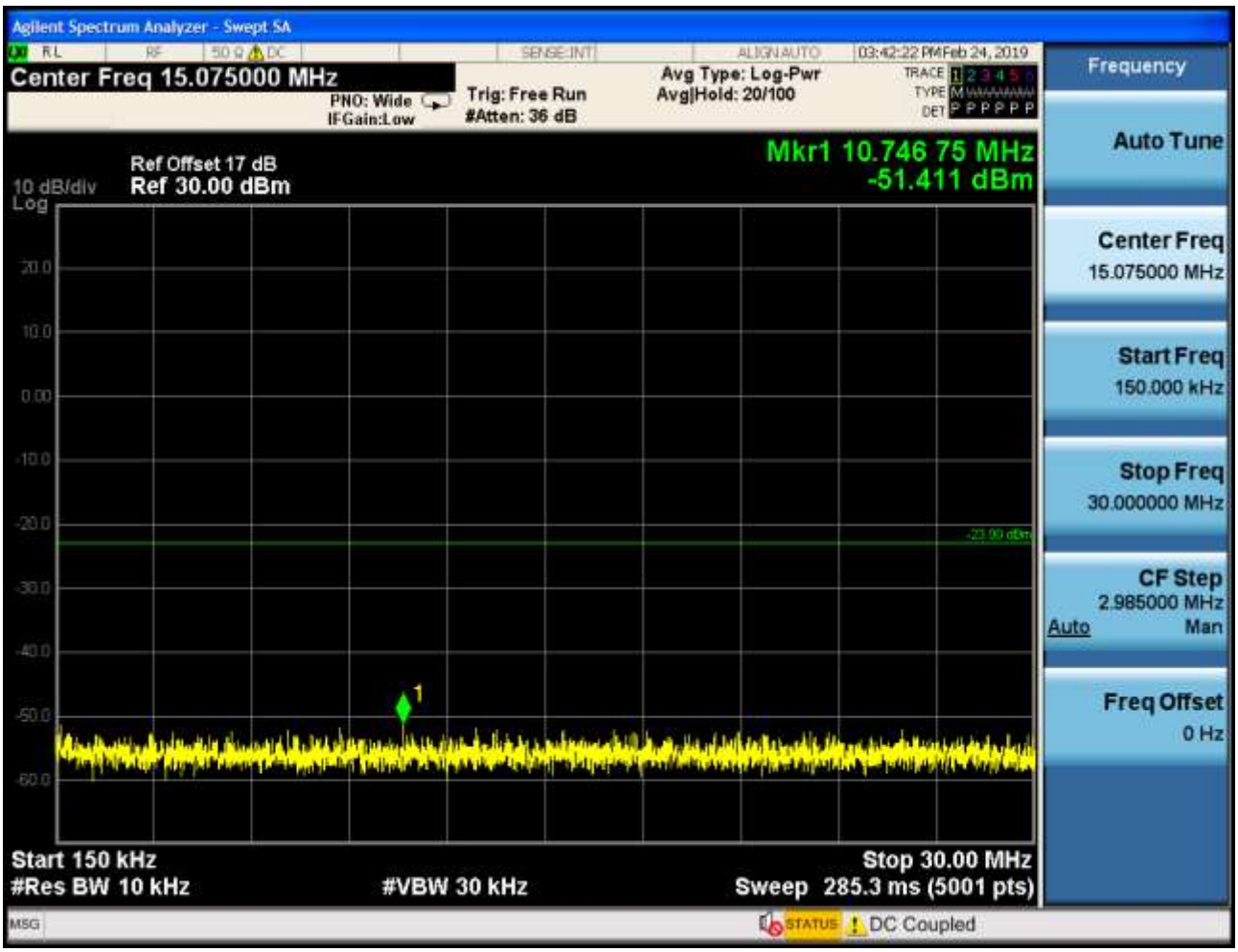


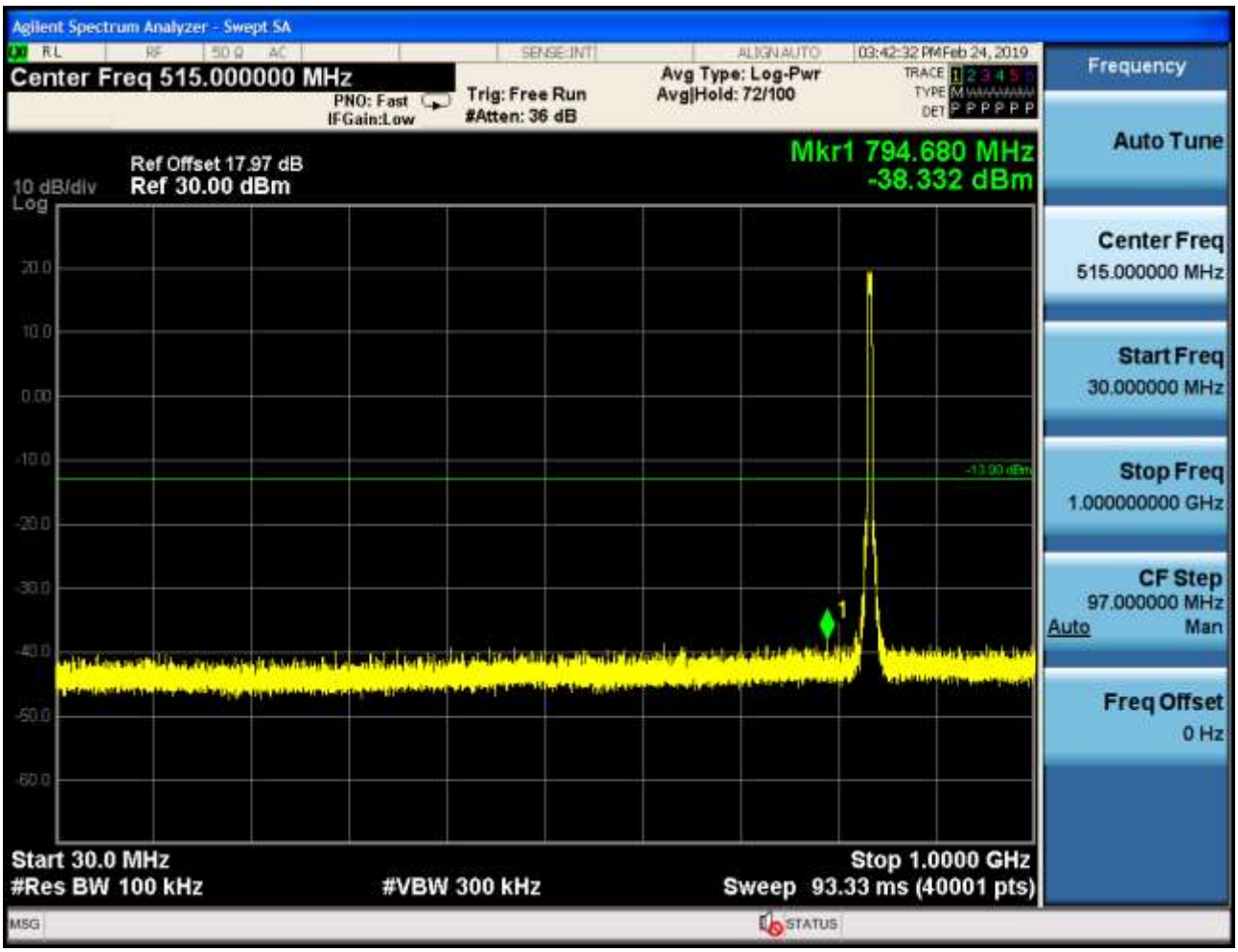

Agilent Spectrum Analyzer - Swept SA
Center Freq 515.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 73/100
03:41:57 PM Feb 24, 2019
Ref Offset 17.97 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 817.230 MHz
-30.512 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 93.33 ms (40001 pts)
Frequency
Auto Tune
Center Freq
515.000000 MHz
Start Freq
30.000000 MHz
Stop Freq
1.000000000 GHz
CF Step
97.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:42:05 PM Feb 24, 2019
Center Freq 6.875000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 53/100
TRACE 1 2 3 4 5
TYPE M
DET P P P P P
Ref Offset 17.2 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 12.571 99 GHz
-25.104 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 12.750 GHz
Sweep 21.33 ms (40001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
6.875000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.750000000 GHz
CF Step
1.175000000 GHz
Auto
Man
Freq Offset
0 Hz

