

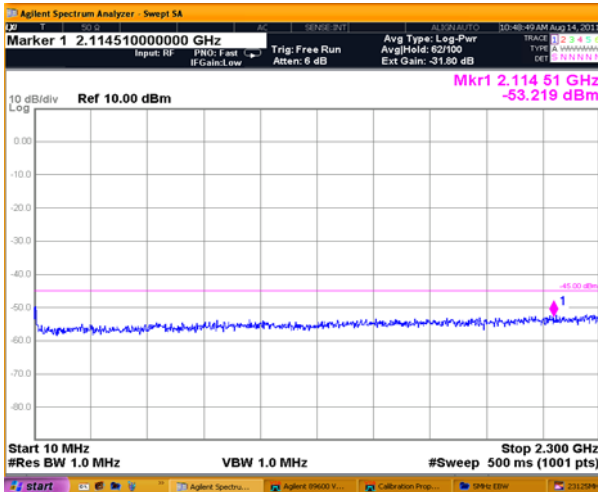


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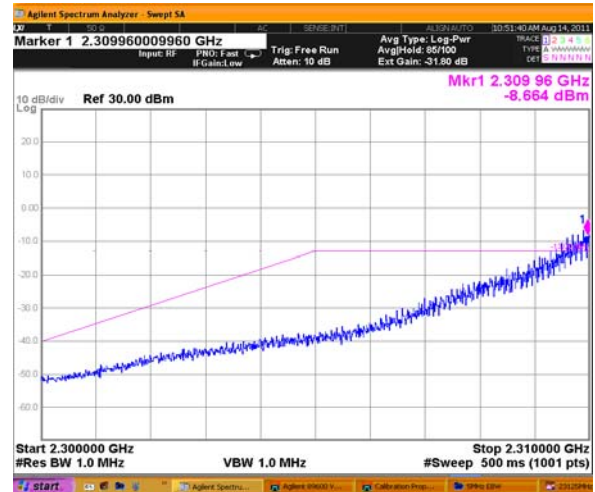
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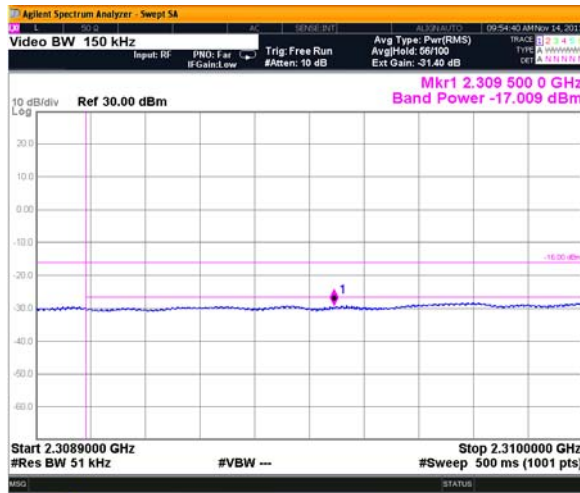
Carrier frequency 2312.5 MHz.



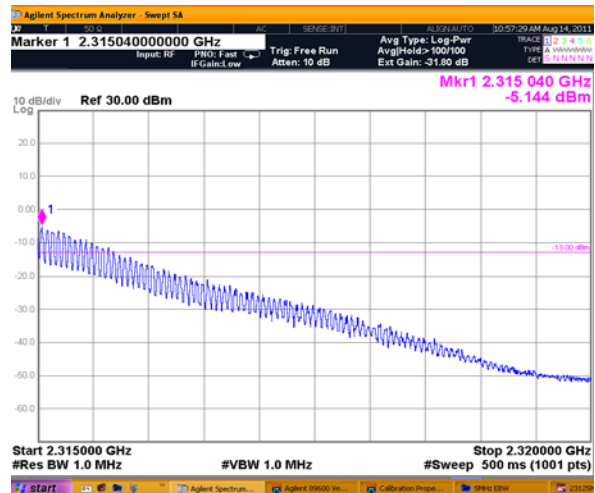
Plot # 56



Plot # 57



Plot # 58.



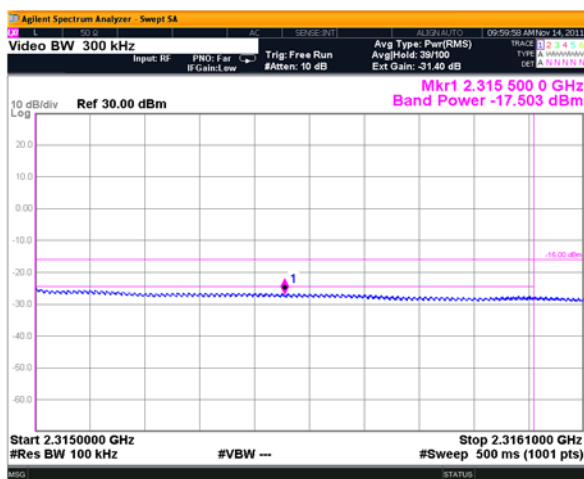
Plot # 59



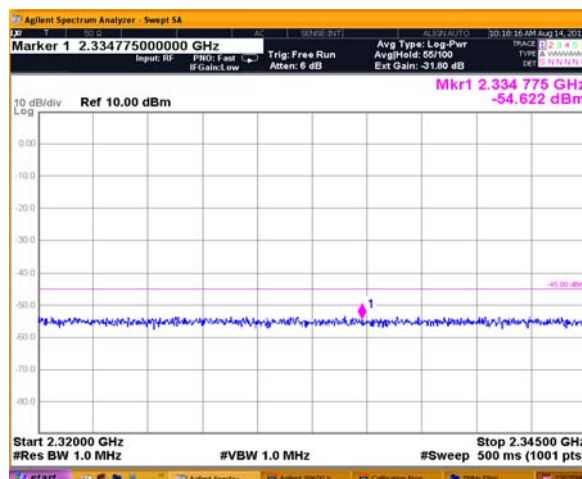
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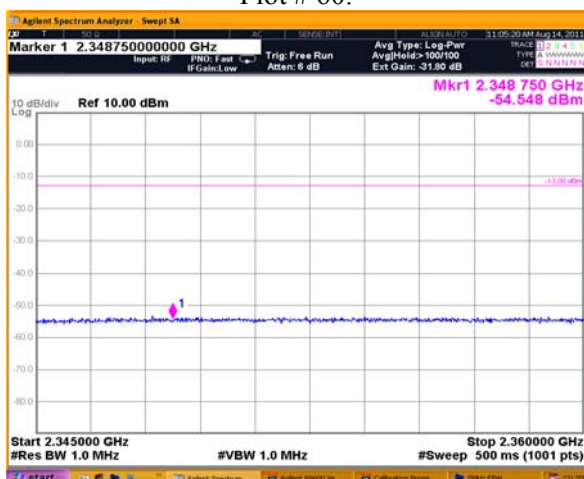
FCC ID: WQEWIN7023



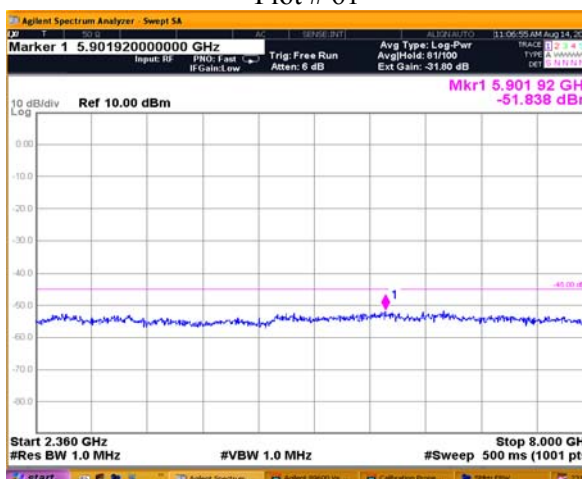
Plot # 60.



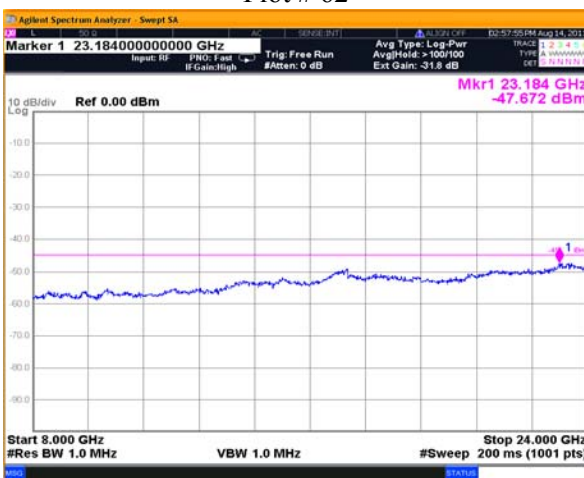
Plot # 61



Plot # 62



Plot # 63



Plot # 64

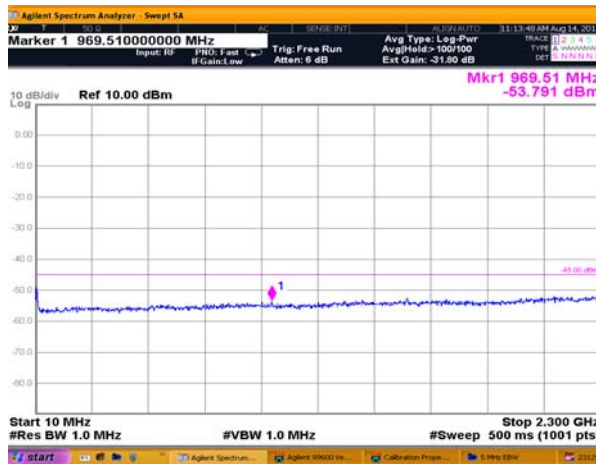


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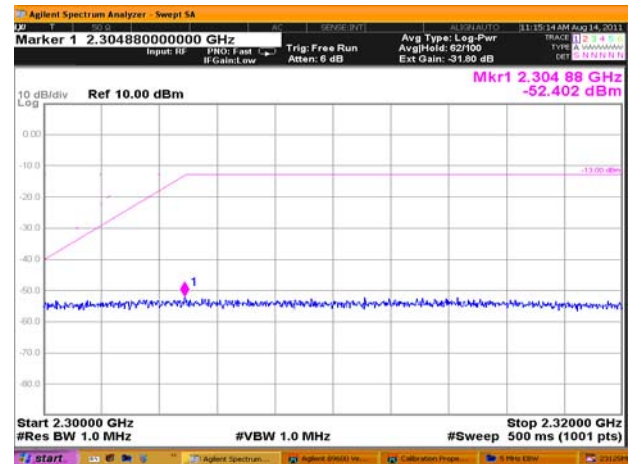
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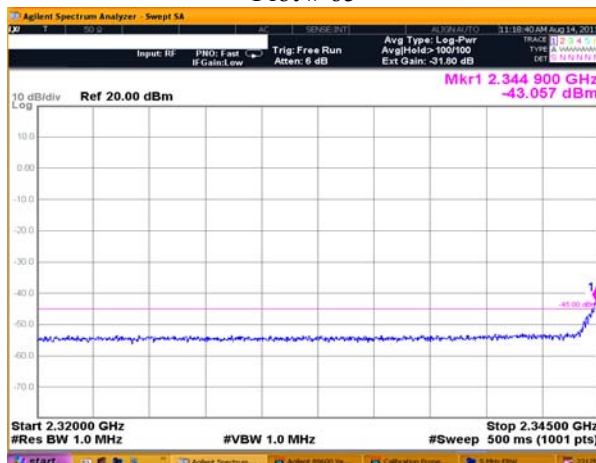
Carrier frequency 2352.5 MHz.



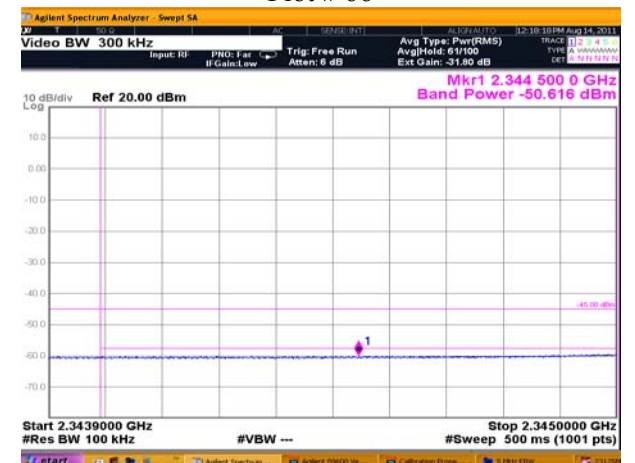
Plot # 65



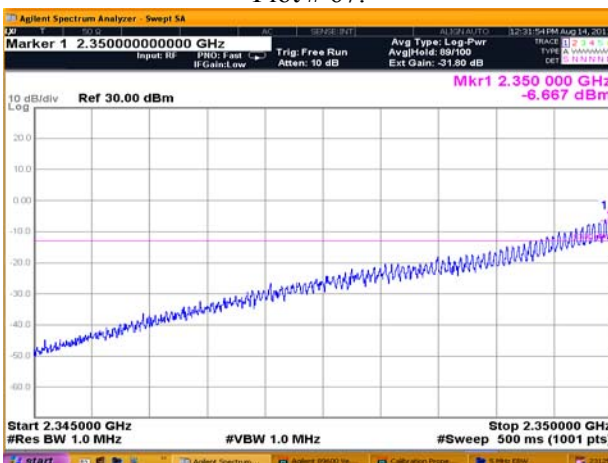
Plot # 66



Plot # 67.



Plot # 68



Plot # 69



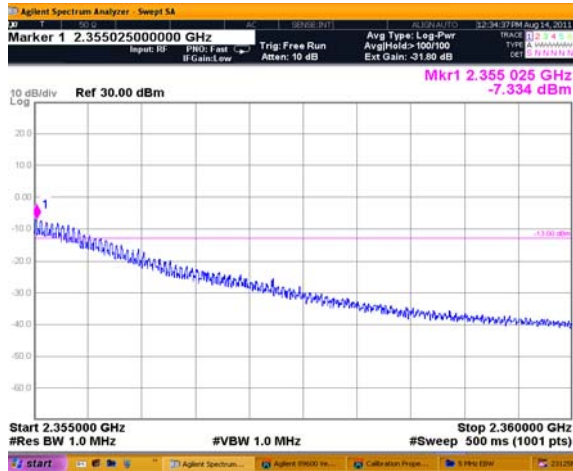
Plot # 70



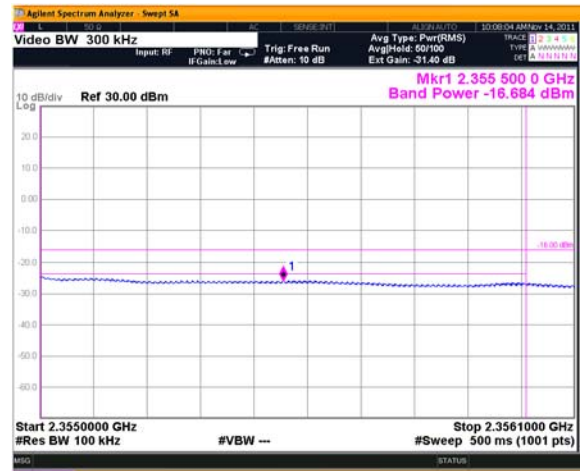
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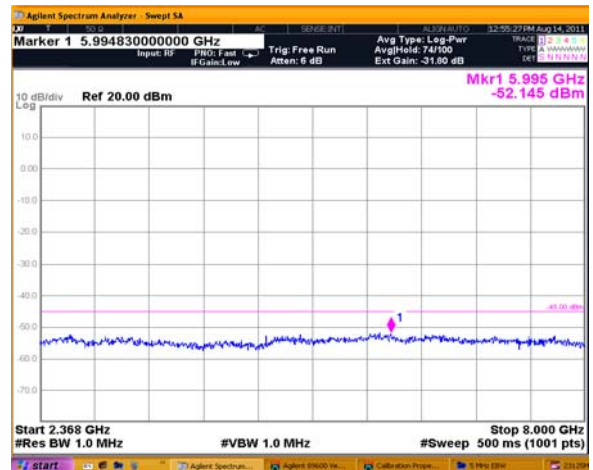
Plot # 71.



