EXHIBIT 11:

RADIATED HARMONICS AND SPURIOUS EMISSIONS DATA ------

Pursuant 47 CFR 2.993.

Measured data on occupied bandwidth per 47CFR 2.993.is the subject of attached Technical Report No.9ELS029T.

ELECTROMAGNETIC COMPATIBILITY TEST REPORT

Compliance with Radiated Harmonics and Spurious Emissions Requirements of 47CFR Parts 2 and 90

Company Name:	**Elisra Electronic Systems Ltd.**
Equipment Under Test:	**Series MW-CBDA-ESMR-1W60 BDA**

Report I.D.Number:	**9ELS029T.DOC**
Total number of pages (including this page):	**26**
Date:	**19 March, 1999**

EMI TEST Ltd. EMC Test Laboratory
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1. General Information.

Applicant:	Elisra Electronic Systems Ltd.
Applicant Address:	48 Mivtza Kadesh St., Bene Beraq 51203, Israel
Telephone:	972-3-6175639
FAX:	972-3-6175299
The testing was observed by the following applicant's personnel:	Mr.Shmuel Auster
Date of reception for testing:	February 12, 1999
Date of testing:	February 12, 1999 February 17, 1999
Test Laboratory Location:	EMI TEST Ltd., Moshav Hanniel, D.N.Lev Hasharon, Israel, 42865
Equipment Under Test:	MW-CBDA-ESMR-1W60 BDA Bi-Directional Amplifier
Series Number:	99021001
Mode of Operation:	Up-Link and Down-Link Receiving and Transmitting modes
Year of Manufacture:	1999
Applicable EMC Specification:	Federal Communication Commission (FCC), Code of Federal Regulations 47, Part 2 Sections 2.993, 2.997 and Part 90, Sections 90.210(g) and 90.691(a).

2. Applicable Documents.

2.1 Federal Communication Commission (FCC), Code of Federal Regulations 47, Ch.1, Parts 2 and 90.

2.2 FCC/OET, Laboratory Measurement Procedures MP-4, July 1987, "FCC Procedures for Measuring RF Emissions from Computing Devices".

2.3 FCC/Office of Science and Technology OST-55, August 1982, "Characteristics of Open Field Test Sites".

2.4 FCC/OET, "FCC Procedure for Measuring Electromagnetic Emissions from Digital Devices", TP-5, March 1989.

2.5 American National Standard, "Specifications for Electromagnetic Noise and Field Strength Instrumentation, 10KHz to 1 GHz", ANSI C63.2, 1987.

2.6 American National Standard, "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9KHz to 40GHz", ANSI C63.4, 1992.

3. Detailed Applicable EMC Requirements and Limits.

Requirements of Federal Communications Commission (FCC), Parts 2 and 90 are applicable for the tested equipment.

The radiated emissions must be measured in accordance with FCC measurement procedure. All tests must be performed in the Up-Link and Down-Link Transmit operational mode.

In accordance with the requirements of 47CFR Part 2, Section 90.210(g) and 47CFR Part 2 Sections 2.993 and 2.997, radiated emission of the first 10 harmonics of the carrier frequency and any other internal oscillator or any spurious radiated emission, will not exceed the radiated field strength radiated from half-wave tuned dipole fed by substitution generator. The spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9kHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40ghz, whichever is lower.

The power at output ports of substitution generator should be 43 + 10logP(watts) below the power radiated at the transmitter carrier frequency.

In the case of the MW-CBDA-ESMR-1W60 BDA the carrier frequency is radiated at the 0.1Watt = 20dBm power level, and as a result the power at output of the substitution generator should be 33dB below the power radiated at the transmitter carrier frequency or equal to
-13dBm (20dBm - 33dB = -13dBm).

All cases of radiated emissions exceeding the level 20dB below the level radiated by the substitution generator must be recorded and reported to FCC.