6.1.1.1.2 Test Channel = MCH

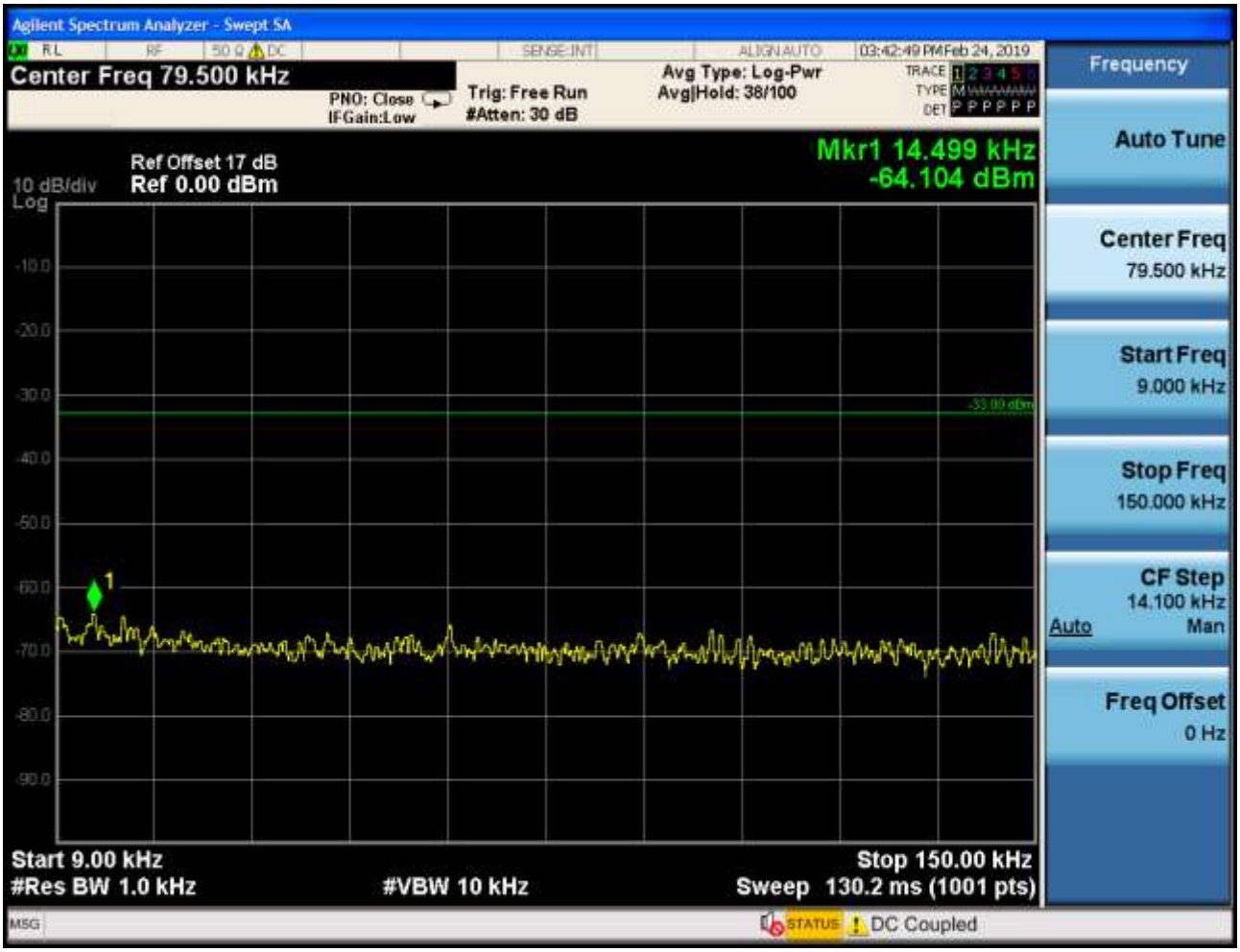


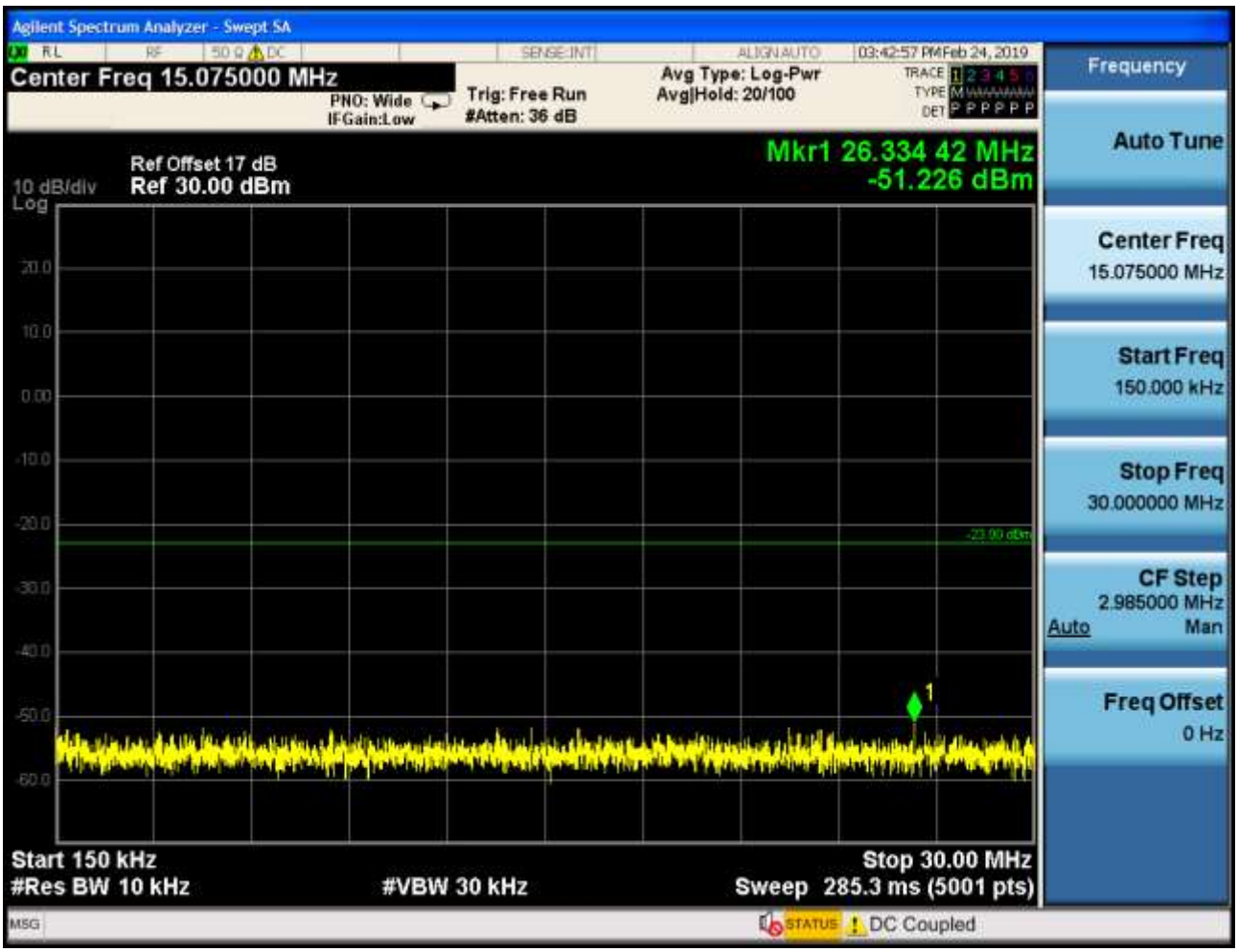

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 20/100
03:42:22 PM Feb 24, 2019
Ref Offset 17 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 10.746 75 MHz
-51.411 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 30.00 MHz
Sweep 285.3 ms (5001 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

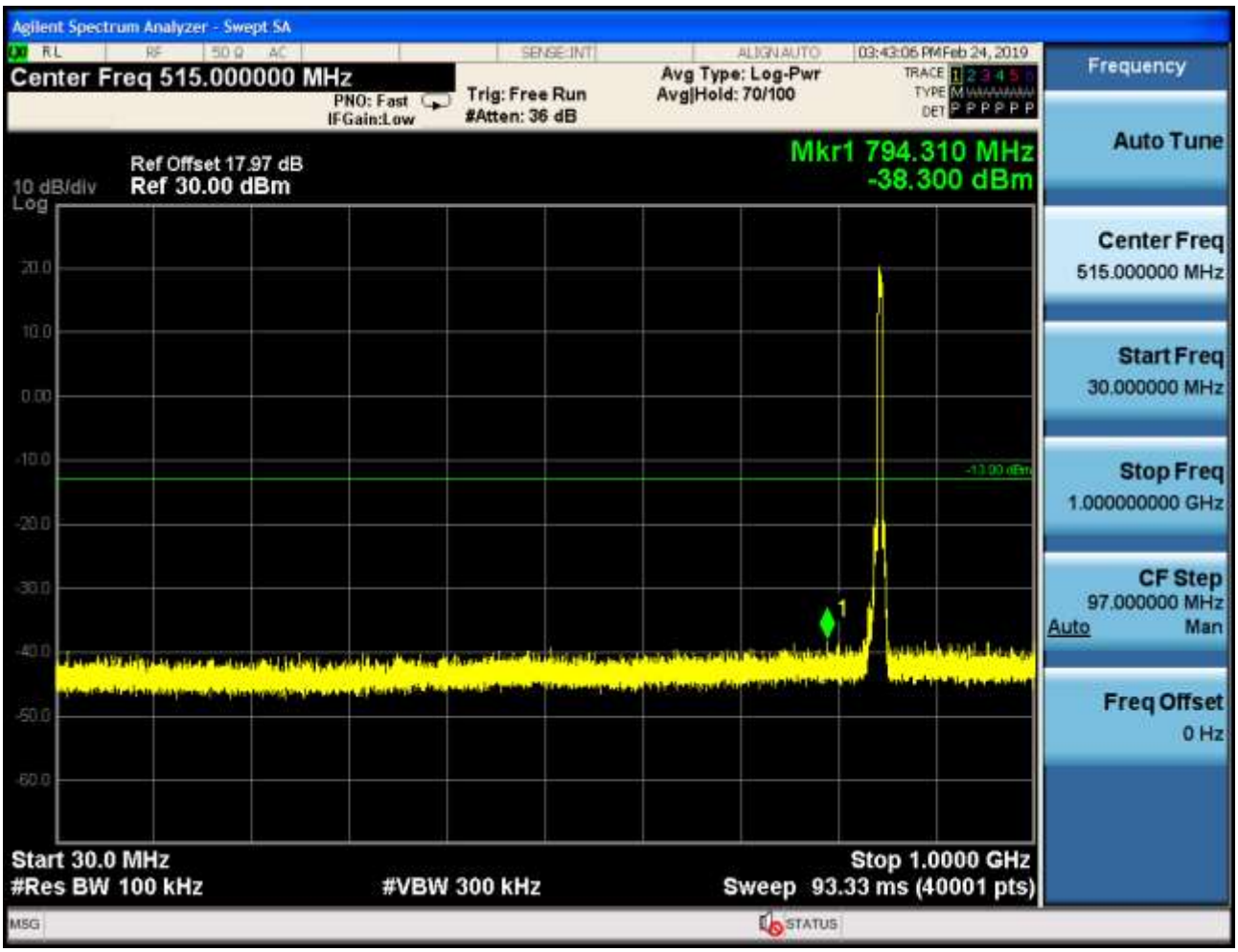



Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:42:40 PM Feb 24, 2019
Center Freq 6.875000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 53/100
TRACE 1 2 3 4 5
TYPE M
DET P P P P P
Ref Offset 17.2 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 3.603 80 GHz
-25.095 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-13.00 dBm
1
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 12.750 GHz
Sweep 21.33 ms (40001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
6.875000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.750000000 GHz
CF Step
1.175000000 GHz
Auto
Man
Freq Offset
0 Hz

6.1.1.1.3 Test Channel = HCH




Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω DC
SENSE:INT
ALIGN AUTO
03:42:57 PM Feb 24, 2019
Center Freq 15.075000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 20/100
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 17 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 26.334 42 MHz
-51.226 dBm
20.0
10.0
0.00
-10.0
-20.0
-23.00 dBm
-30.0
-40.0
-50.0
-60.0
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 30.00 MHz
Sweep 285.3 ms (5001 pts)
MSG
STATUS
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