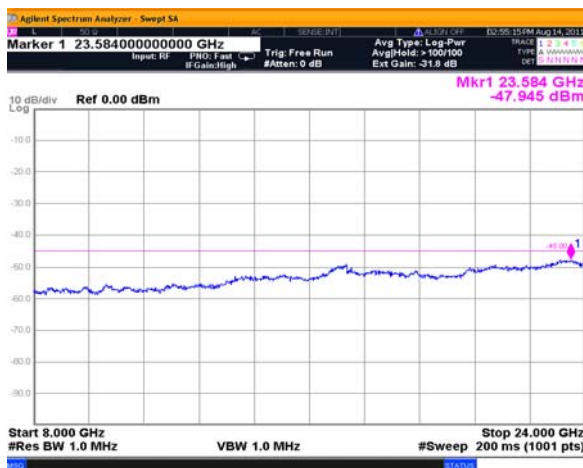
Plot # 72



Plot # 73



Plot # 74



Plot # 75

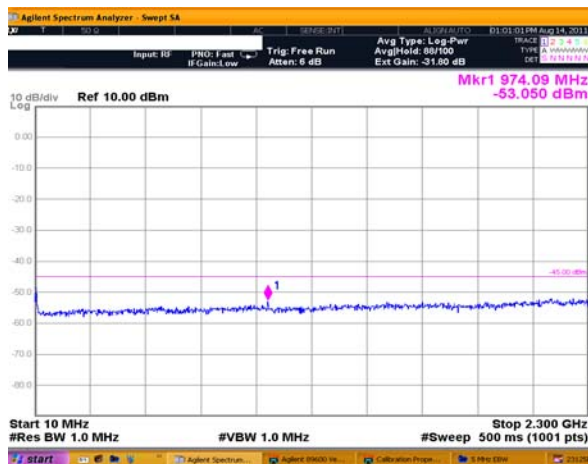


Test report No: 9112340871
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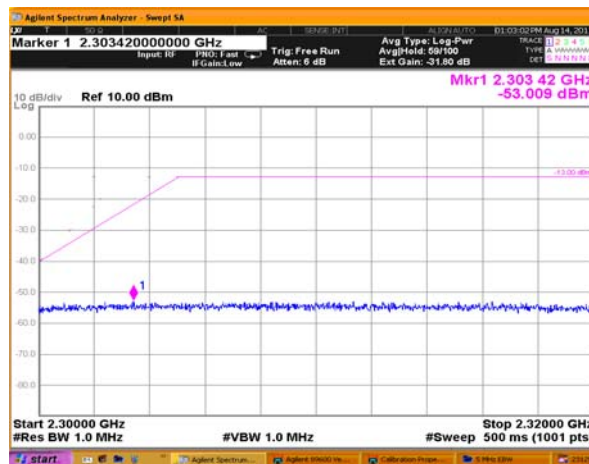
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FCC ID: WQEWIN7023

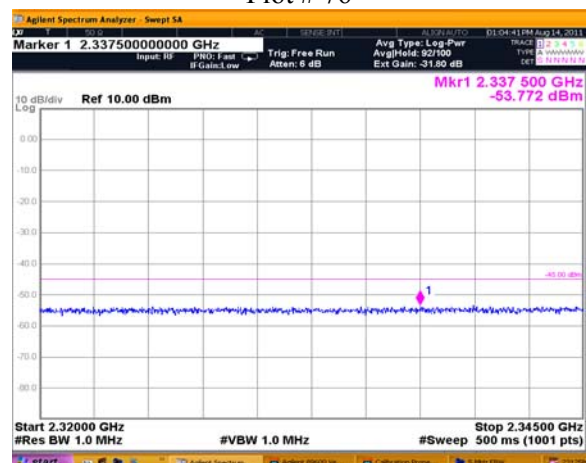
Carrier frequency 2357.5 MHz.



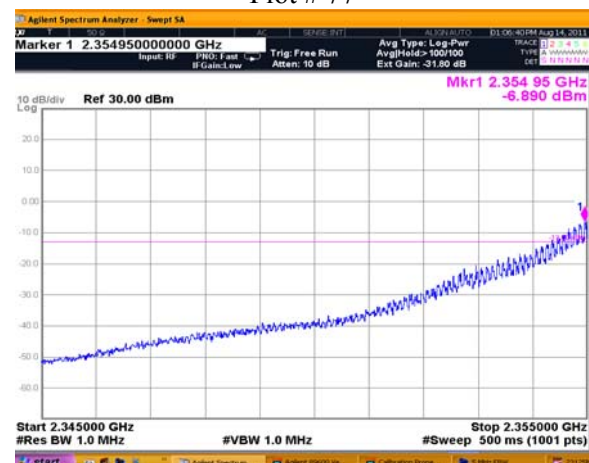
Plot # 76



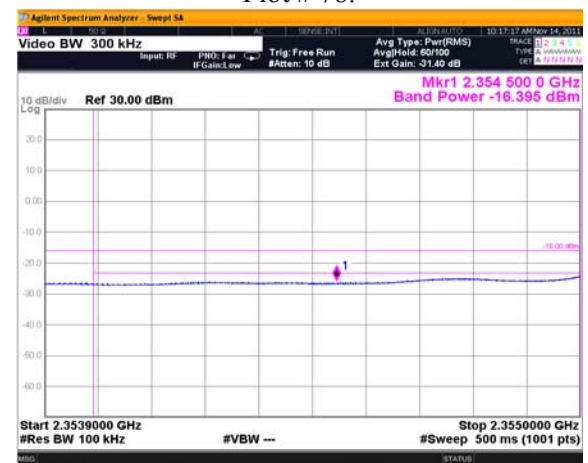
Plot # 77



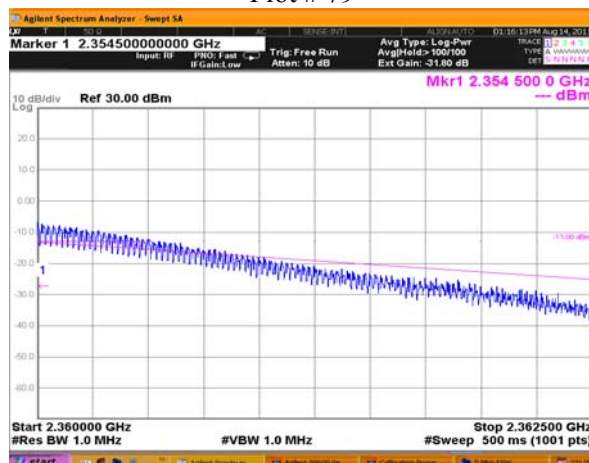
Plot # 78.



Plot # 79



Plot # 80



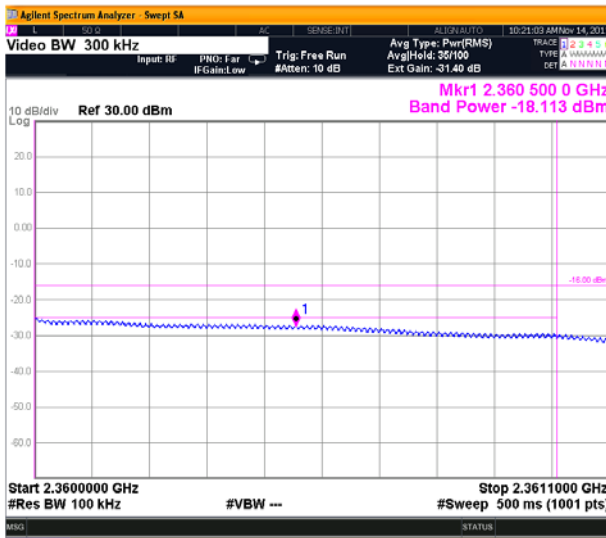
Plot # 81



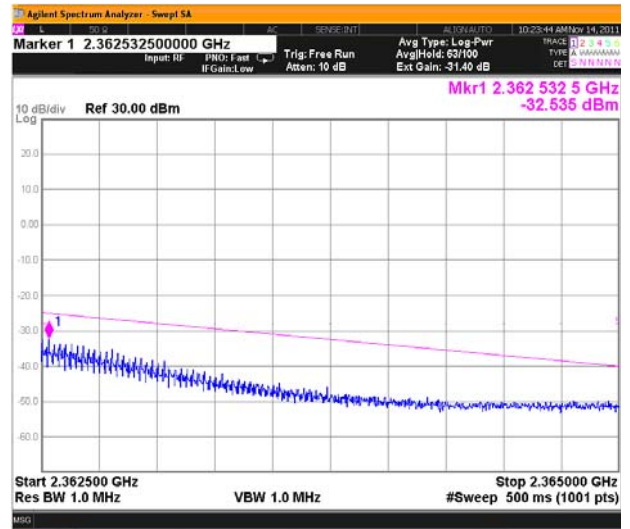
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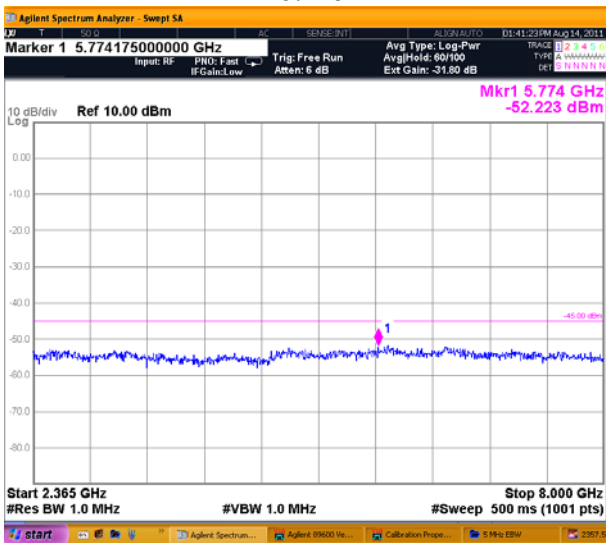
FCC ID: WQEWIN7023



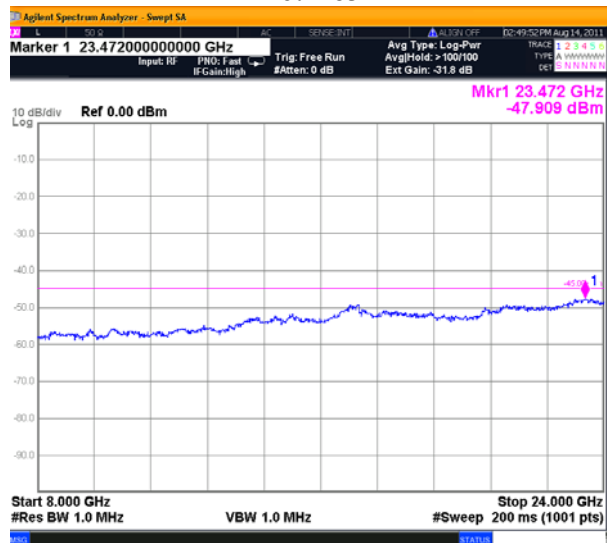
Plot # 82



Plot # 83



Plot # 84



Plot # 85



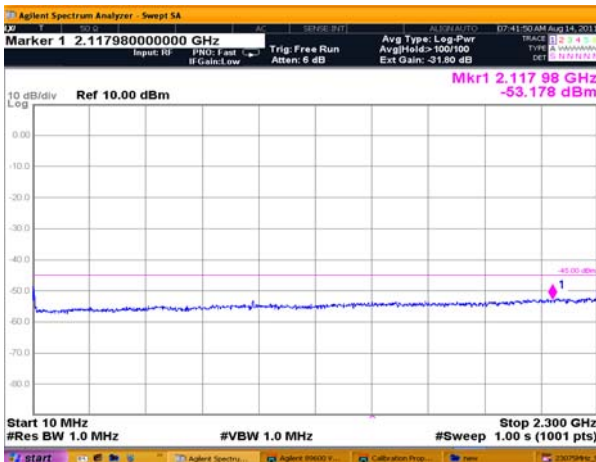
Test report No: 9112340871
Title: WiMax Transceiver
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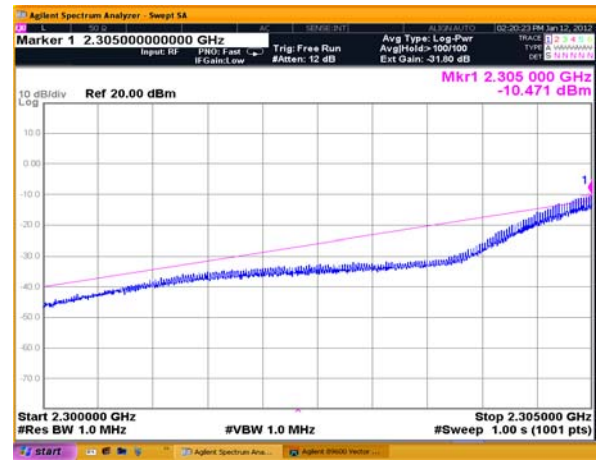
FCC ID: WQEWIN7023

10 MHz EBW

Carrier frequency 2310 MHz.