4. Test Procedure for Measurement of RF Emissions from Equipment Under Test (EUT).

The test was performed in the FCC-listed 3-meter-range open site.
The tested equipment was placed on a wooden 80-cm-high turntable located above the ground plane.

Radiated emission tests of harmonics of signal amplified by the BDA was performed with a single-tone input signal at -45dBm level, resulting +20dBm output signal. This test was performed for Up-Link and Down-Link operational modes for three frequencies for each operational frequency band (the upper, center and lower operational frequencies).

Radiated emission tests of spurious signals generated in the BDA due to intermodulation of two Up-Link or two Down-Link signals was performed with two -45dBm, each input signals, resulting +20dBm output power for each one of processed signals. This test was performed with one signal located at a center frequency of the operational frequency band, and the second signal at frequency 1MHz higher.

All measurements were performed by substitution method. This method prescribes the measurements carried out in two stages.

4.1 Stage 1.

At the first stage measurements of the radiated emission were done using setup in Fig.1. At each emission frequency the height of receiving antenna above the ground was scanned in 1-to-4 meter range.

The test antenna was set in horizontal and vertical polarization. For each polarization, the EUT was rotated through 360 degrees in the horizontal plane. The highest reading of test EMI spectrum analyzer was recorded at each emission frequency.

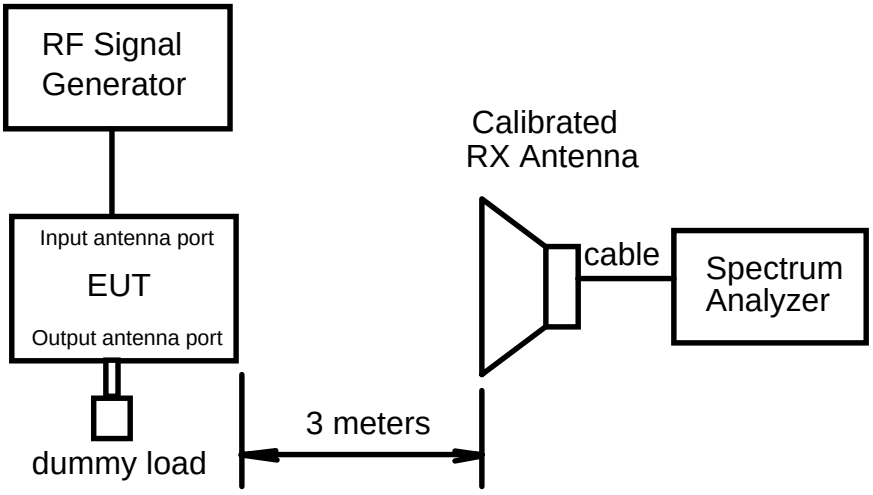

FIG. 1: Test setup for the measurements of radiated emissions from the EUT at frequencies up to the tenth harmonic of the carrier frequency.

4.2 Stage 2.

At the second stage, the transmitting antenna was set at the geometrical center of the EUT (the EUT is removed). The transmitting antenna must have the same radiation properties as a half-wave tuned dipole. If half-wave dipole is not available, like in the case of microwave frequency band, correction factor must be used in order to compensate the difference in gains of the dipole and available antennas.

Transmitting antenna was then connected to a signal generator. The receiving antenna was raised and in the same range of heights above ground plane as earlier. Both receive and transmit antennas had the same polarization. The maximum reading of the spectrum analyzer was recorded. The interference power of the EUT was defined as the power at the terminals of transmitting antenna when the signal generator was adjusted to give the same indication on the EMI spectrum analyzer as that recorded earlier (at the first stage).