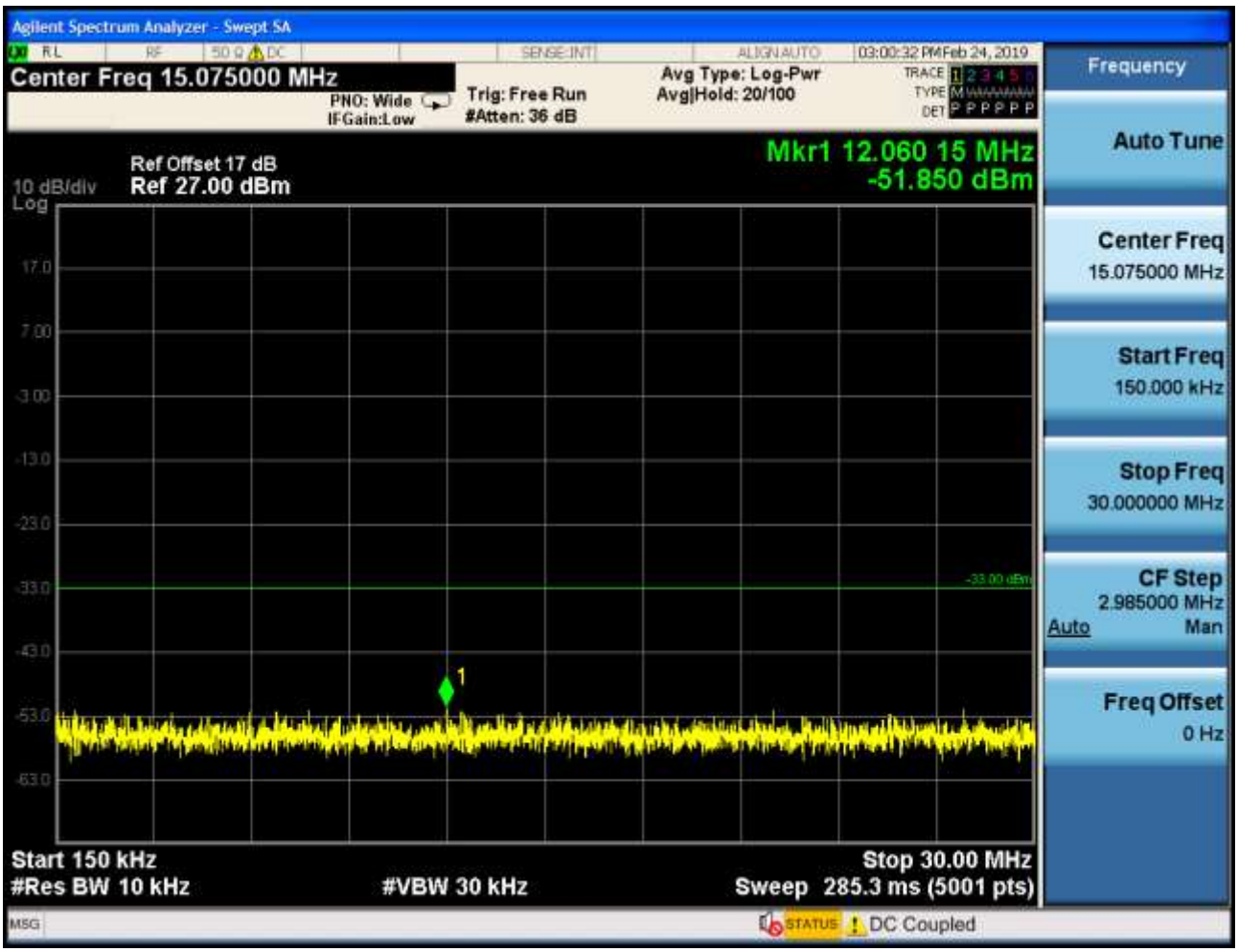

Agilent Spectrum Analyzer - Swept SA
Center Freq 515.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 70/100
03:43:06 PM Feb 24, 2019
Ref Offset 17.97 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 794.310 MHz
-38.300 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 93.33 ms (40001 pts)
Frequency
Auto Tune
Center Freq
515.000000 MHz
Start Freq
30.000000 MHz
Stop Freq
1.000000000 GHz
CF Step
97.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:43:14 PM Feb 24, 2019
Center Freq 6.875000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 53/100
TRACE 1 2 3 4 5
TYPE M
DET P P P P P
Ref Offset 17.2 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 2.492 25 GHz
-25.164 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-13.00 dBm
1
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 12.750 GHz
Sweep 21.33 ms (40001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
6.875000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.750000000 GHz
CF Step
1.175000000 GHz
Auto
Man
Freq Offset
0 Hz

6.1.3 Test Band = WCDMA1900

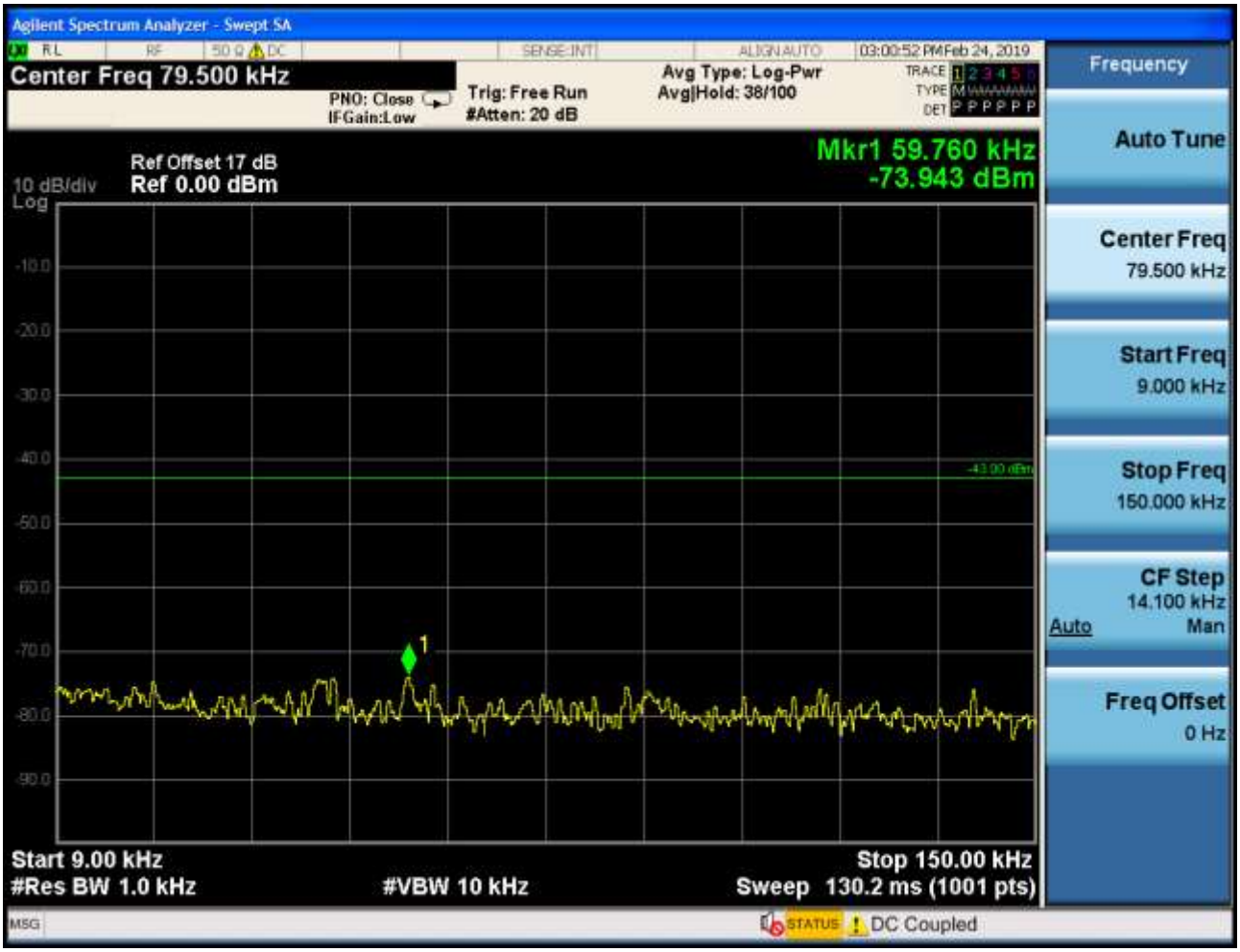
6.1.3.1 Test Mode = UMTS/TM1

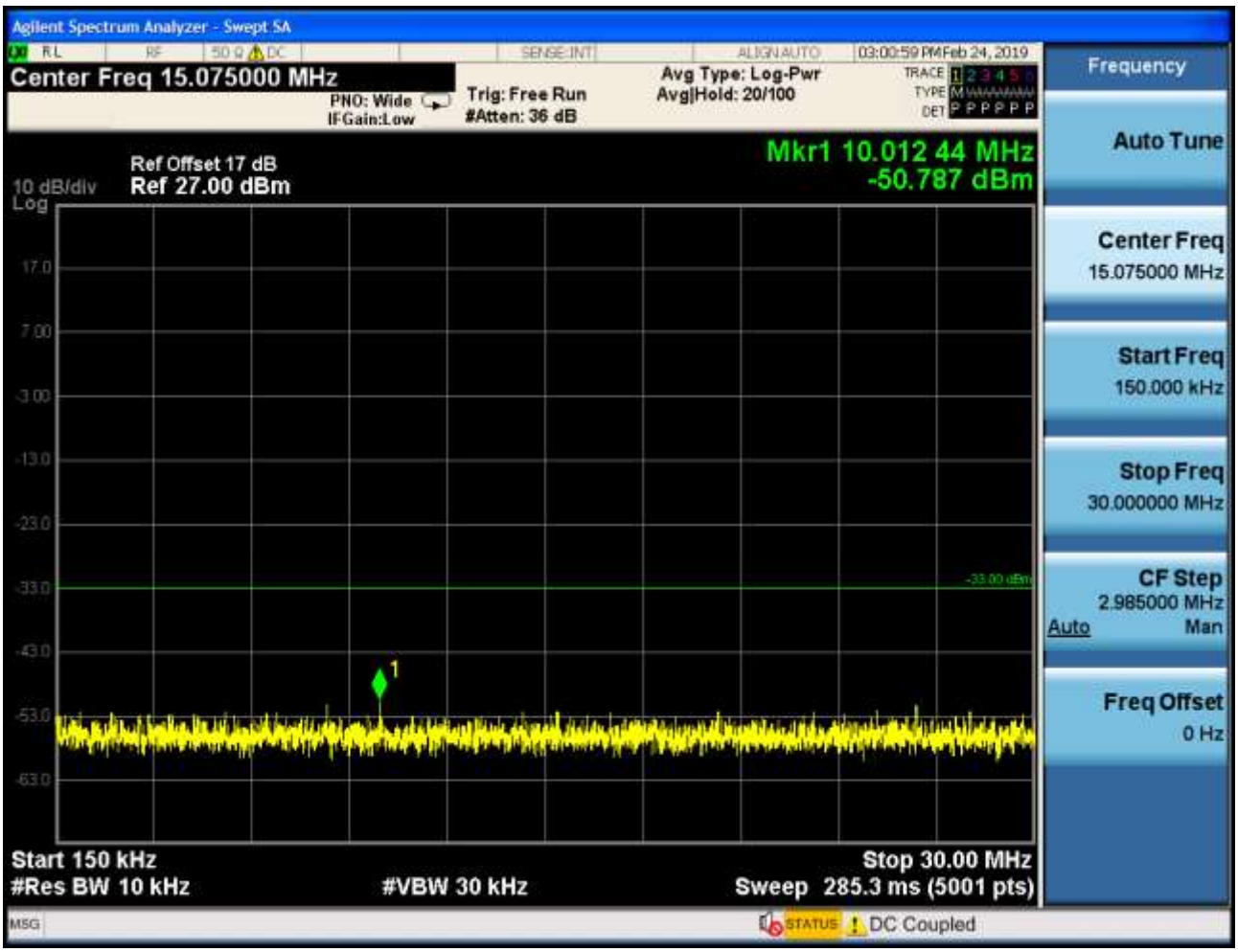
6.1.3.1.1 Test Channel = LCH




Agilent Spectrum Analyzer - Swept SA
Center Freq 10.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 38/100
03:00:42 PM Feb 24, 2019
Ref Offset 17.97 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 18.074 4 GHz
-19.948 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 20.000 GHz
Sweep 50.67 ms (40001 pts)
Frequency
Auto Tune
Center Freq
10.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
20.000000000 GHz
CF Step
1.997000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