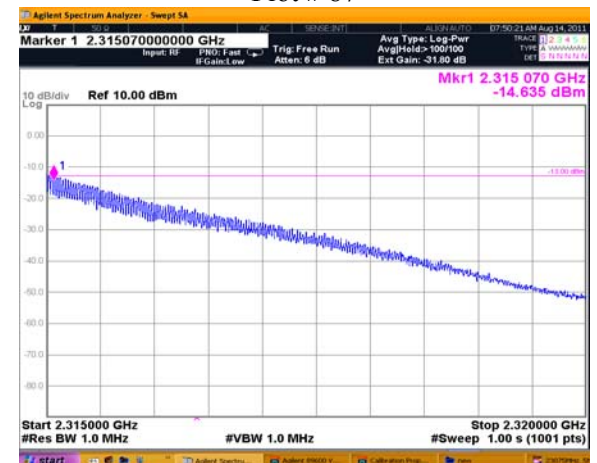
Plot # 86



Plot # 87



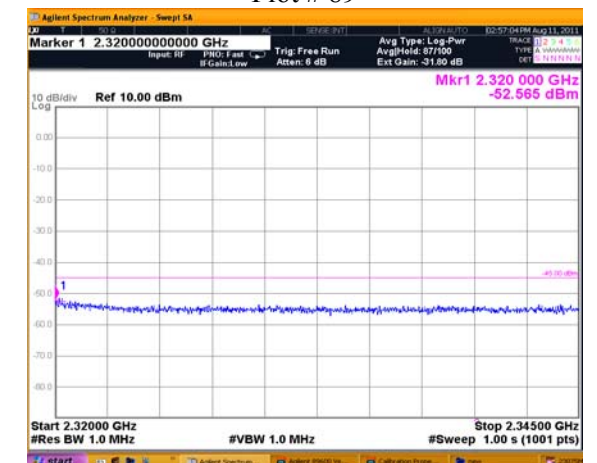
Plot # 88.



Plot # 89



Plot # 90

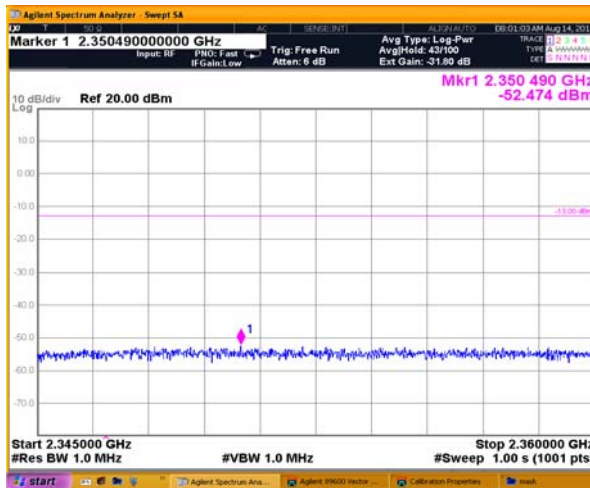


Plot # 91

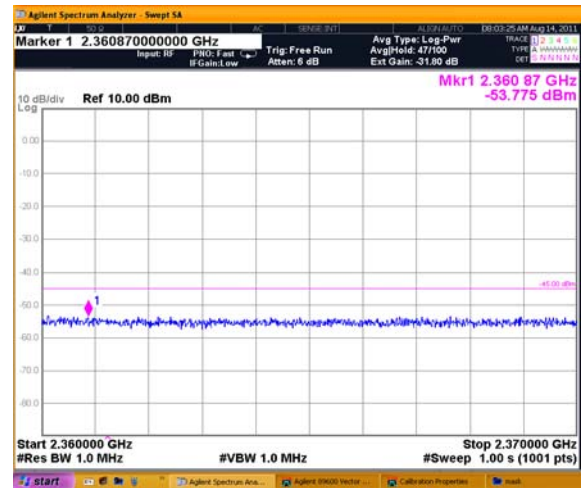


Test report No: 9112340871
Title: WiMax Transceiver
Model: WIN7023

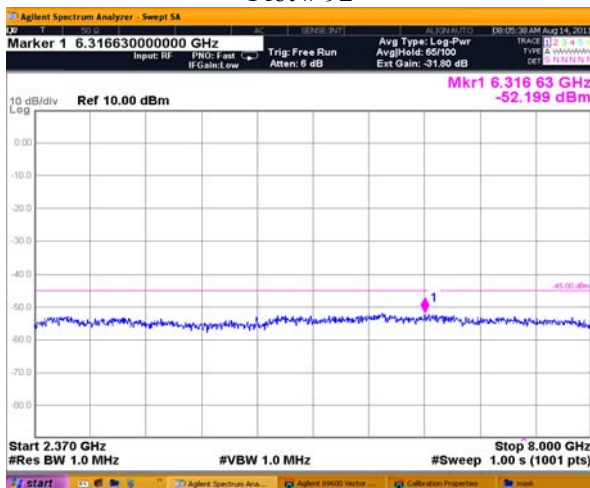
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FCC ID: WQEWIN7023



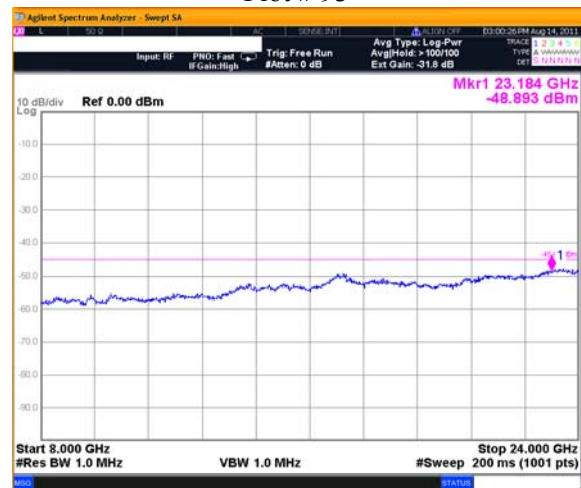
Plot # 92



Plot # 93



Plot # 94.



Plot # 95

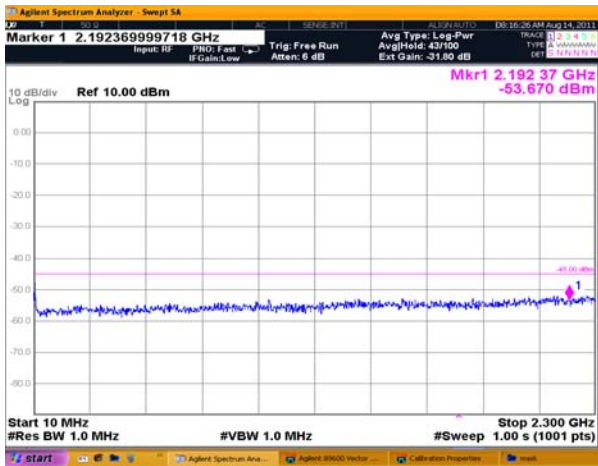


Test report No: 9112340871
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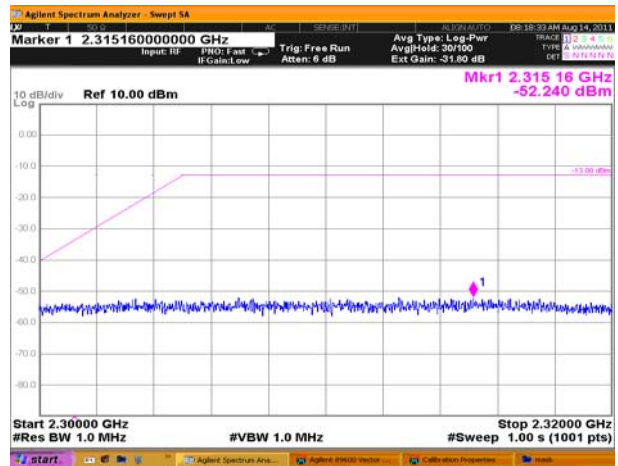
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FCC ID: WQEWIN7023

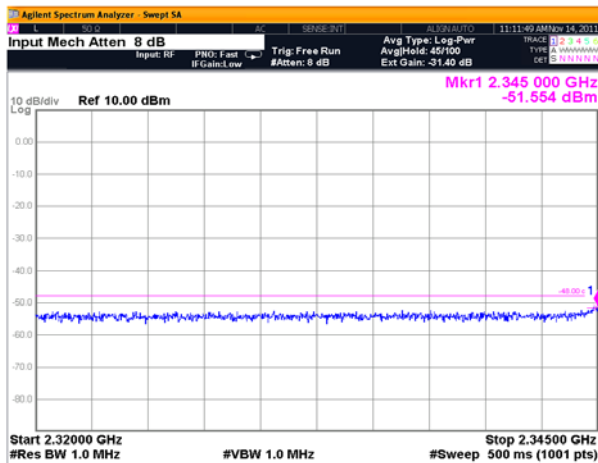
Carrier frequency 2355 MHz.



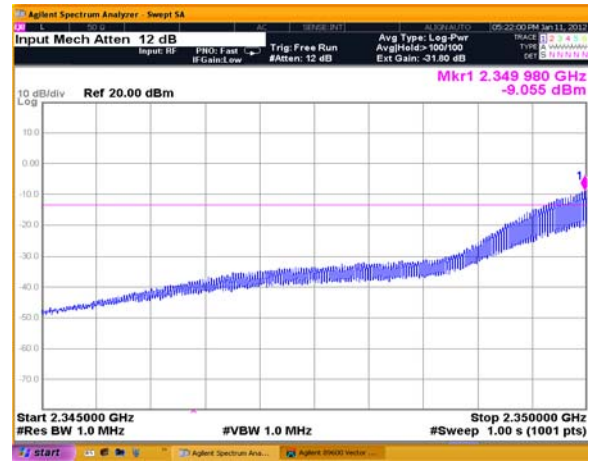
Plot # 96



Plot # 97



Plot # 98.



Plot # 99



Plot # 100



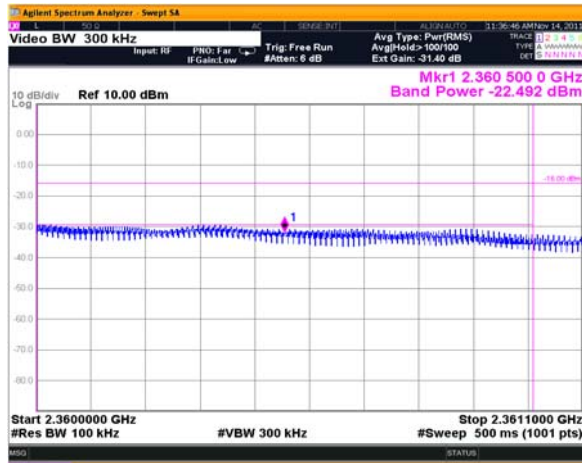
Plot # 101



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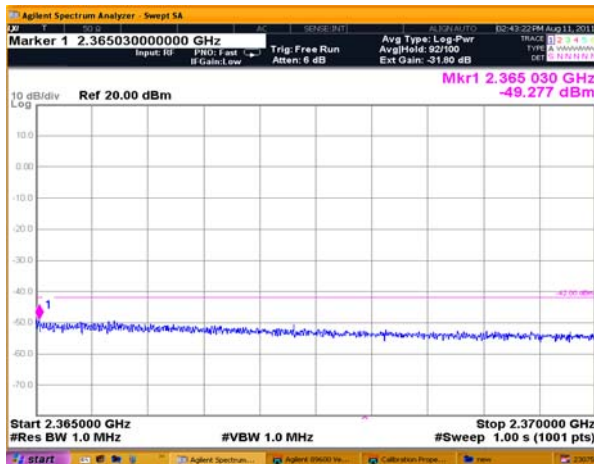
FCC ID: WQEWIN7023



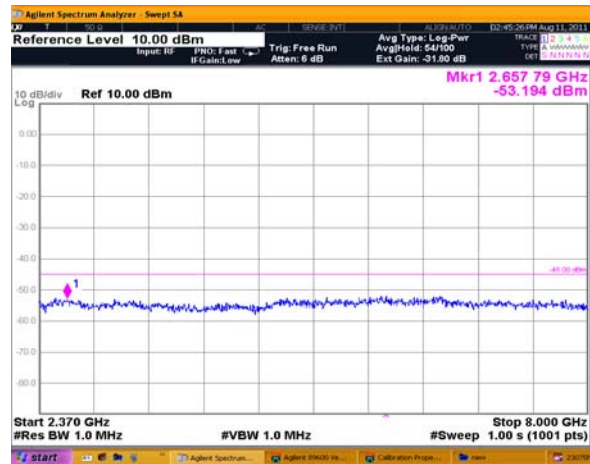
Plot # 102



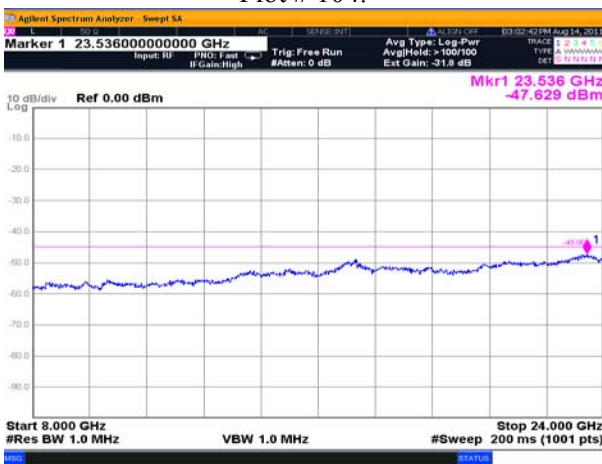
Plot # 103



Plot # 104.



Plot # 105.



Plot # 106.

**Test report No: 9112340871****Page 35 of 59 Pages****Title: WiMax Transceiver****Model: WIN7023****FCC ID: WQEWIN7023****5.1.5. Radiated emissions test according to §§ 2.1053, 27.53 (1)**

Operating Frequency Range 2305 – 2320 MHz , 2345 – 2360 MHz
 Ambient Temperature 21⁰ C Relative Humidity 48% Air Pressure 1006 hPa

The frequency spectrum was investigated from the lowest radio frequency generated in the equipment up to the tenth harmonic of the highest fundamental frequency. No emissions except at carrier frequencies points were found. For the test results refer to the table and plots in this section.

EBW, MHz	Carrier frequency, MHz	Measured frequency, MHz	Measured level, dBm	Specified limit, dBm	Margin, dB	Reference to plot #
3.5	2316.75	2317.6	-23.1	-13.0	10.1	108
		2320	-57.6	-45.0	12.6	109
	2348.25	2344	59.7	-45.0	14.7	116
		2349.2	-22.2	-13.0	9.2	117
5.0	2307.5	2270	-60.7	-45.0	15.7	121
		2320	-50.8	-45.0	5.8	123
		2937	-48.8	-45.0	3.8	125
	2312.5	2297	-58.6	-45.0	13.6	128
		2335	-58.5	-45.0	13.5	130
		2968	-53.4	-45.0	8.4	132
	2352.5	2335	-57.9	-45.0	12.9	137
		2961	-54.0	-45.0	9.0	139
	2357.5	2341	-58.4	-45.0	13.4	144
		2357	-44.7	-13.0	31.7	145
10.0	2310	2254	-59.6	-45.0	14.6	149
		2344	-58.7	-45.0	13.7	151
	2355	2342	-58.4	-45.0	13.4	158
		2950	-53.1	-45.0	8.1	160



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Title: WiMax Transceiver

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LIMIT

For operation in the bands 2305 –2320 MHz and 2345 – 2360 MHz, the power of any emissions outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by the following amounts:

Below 2285 MHz and above 2370 MHz and on all frequencies from 2320 to 2345 MHz by factor of not less than $75+10\text{Log}(P)$ dB (-45 dBm@50.2 dBµV/m at 3m distance). On all frequencies from 2305 to 2320 MHz and on all frequencies from 2345 to 2360 MHz by factor of not less than $43+10\text{Log}(P)$ dB (-13 dBm@ 82.2 dBµV/m at 3m distance).