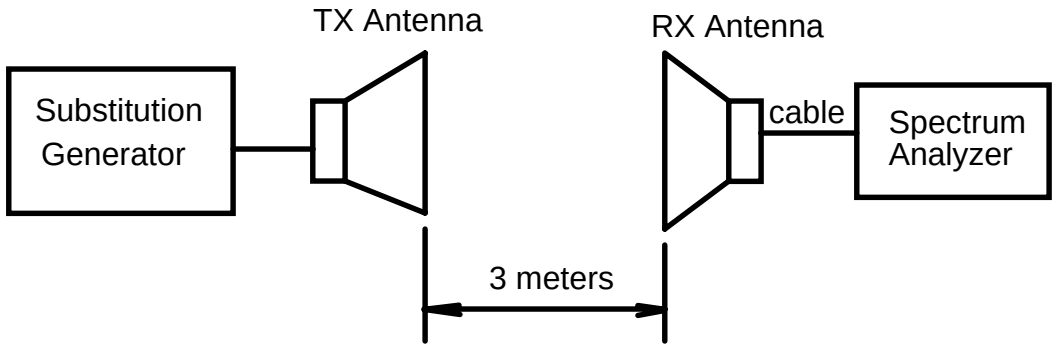

FIG.2 Test setup for the test site calibration for FCC, Part 90 measurements

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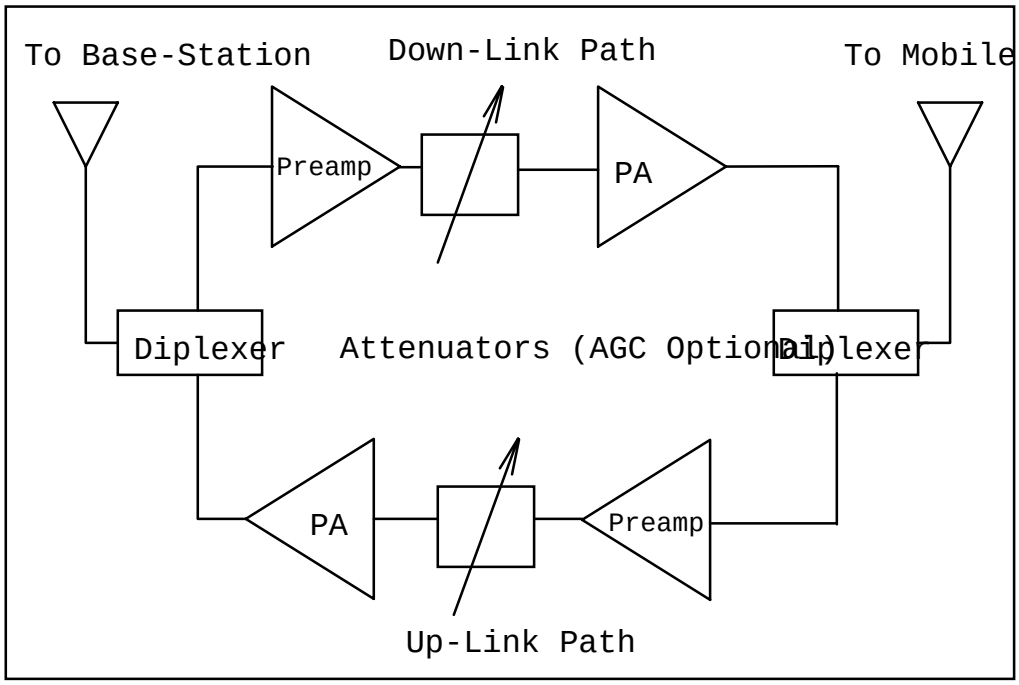
Resolution bandwidth of EMI Spectrum was 100kHz. Lower values of resolution bandwidth were used to detect emission of higher harmonics buried in the noise of spectrum analyzer. Low-noise preamplifier with gain 30dB was used for further improvement of dynamic range.