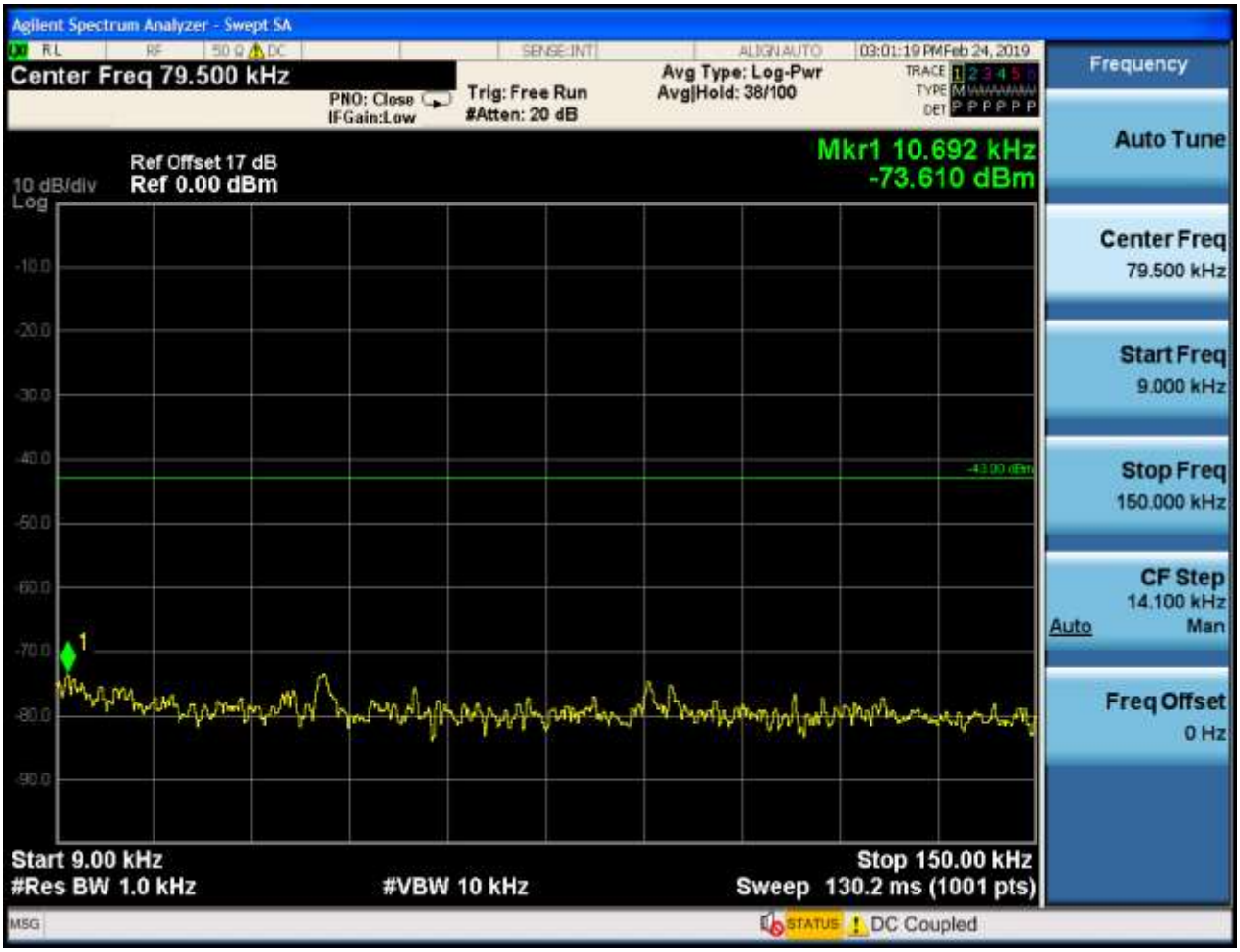
6.1.3.1.2 Test Channel = MCH

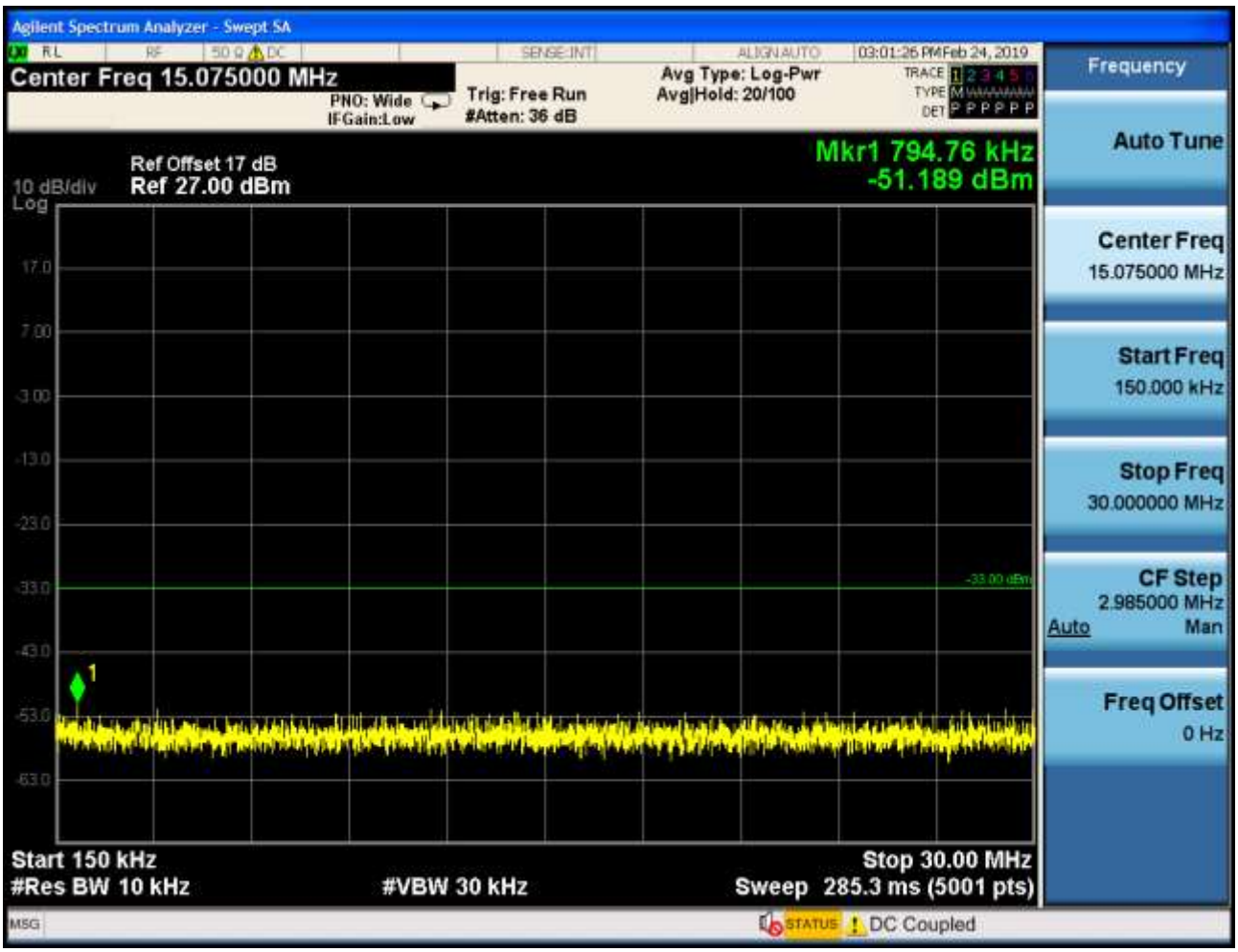



Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 20/100
03:00:59 PM Feb 24, 2019
Ref Offset 17 dB
10 dB/div
Log
Ref 27.00 dBm
Mkr1 10.012 44 MHz
-50.787 dBm
17.0
7.00
-3.00
-13.0
-23.0
-33.0
-43.0
-53.0
-63.0
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz
Stop 30.00 MHz
Sweep 285.3 ms (5001 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:01:09 PM Feb 24, 2019
Center Freq 10.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 39/100
TRACE 1 2 3 4 5
TYPE M
DET P P P P P
Ref Offset 17.97 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 17.829 3 GHz
-19.886 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-13.00 dBm
1
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 20.000 GHz
Sweep 50.67 ms (40001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
10.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
20.000000000 GHz
CF Step
1.997000000 GHz
Auto
Man
Freq Offset
0 Hz

6.1.3.1.3 Test Channel = HCH






Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:01:35 PM Feb 24, 2019
Center Freq 10.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 38/100
TRACE 1 2 3 4 5
TYPE M
DET P P P P P
Ref Offset 17.97 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 18.090 9 GHz
-20.341 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-13.00 dBm
1
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 20.000 GHz
Sweep 50.67 ms (40001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
10.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
20.000000000 GHz
CF Step
1.997000000 GHz
Auto
Man
Freq Offset
0 Hz