By a factor of not less than: $43 + 10 \log(P)$ dB at 2305 MHz, $70 + 10 \log(P)$ dB (-40 dBm) at 2300 MHz, $72 + 10 \log(P)$ dB (-42 dBm) at 2287.5 MHz.

By a factor of not less than: $43 + 10 \log(P)$ dB at 2360 MHz, $55 + 10 \log(P)$ dB (-25 dBm) at 2362.5 MHz, $70 + 10 \log(P)$ dB at 2365 MHz, $72 + 10 \log(P)$ dB at 2367.5 MHz.

TEST PROCEDURE

Substitution method.

The measurements were performed according to ANSI/TIA-603-C-2004 section 2.2.12 test method. Investigation of transmitter spurious emissions was performed. EUT was replaced by generator and substitution antenna. Level calculated from generator output level, substitution antenna gain and connected cable loss was compared with the limit.

Measurements were performed under 64 QAM modulation as worse case. RBW = 1 MHz and $VBW \geq 1$ MHz. Detector Sample and power average function. Test was performed for all emission bandwidths and all declare carrier (channel) frequencies.

TEST EQUIPMENT USED:

5	6	7	8	9	10	13	15
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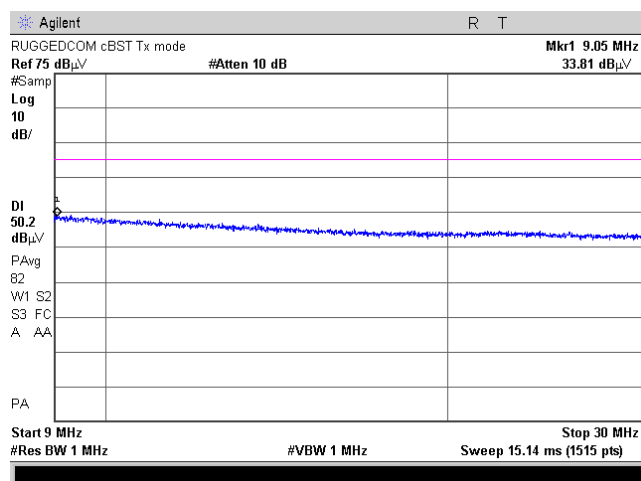
Title: WiMax Transceiver

Model: WIN7023

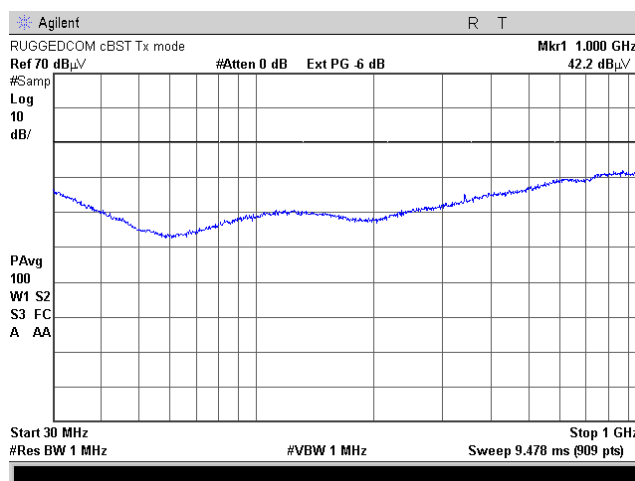
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Recorded results shown below are common and worse for all emission bandwidths and transmitter frequencies.



Plot # 107. Scan in 9 – 30 MHz band.



Plot # 108. Scan in 30 – 1000 MHz band.



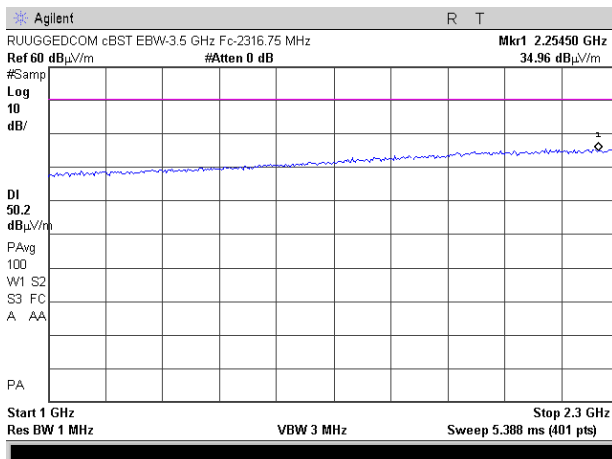
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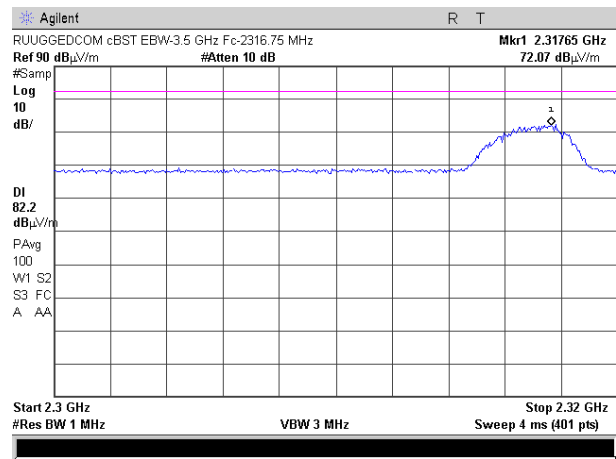
FCC ID: WQEWIN7023

3.5 MHz EBW.

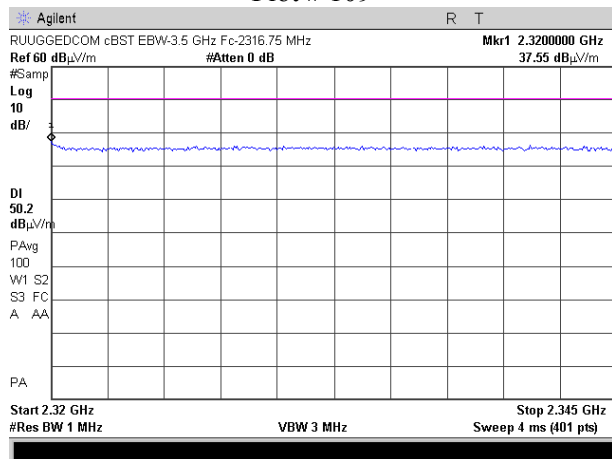
Carrier frequency 2316.75 MHz.



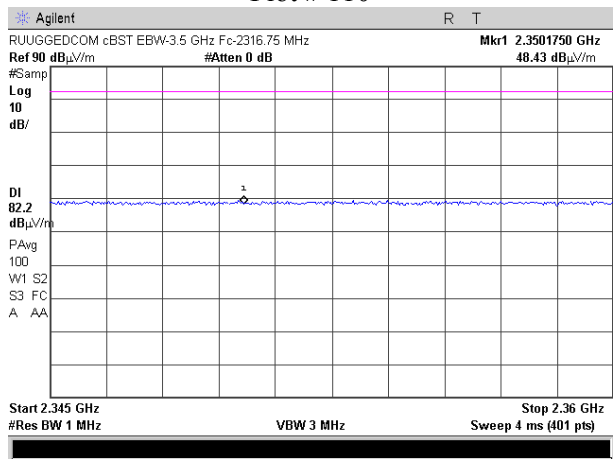
Plot # 109



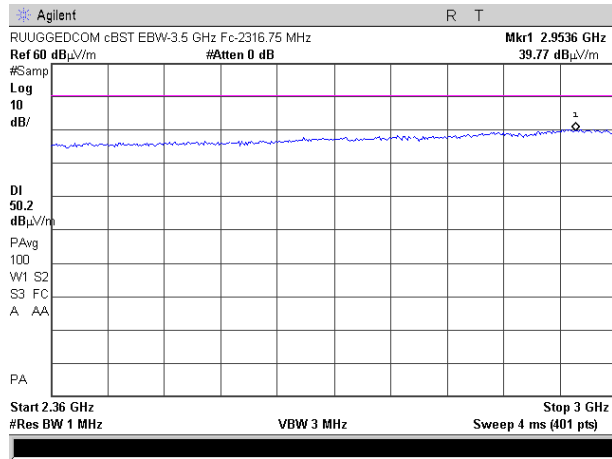
Plot # 110



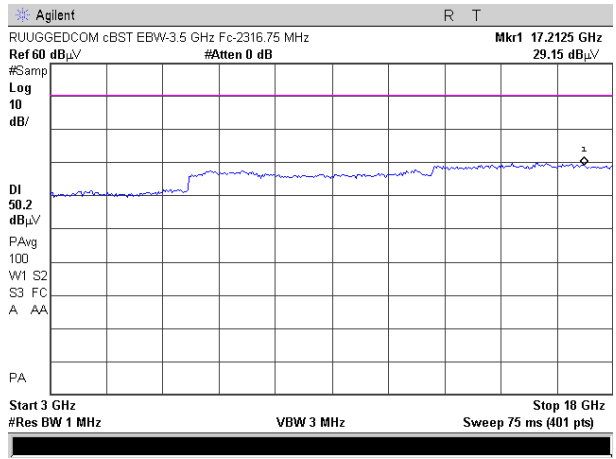
Plot # 111.



Plot # 112



Plot # 113.



Plot # 114



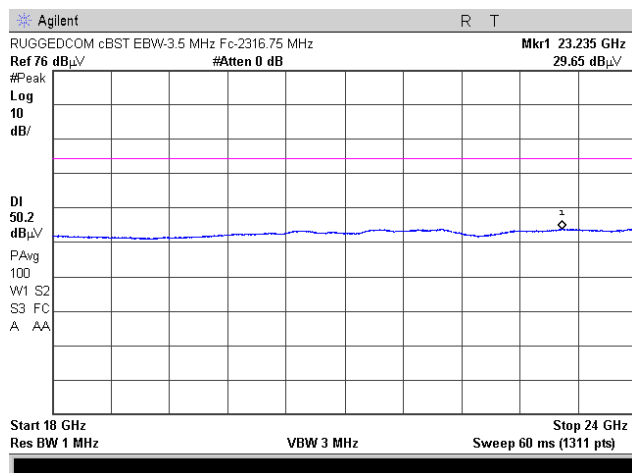
Test report No: 9112340871

Title: WiMax Transceiver

Model: WIN7023

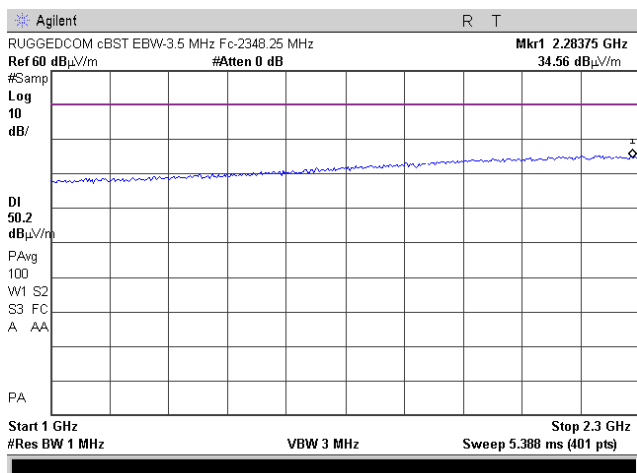
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FCC ID: WQEWIN7023

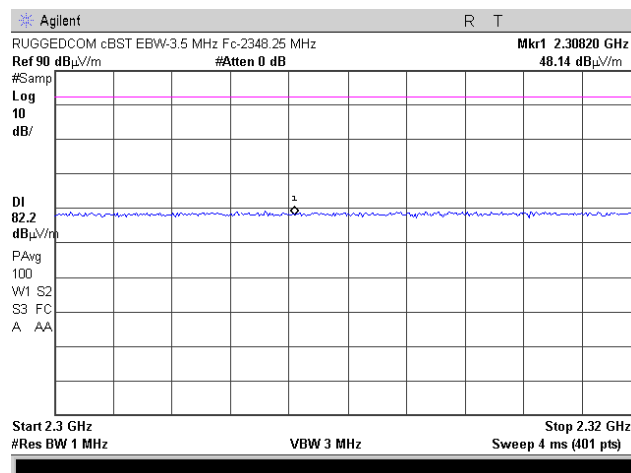


Plot # 115

Carrier frequency 2348.25 MHz.



Plot # 116.



