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	24.27	17.42	38.5	PASS
		MCH	24.21	17.36	38.5	PASS
		HCH	24.20	17.35	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
WCDMA1700	UMTS/TM1	LCH	24.13	19.83	30	PASS
		MCH	24.15	19.85	30	PASS
		HCH	24.12	19.82	30	PASS
WCDMA1900	UMTS/TM1	LCH	23.80	20	33	PASS
		MCH	23.77	19.97	33	PASS
		HCH	23.88	20.08	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
WCDMA1700	UMTS/TM1	LCH	2.73	13	PASS
		MCH	2.51	13	PASS
		HCH	2.78	13	PASS
WCDMA850	UMTS/TM1	LCH	2.51	13	PASS
		MCH	2.65	13	PASS
		HCH	2.69	13	PASS
WCDMA1900	UMTS/TM1	LCH	2.6	13	PASS
		MCH	2.66	13	PASS
		HCH	2.67	13	PASS

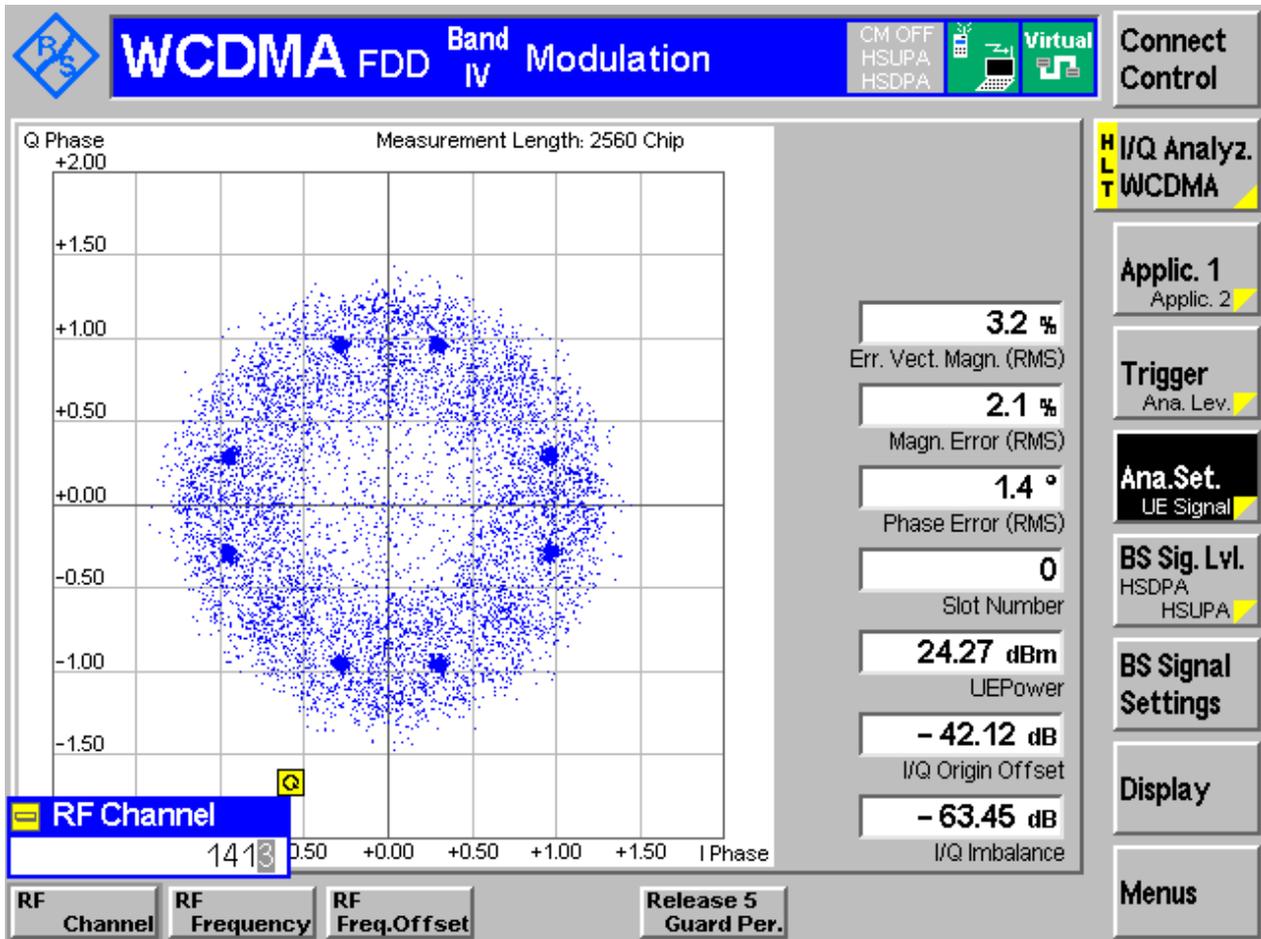# 3Appendix_C: Modulation Characteristics

Part I - Test Plots

3.1 For UMTS

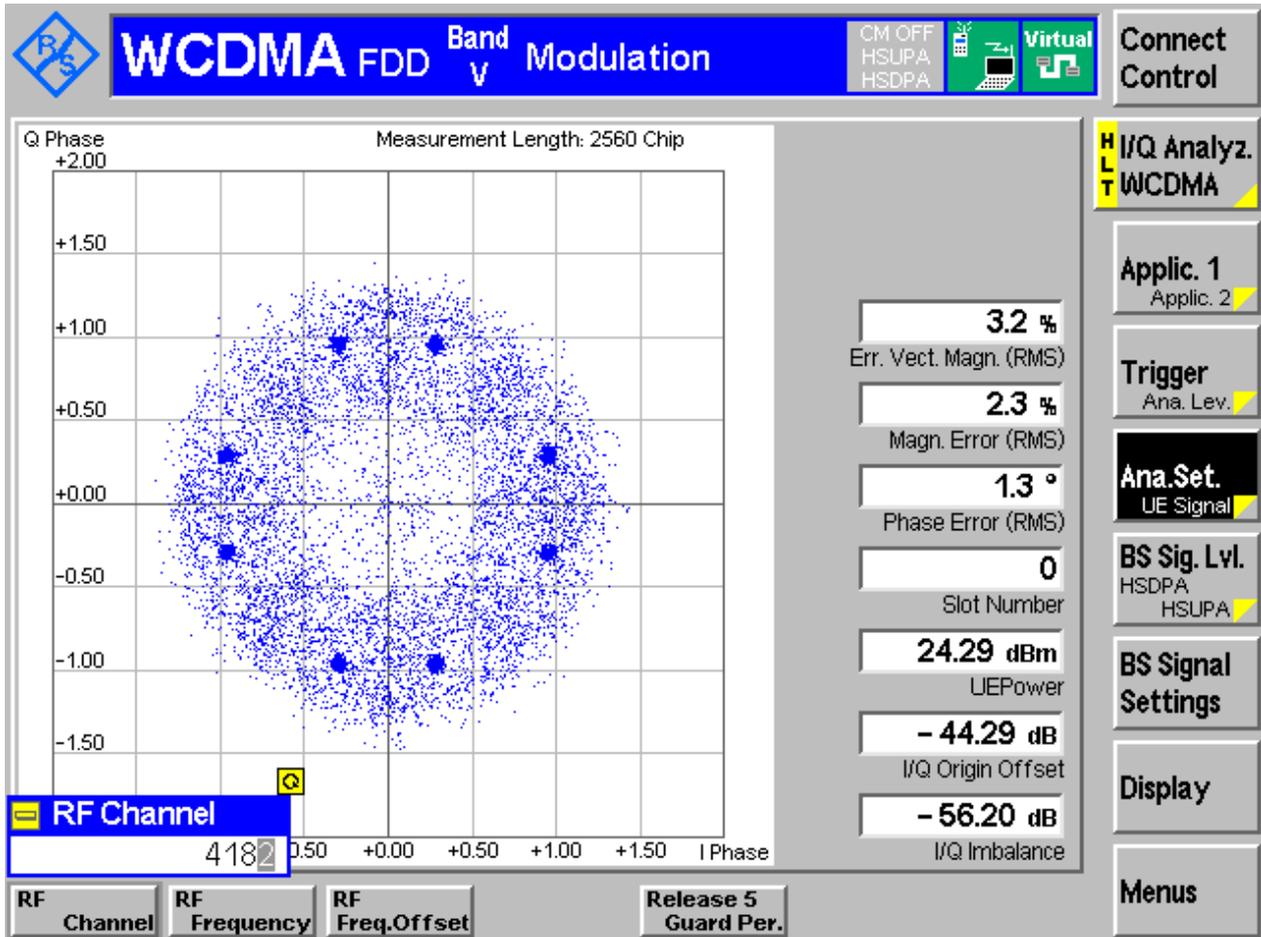**3.1.1 Test Band = WCDMA1700**

3.1.1.1 Test Mode = UMTS/TM1

3.1.1.1.1 Test Channel = MCH

3.1.2 Test Band = WCDMA850
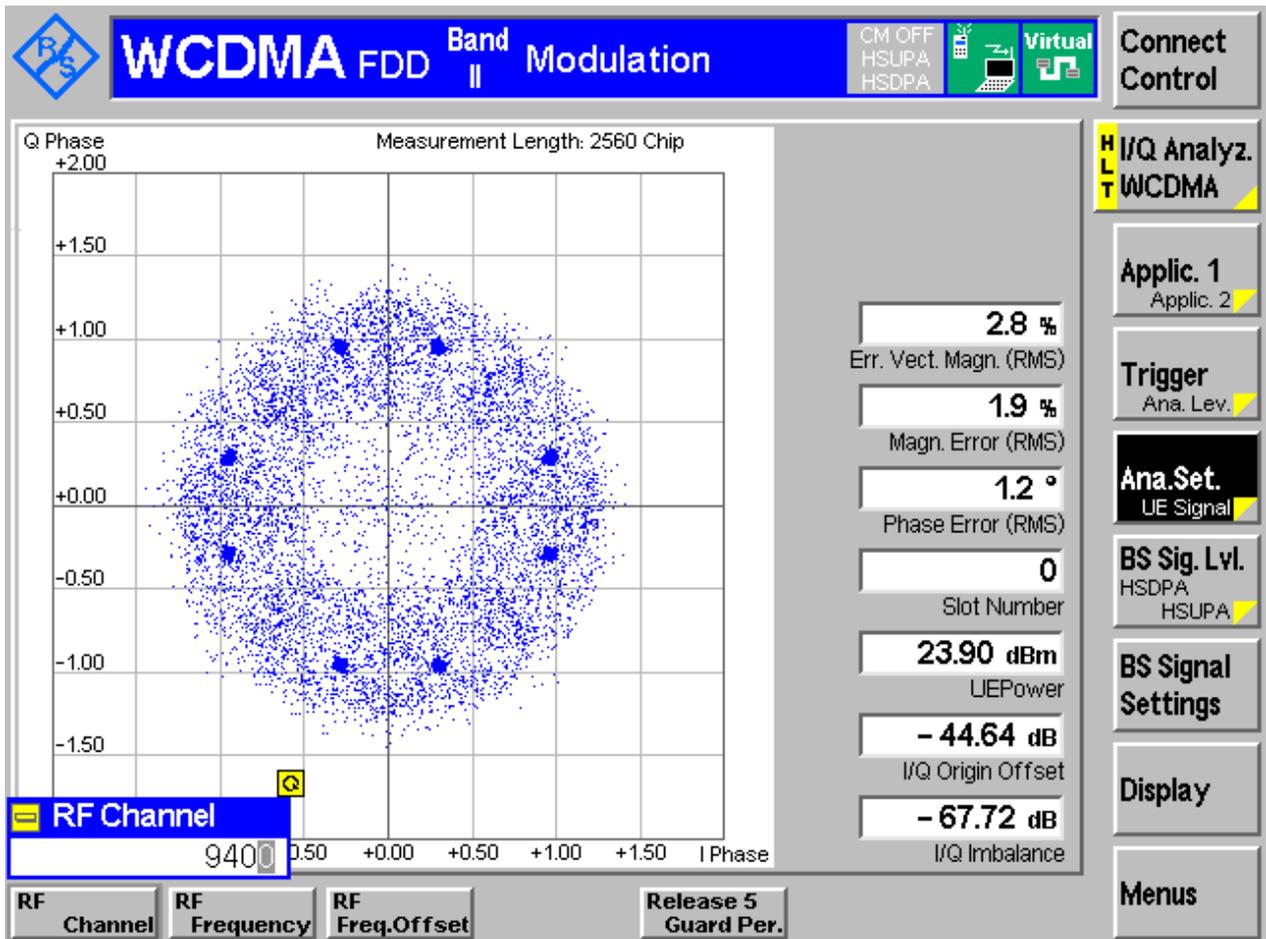
3.1.2.1 Test Mode = UMTS/TM1

3.1.2.1.1 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	4.14	4.74	Pass
		MCH	4.16	4.75	Pass
		HCH	4.16	4.73	Pass
WCDMA1700	UMTS/TM1	LCH	4.15	4.73	Pass
		MCH	4.16	4.73	Pass
		HCH	4.15	4.73	Pass
WCDMA1900	UMTS/TM1	LCH	4.16	4.73	Pass
		MCH	4.16	4.74	Pass
		HCH	4.15	4.73	Pass

Part II - Test Plots

4.1 For UMTS

4.1.1 Test Band = WCDMA850

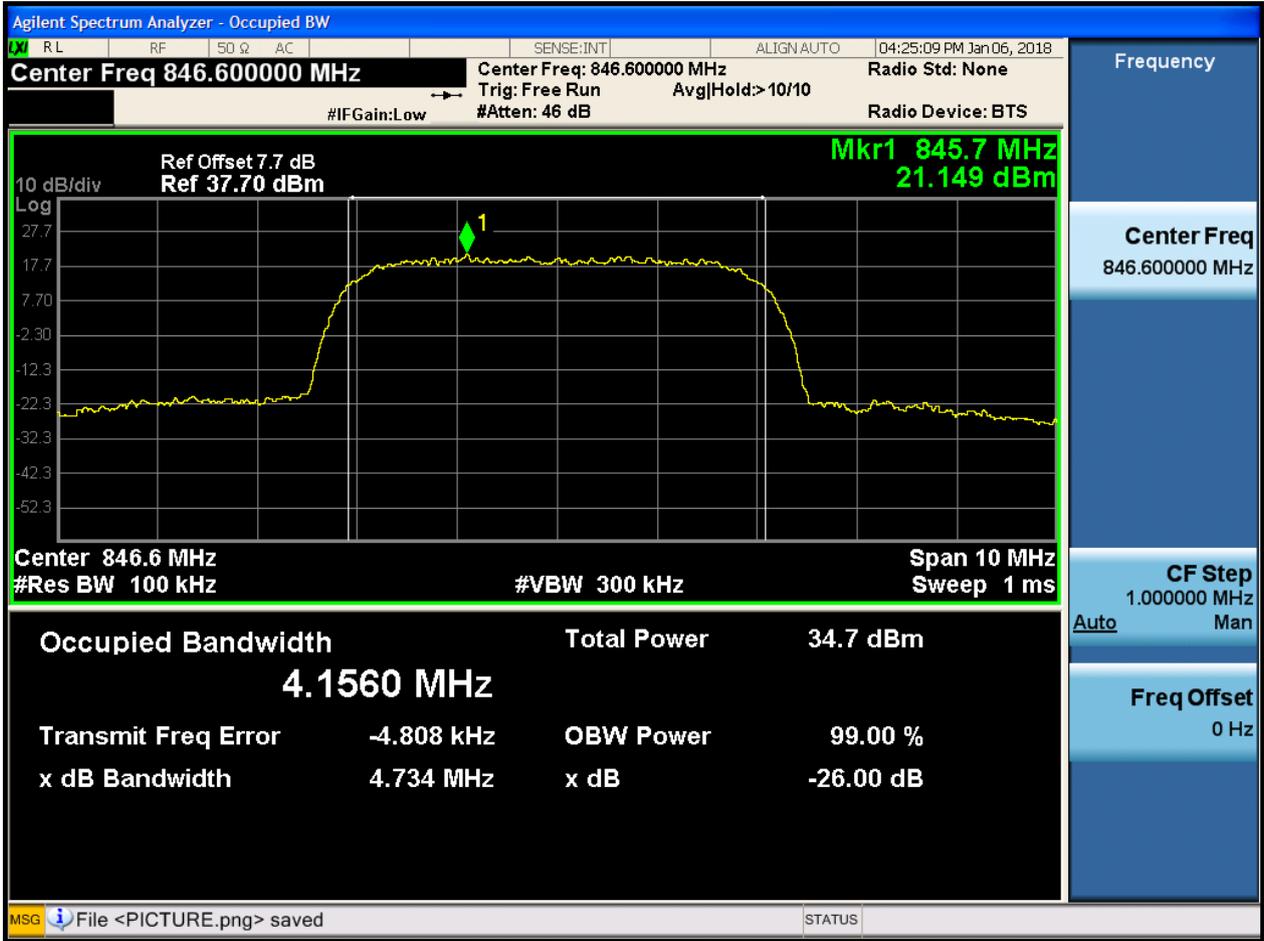### 4.1.1.1 Test Mode = UMTS/TM1

4.1.1.1.1 Test Channel = LCH

Agilent Spectrum Analyzer - Occupied BW		
LXI R L RF 50 Ω AC	SENSE:INT ALIGN AUTO 04:24:35 PM Jan 06, 2018	Frequency
Center Freq 826.400000 MHz	Center Freq: 826.400000 MHz Radio Std: None	
#IFGain:Low	Trig: Free Run Avg|Hold:>10/10 #Atten: 46 dB Radio Device: BTS	

Ref Offset 7.7 dB
Ref 37.70 dBm

Mkr1 825.5 MHz
21.011 dBm

10 dB/div
Log
27.7
17.7
7.70
-2.30
-12.3
-22.3
-32.3
-42.3
-52.3

Center 826.4 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 1 ms

Occupied Bandwidth		Total Power	34.7 dBm
4.1449 MHz			
Transmit Freq Error	3.766 kHz	OBW Power	99.00 %
x dB Bandwidth	4.745 MHz	x dB	-26.00 dB