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

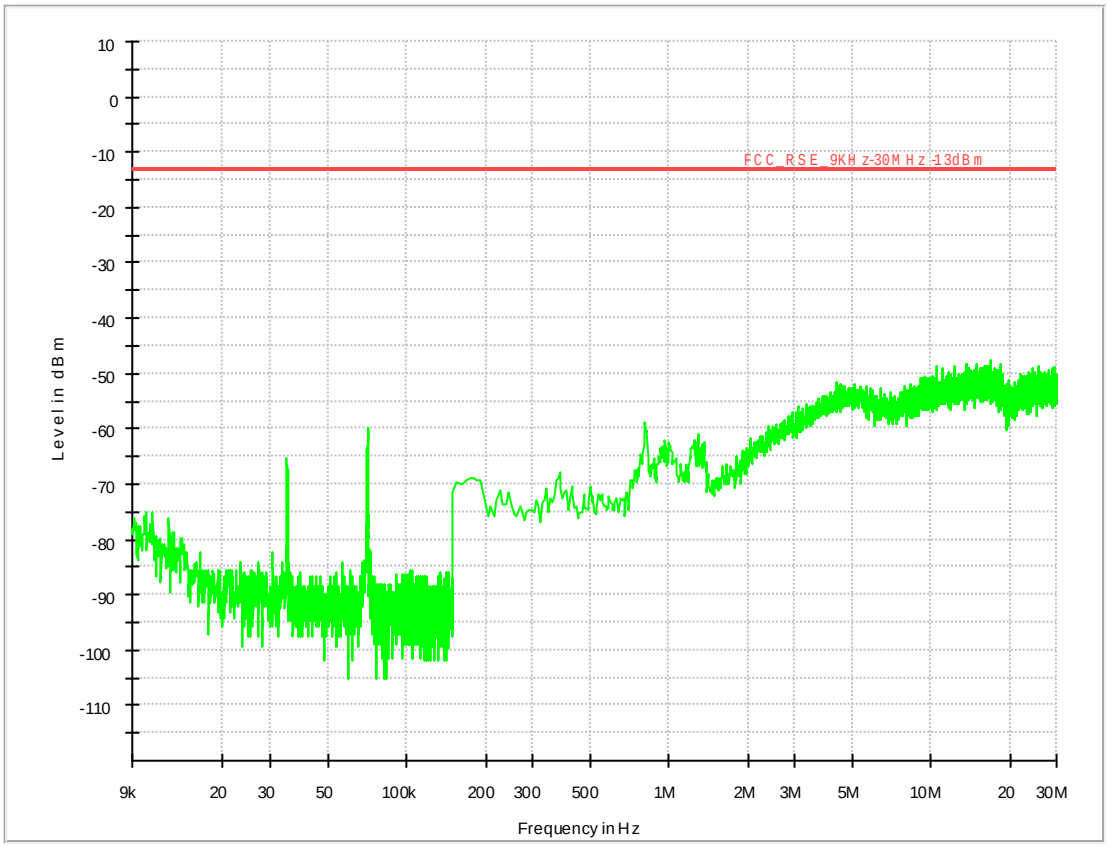
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