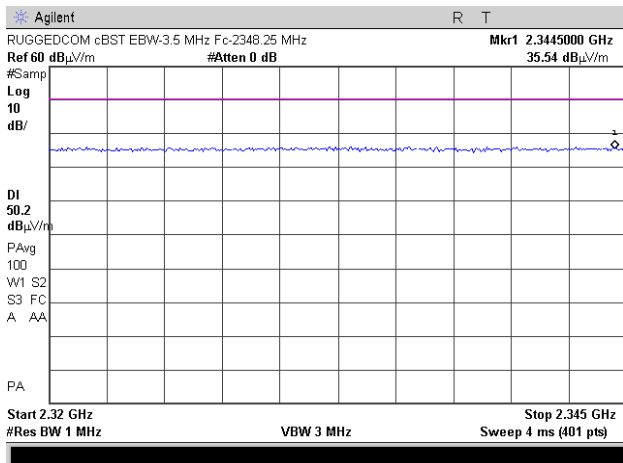
Plot # 117



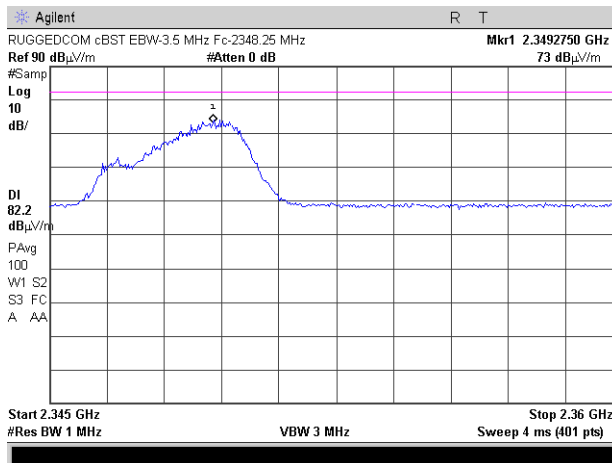
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Title: WiMax Transceiver
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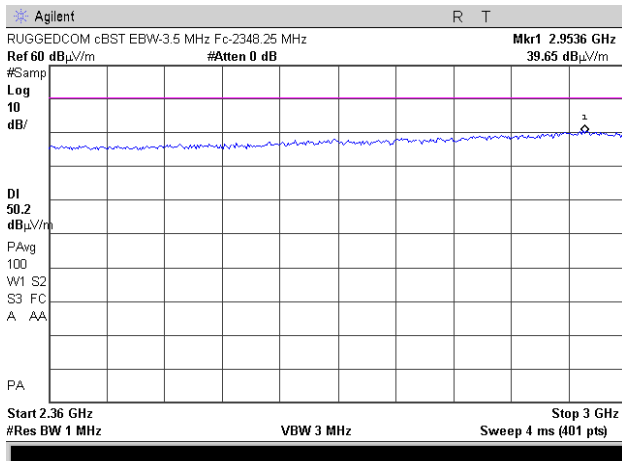
FCC ID: WQEWIN7023



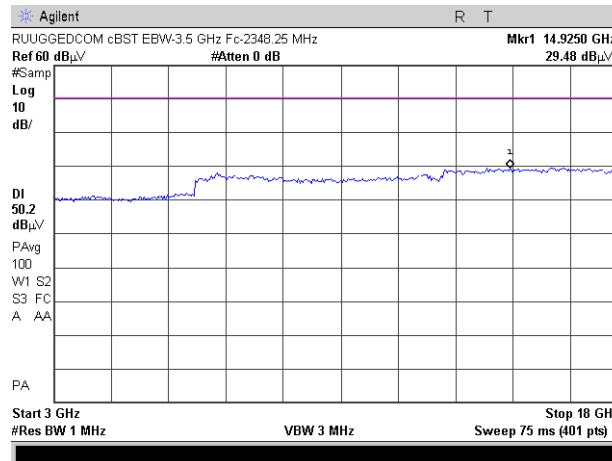
Plot # 118



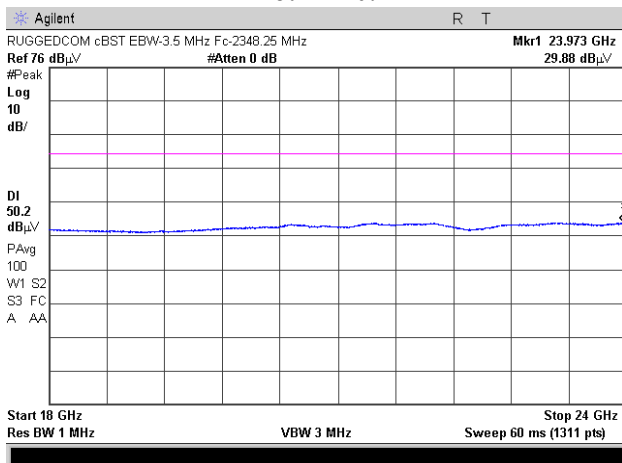
Plot # 119



Plot # 120.



Plot # 121



Plot # 122.



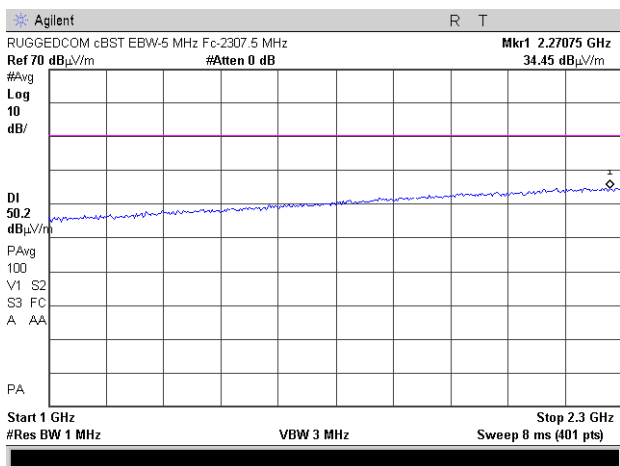
Test report No: 9112340871
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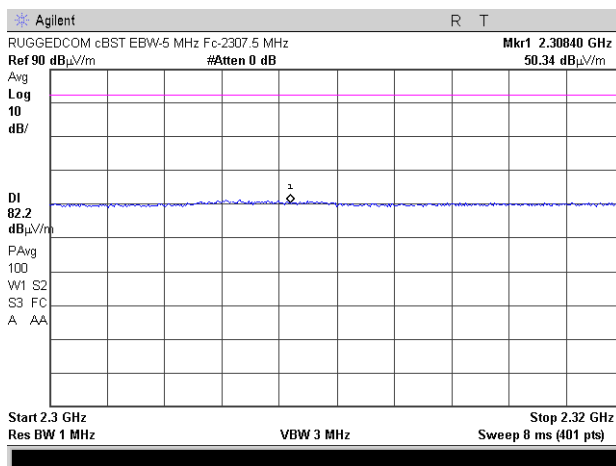
FCC ID: WQEWIN7023

5 MHz EBW.

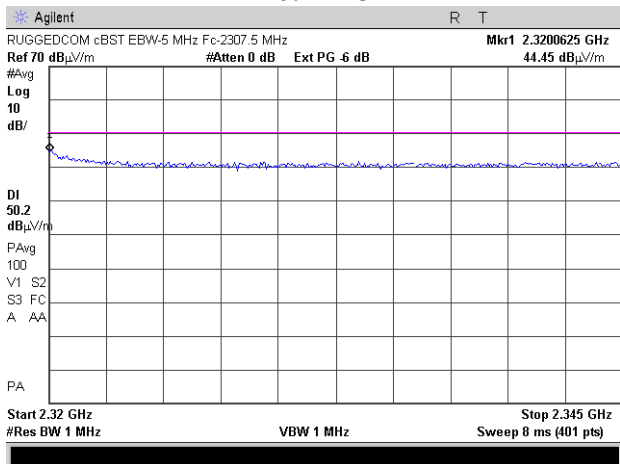
Carrier frequency 2307.5 MHz.



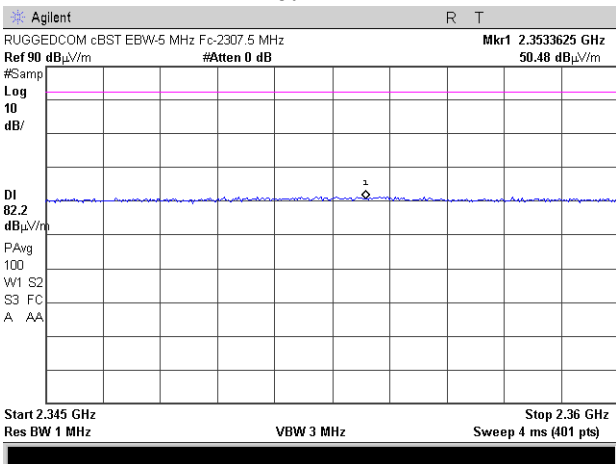
Plot # 123



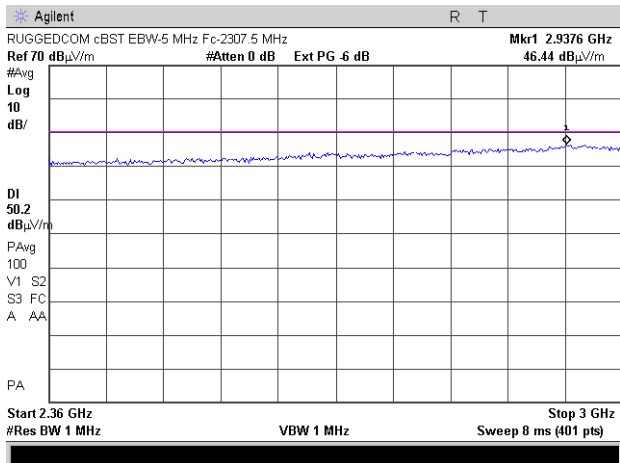
Plot # 124



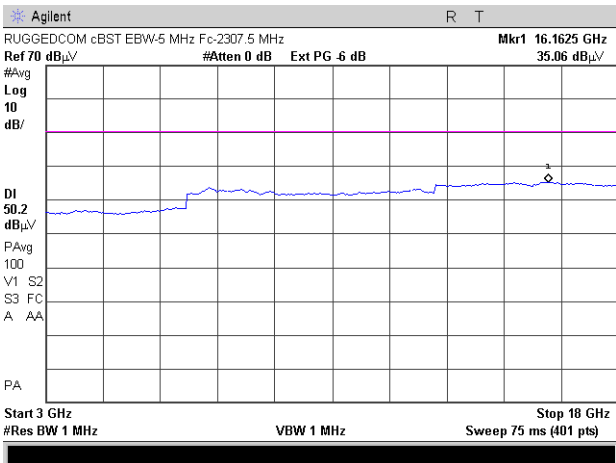
Plot # 125.



Plot # 126



Plot # 127.



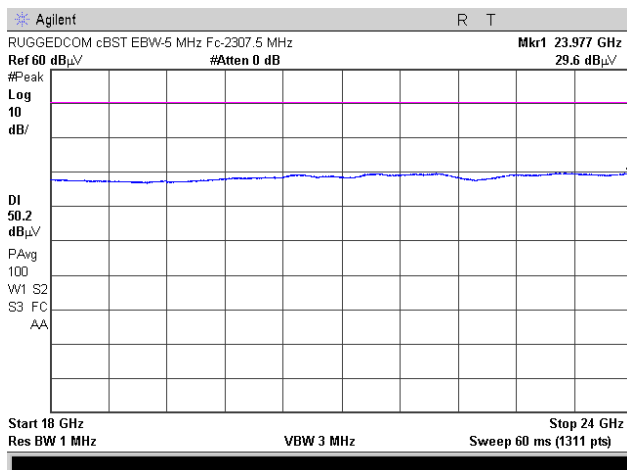
Plot # 128



Test report No: 9112340871
Title: WiMax Transceiver
Model: WIN7023

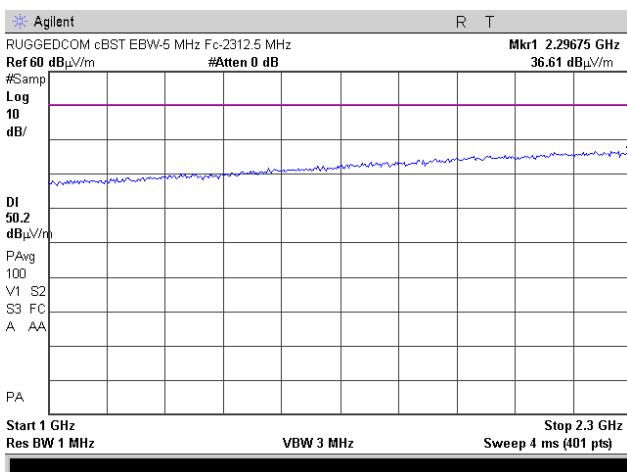
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FCC ID: WQEWIN7023

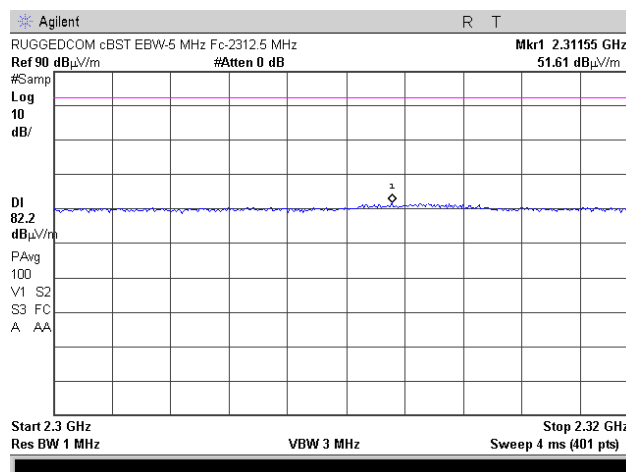


Plot # 129.

Carrier frequency 2312.5 MHz.



Plot # 130.



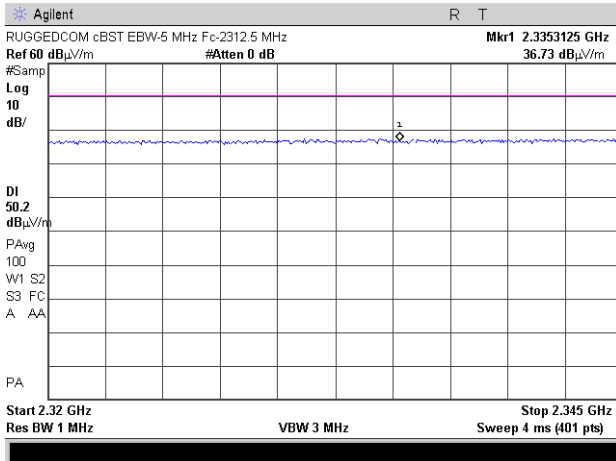
Plot # 131



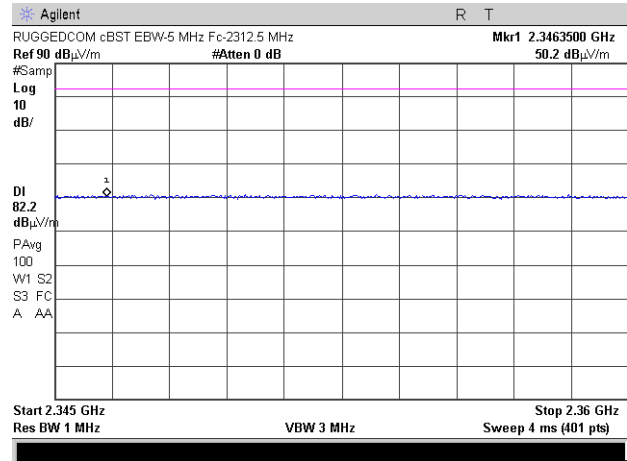
Test report No: 9112340871
Title: WiMax Transceiver
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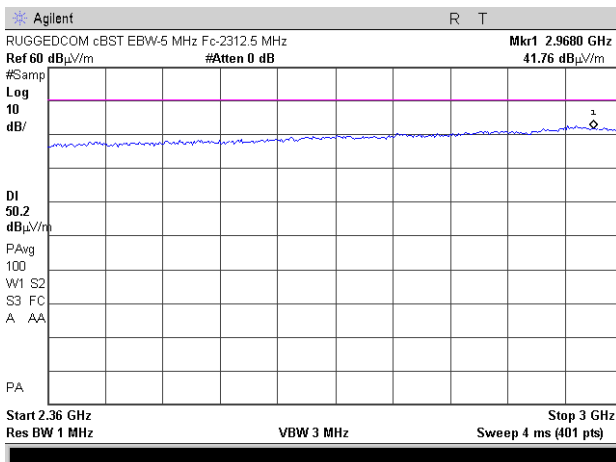
FCC ID: WQEWIN7023



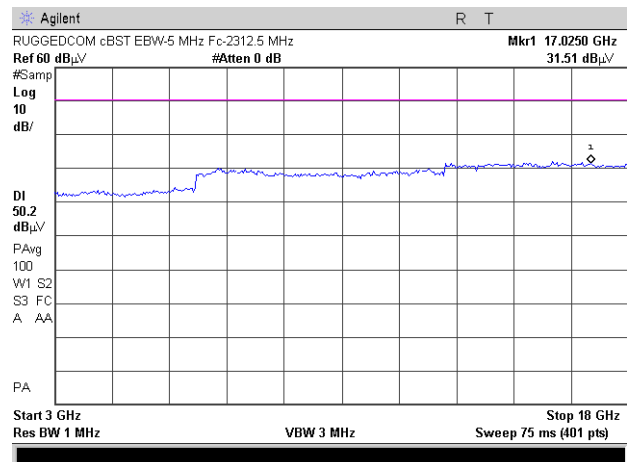
Plot # 132



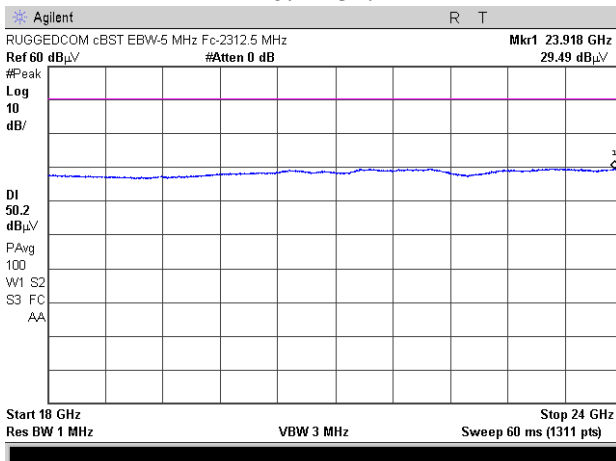
Plot # 133



Plot # 134.