Center Freq
826.400000 MHz

CF Step
1.000000 MHz
Auto   Man

Freq Offset
0 Hz

MSG (i) Alignment Completed   STATUS

4.1.1.1.2 Test Channel = MCH

4.1.1.1.3 Test Channel = HCH

Agilent Spectrum Analyzer - Occupied BW		
R L RF 50 Ω AC SENSE:INT ALIGN AUTO 04:25:09 PM Jan 06, 2018		Frequency
Center Freq 846.600000 MHz Center Freq: 846.600000 MHz Radio Std: None		
Trig: Free Run Avg|Hold:>10/10		
#IFGain:Low #Atten: 46 dB Radio Device: BTS		

Ref Offset 7.7 dB
Ref 37.70 dBm
10 dB/div
Mkr1 845.7 MHz
21.149 dBm

Center 846.6 MHz Span 10 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 1 ms

Center Freq 846.600000 MHz

CF Step 1.000000 MHz
Auto Man

Freq Offset 0 Hz

Occupied Bandwidth		Total Power	34.7 dBm
4.1560 MHz			
Transmit Freq Error	-4.808 kHz	OBW Power	99.00 %
x dB Bandwidth	4.734 MHz	x dB	-26.00 dB

MSG File <PICTURE.png> saved STATUS

4.1.2 Test Band = WCDMA1700

4.1.2.1 Test Mode = UMTS/TM1

4.1.2.1.1 Test Channel = LCH

Agilent Spectrum Analyzer - Occupied BW

| | | | | | | SENSE:INT | ALIGN AUTO | 04:34:54 PM Jan 06, 2018 | |
| L R L | | RF | 50 Ω | AC | | | | | |

Center Freq 1.712400000 GHz

Center Freq: 1.712400000 GHz — Radio Std: None
#IFGain:Low — Trig: Free Run — Avg|Hold:>10/10
#Atten: 46 dB — Radio Device: BTS

Ref Offset 7.7 dB
10 dB/div — Ref 37.70 dBm
Log

Mkr1 1.71151 GHz
20.171 dBm

Center 1.712 GHz — Span 10 MHz
#Res BW 100 kHz — #VBW 300 kHz — Sweep 1 ms

Occupied Bandwidth		Total Power	33.4 dBm
4.1506 MHz			
Transmit Freq Error	8.133 kHz	OBW Power	99.00 %
x dB Bandwidth	4.725 MHz	x dB	-26.00 dB

MSG Alignment Completed — STATUS

Frequency

Center Freq
1.712400000 GHz

CF Step
1.000000 MHz
Auto — Man

Freq Offset
0 Hz

4.1.2.1.2 Test Channel = MCH

Agilent Spectrum Analyzer - Occupied BW

LXI R L   RF   50 Ω   AC   SENSE:INT   ALIGN AUTO   04:35:11 PM Jan 06, 2018

Center Freq 1.732600000 GHz   Center Freq: 1.732600000 GHz   Radio Std: None
                                          Trig: Free Run   Avg|Hold: 10/10
                    #IFGain:Low   #Atten: 46 dB   Radio Device: BTS

Ref Offset 7.7 dB   Mkr1 1.73175 GHz
10 dB/div   Ref 37.70 dBm   20.596 dBm
Log
27.7
17.7
7.70
-2.30
-12.3
-22.3
-32.3
-42.3
-52.3

Center 1.733 GHz   Span 10 MHz
#Res BW 100 kHz   #VBW 300 kHz   Sweep 1 ms

Occupied Bandwidth	Total Power	33.5 dBm
4.1553 MHz		
Transmit Freq Error -388 Hz	OBW Power	99.00 %
x dB Bandwidth 4.734 MHz	x dB	-26.00 dB

MSG (i) File <PICTURE.png> saved   STATUS

Frequency

Center Freq
1.732600000 GHz

CF Step
1.000000 MHz
Auto   Man

Freq Offset
0 Hz

4.1.2.1.3 Test Channel = HCH

Agilent Spectrum Analyzer - Occupied BW		

Center Freq 1.752600000 GHz
Center Freq: 1.752600000 GHz
Trig: Free Run Avg|Hold:>10/10
#Atten: 46 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS

Mkr1 1.75171 GHz
20.251 dBm

Ref Offset 7.7 dB
Ref 37.70 dBm

Center 1.753 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 1 ms

Occupied Bandwidth	Total Power	33.6 dBm
4.1463 MHz		
Transmit Freq Error	7.456 kHz	OBW Power	99.00 %
x dB Bandwidth	4.729 MHz	x dB	-26.00 dB

MSG File <PICTURE.png> saved   STATUS

Frequency

Center Freq
1.752600000 GHz

CF Step
1.000000 MHz
Auto   Man

Freq Offset
0 Hz

4.1.3 Test Band = WCDMA1900

4.1.3.1 Test Mode = UMTS/TM1

4.1.3.1.1 Test Channel = LCH

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4.1.3.1.2 Test Channel = MCH

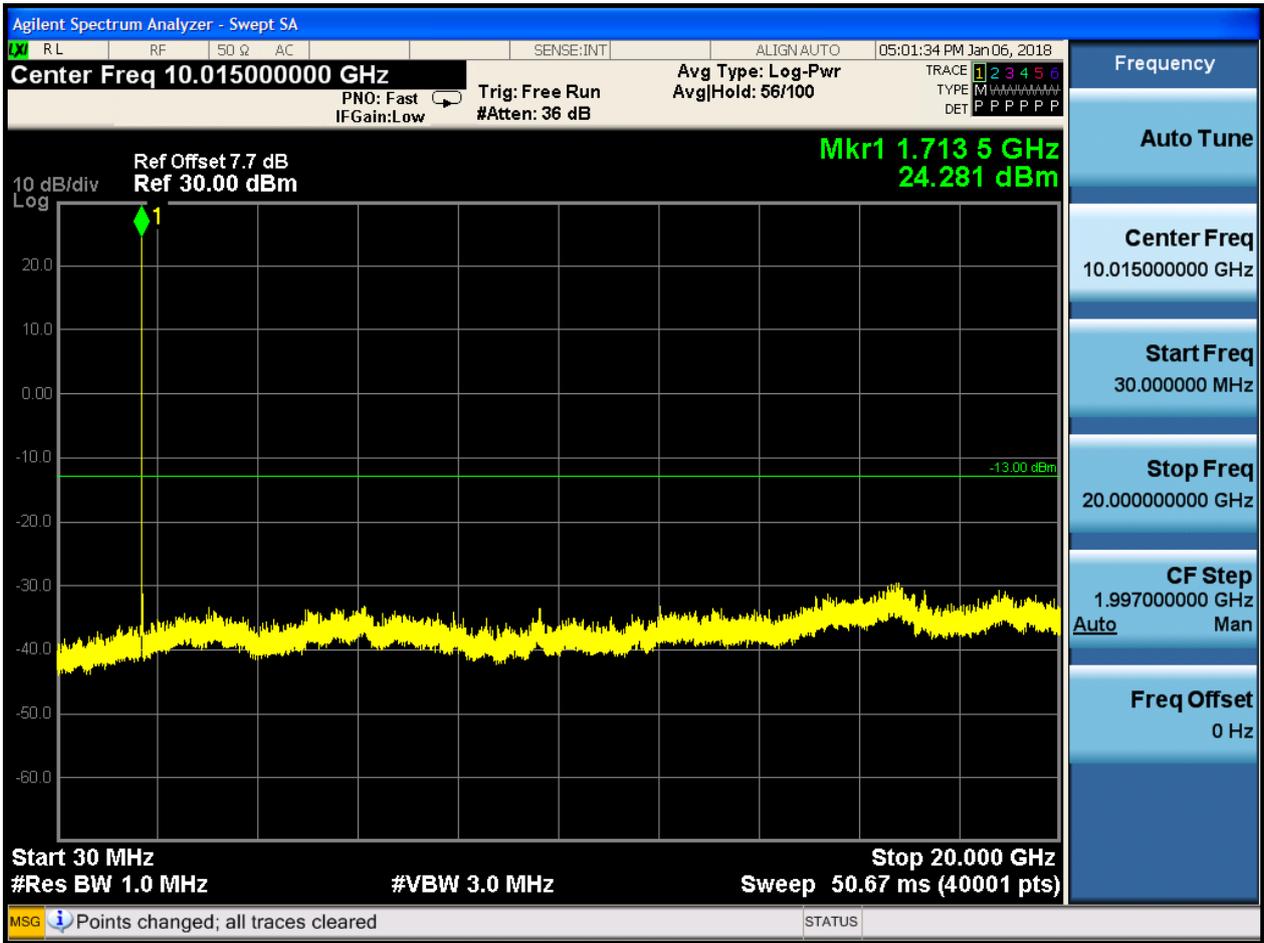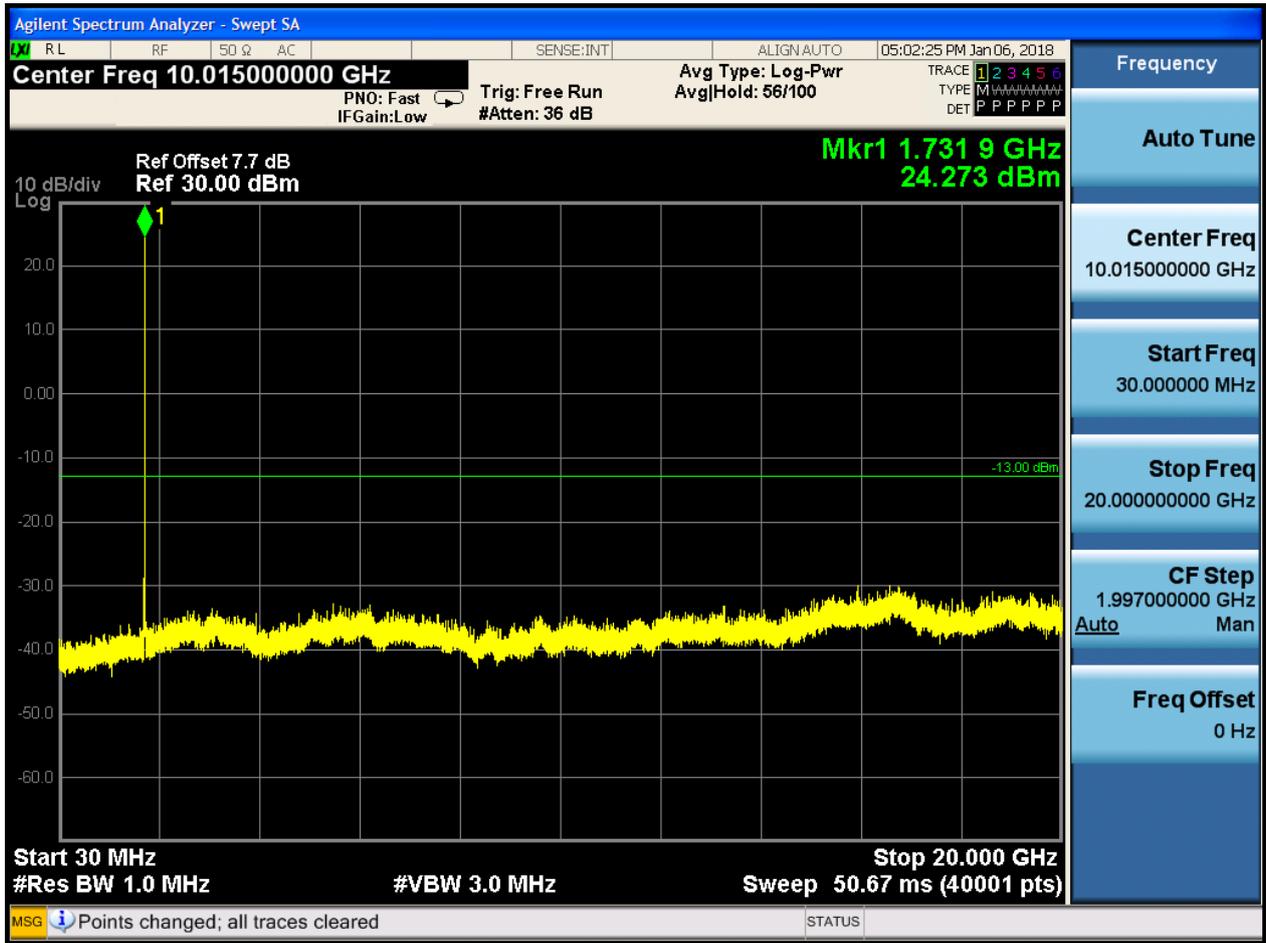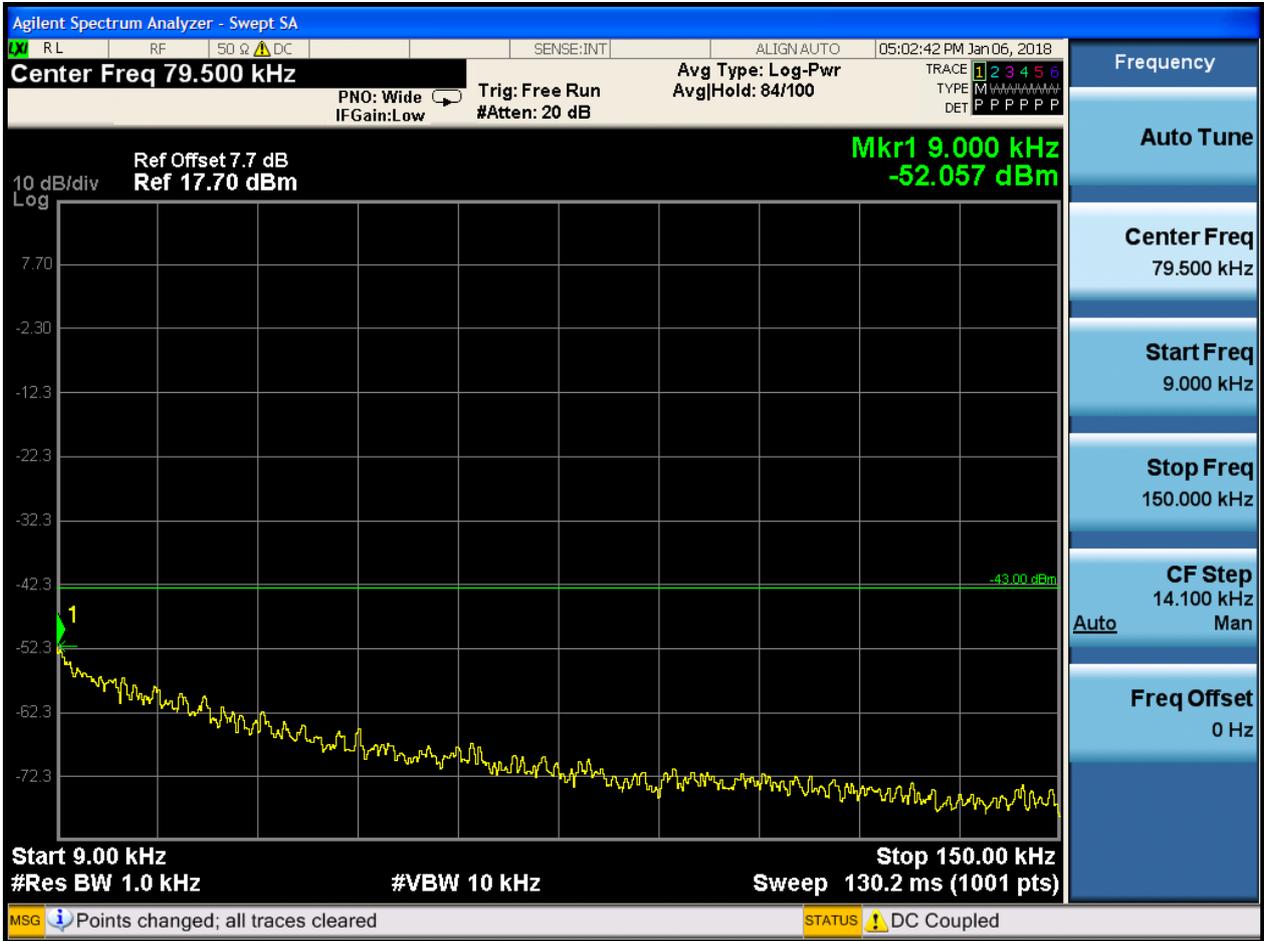## 4.1.3.1.3 Test Channel = HCH

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
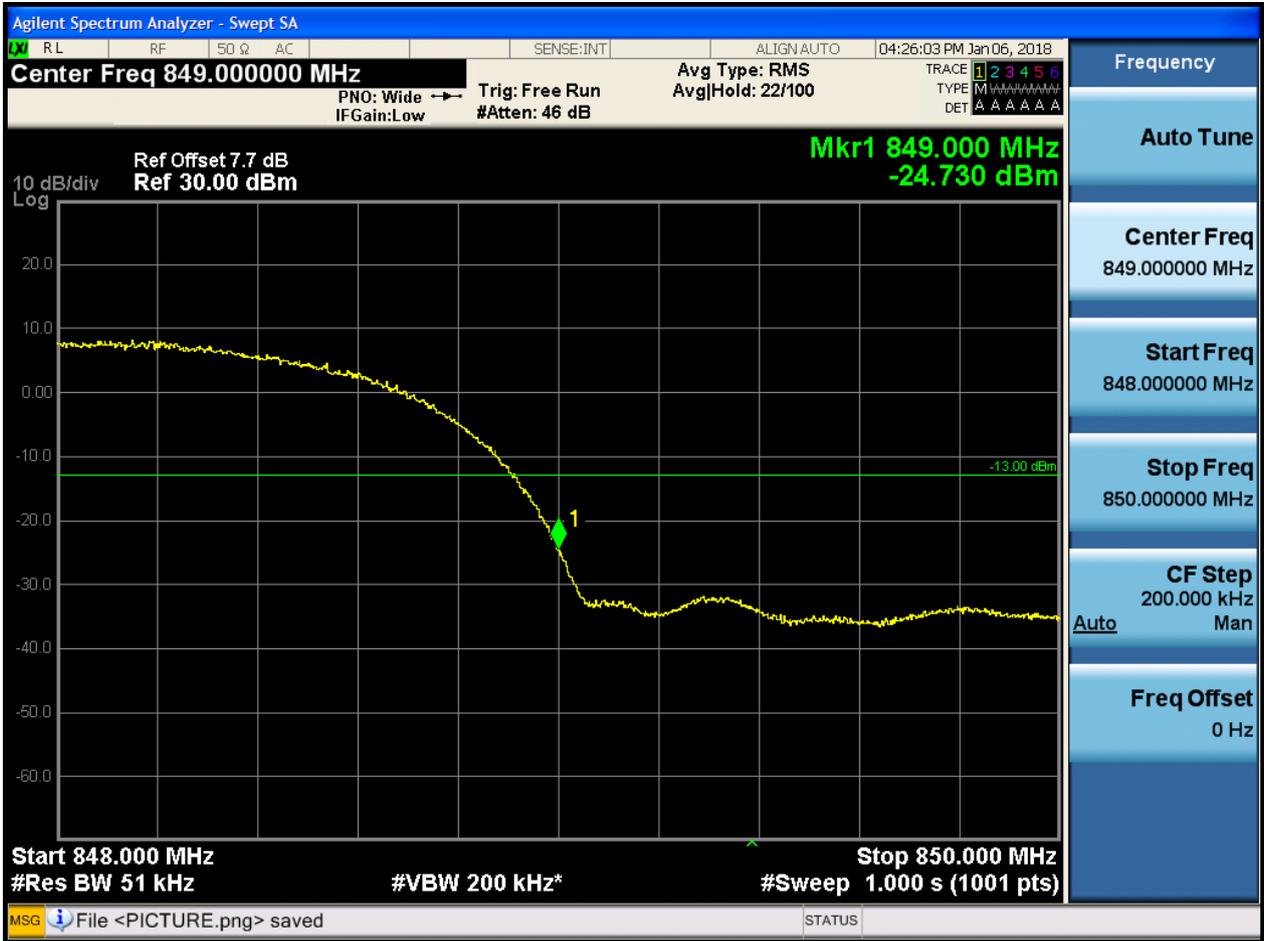
5.1.2 Test Band = WCDMA1700