Part I - Test Plots

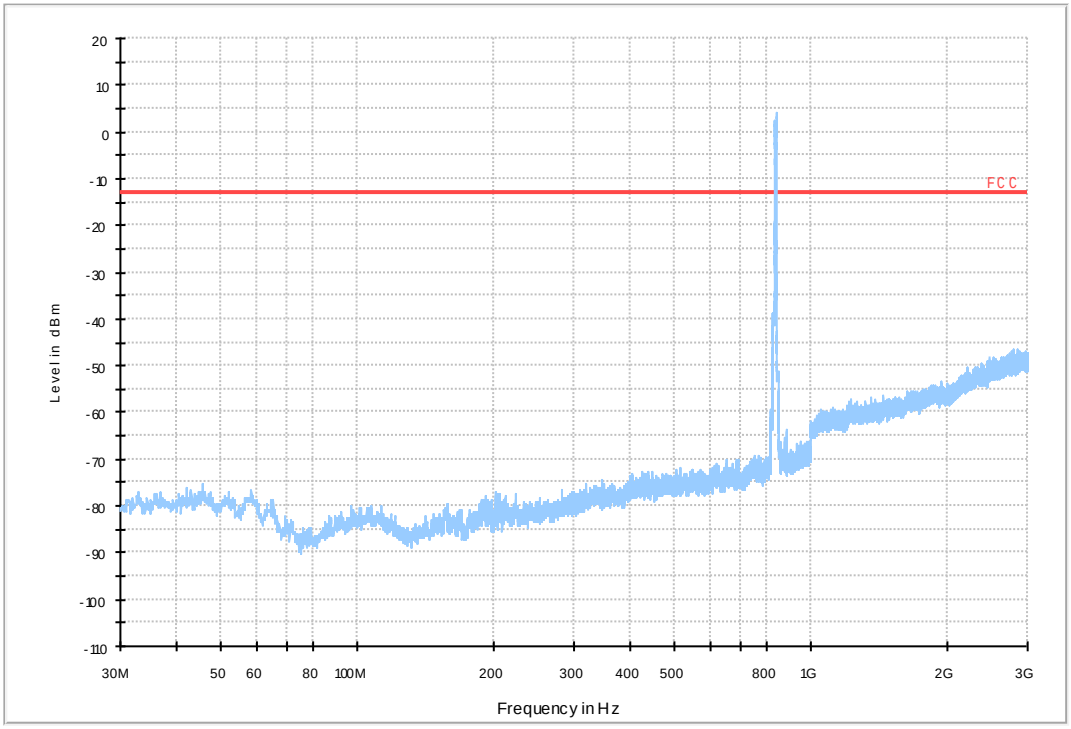
7.1 For UMTS

7.1.1 Test Band = WCDMA850

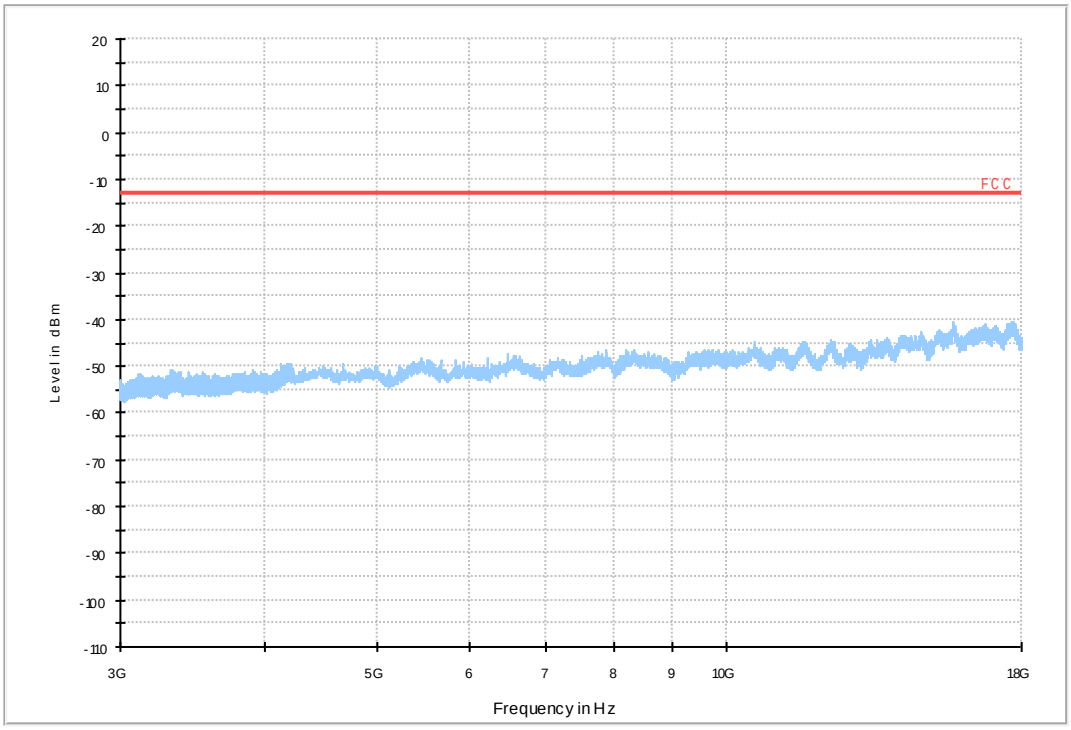
WCDMA850/TM1_Ant1



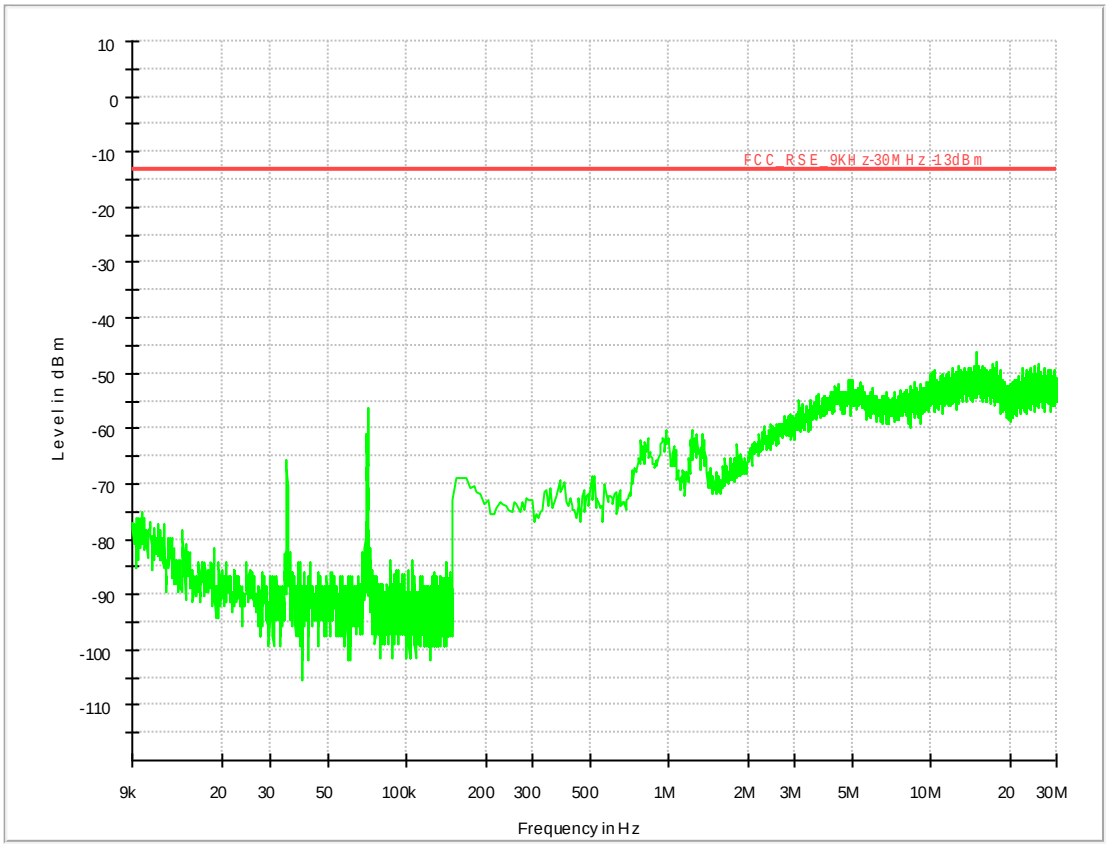
06 FCC PART22 WCDMA850_L



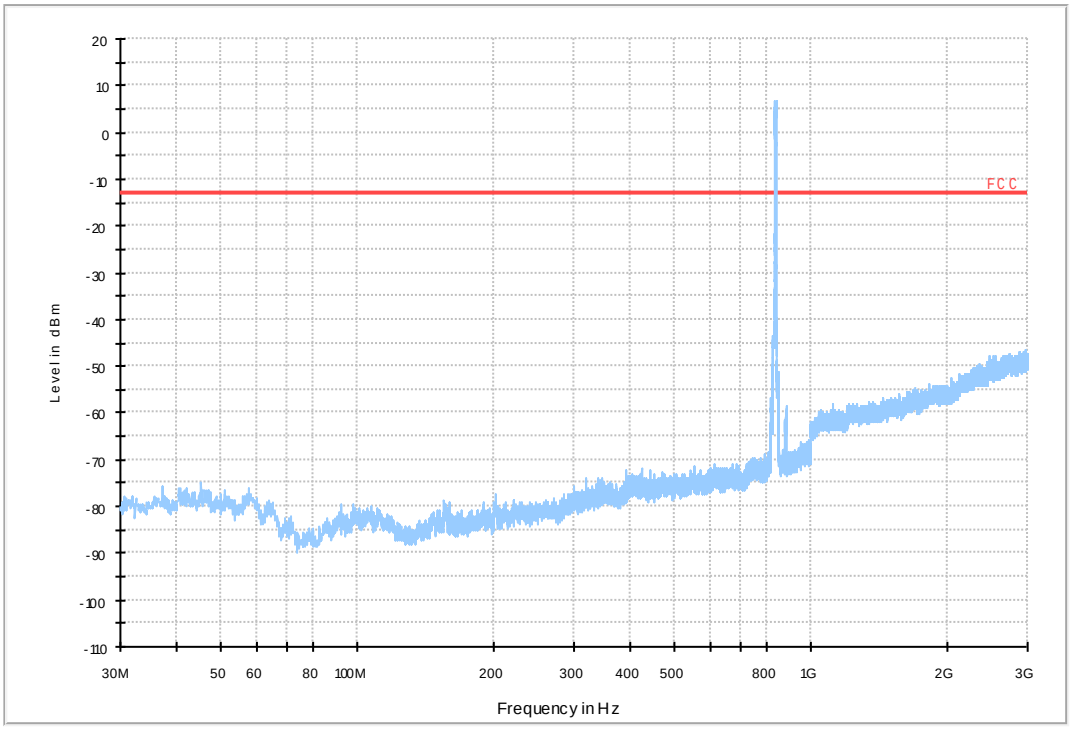
05 FCC PART22 WCDMA850_H

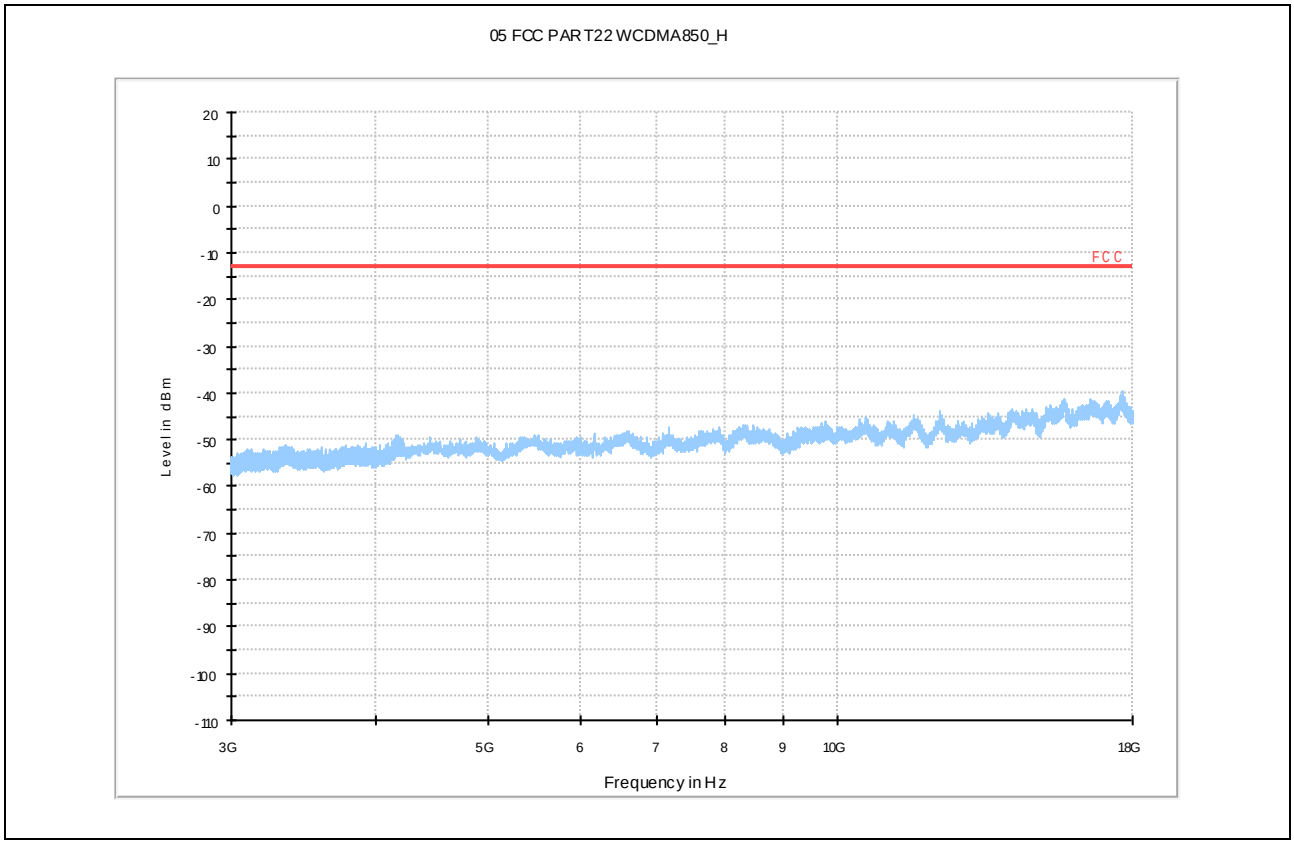


WCDMA850/TM1_Ant2



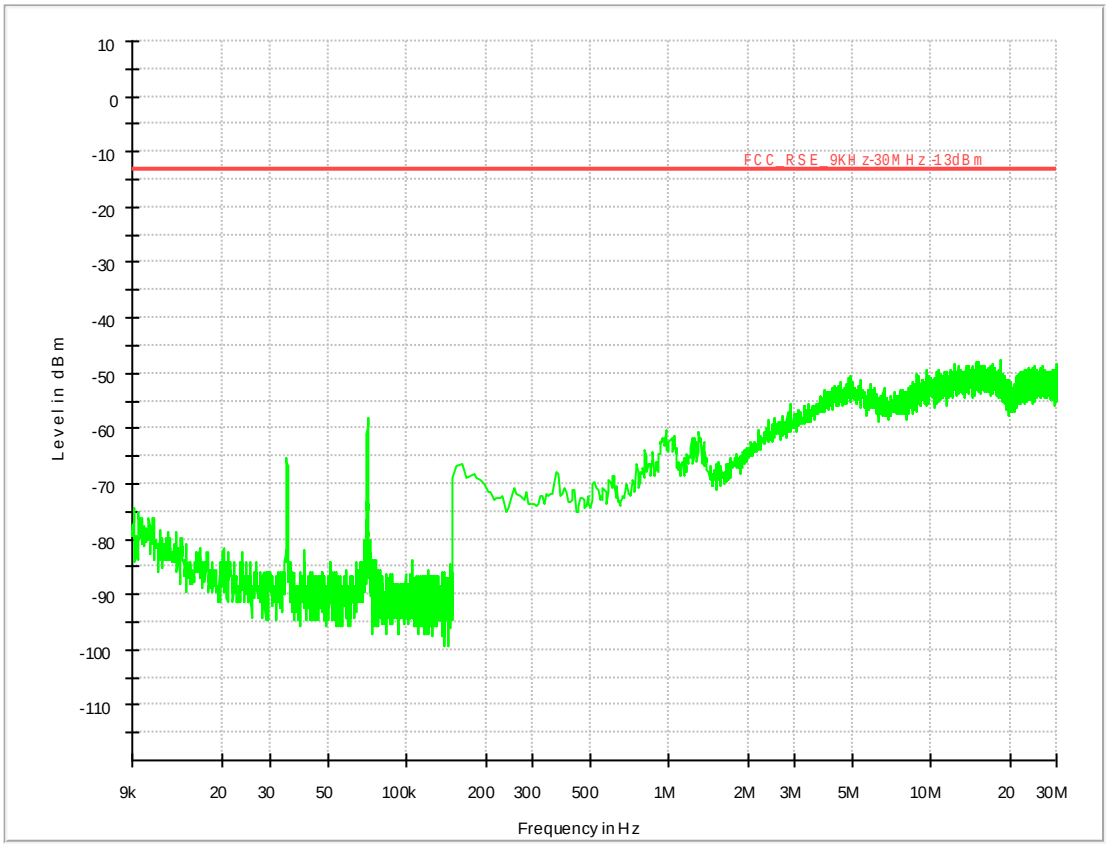
06 FCC PART22 WCDMA850_L