Plot # 135



Plot # 136.

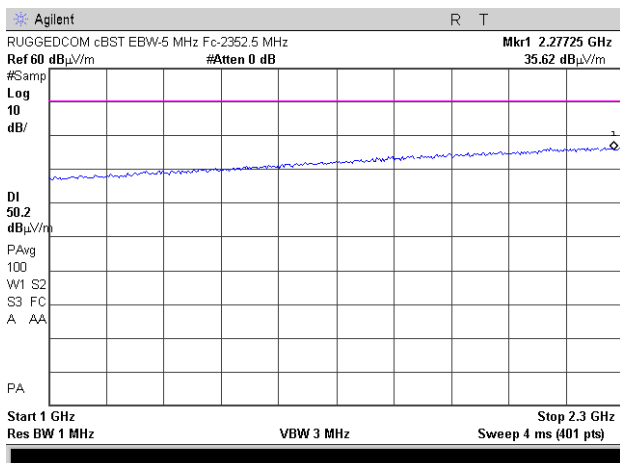


Test report No: 9112340871
Title: WiMax Transceiver
Model: WIN7023

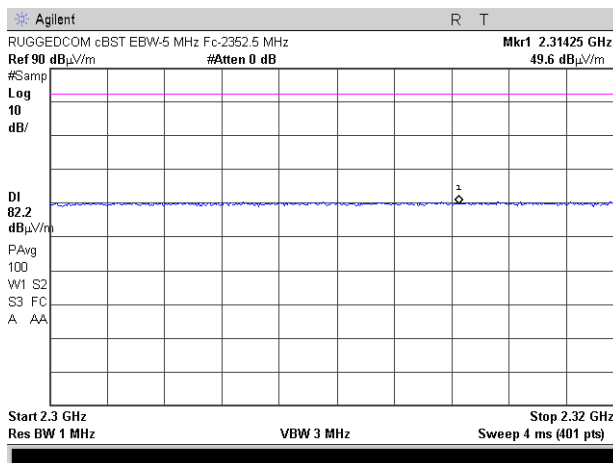
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FCC ID: WQEWIN7023

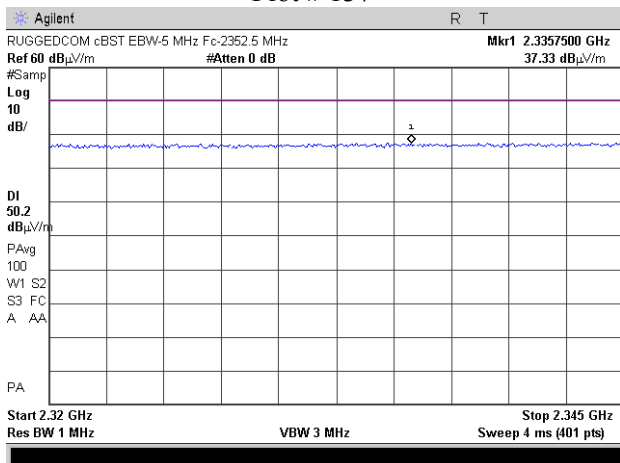
Carrier frequency 2352.5 MHz.



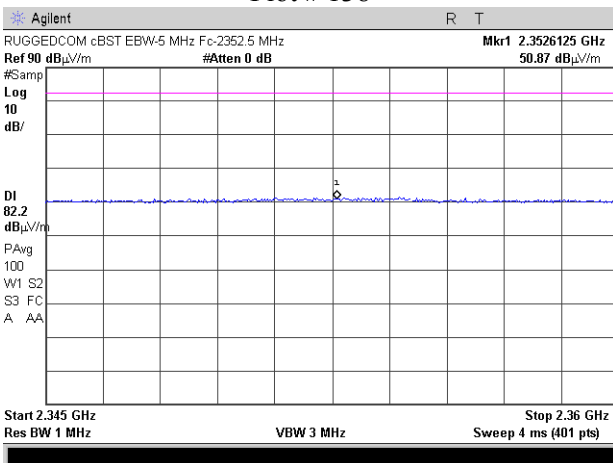
Plot # 137



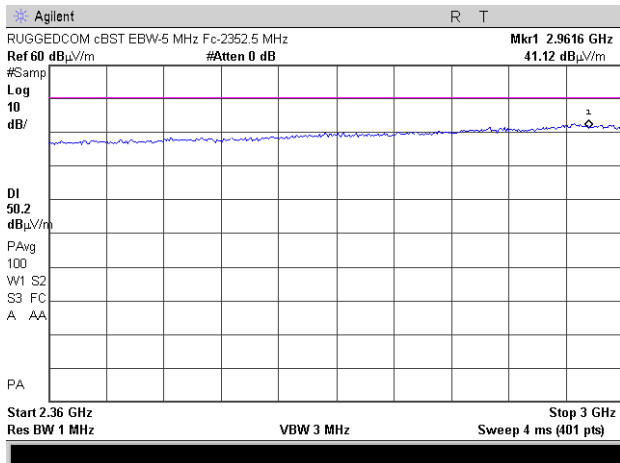
Plot # 138



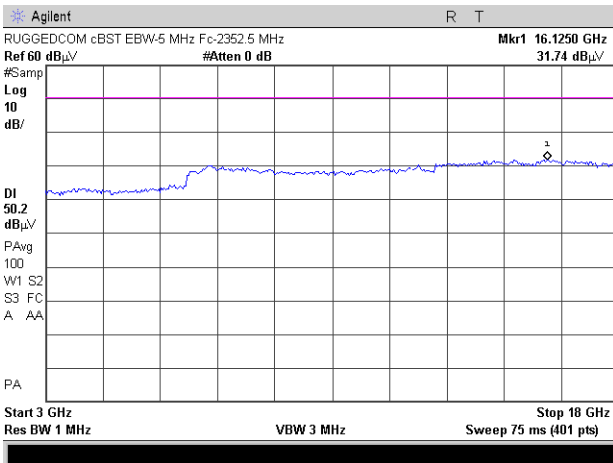
Plot # 139.



Plot # 140



Plot # 141.



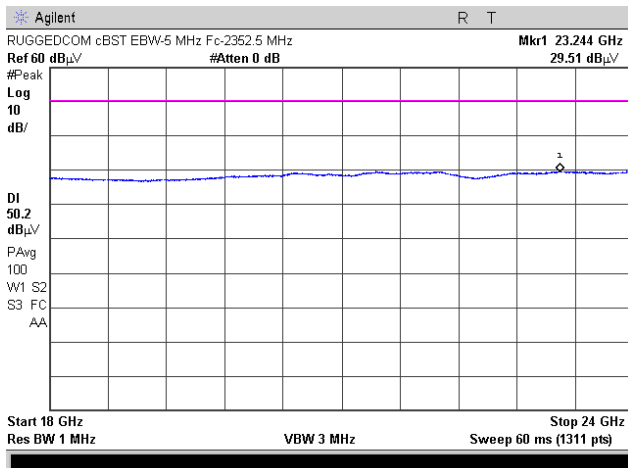
Plot # 142



Test report No: 9112340871
Title: WiMax Transceiver
Model: WIN7023

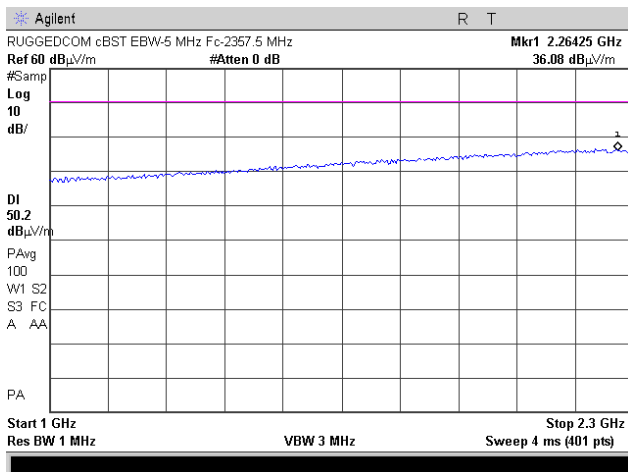
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FCC ID: WQEWIN7023

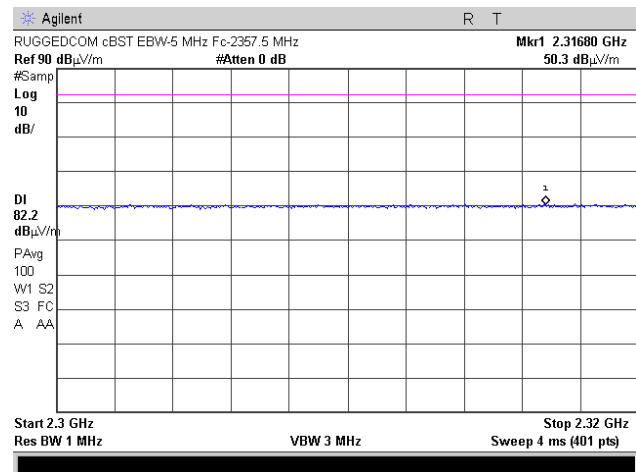


Plot # 143.

Carrier frequency 2357.5 MHz.



Plot # 144.



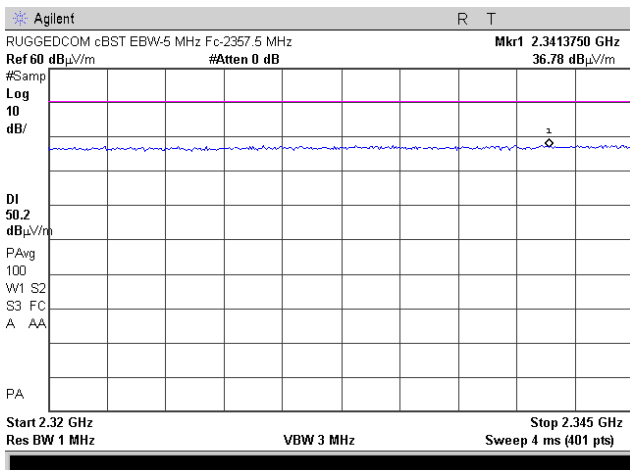
Plot # 145



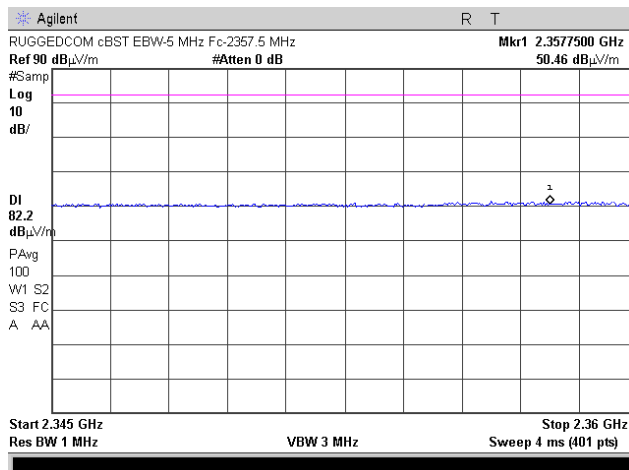
Test report No: 9112340871
Title: WiMax Transceiver
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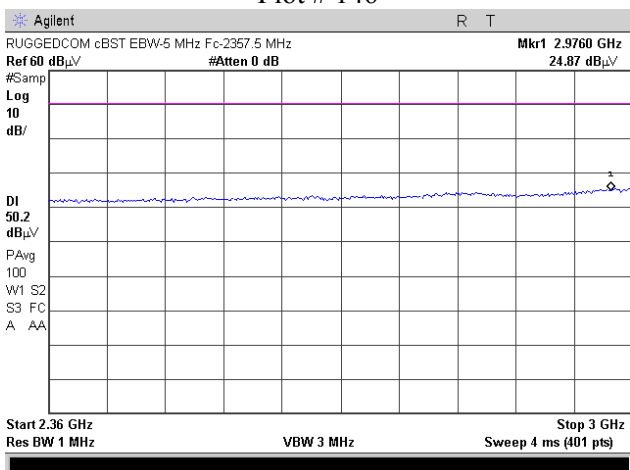
FCC ID: WQEWIN7023



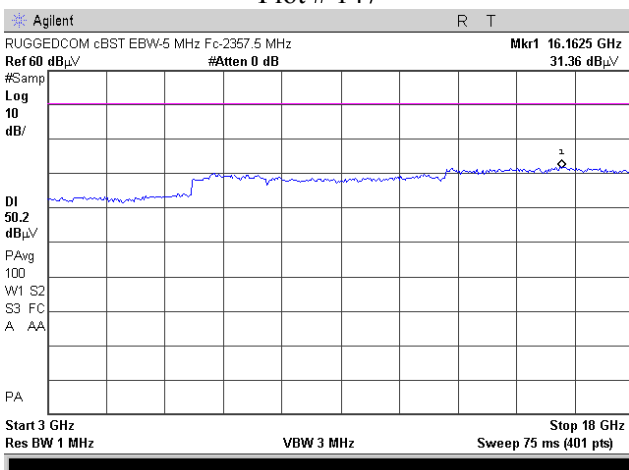
Plot # 146



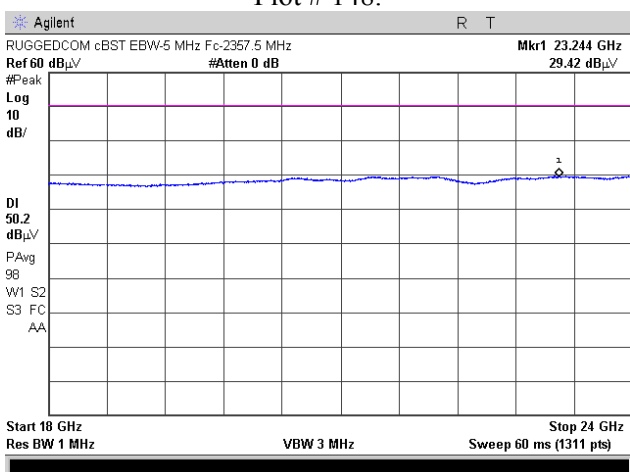
Plot # 147



Plot # 148.