5.1.2.1 Test Mode = UMTS/TM1

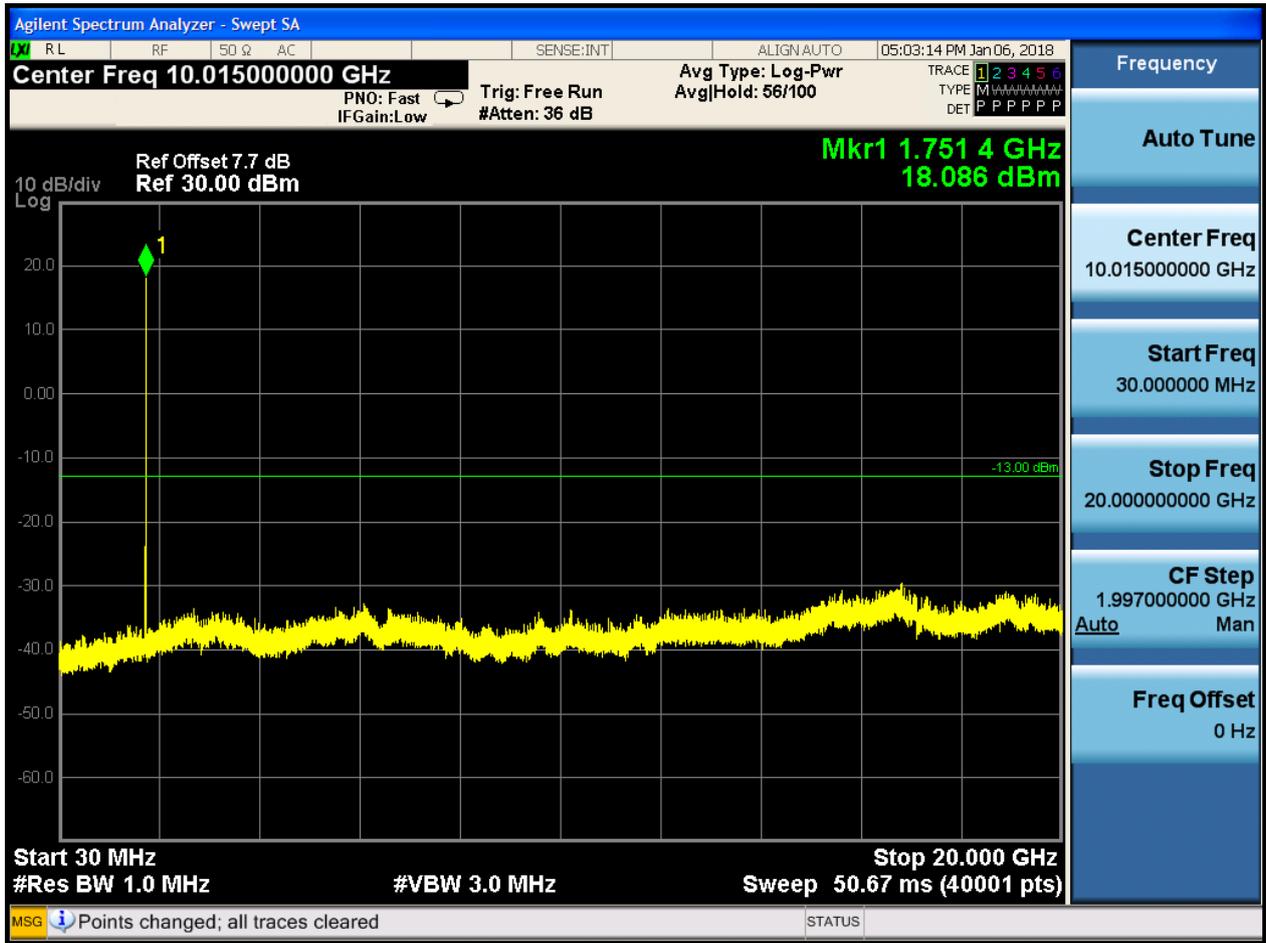## 5.1.2.1.1 Test Channel = LCH
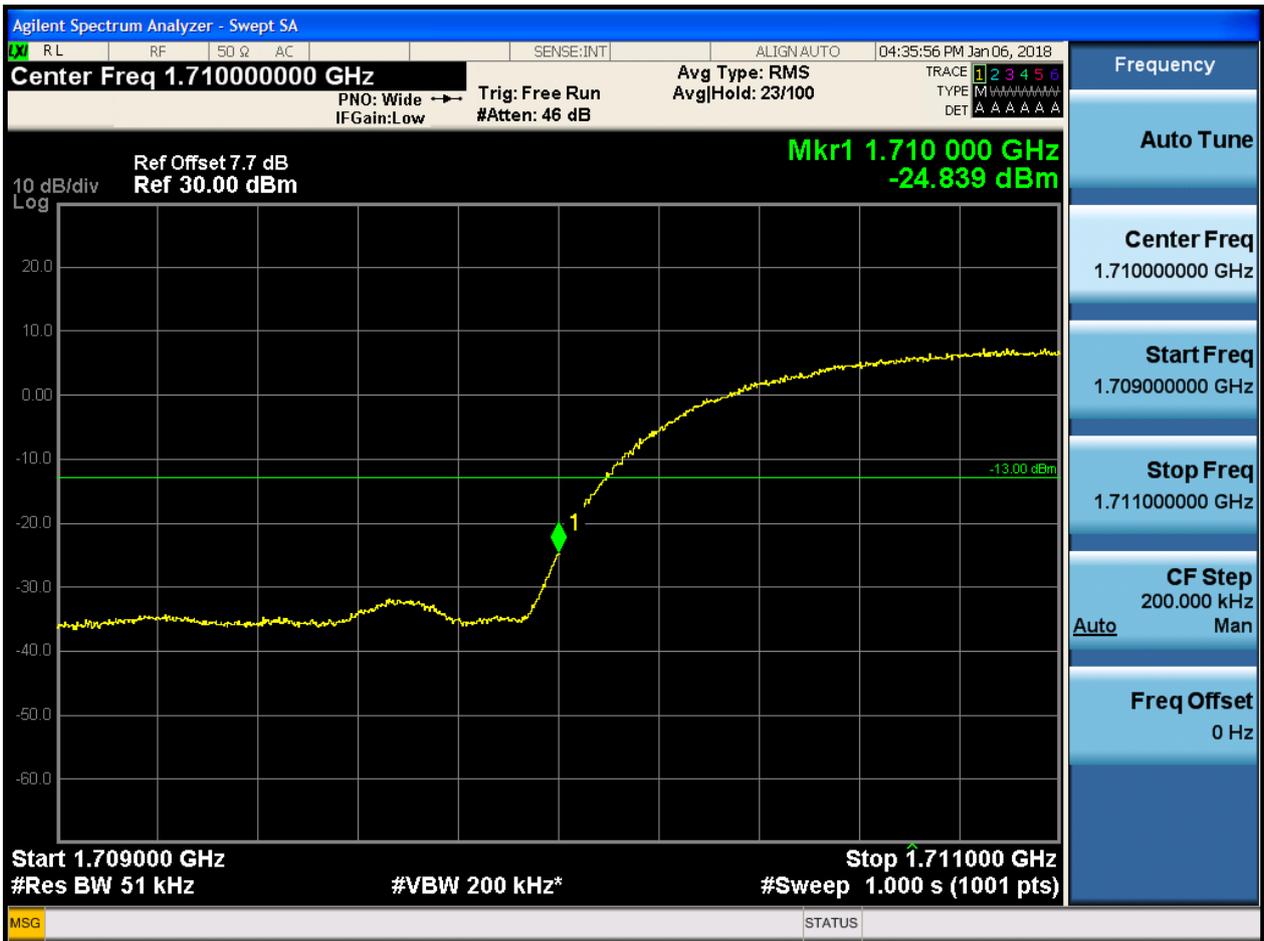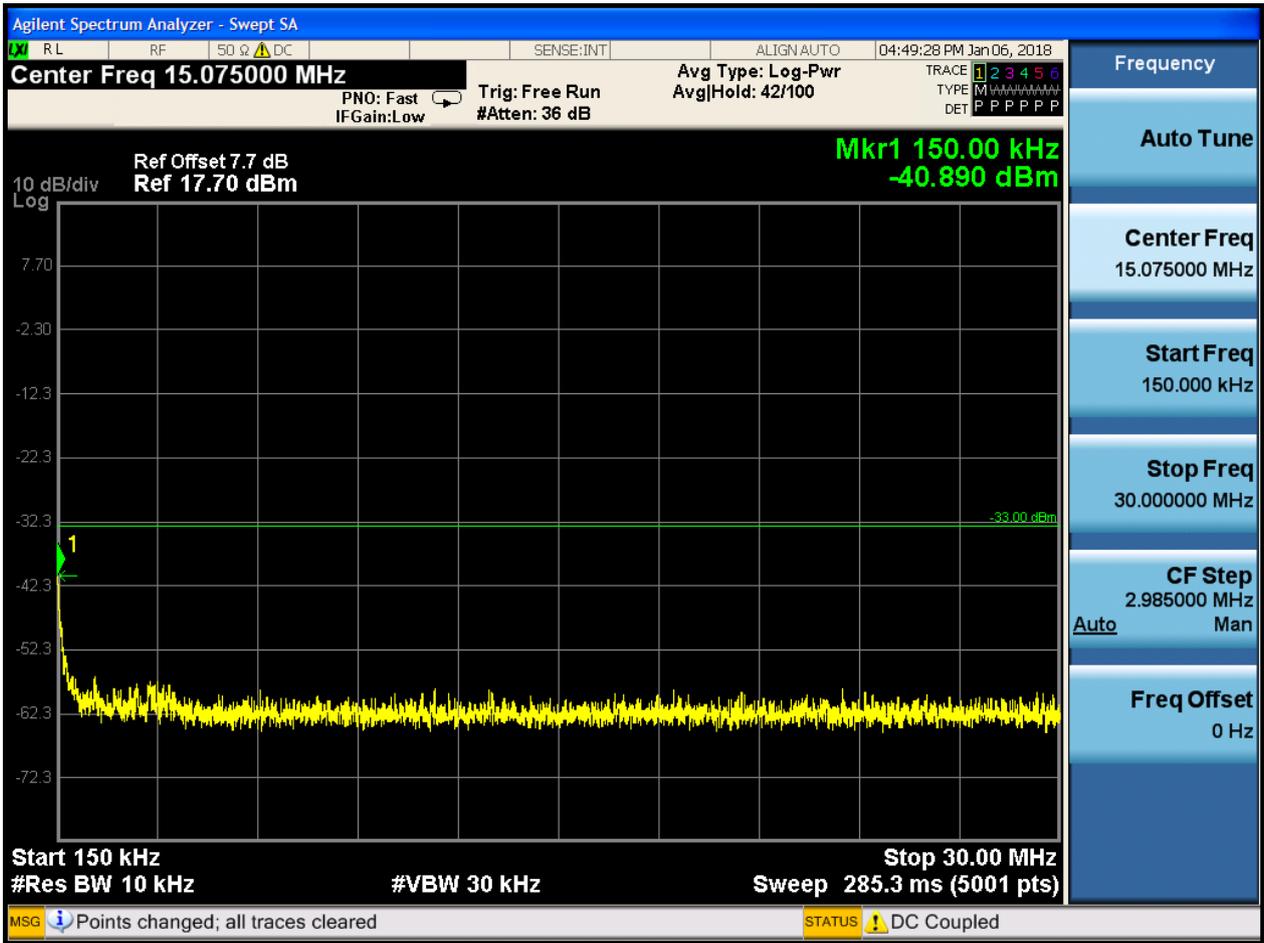
5.1.2.1.2 Test Channel = HCH