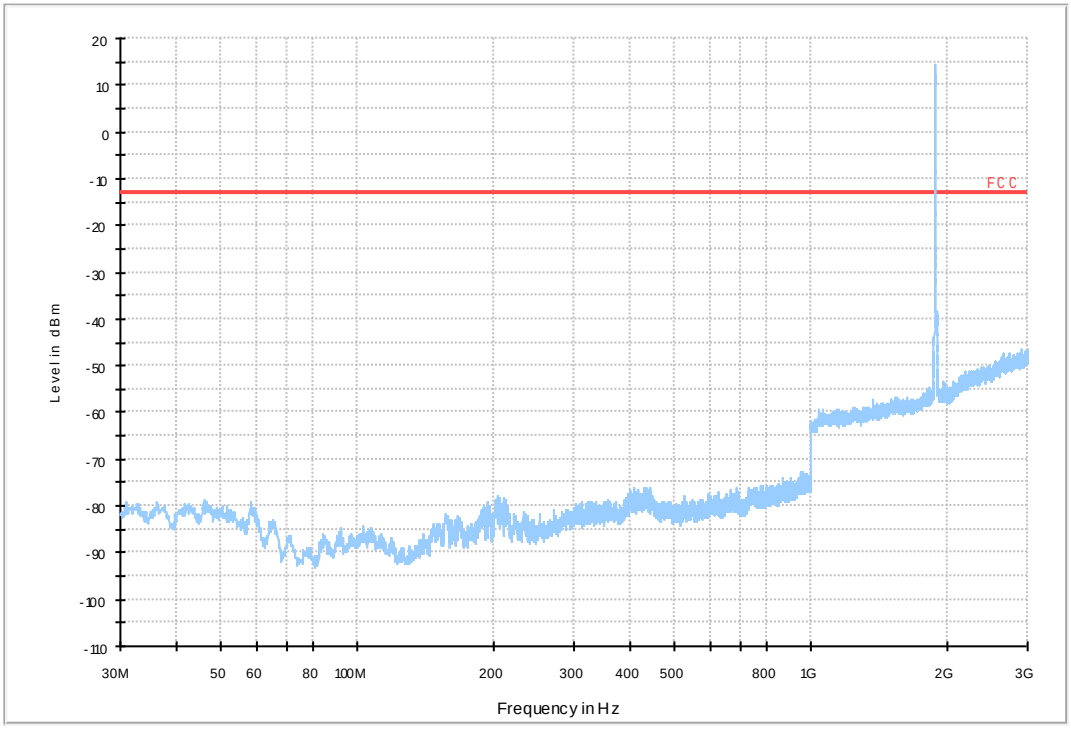


7.1.3 Test Band = WCDMA1900

WCDMA1900/TM1_Ant1



12 FCC PART24 WCDMA1900_L



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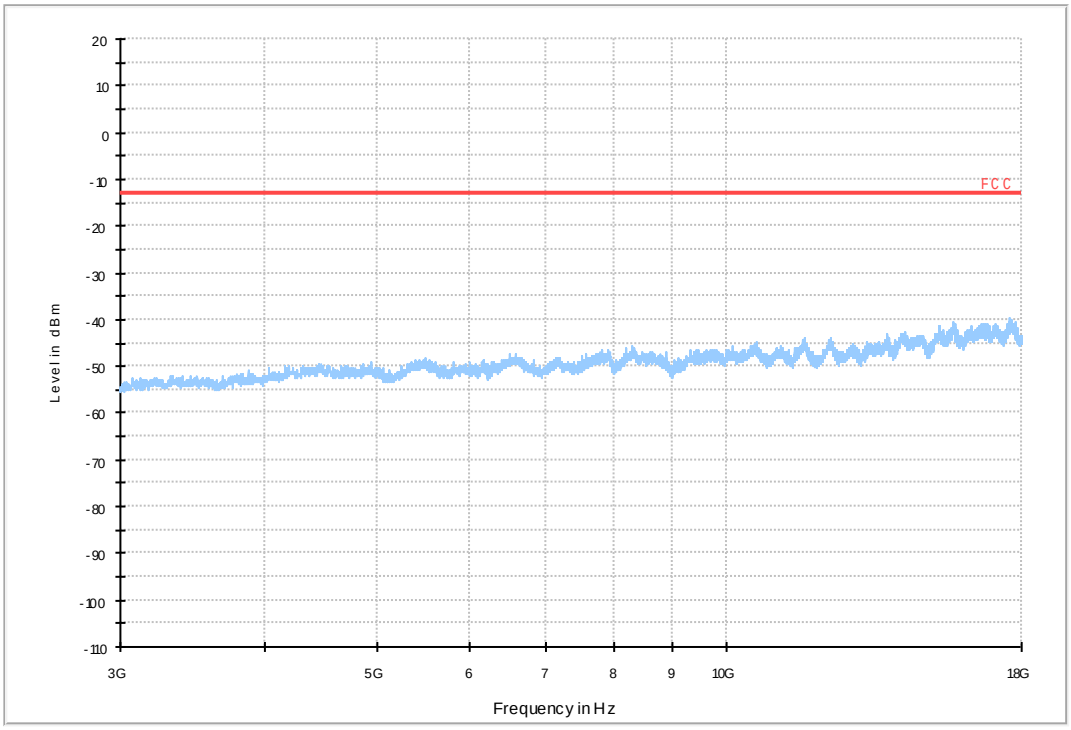
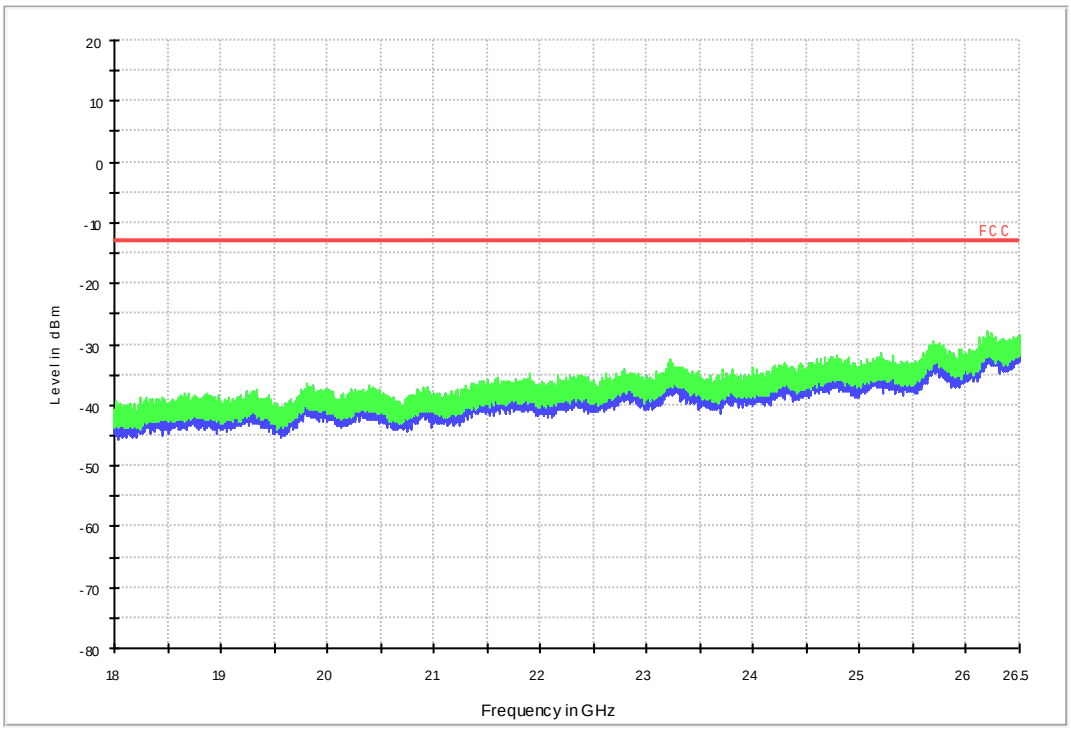
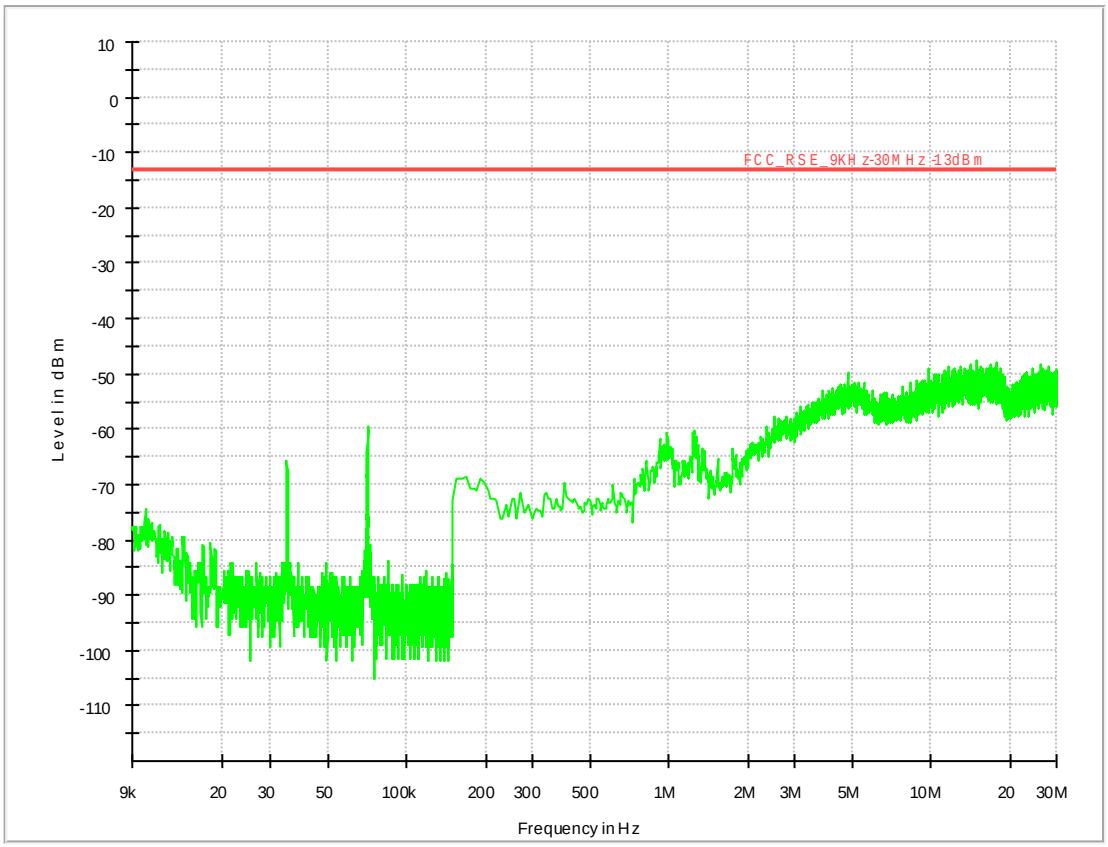




WCDMA1900/TM1_Ant2



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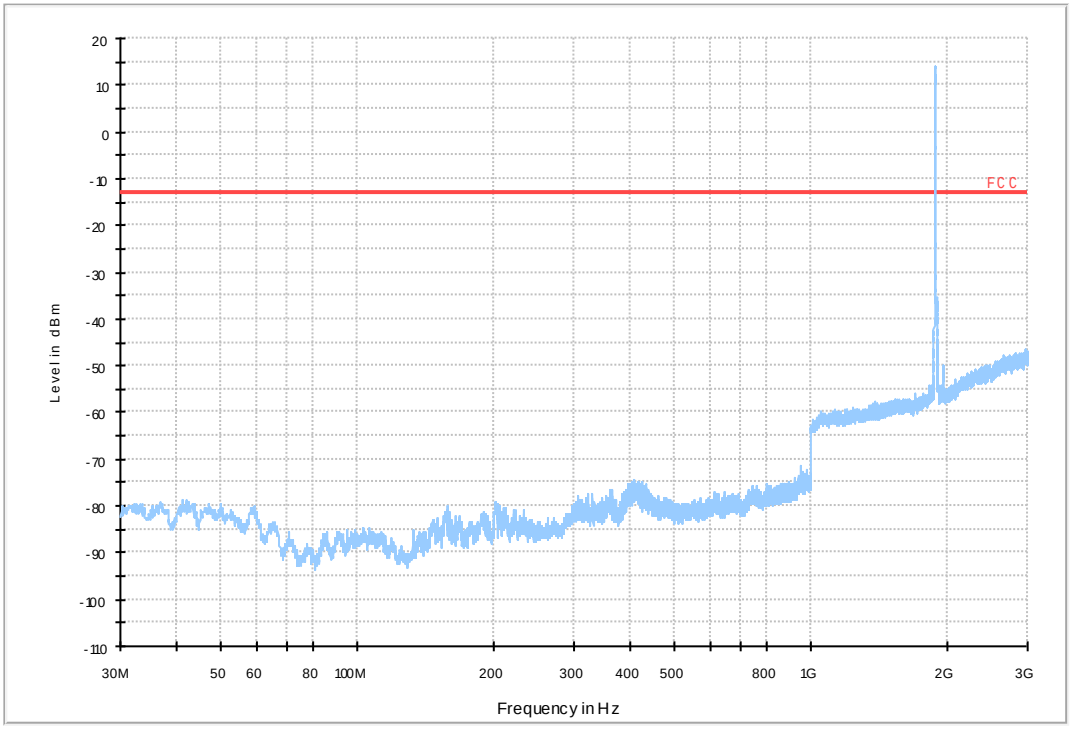