Plot # 149



Plot # 150.



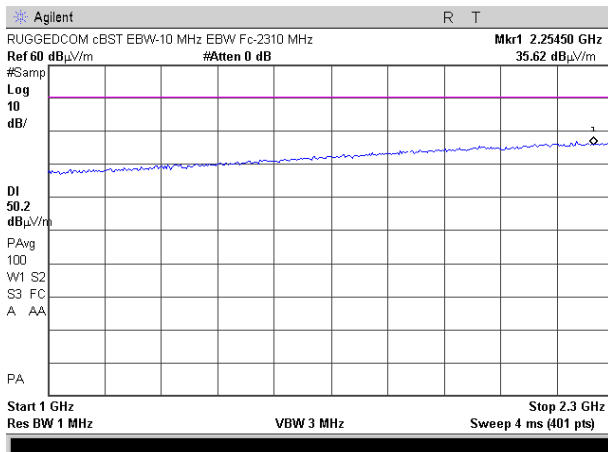
Test report No: 9112340871
Title: WiMax Transceiver
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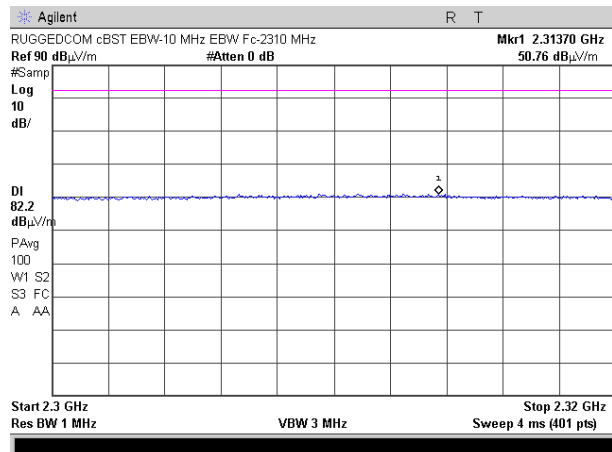
FCC ID: WQEWIN7023

10 MHz EBW.

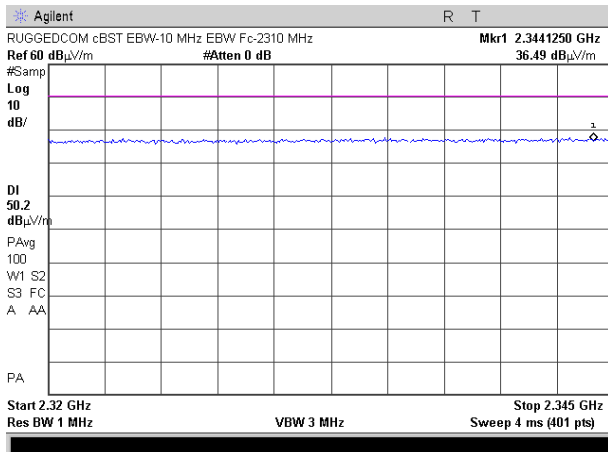
Carrier frequency 2310 MHz.



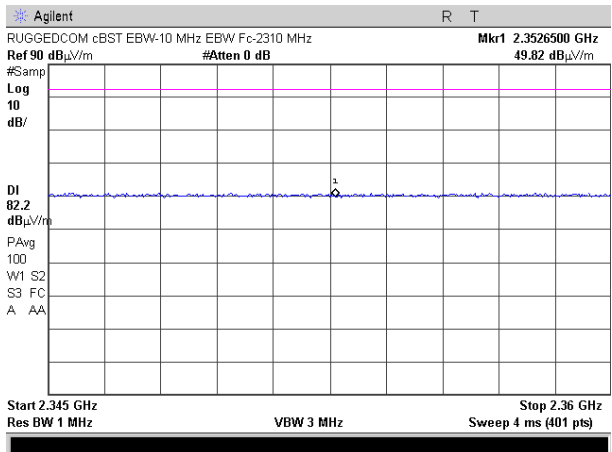
Plot # 151



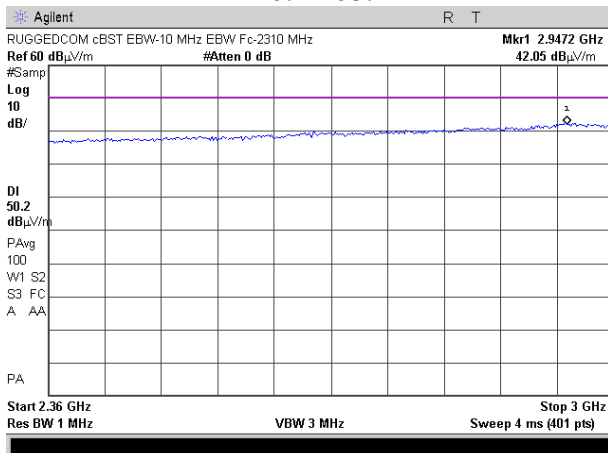
Plot # 152



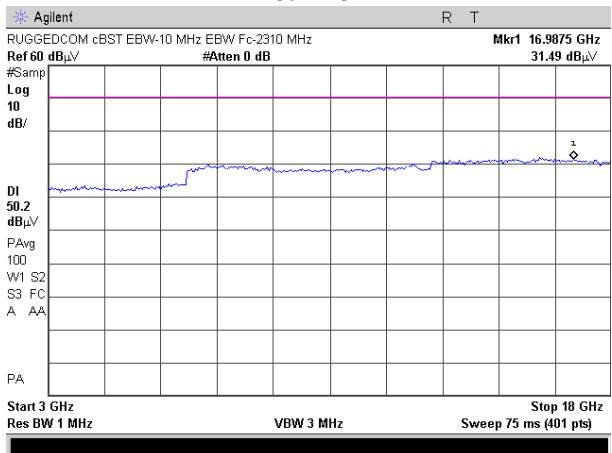
Plot # 153.



Plot # 154



Plot # 155.



Plot # 156



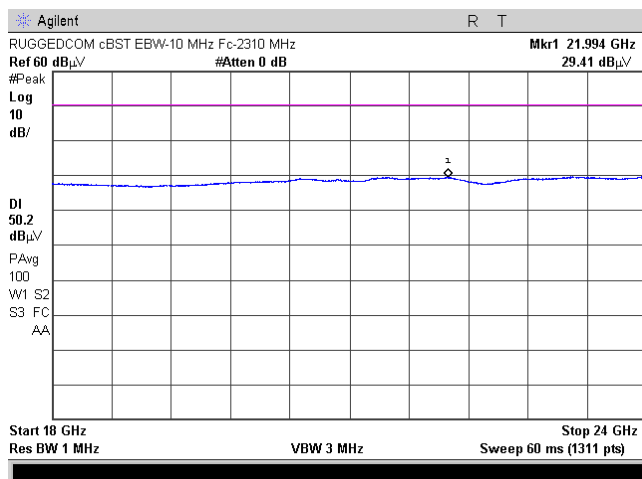
Test report No: 9112340871

Title: WiMax Transceiver

Model: WIN7023

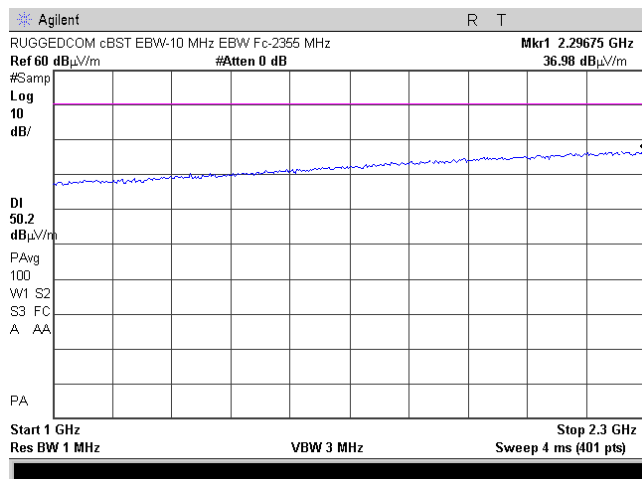
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FCC ID: WQEWIN7023

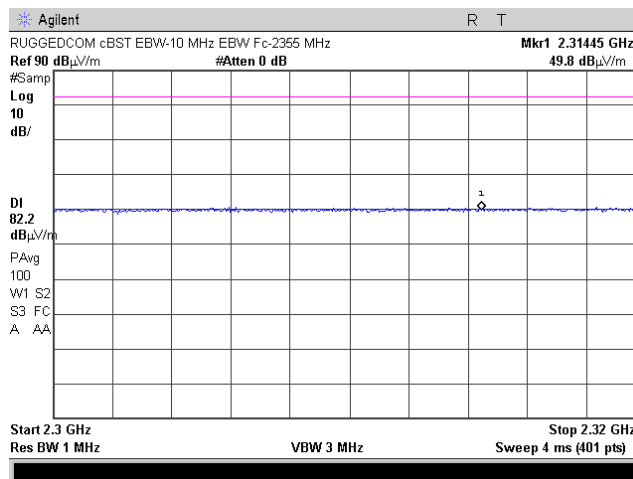


Plot # 157.

Carrier frequency 2355 MHz.



Plot # 158.



Plot # 159



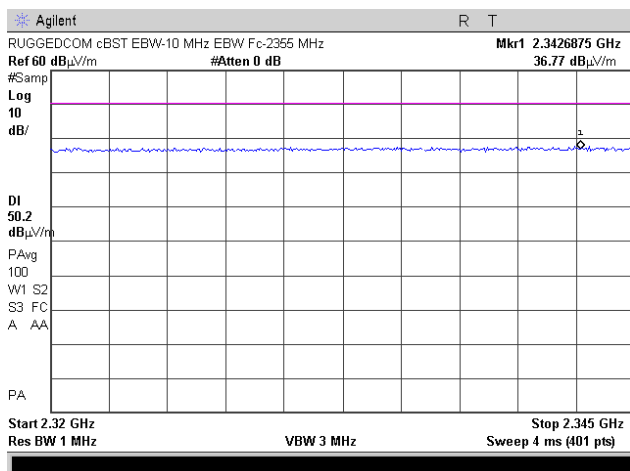
Test report No: 9112340871

Title: WiMax Transceiver

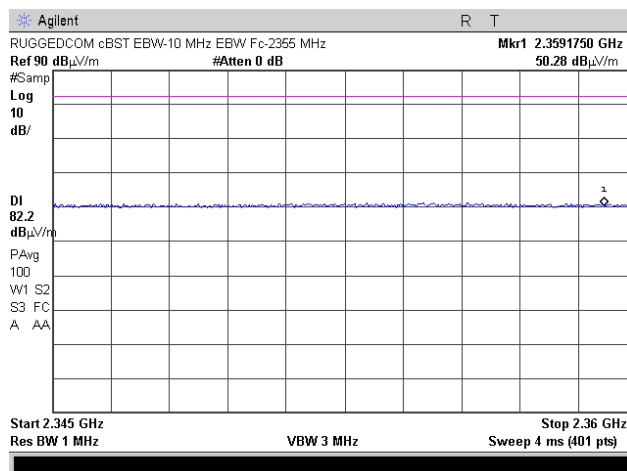
Model: WIN7023

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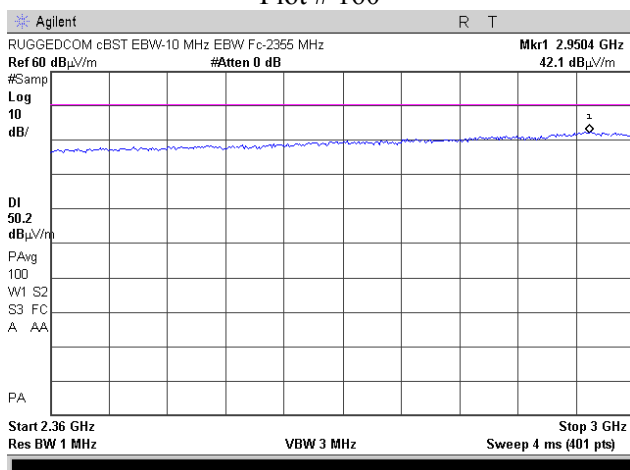
FCC ID: WQEWIN7023



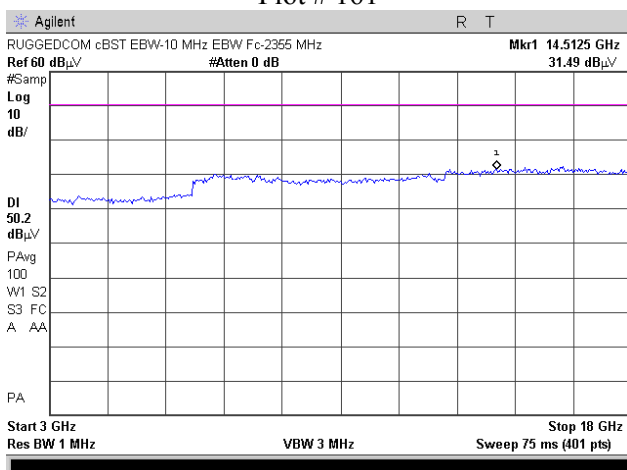
Plot # 160



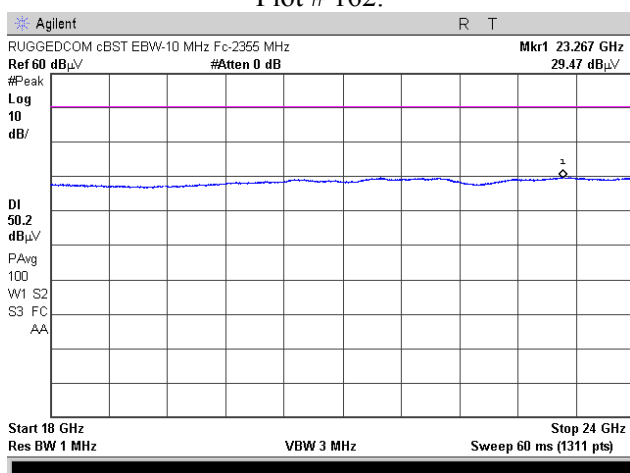
Plot # 161



Plot # 162.



Plot # 163



Plot # 164.