5. Description of Equipment Under Test.

5.1 Description of the Tested Equipment.

MW-CBDA-ESMR-1W60 BDA is cellular repeater/booster, and may be used in order to enlarge coverage of cellular base stations. The MW-CBDA-ESMR-1W60 BDA incorporates high-linear power amplifiers and diplexers with sharp out-of band rejection, which assists in avoiding interfering signals and intermodulations. MW-CBDA-ESMR-1W60 BDA operates without AGC.
The tested MW-CBDA-ESMR-1W60 BDA operated without AGC provisions.

The block-diagram of the MW-CBDA-ESMR-1W60 BDA is given in the following figure 3:

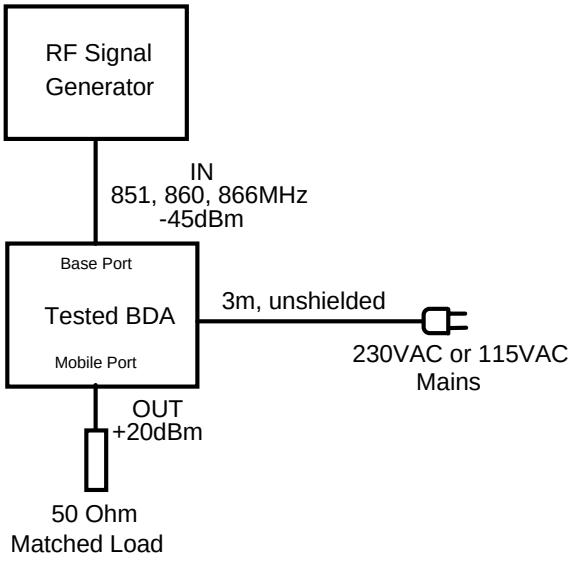


5.2 The Tested Configuration.

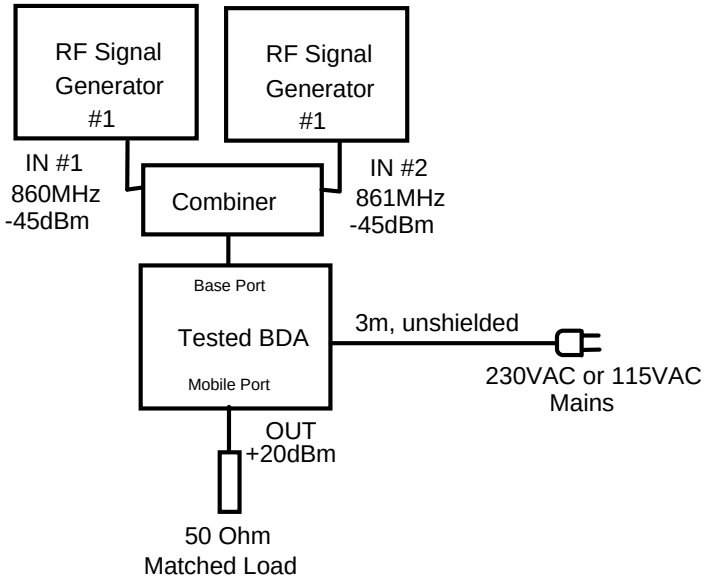
The MW-CBDA-ESMR-1W60 BDA was tested in the configuration shown in the following figure 4:

a) Down-Link Configuration.