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
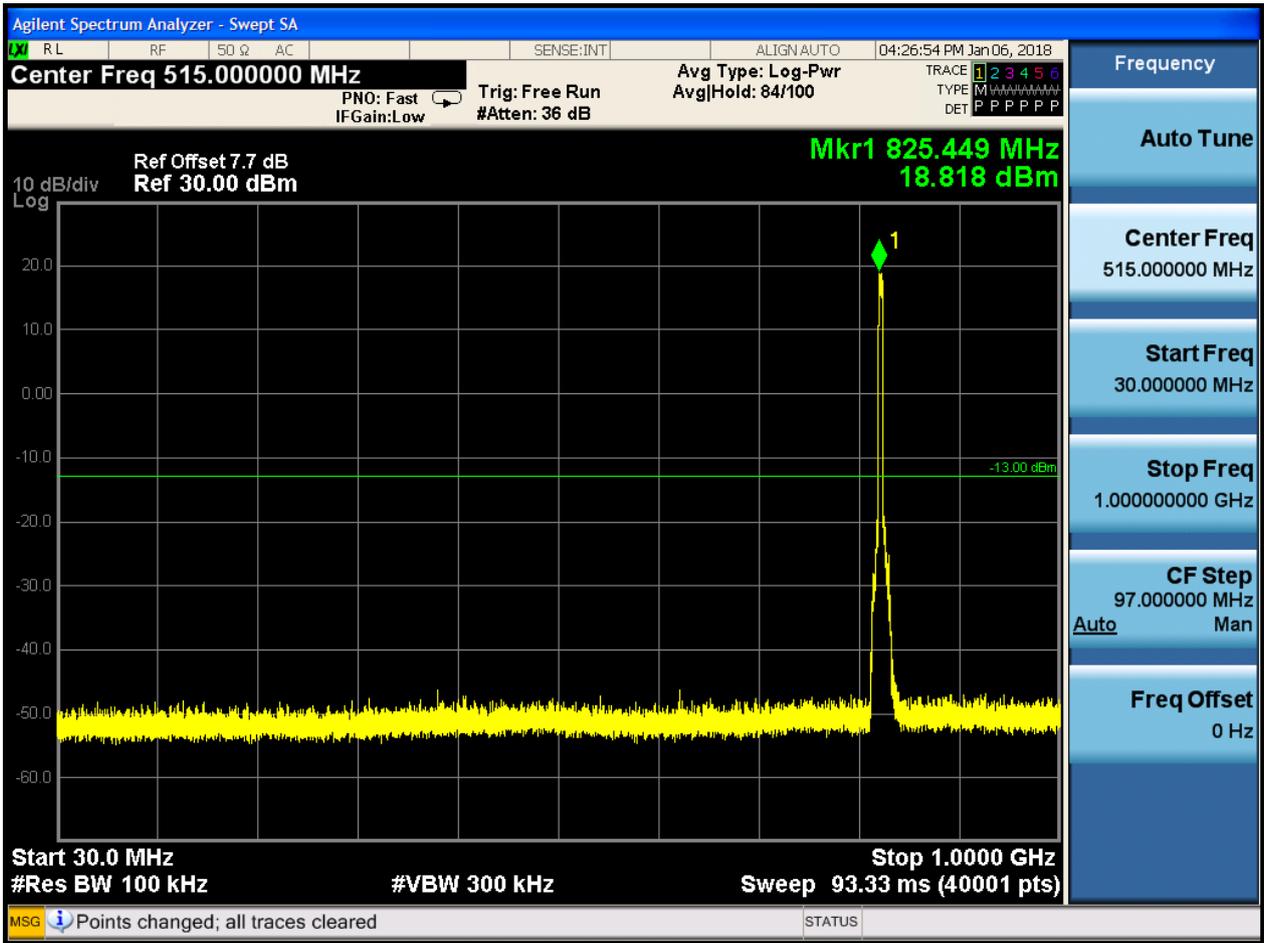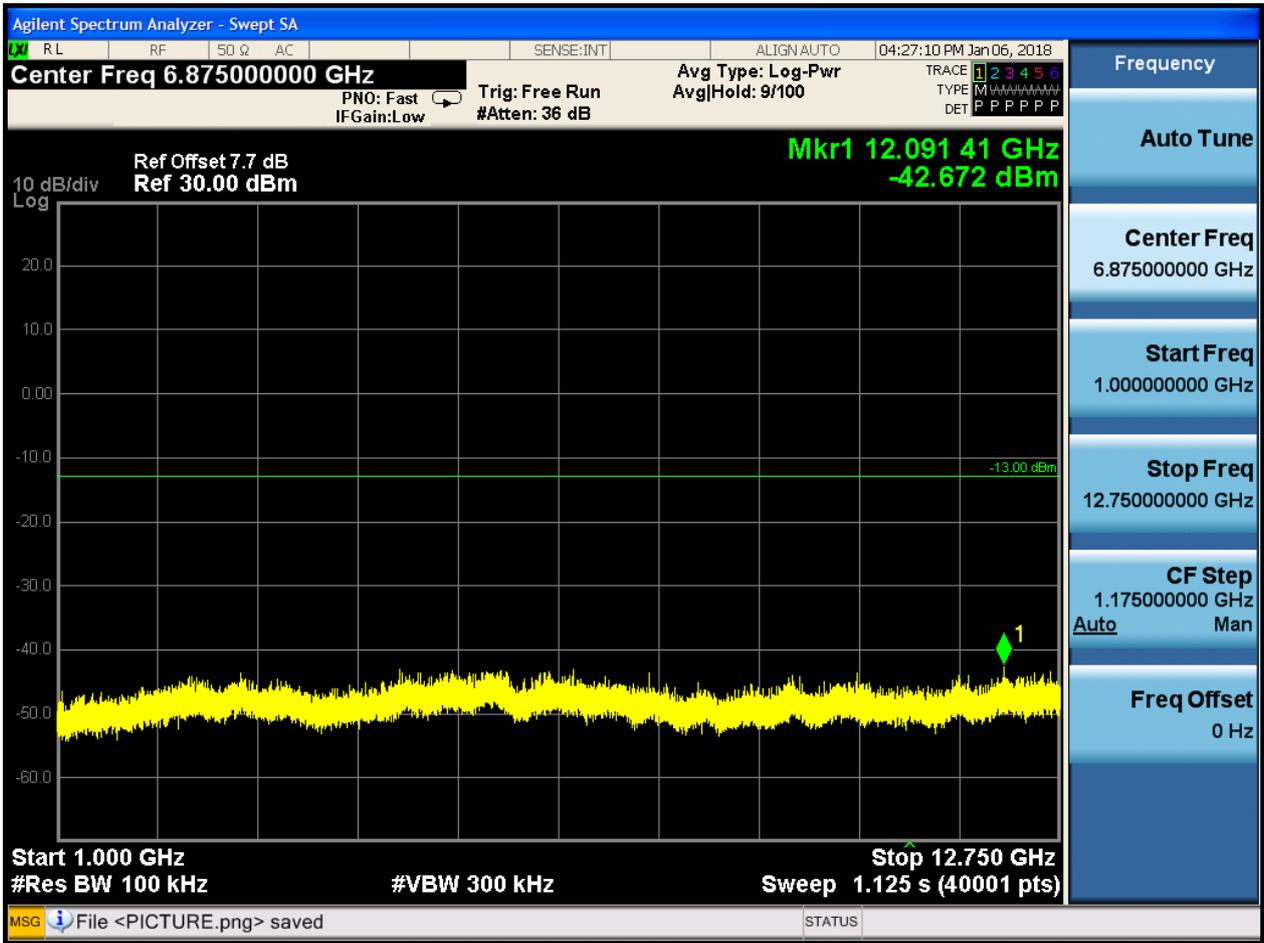
6.1.1.1.2 Test Channel = MCH
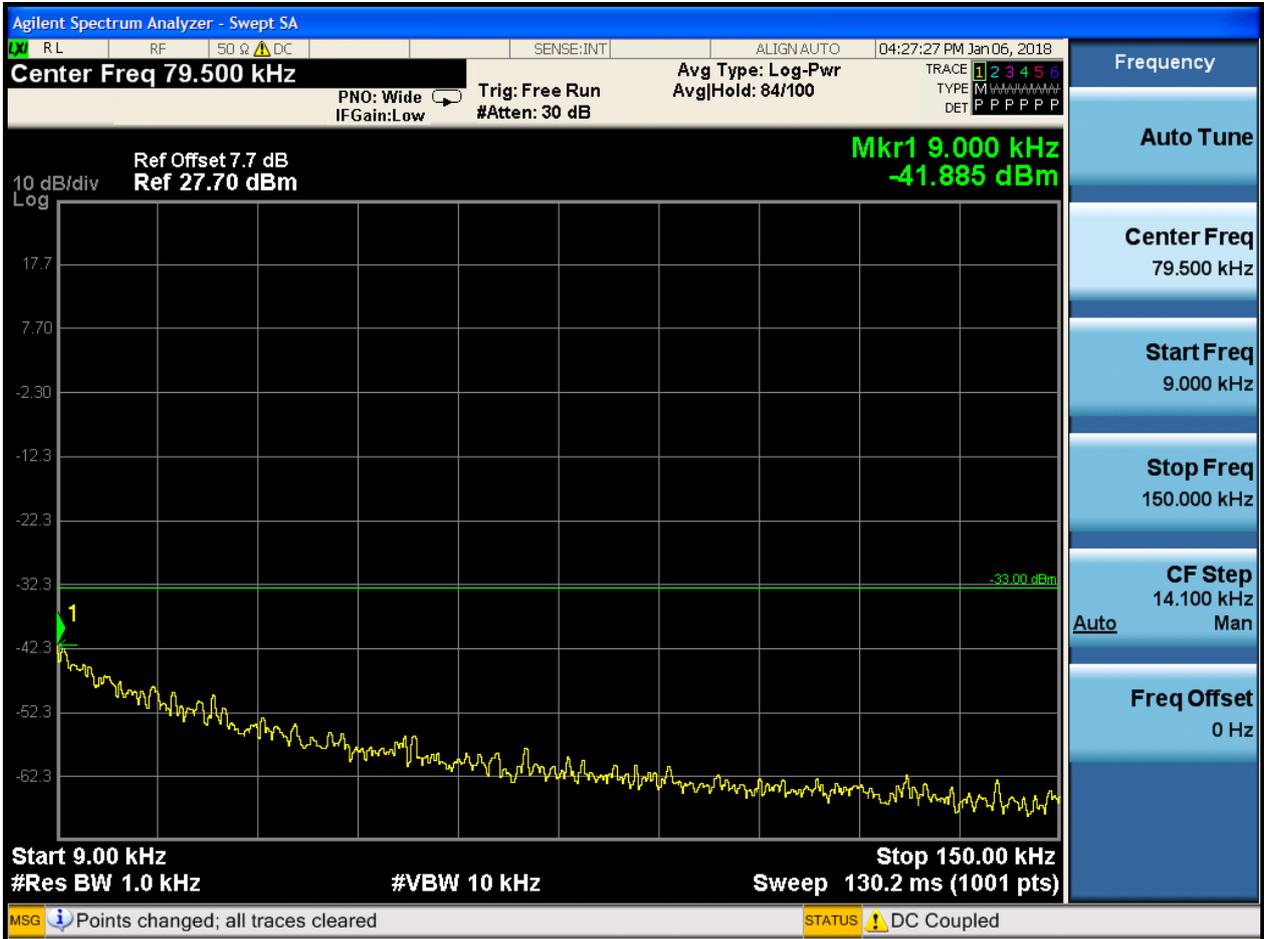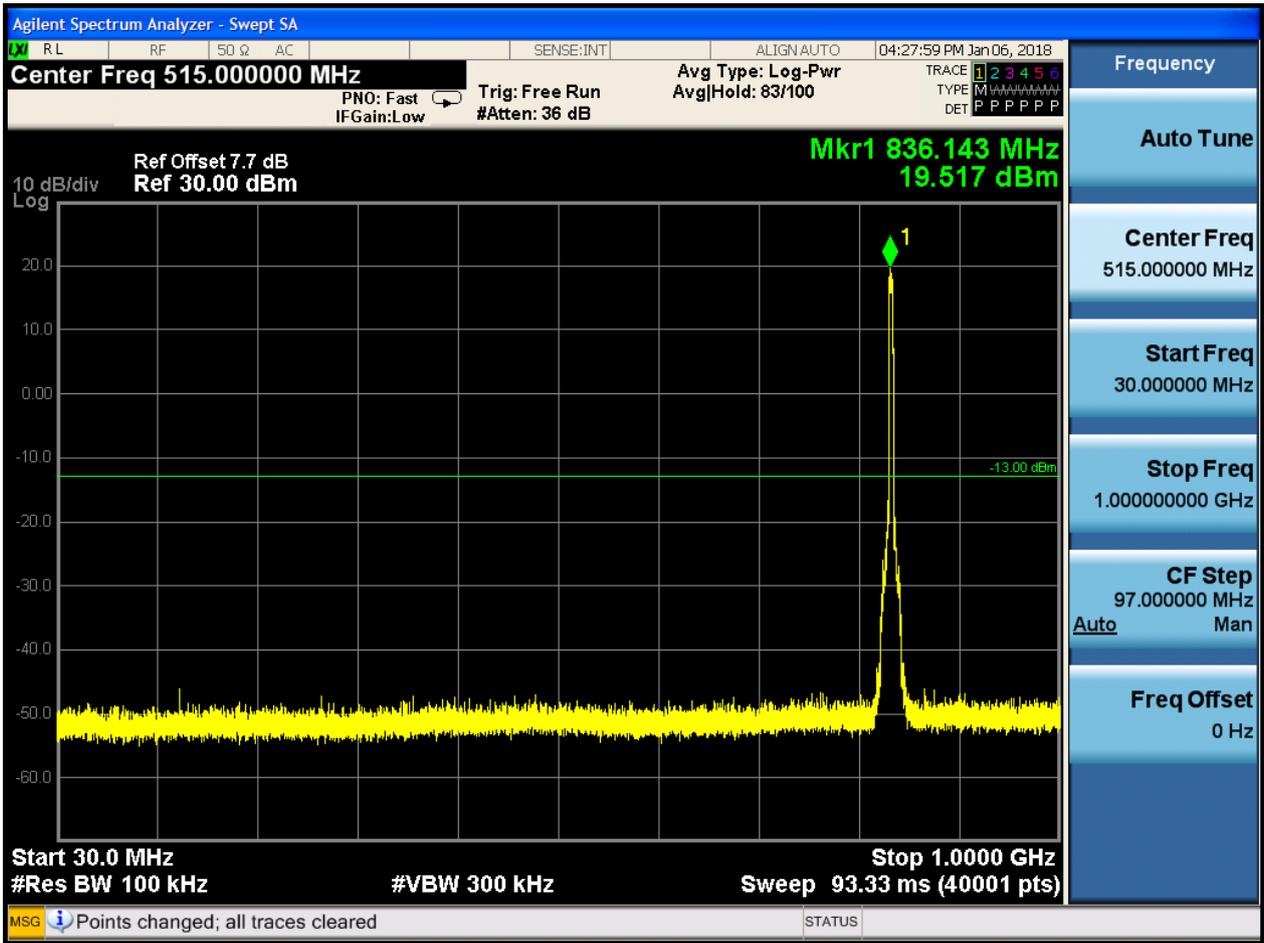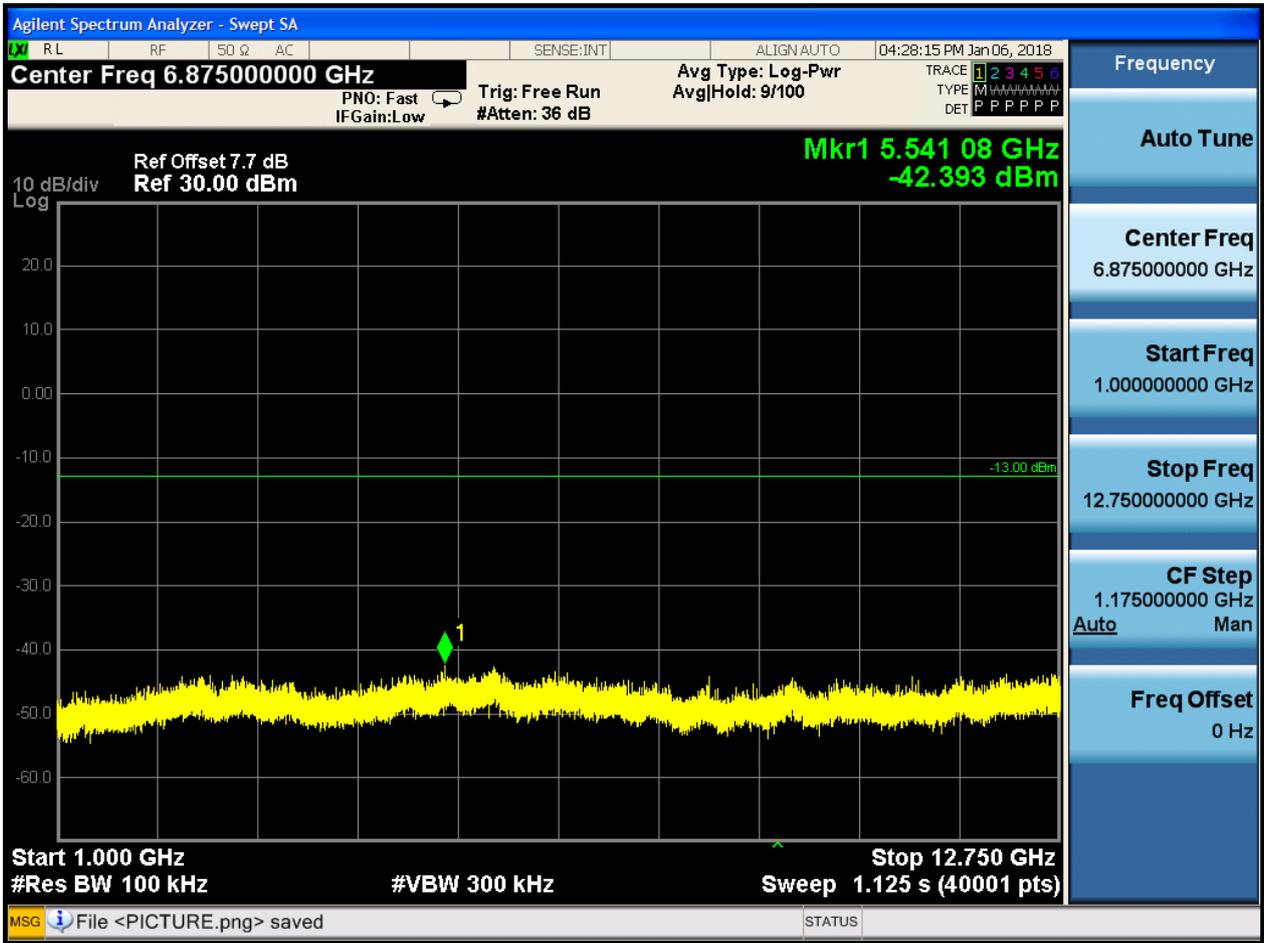
6.1.1.1.3 Test Channel = HCH
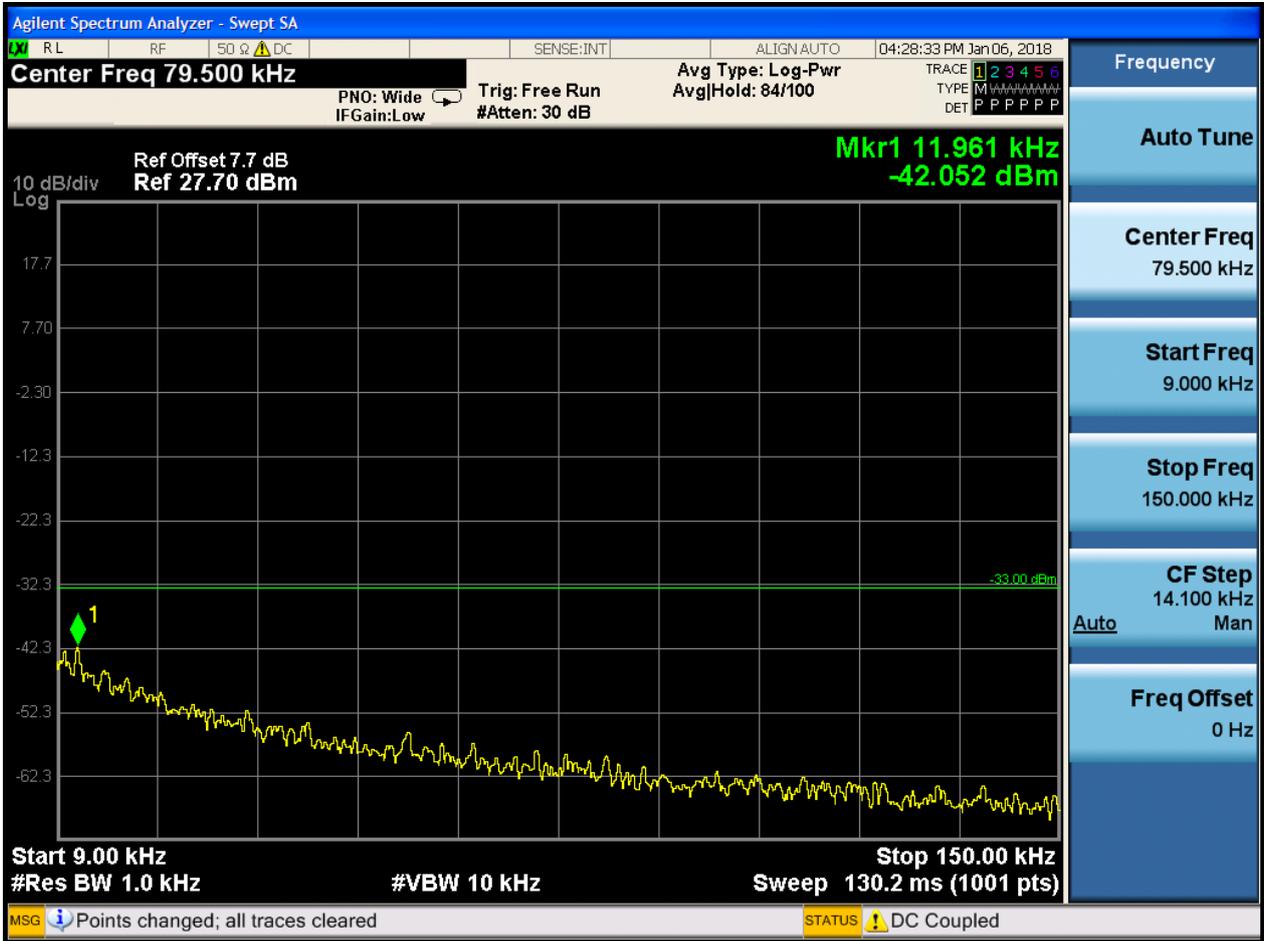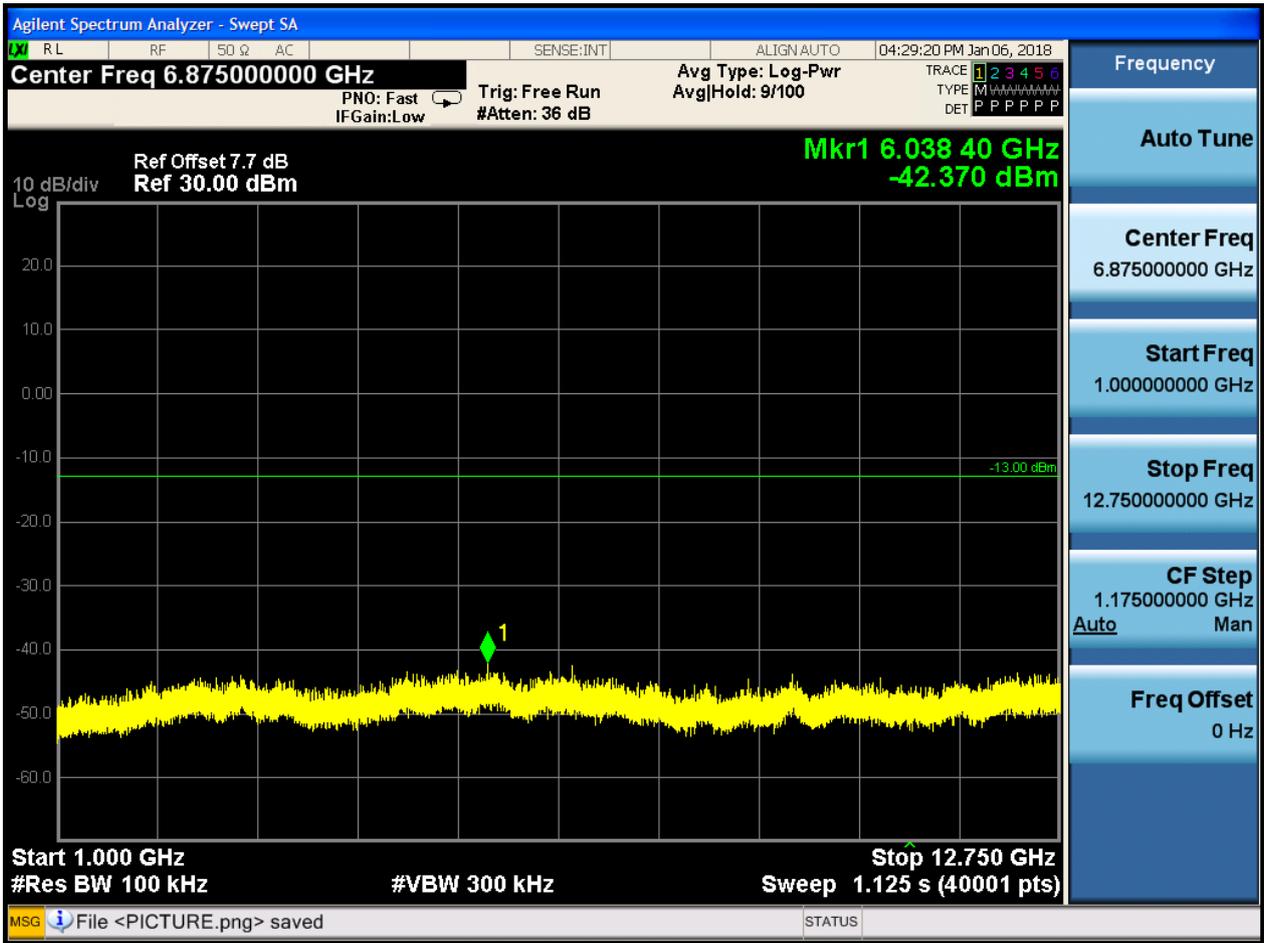
6.1.2 Test Band = WCDMA1700