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5.1.6. Frequency stability test according to § 27.54

Operating Frequency Range 2305 – 2320 MHz , 2345 – 2360 MHz
 Ambient Temperature 21⁰ C Relative Humidity 49% Air Pressure 1008 hPa

TEST CONDITIONS		Lowest Tx frequency 2307.5 MHz	Frequency deviation (ppm)	Highest Tx frequency 2357.5MHz	Frequency deviation (ppm)
Test temperature	Test voltage(DC)				
+20°C	Vmin (40.5)	2307.50654	0.23	2357.50654	0.23
	Vnom (48)	2307.50600	0	2357.50600	0
	Vmax (55.2)	2307.50655	0.24	2357.50654	0.23
-30°C	Vnom (48)	2307.50668	0.29	2357.50667	0.29
-20°C	Vnom (48)	2307.50672	0.31	2357.50677	0.34
-10°C	Vnom (48)	2307.50675	0.33	2357.50678	0.34
0°C	Vnom (48)	2307.50675	0.32	2357.50674	0.32
+10°C	Vnom (48)	2307.50669	0.30	2357.50663	0.27
+30°C	Vnom (48)	2307.50647	0.20	2357.50645	0.19
+40°C	Vnom (48)	2307.50638	0.16	2357.50636	0.16
+50°C	Vnom (48)	2307.50631	0.14	2357.50629	0.12

TEST PROCEDURE

The EUT was placed in a climatic chamber and allowed to stabilize at 20°C temperature and nominal voltage for at list 15 min. The reference carrier frequency was taken. The input voltage was changed from 85% of nominal to 115% of nominal. Frequency changes were noted. The temperature in climatic chamber was varied from -30°C to +50°C. Measured frequencies were noted in table above.

LIMIT

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

TEST SUMMARY

Transmitter carrier frequencies stay within the authorized frequency bands 2305 – 2320 MHz and 2345 – 2360 MHz.

TEST EQUIPMENT USED:

2	3	13				
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APPENDIX A Photographs

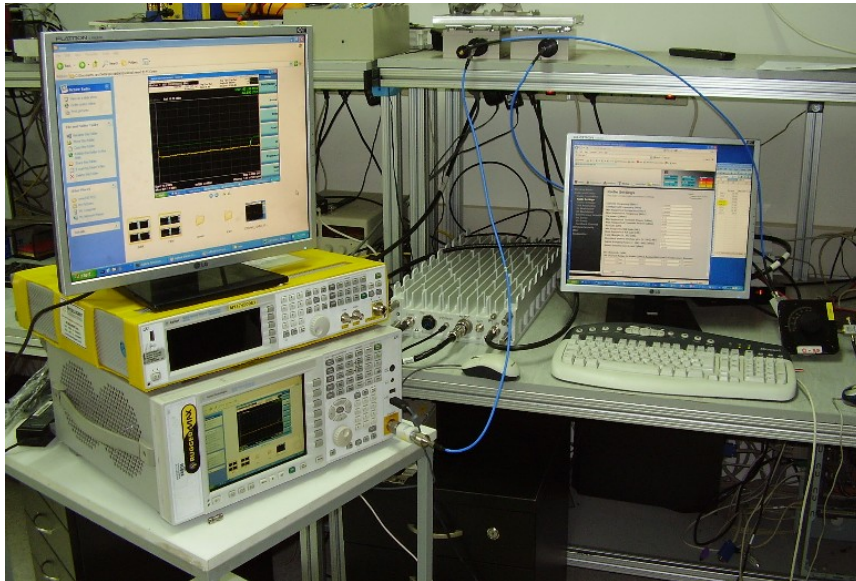


Photo 1-1. Conducted measurements. Test setup.

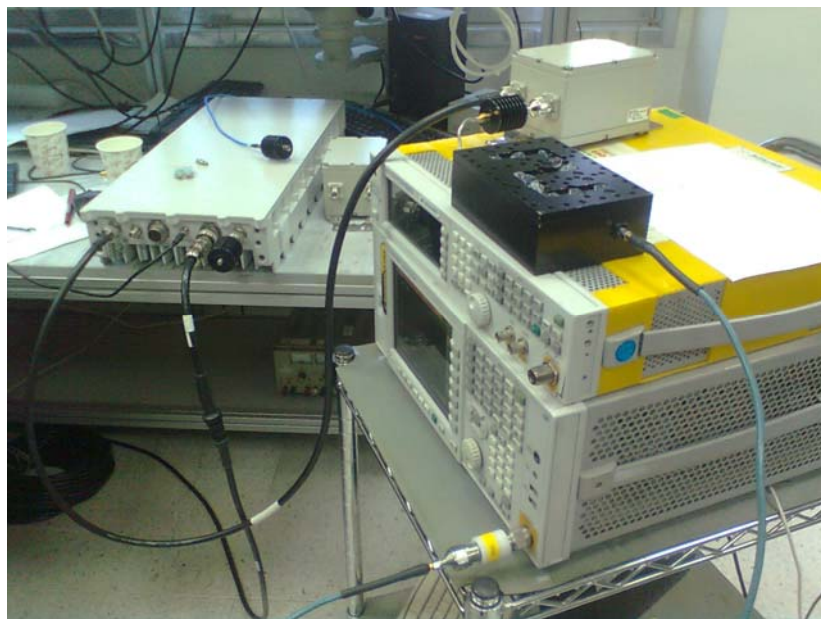


Photo 1-2. Conducted measurements. Test setup.

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Photo 2. Radiated emission test setup.



Photo 3. Radiated emission test setup.

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Photo 4. Radiated emission test setup.

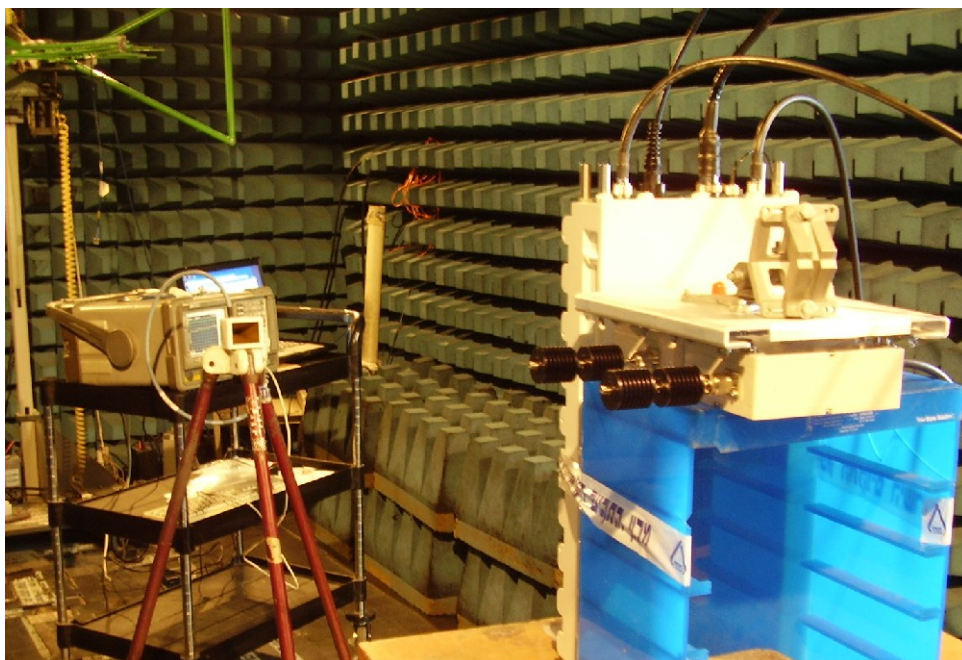


Photo 5. Radiated emission test setup.

**Test report No: 9112340871****Title: WiMax Transceiver****Model: WIN7023****Page 54 of 59 Pages****FCC ID: WQEWIN7023****APPENDIX B****Test equipment used****Test equipment used**

No	Description	Manufacturer information			Due Calibration date
		Name	Model No	Serial No	
1	Spectrum Analyzer MXA 20 Hz – 8.4 GHz	Agilent	N9020A	MY46471162	July 2012
2	Spectrum Analyzer EXA 9 kHz - 26.5 GHz	Agilent	N9010A	MY47191122	July 2012
3	Attenuator 10 dB 20W	Inmet	6B20W-10	NA	July 2012
4	Directional Coupler	TIGER	TGD-A1220-20	SDC2034-021	July 2012
5	Cable RF 1.5m	NaF	RG-402	NA	July 2012
6	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	Aug 2012
7	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	October 2012
8	Antenna Biconilog 30 – 2000 MHz	Schaffner- Chase	CBL6112B	S/N 23181	Aug 2012
9	Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405A	SII 4944	April 2012
10	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+85460A	SII 4068	April 2012
11	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	October 2012
12	Transient limiter 0.009-200 MHz	HP	11947A	3107105	August 2012
13	Cable RF 4m	Huber-Suhner	Sucoflex 104PE	21328/4PE	October 2012
14	Cable RF 0.5m	Huber-Suhner	Multiflex 141	520201	October 2012
15	Active Loop antenna 10 kHz – 30 MHz	EMCO	6502	SII 4874	October 2012
16	HP/LP filter for Block C and D	Ruggedcom Inc.	Block C and D band	NA	December 2012

**Test report No: 9112340871****Title: WiMax Transceiver****Model: WIN7023****Page 55 of 59 Pages****FCC ID: WQEWIN7023****Cable Loss (10m cable + Mast)**

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84



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Biconilog Antenna, Model Number: CBL-6112D, S/N: 23181.

No.	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m
1	30	17.90	170	9.40	530	17.70	1040	22.20
2	32	16.70	175	9.00	540	18.25	1060	22.50
3	34	15.55	180	8.50	550	18.60	1080	22.50
4	36	14.35	185	8.45	560	14.45	1100	22.40
5	38	13.30	190	8.60	570	18.40	1120	22.60
6	40	12.20	195	8.85	580	18.50	1140	22.45
7	42	11.05	200	8.95	590	18.60	1160	22.50
8	44	9.95	205	8.80	600	18.60	1180	22.40
9	46	8.90	210	8.50	610	18.80	1200	22.80
10	48	8.05	215	8.20	620	18.99	1220	22.95
11	50	7.30	220	8.50	630	19.05	1240	23.10
12	52	6.80	225	9.00	640	19.23	1260	23.40
13	54	6.45	230	9.65	650	19.10	1280	23.35
14	56	6.00	235	10.30	660	19.13	1300	23.62
15	58	5.70	240	11.00	670	19.04	1320	23.64
16	60	5.45	245	11.60	680	19.00	1340	23.86
17	62	5.30	250	12.00	690	19.17	1360	23.95
18	64	5.20	255	12.45	700	19.28	1380	23.90
19	66	5.30	260	12.85	710	19.25	1400	24.45
20	68	5.30	265	12.50	720	19.45	1420	24.74
21	70	5.35	270	12.45	730	19.75	1440	24.93
22	72	5.50	275	12.40	740	19.95	1460	25.03
23	74	5.80	280	12.55	750	20.07	1480	25.45
24	76	6.00	285	12.65	760	19.85	1500	25.30
25	78	6.60	290	12.75	770	19.80	1520	25.25
26	80	6.70	295	12.95	780	19.85	1540	25.36
27	82	7.15	300	13.00	790	19.95	1560	25.58
28	84	7.60	310	13.35	800	20.05	1580	25.50
29	86	8.10	320	13.75	810	20.10	1600	25.65
30	88	8.50	330	13.85	820	20.35	1620	25.60
31	90	8.90	340	14.10	830	20.40	1640	25.70
32	92	9.20	350	14.50	840	20.35	1660	25.83
33	94	9.75	360	14.70	850	20.46	1680	25.97
34	96	9.95	370	14.90	860	20.39	1700	26.10
35	98	10.20	380	15.10	870	20.29	1720	26.25
36	100	10.50	390	15.45	880	20.24	1740	26.04
37	105	11.25	400	16.00	890	20.35	1760	26.14
38	110	11.70	410	16.40	900	20.55	1780	26.20
39	115	11.70	420	16.70	910	20.45	1800	26.40
40	120	11.80	430	16.35	920	20.60	1820	26.64
41	125	11.80	440	16.30	930	20.60	1840	26.86
42	130	11.70	450	16.30	940	20.66	1860	27.12
43	135	11.35	460	16.70	950	20.88	1880	27.00
44	140	10.95	470	17.05	960	21.11	1900	27.25
45	145	10.35	480	17.20	970	20.93	1920	27.36
46	150	10.05	490	17.30	980	21.03	1940	27.68
47	155	9.70	500	17.40	990	21.05	1960	27.10
48	160	9.70	510	17.50	1000	21.10	1980	27.06
49	165	9.45	520	17.60	1020	21.40	2000	27.25

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Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.9
2	2000	28.3
3	3000	31.0
4	4000	33.1
5	4500	32.5
6	5000	32.4
7	6000	53.7
8	6500	35.6
9	7000	36.4
10	7500	36.9
11	8000	37.0
12	8500	38.0
13	9000	38.6
14	9500	38.4
15	10000	38.4
16	10500	38.4
17	11000	38.9
18	11500	39.6
19	12000	39.4
20	12500	39.2
21	13000	40.3
22	13500	41.0
23	14000	41.2
24	14500	41.3
25	15000	40.0
26	15500	38.0
27	16000	38.1
28	16500	40.3
29	17000	42.2
30	17500	44.6
31	18000	46.2

Cable Loss**Type: Sucoflex 104PE; Ser.No.21328/4PE; 4 m length**

Point	Frequency (GHz)	Cable Loss (dB)
1	0.0-1.0	1.7
2	1.0-3.5	3.2
3	3.5-5.5	4.0
4	5.5-7.5	4.7
5	7.5-9.5	5.3
6	9.5-10.5	5.6
7	10.5-12.5	6.2
8	12.5-14.5	6.8
9	14.5-16.5	7.5
10	16.5-18.0	8.1

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Antenna Factor
Broadband Horn Antenna model BBHA 9170 1m calibration

Point	Frequency, GHz	Antenna Factor (dB/m)
1	15.0	38.5
2	16.0	37.7
3	17.0	38.1
4	18.0	37.9
5	19.0	38.0
6	20.0	38.0
7	21.0	37.9
8	22.0	38.2
9	23.0	39.6
10	24.0	39.6
11	25.0	39.3
12	26.0	39.5
13	27.0	39.6
14	28.0	39.6
15	30.0	40.1
16	32.0	41.2
17	34.0	41.5
18	35.0	41.9
19	36.0	42.2
20	38.0	43.8
21	40.0	43.2

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APPENDIX C General information.

Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

AC	alternating current
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
L	length
LNA	low noise amplifier
m	meter
Mbps	megabit per second
MHz	megahertz
NA	not applicable
OFDM	Orthogonal Frequency Division Multiple Access
PRBS	pseudo random binary sequence
QP	quasi-peak
RF	radio frequency
RE	radiated emission
rms	root mean square
W	width

Specification references

47 CFR Part 27: 2011	Miscellaneous Wireless Communications Services
ANSI C63.4: 2009	American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communication Equipment Measurement and Performance.