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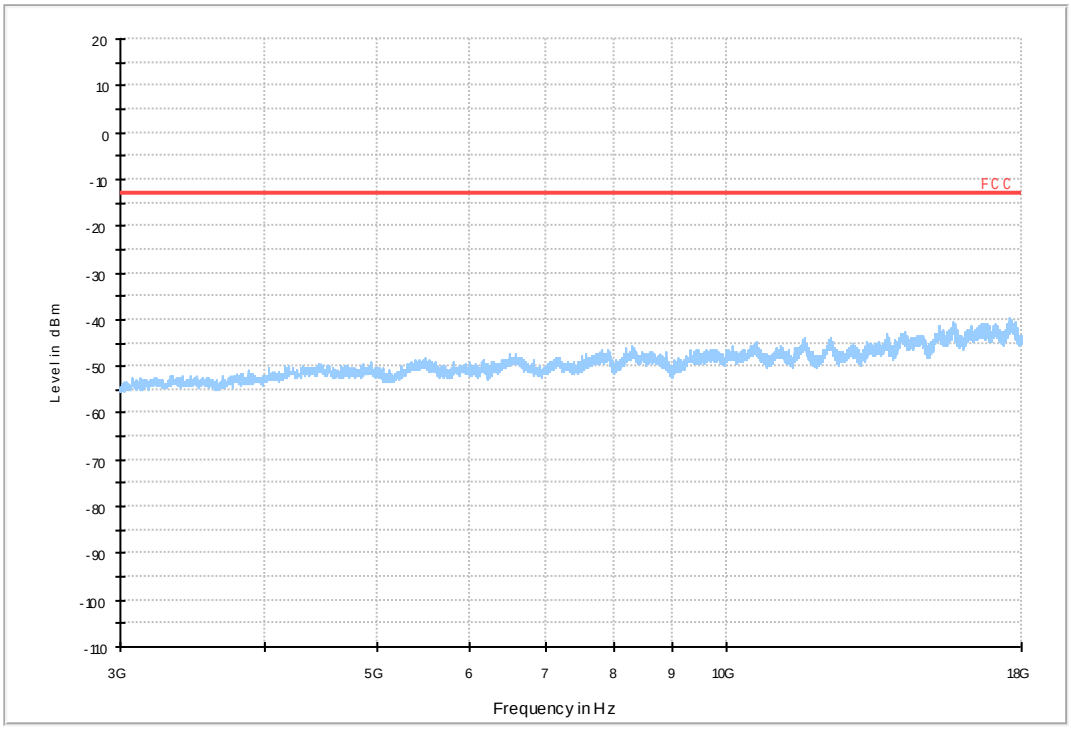

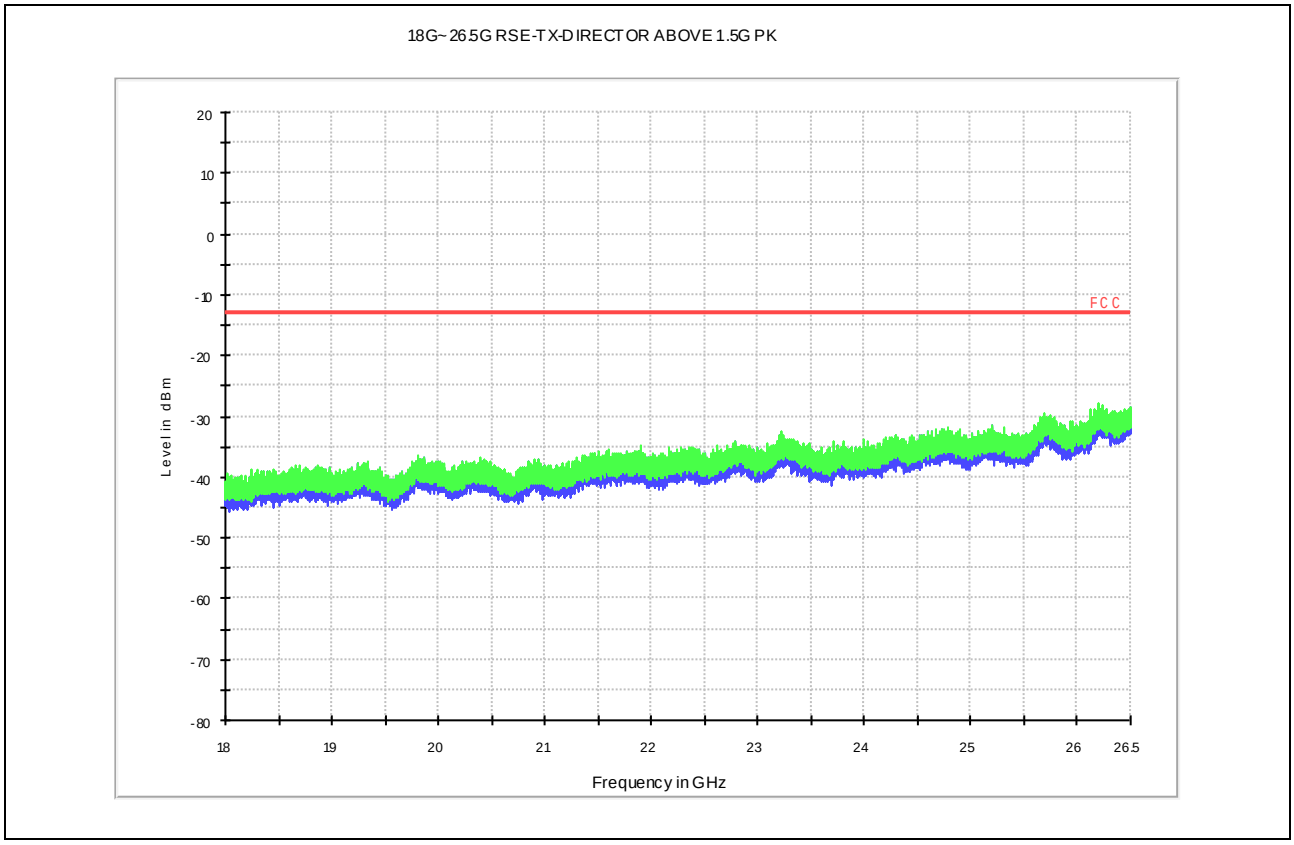

8Appendix_H: Frequency Stability

8.1 For UMTS

8.1.1Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
WCDMA850	UMTS/TM1	LCH	TN	VL	-3.89814	-0.00472	PASS
				VN	-4.97818	-0.00602	PASS
				VH	0.93698	0.00113	PASS
		MCH	TN	VL	4.52042	0.00540	PASS
				VN	-5.07832	-0.00607	PASS
				VH	-0.97275	-0.00116	PASS
		HCH	TN	VL	-4.27008	-0.00504	PASS
				VN	-6.10113	-0.00721	PASS
				VH	3.03268	0.00358	PASS
WCDMA1900	UMTS/TM1	LCH	TN	VL	-2.43902	-0.00132	PASS
				VN	1.76668	0.00095	PASS
				VH	1.40905	0.00076	PASS
		MCH	TN	VL	6.62327	0.00352	PASS
				VN	-1.38044	-0.00073	PASS
				VH	-3.68357	-0.00196	PASS
		HCH	TN	VL	7.43866	-0.00132	PASS
				VN	-4.04835	0.00095	PASS
				VH	4.17709	0.00076	PASS

8.1.2Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
WCDMA850	UMTS/TM1	LCH	VN	-30	-3.04699	-0.00369	PASS
				-20	-2.31743	-0.00280	PASS
				-10	2.86818	0.00347	PASS
				0	-1.19448	-0.00145	PASS
				10	3.71933	0.00450	PASS
				20	-4.97818	-0.00602	PASS
				30	-2.88248	-0.00349	PASS
				40	-1.73092	-0.00209	PASS
				50	3.18289	0.00385	PASS
		MCH	VN	-30	-0.99421	-0.00119	PASS
				-20	0.27180	0.00032	PASS
				-10	-0.35763	-0.00043	PASS
				0	0.30041	0.00036	PASS
				10	2.15292	0.00257	PASS
				20	-5.07832	-0.00607	PASS
				30	0.41485	0.00050	PASS
				40	-5.87940	-0.00703	PASS
				50	-3.32594	-0.00398	PASS
		HCH	VN	-30	0.05007	0.00006	PASS
				-20	-0.51498	-0.00061	PASS
				-10	-0.49353	-0.00058	PASS
				0	-2.43902	-0.00288	PASS
				10	-0.59366	-0.00070	PASS
				20	-6.10113	-0.00721	PASS
				30	0.45776	0.00054	PASS
				40	-3.94821	-0.00466	PASS
				50	-4.79221	-0.00566	PASS
WCDMA1900	UMTS/TM1	LCH	VN	-30	1.28746	0.00070	PASS
				-20	1.73807	0.00094	PASS
				-10	-2.22444	-0.00120	PASS
				0	1.62363	0.00088	PASS
				10	-1.10149	-0.00059	PASS
				20	1.76668	0.00095	PASS
				30	1.51634	0.00082	PASS
				40	3.37601	0.00182	PASS
				50	4.82082	0.00260	PASS
		MCH	VN	-30	0.57220	0.00030	PASS
				-20	-0.19312	-0.00010	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				-10	-2.65360	-0.00141	PASS
				0	-0.56505	-0.00030	PASS
				10	-3.35455	-0.00178	PASS
				20	-1.38044	-0.00073	PASS
				30	-1.32322	-0.00070	PASS
				40	0.04292	0.00002	PASS
				50	-0.27895	-0.00015	PASS
		HCH	VN	-30	0.85831	0.00045	PASS
				-20	-0.18597	-0.00010	PASS
				-10	-2.09570	-0.00110	PASS
				0	-4.16279	-0.00218	PASS
				10	-2.03848	-0.00107	PASS
				20	-4.04835	-0.00212	PASS
				30	-2.45333	-0.00129	PASS
				40	2.39611	0.00126	PASS
				50	-1.21593	-0.00064	PASS

END