6.1.2.1 Test Mode = UMTS/TM1

6.1.2.1.1 Test Channel = LCH

6.1.2.1.2 Test Channel = MCH

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Agilent Spectrum Analyzer - Swept SA

LXI R L | RF | 50 Ω AC | | SENSE:INT | ALIGN AUTO | 05:02:25 PM Jan 06, 2018

Center Freq 10.015000000 GHz

PNO: Fast
IFGain:Low

Trig: Free Run
#Atten: 36 dB

Avg Type: Log-Pwr
Avg|Hold: 56/100

TRACE 1 2 3 4 5 6
TYPE M WWWWWWW
DET P P P P P P

Mkr1 1.731 9 GHz
24.273 dBm

10 dB/div
Log
Ref Offset 7.7 dB
Ref 30.00 dBm

20.0
10.0
0.00
-10.0 .... -13.00 dBm
-20.0
-30.0
-40.0
-50.0
-60.0

Start 30 MHz
#Res BW 1.0 MHz   #VBW 3.0 MHz

Stop 20.000 GHz
Sweep 50.67 ms (40001 pts)

MSG (i) Points changed; all traces cleared   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

6.1.2.1.3 Test Channel = HCH

6.1.3 Test Band = WCDMA1900

6.1.3.1 Test Mode = UMTS/TM1

6.1.3.1.1 Test Channel = LCH
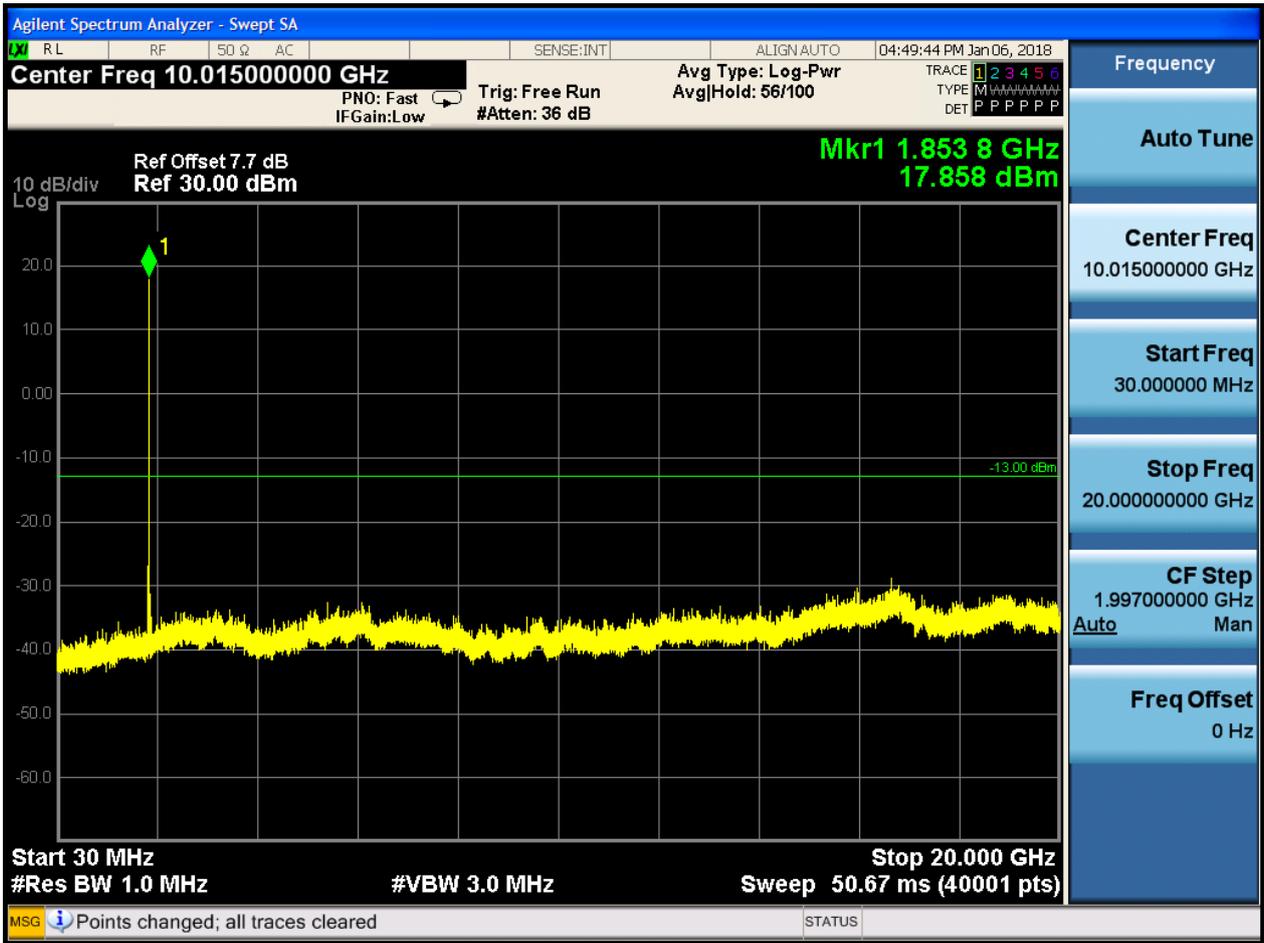
6.1.3.1.2 Test Channel = MCH
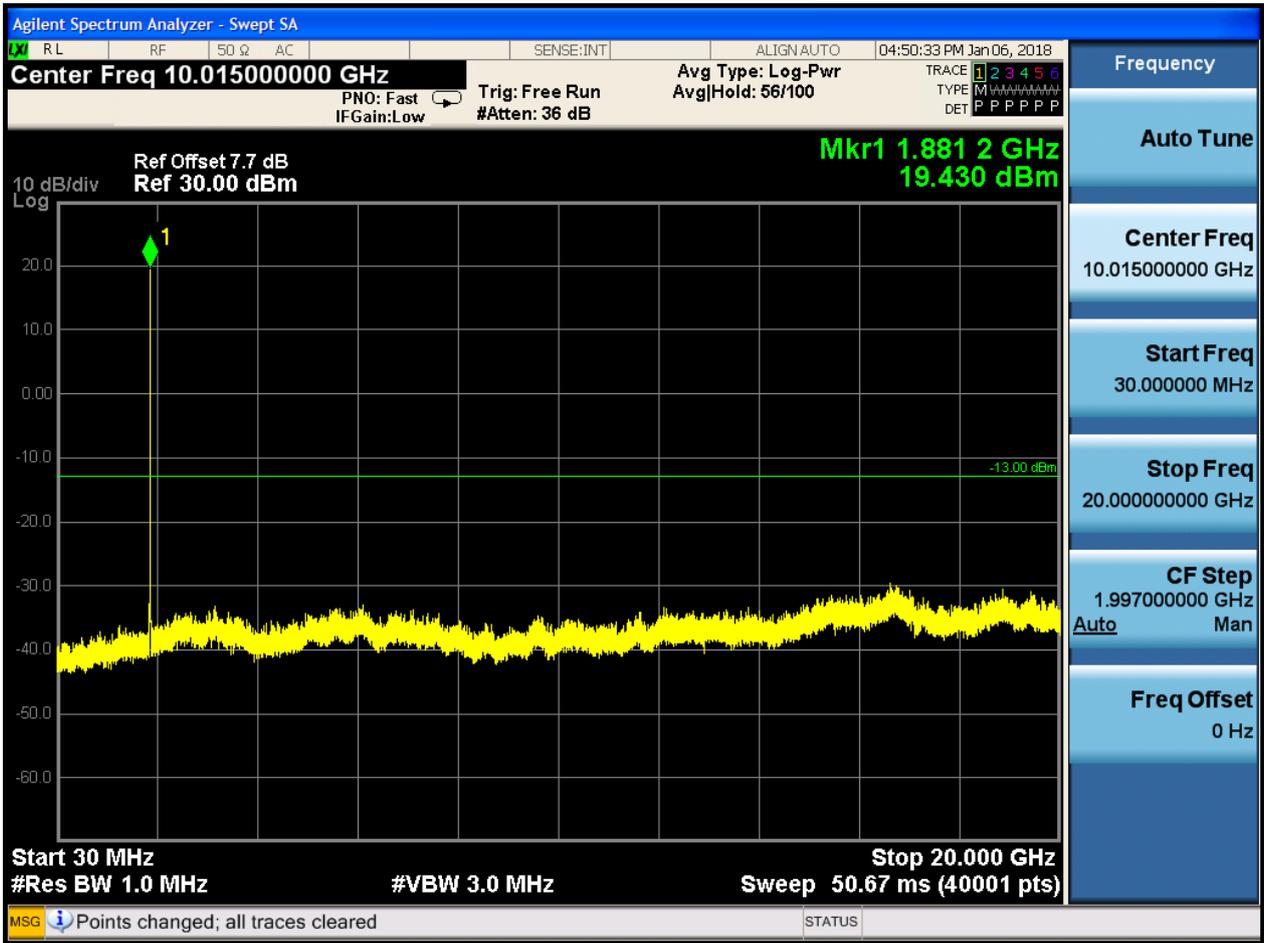
6.1.3.1.3 Test Channel = HCH
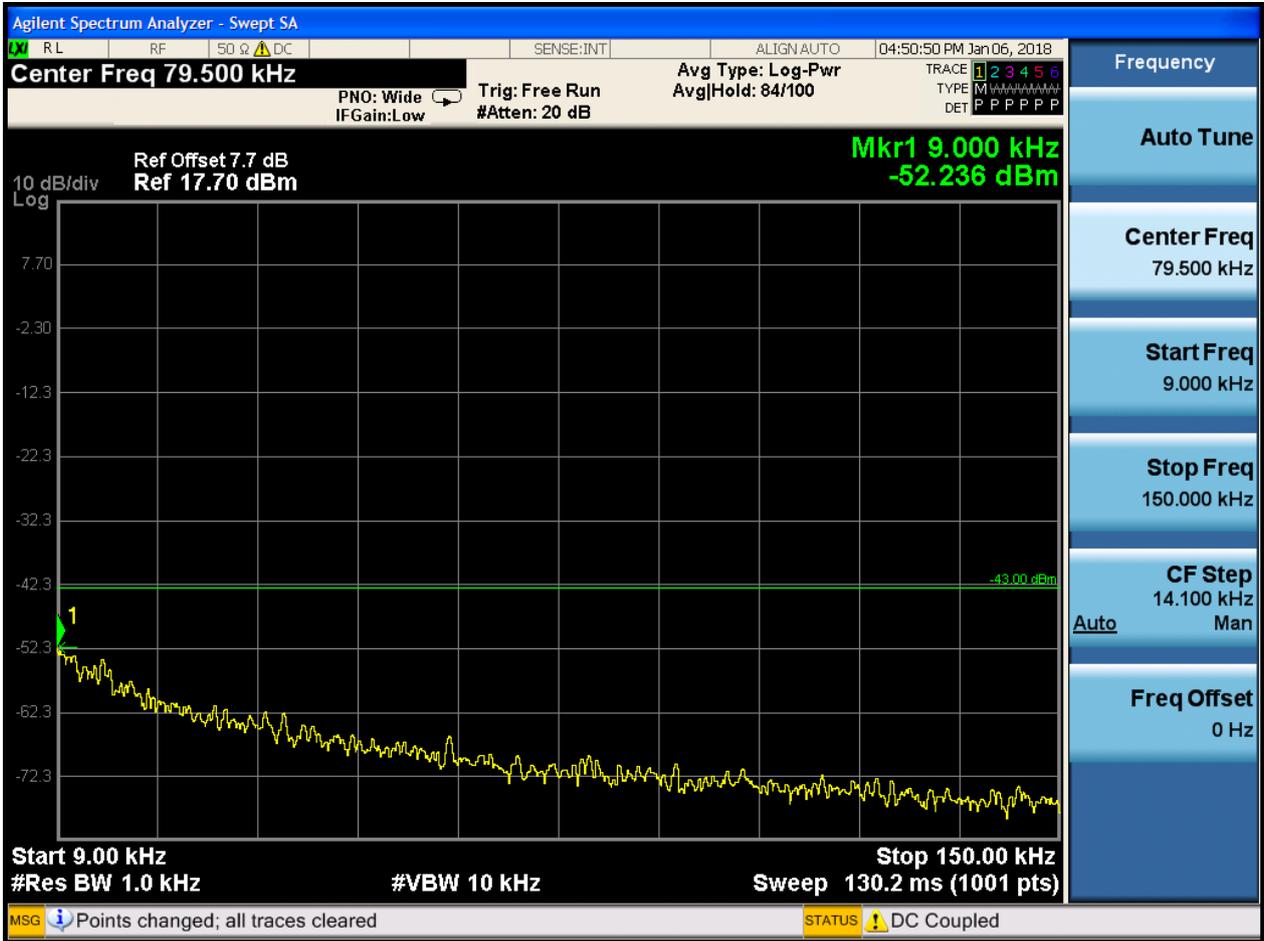
7Appendix_G: Field Strength of Spurious Radiation

Note:

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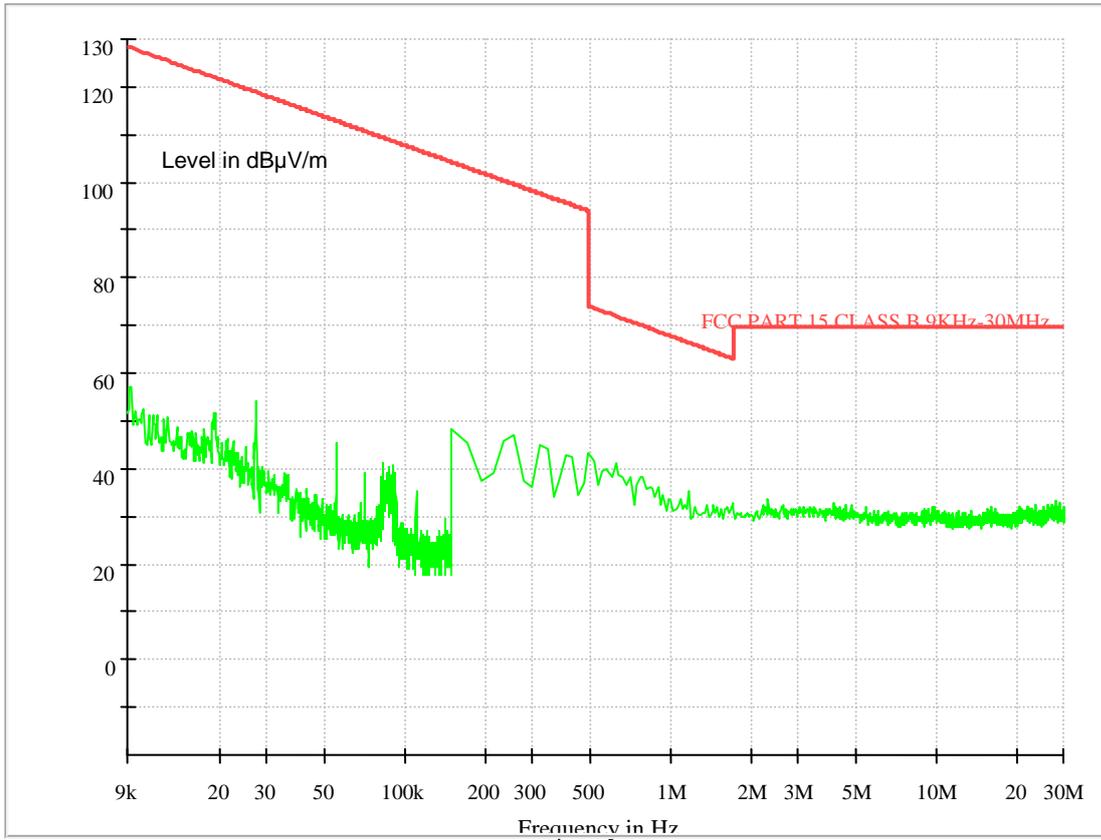
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

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

Part I - Test Plots

7.1 For UMTS

7.1.1 Test Band = WCDMA850_ANT1

7.1.1.1 Test Mode = UMTS/TM1

Copy of FCC PART22 WCDMA850_L
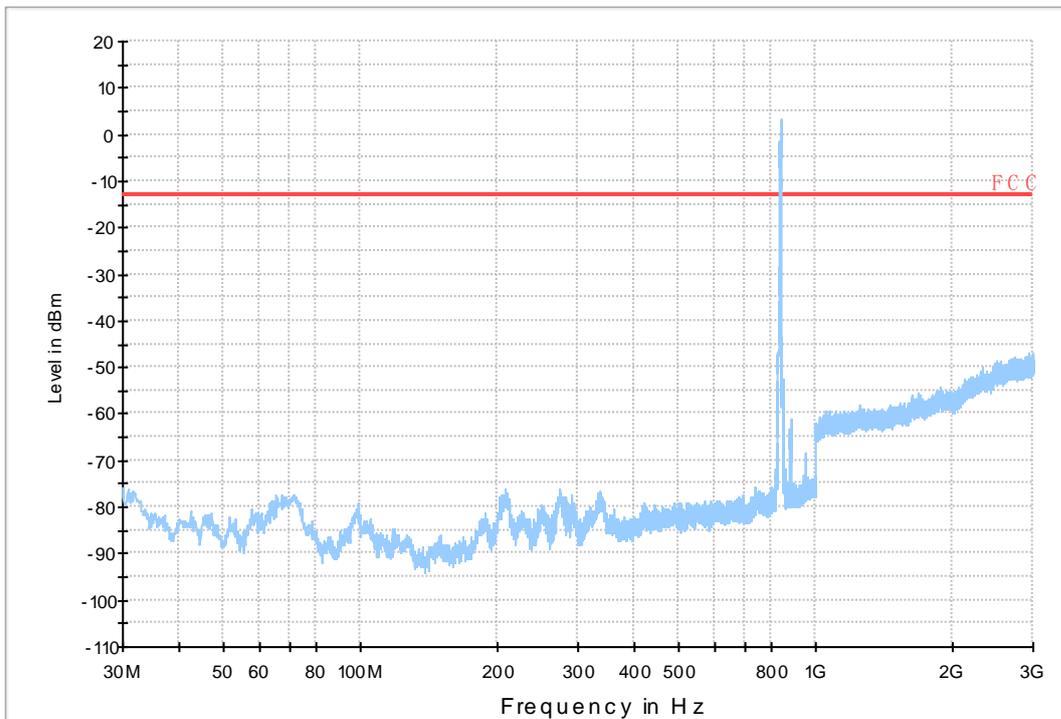
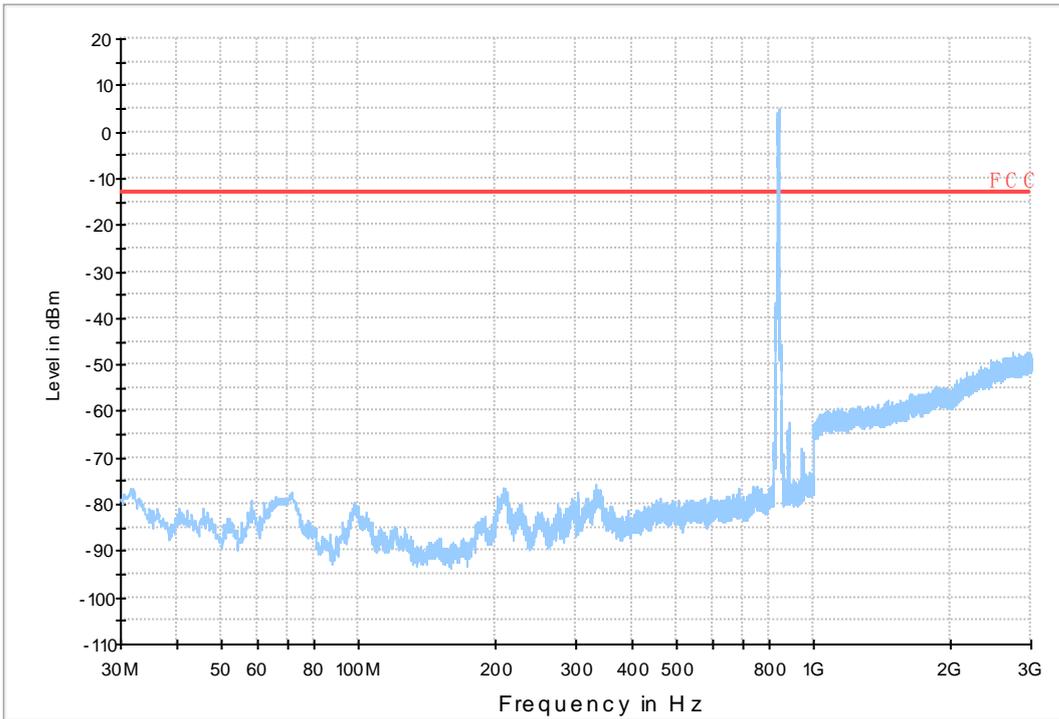Copy of FCC PART22 WCDMA850_H
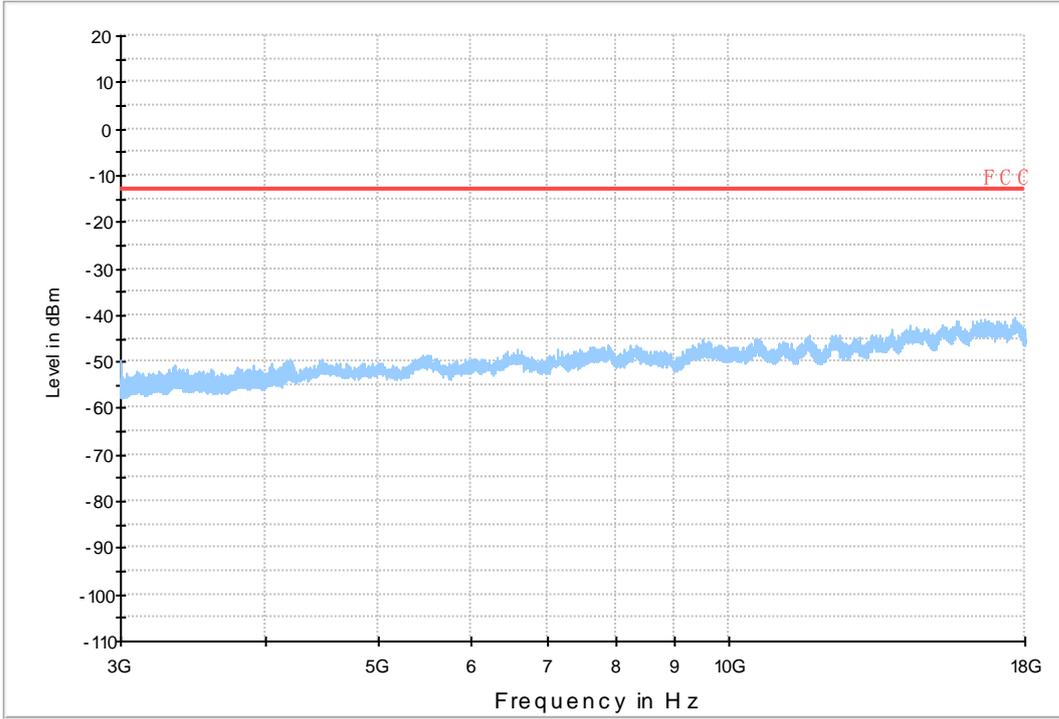
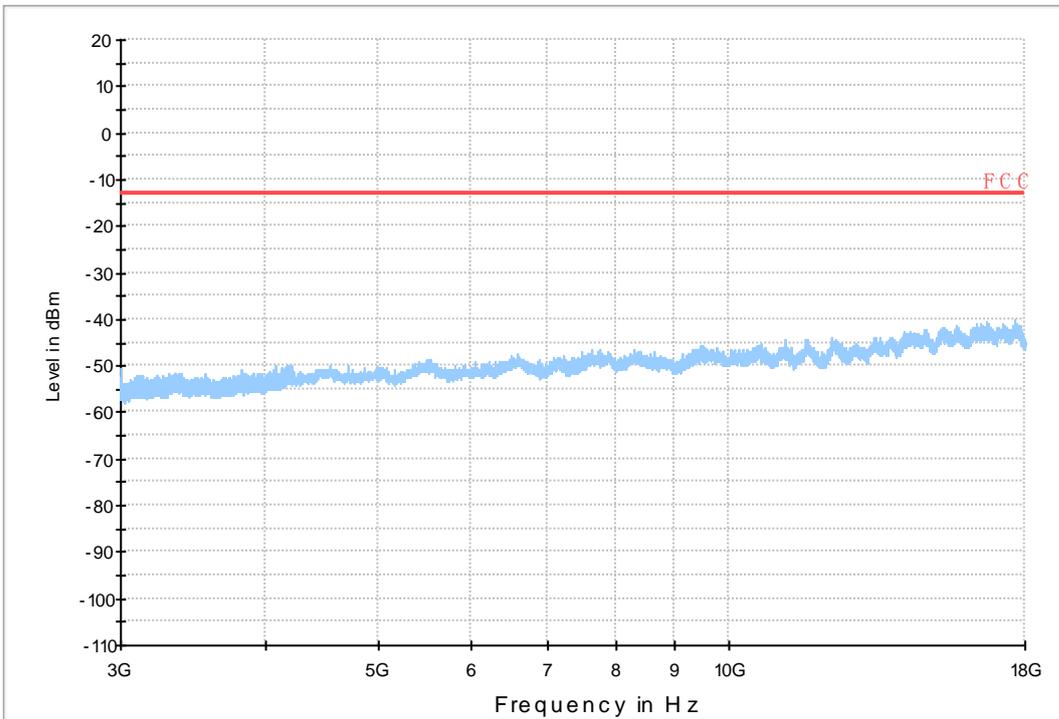## 7.1.2 Test Band = WCDMA850_ANT2

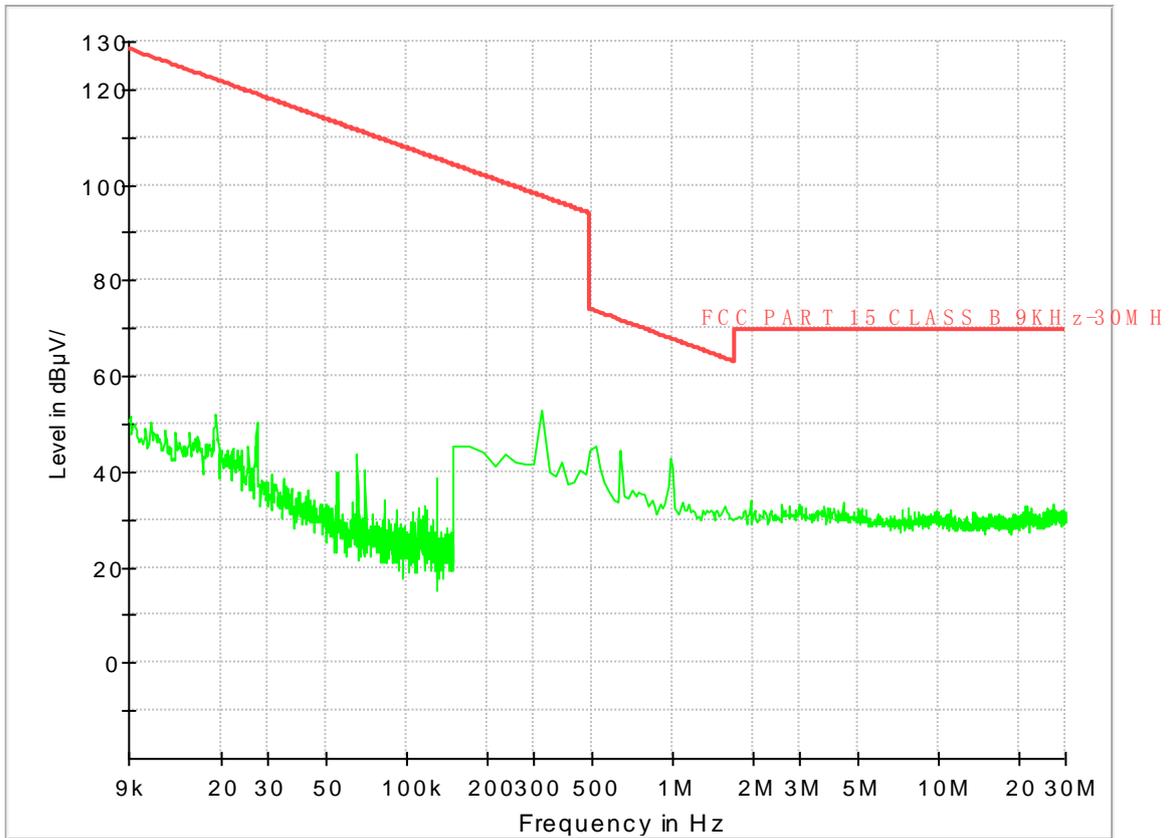## 7.1.2.1 Test Mode = UMTS/TM1
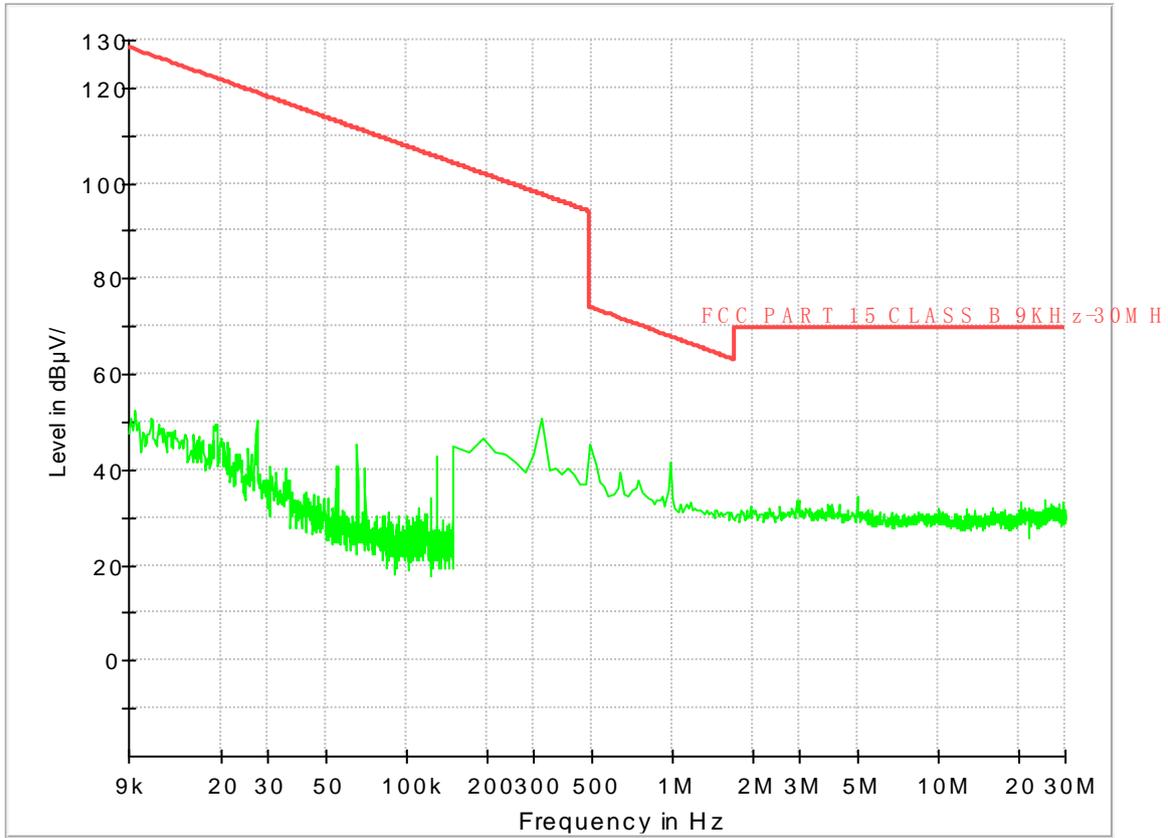
Copy of FCC PART22 WCDMA850_L

Copy of FCC PART22 WCDMA850_H

7.1.3 Test Band = WCDMA1700_ANT1

7.1.3.1 Test Mode = UMTS/TM1

Copy of FCC PART27 WCDMA1700_L

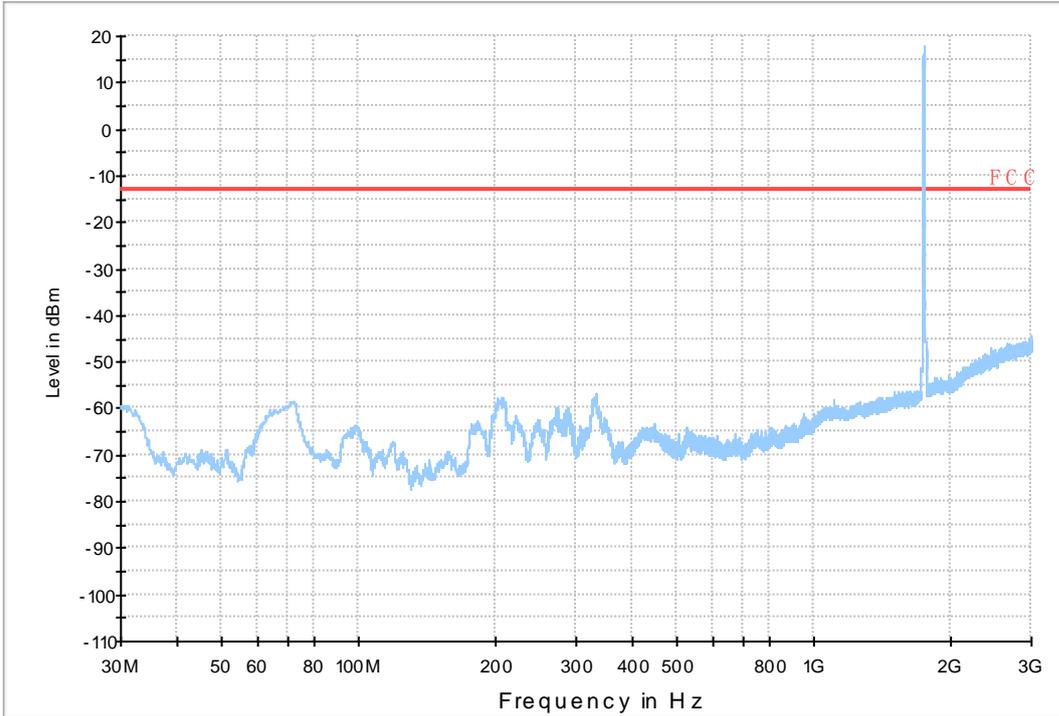## Copy of FCC PART27 WCDMA1700_H

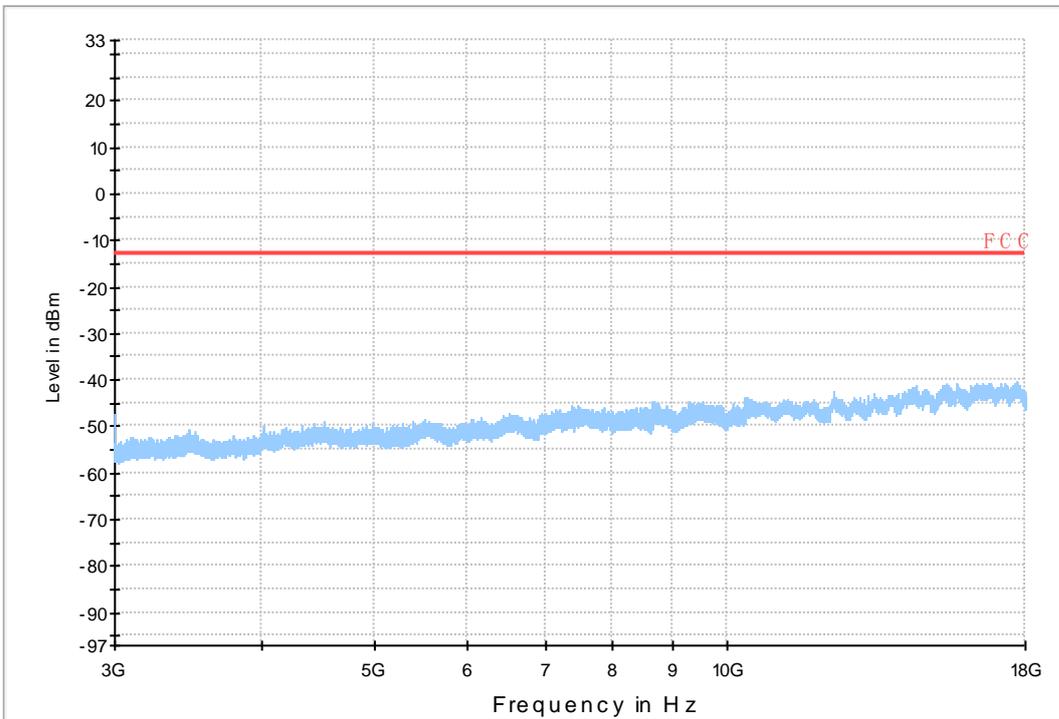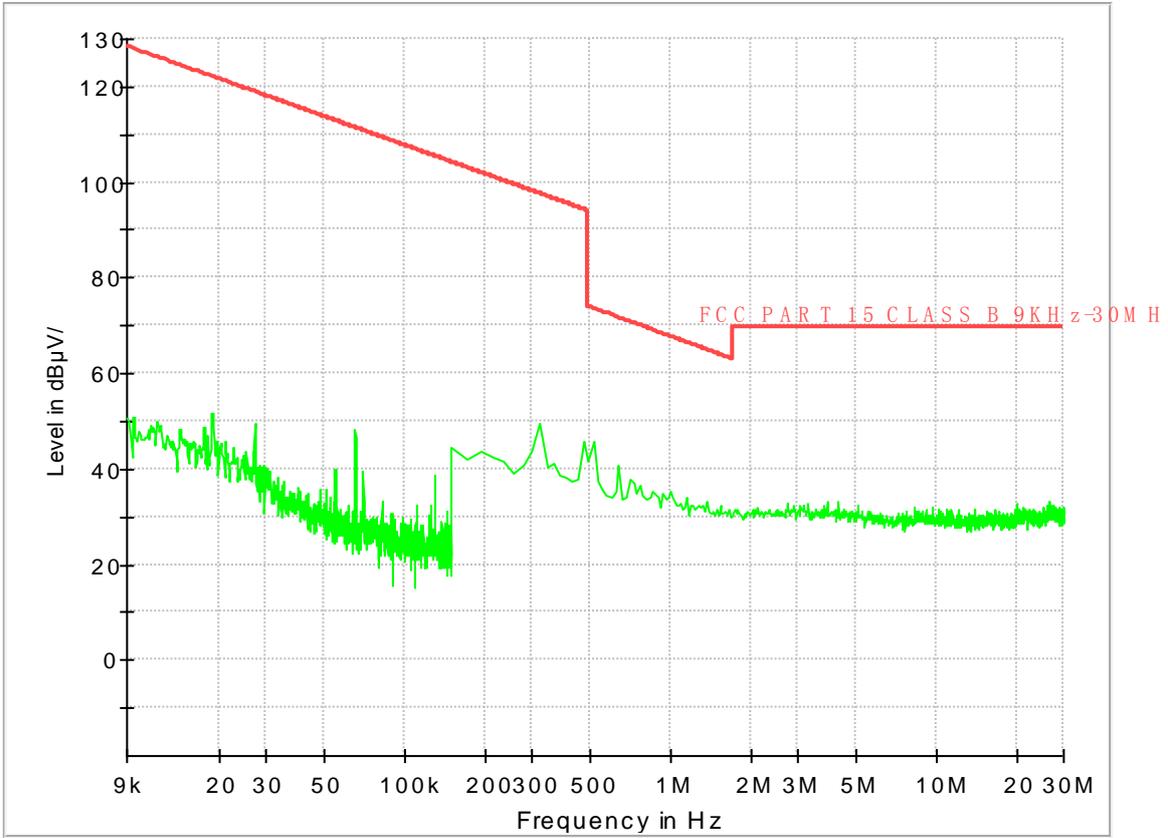## 7.1.4 Test Band = WCDMA1700_ANT2

7.1.4.1 Test Mode = UMTS/TM1

Copy of FCC PART27 WCDMA1700_L

Copy of FCC PART27 WCDMA1700_H

7.1.5 Test Band = WCDMA1900_ANT1

7.1.5.1 Test Mode = UMTS/TM1

Copy of FCC PART24 WCDMA1900_L

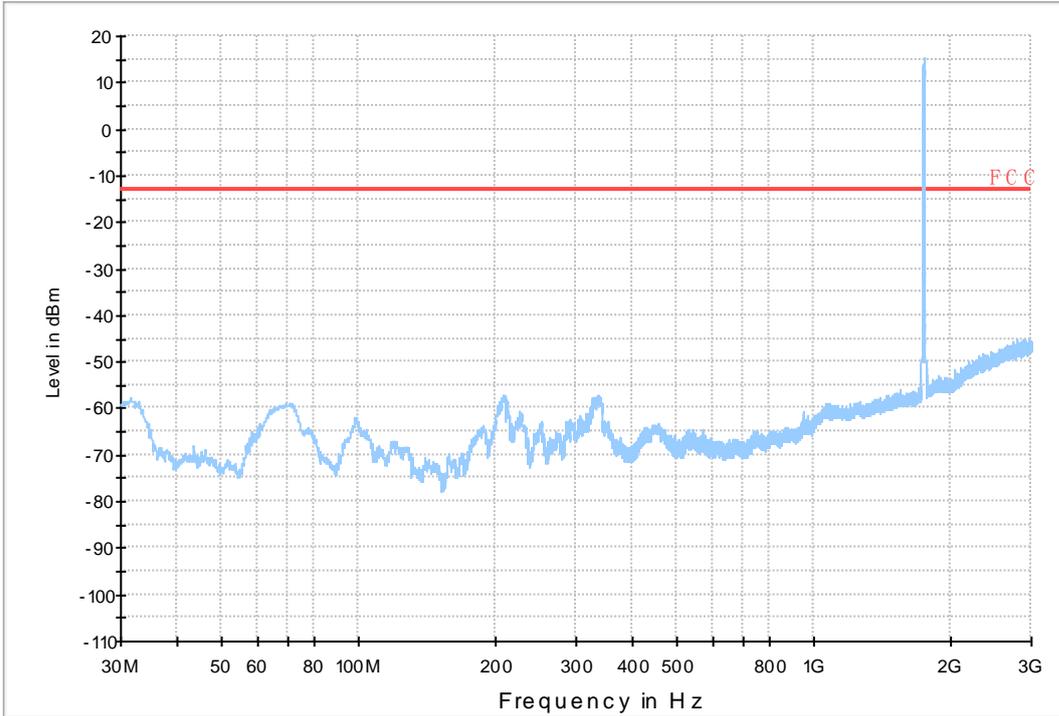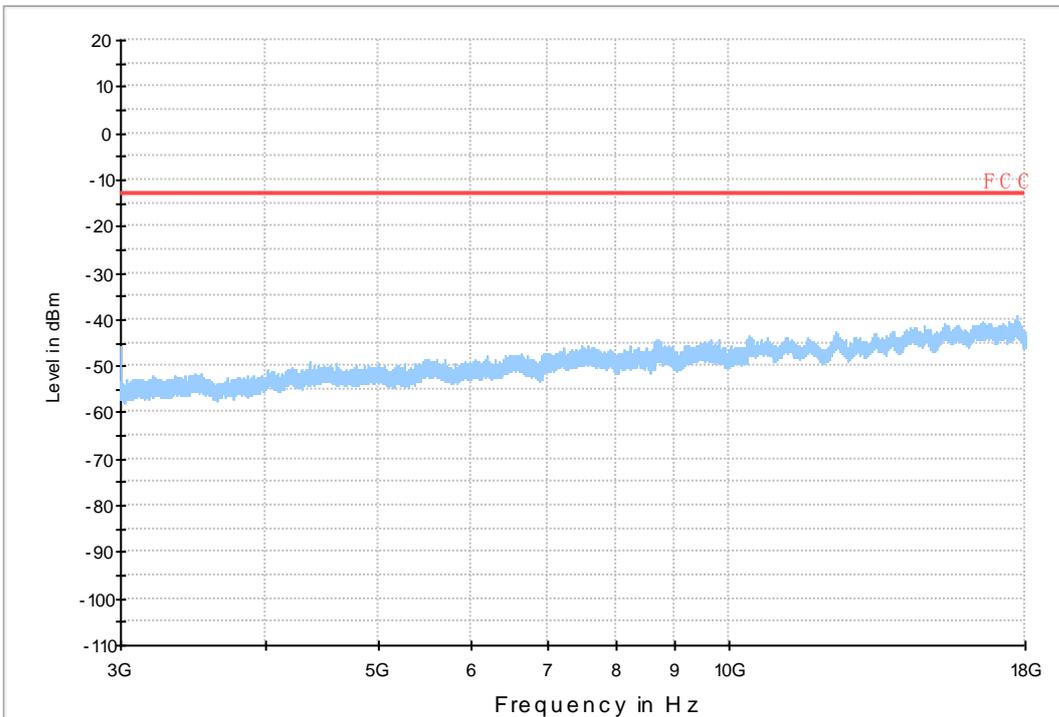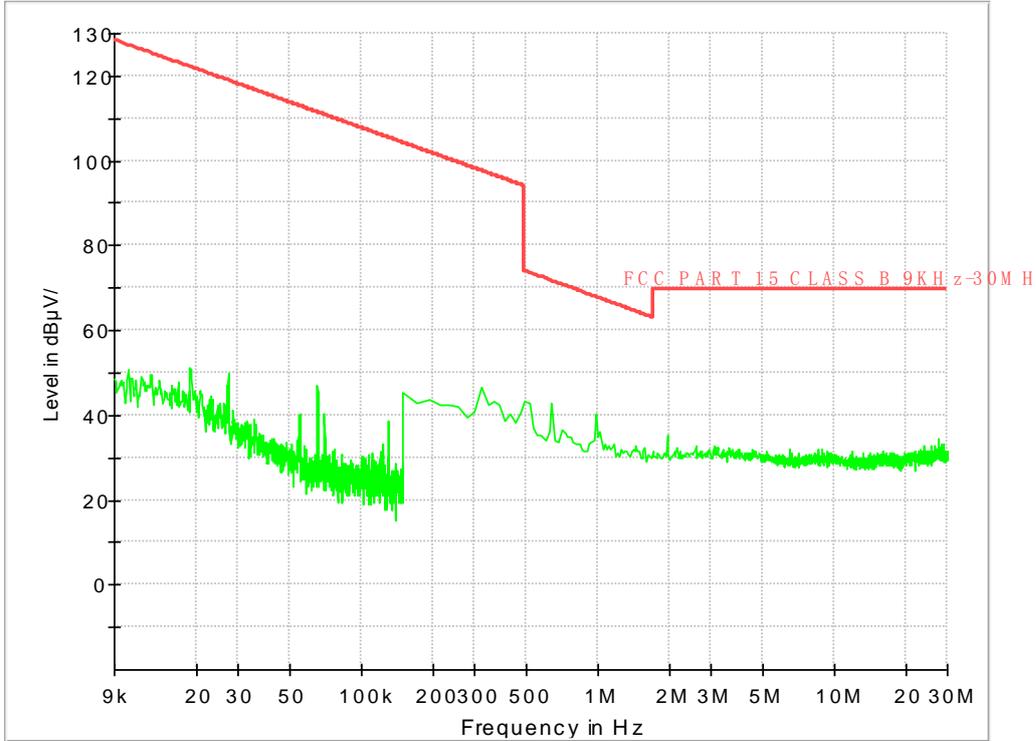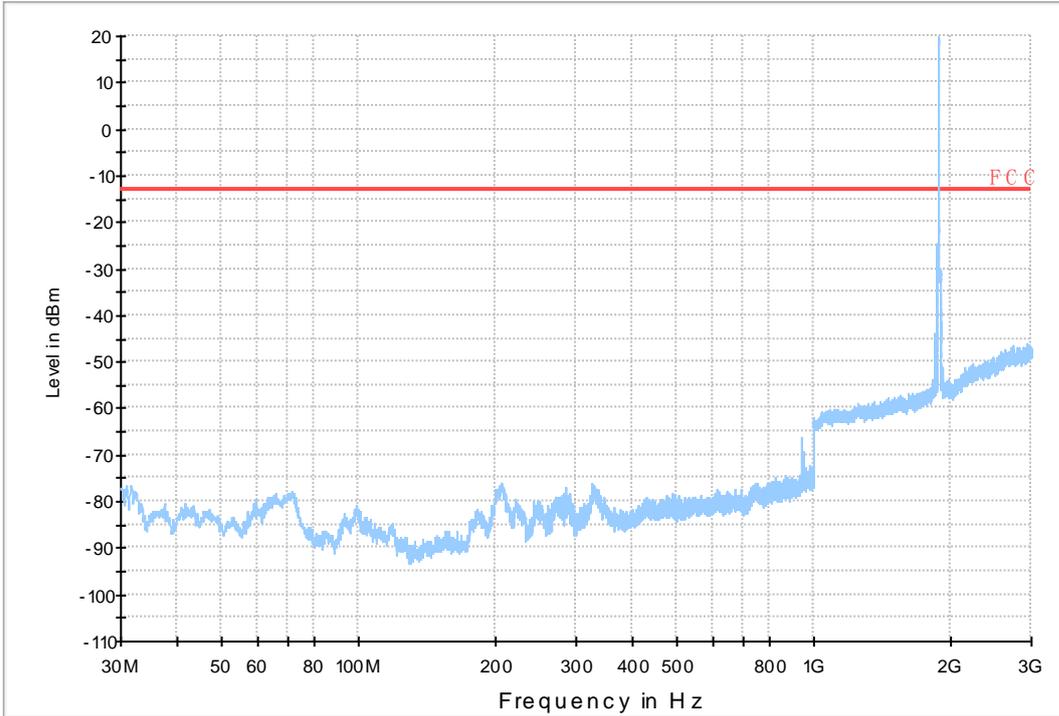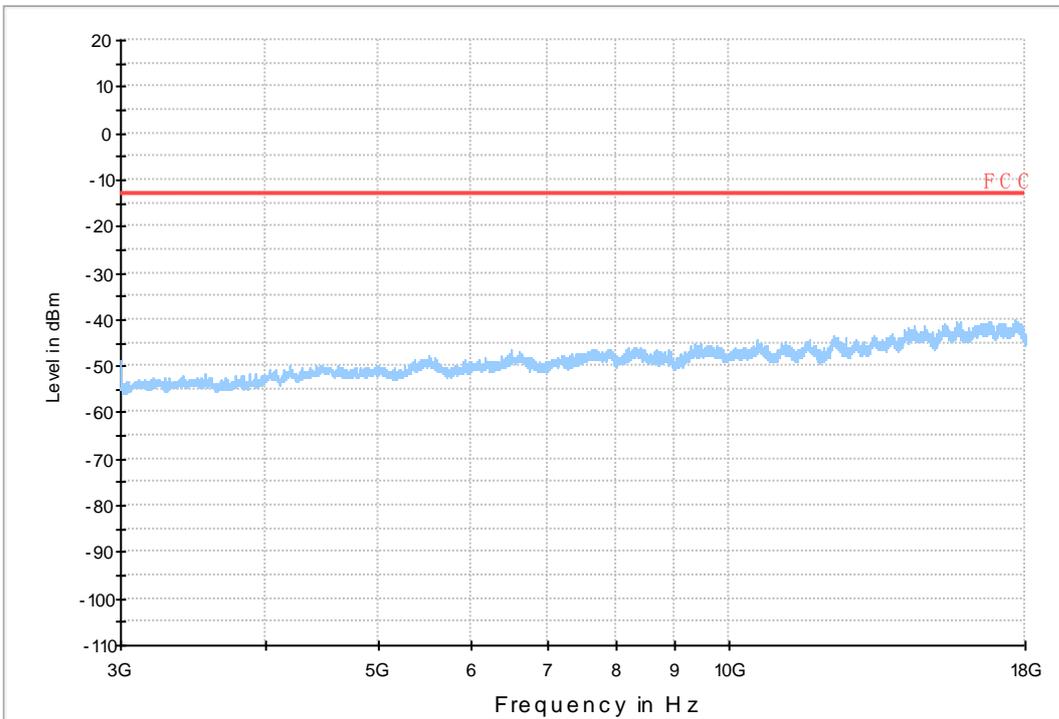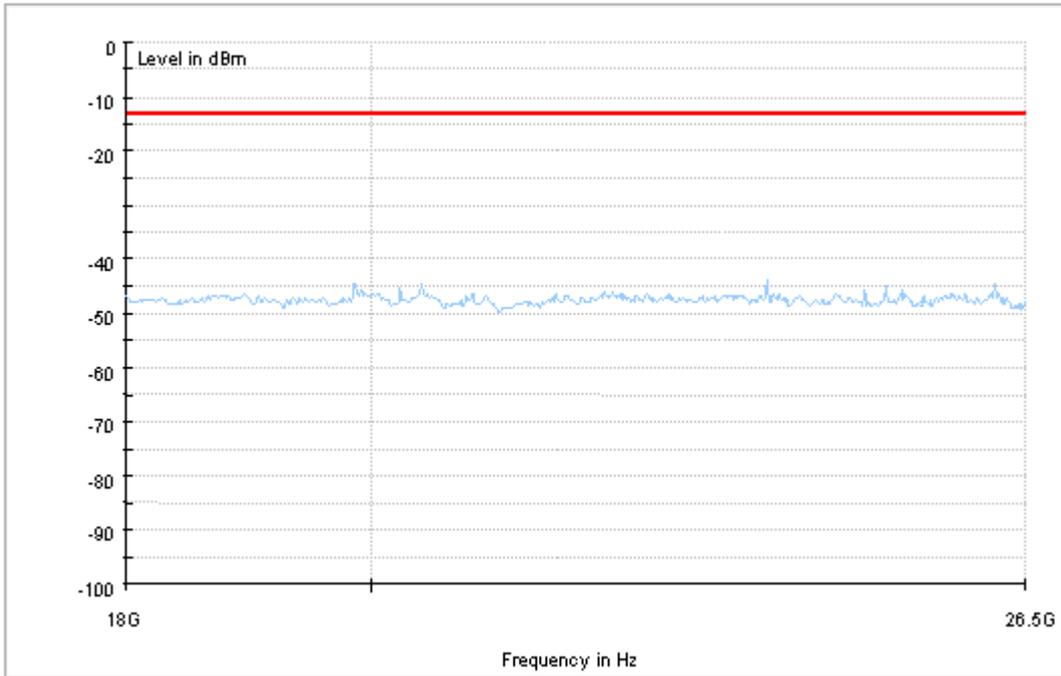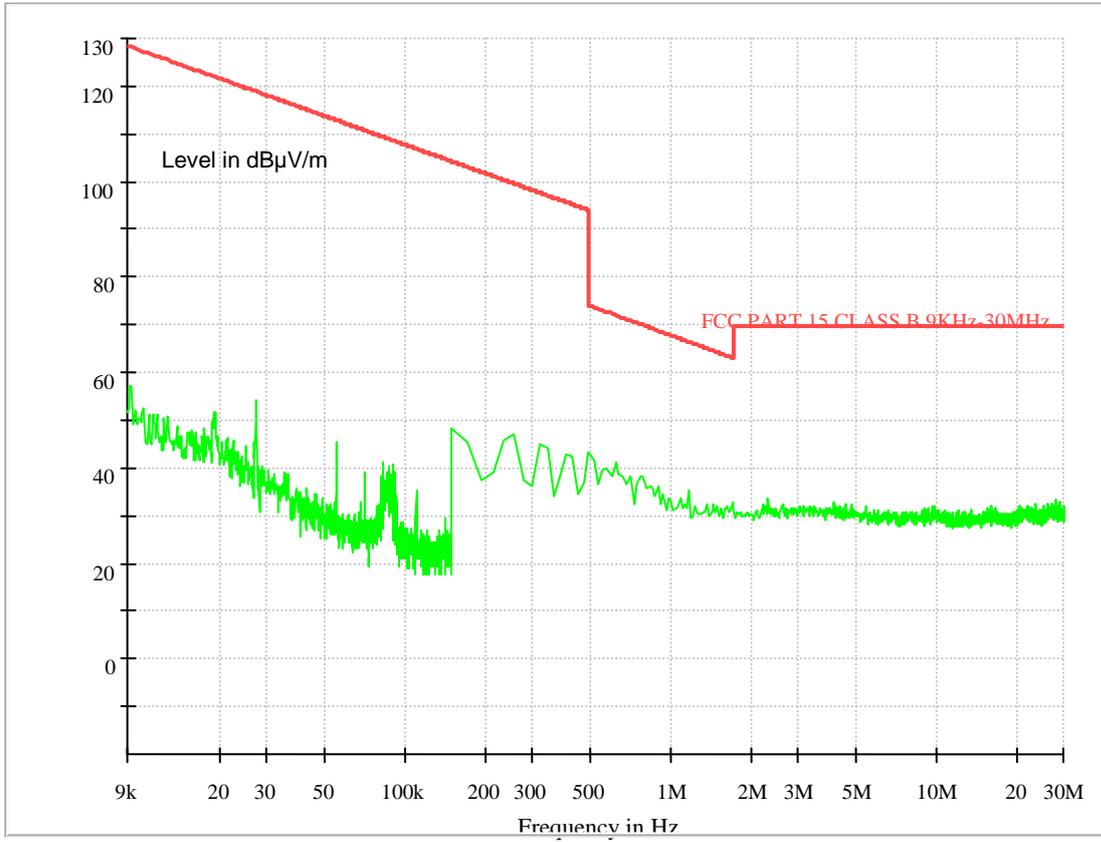Copy of FCC PART24 WCDMA1900_H

7.1.6 Test Band = WCDMA1900_ANT2

7.1.6.1 Test Mode = UMTS/TM1

Copy of FCC PART24 WCDMA1900_L
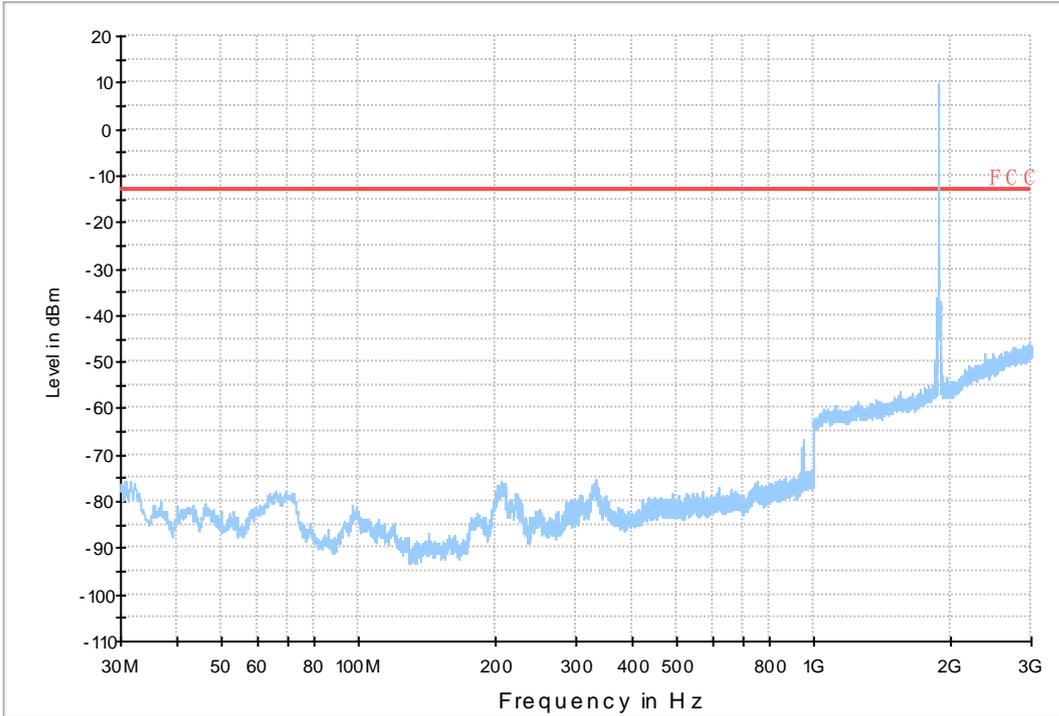
Copy of FCC PART24 WCDMA1900_H
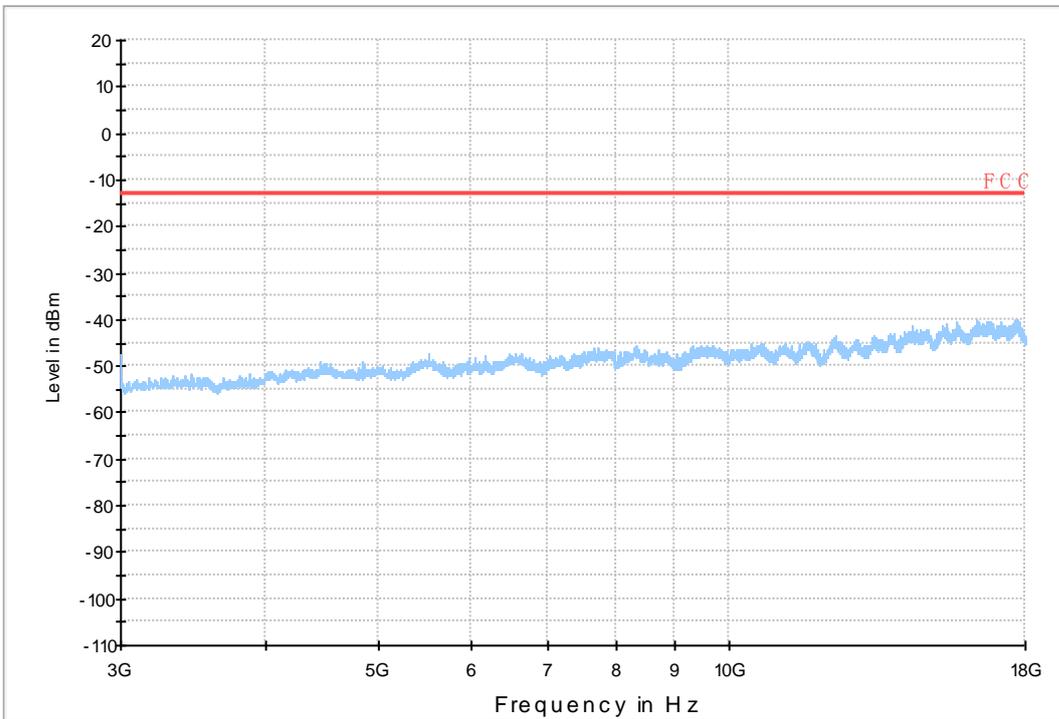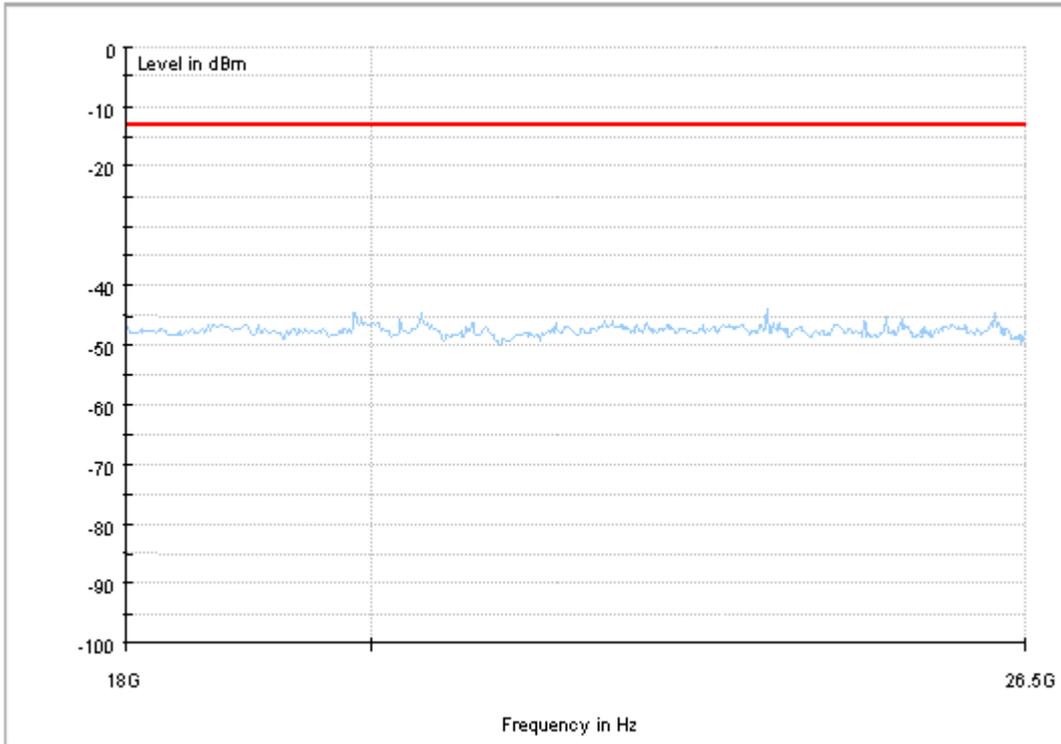
8Appendix_H: Frequency Stability

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	17.79	0.02153	PASS
				VN	-9.48	-0.01147	PASS
				VH	3.34	0.00404	PASS
		MCH	TN	VL	-1.22	-0.00146	PASS
				VN	-9.37	-0.0112	PASS
				VH	-4.09	-0.00489	PASS
		HCH	TN	VL	-9.52	-0.01124	PASS
				VN	-17.78	-0.021	PASS
				VH	5.36	0.00633	PASS
WCDMA1700	UMTS/TM1	LCH	TN	VL	5.91	0.00345	PASS
				VN	-5.43	-0.00317	PASS
				VH	4.93	0.00288	PASS
		MCH	TN	VL	7.98	0.00461	PASS
				VN	4.52	0.00261	PASS
				VH	-4.9	-0.00283	PASS
		HCH	TN	VL	9.02	0.00515	PASS
				VN	-0.99	-0.00056	PASS
				VH	7.1	0.00405	PASS
WCDMA1900	UMTS/TM1	LCH	TN	VL	-8	-0.00432	PASS
				VN	-2.27	-0.00123	PASS
				VH	1.39	0.00075	PASS
		MCH	TN	VL	1.56	0.00083	PASS
				VN	-1.22	-0.00065	PASS
				VH	4.56	0.00243	PASS
		HCH	TN	VL	-7.39	-0.00387	PASS
				VN	2.56	0.00134	PASS
				VH	4.03	0.00211	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
WCDMA850	UMTS/TM1	LCH	VN	-30	-0.89	-0.00108	PASS
				-20	-7.25	-0.00877	PASS
				-10	-4.24	-0.00513	PASS
				0	2.18	0.00264	PASS
				10	5.29	0.0064	PASS
				20	7.8	0.00944	PASS
				30	2.79	0.00338	PASS
				40	0.24	0.00029	PASS
				50	0.03	0.00004	PASS
		MCH	VN	-30	-11.93	-0.01426	PASS
				-20	-1.33	-0.00159	PASS
				-10	2.69	0.00322	PASS
				0	1.22	0.00146	PASS
				10	-3.3	-0.00395	PASS
				20	-5.39	-0.00644	PASS
				30	-13.52	-0.01616	PASS
				40	-8.01	-0.00958	PASS
				50	-10.25	-0.01225	PASS
		HCH	VN	-30	-15.5	-0.01831	PASS
				-20	-5.65	-0.00667	PASS
				-10	-1.65	-0.00195	PASS
				0	-6.06	-0.00716	PASS
				10	-2.38	-0.00281	PASS
				20	-15.79	-0.01865	PASS
				30	1.69	0.002	PASS
				40	4.07	0.00481	PASS
				50	0.11	0.00013	PASS
WCDMA1700	UMTS/TM1	LCH	VN	-30	9.22	0.00538	PASS
				-20	-0.69	-0.0004	PASS
				-10	4.61	0.00269	PASS
				0	8.36	0.00488	PASS
				10	2.94	0.00172	PASS
				20	8.1	0.00473	PASS
				30	3.14	0.00183	PASS
				40	9.81	0.00573	PASS
				50	-1.88	-0.0011	PASS
		MCH	VN	-30	2.29	0.00132	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				-20	8.87	0.00512	PASS
				-10	-0.78	-0.00045	PASS
				0	5.75	0.00332	PASS
				10	6.36	0.00367	PASS
				20	3.68	0.00212	PASS
				30	2.99	0.00173	PASS
				40	-1.57	-0.00091	PASS
				50	7.26	0.00419	PASS
		HCH	VN	-30	-2.14	-0.00122	PASS
				-20	-0.08	-0.00005	PASS
				-10	5.25	0.003	PASS
				0	4.36	0.00249	PASS
				10	1.04	0.00059	PASS
				20	2	0.00114	PASS
				30	0.41	0.00023	PASS
				40	-0.76	-0.00043	PASS
				50	3.4	0.00194	PASS
WCDMA1900	UMTS/TM1	LCH	VN	-30	-0.38	-0.00021	PASS
				-20	-1.72	-0.00093	PASS
				-10	7.55	0.00408	PASS
				0	5.46	0.00295	PASS
				10	0.55	0.0003	PASS
				20	-1.75	-0.00094	PASS
				30	2.61	0.00141	PASS
				40	0.23	0.00012	PASS
				50	0.27	0.00015	PASS
		MCH	VN	-30	3.59	0.00191	PASS
				-20	-0.17	-0.00009	PASS
				-10	6.55	0.00348	PASS
				0	1.88	0.001	PASS
				10	2.67	0.00142	PASS
				20	-0.6	-0.00032	PASS
				30	0.32	0.00017	PASS
				40	-0.58	-0.00031	PASS
				50	-3.59	-0.00191	PASS
		HCH	VN	-30	12.7	0.00666	PASS
				-20	0.03	0.00002	PASS
				-10	6.74	0.00353	PASS
				0	-0.17	-0.00009	PASS
				10	4.14	0.00217	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				20	-3.63	-0.0019	PASS
				30	0.63	0.00033	PASS
				40	-4.2	-0.0022	PASS
				50	0.41	0.00021	PASS

END