Harmonics Emission Test

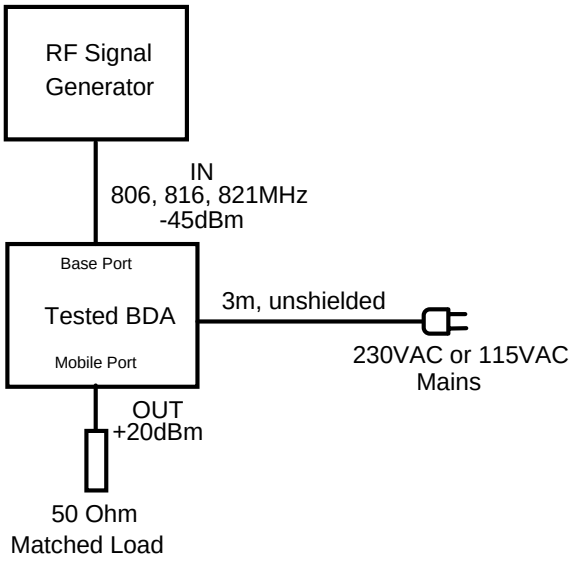


Intermodulation Emission Test

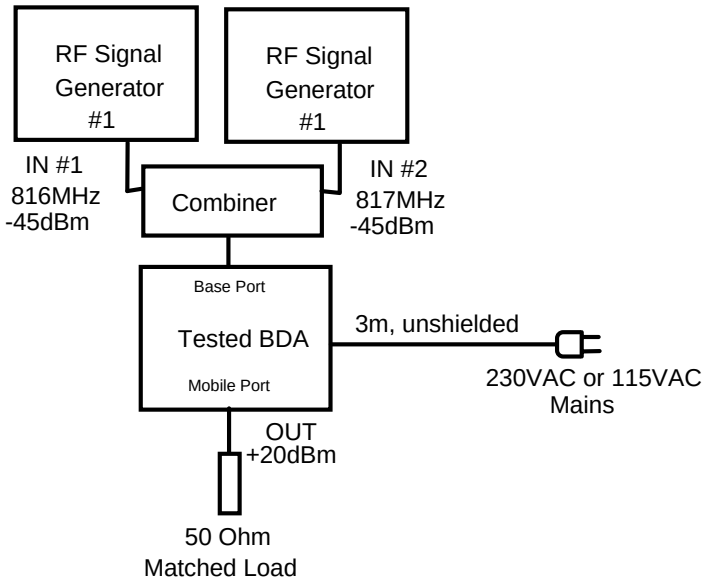


b) Up-Link Configuration.

Harmonics Emission Test



Intermodulation Emission Test



5.3 Cables Used During the Tests:

No.	Description	Length (m)	Shielding
1	50Ohm coaxial cable from Signal Generator to the EUT.	1.0	85-95% braided + foil overall shield
2	50Ohm coaxial cable from the EUT to 50Ohm matched load.	0.5	85-95% braided + foil overall shield
3	Power cable	3.0	Unshielded

5.4 Modifications Required for Compliance.

The MW-CBDA-ESMR-1W60 BDA in its original design complied with the radiated emission requirements of 47CFR Part 90. Therefore no corrective actions were required.

6. Description of the Test Site.

Location:	Moshav Hanniel P.O.Box 65, 42865 Israel
Phone:	(972)-9-8987382
FAX:	(972)-9-8987383
Open Site Ranges:	3 and 10 meters
Turntable:	2.1 x 1.6 meter with maximum loading 1500kg, distant actuation. The turntable and the tested equipment are environmentally protected.
Antenna Mast:	1 to 4 meter
Supply Voltages:	230VAC, 3 Phases, 16A from each phase; 110VAC, 3 Phases, 32A from each phase.

7. List of Test Equipment Used.

No.	Description	Manufacturer and Model Number	Series No.
1	**Spectrum Analyzer 9KHz to 26.5GHz**	**Hewlett Packard Model 8563E**	**3821A09026**
2	**Antenna, Biconical, 20MHz to 300MHz**	**EMCO Model 3110B**	**1813**
3	**Antenna, Log-Periodic, 200MHz to 1000MHz**	**EMCO Model 3146B**	**3807**
4	**Antenna, Double Ridge Guide, 1GHz to 18GHz**	**EMCO Model 3115**	**4272**
5	**Antenna, Double Ridge Guide, 1GHz to 18GHz**	**EMCO Model 3105**	**2017**
6	**Plotter**	**HP, Model 7440A**	**2929A17765**
7	**RF Signal Generator 0.1-990MHz**	**HP Model 8656A**	
8	**Microwave Sweep Generator Mainframe**	**HP, Model 8350B**	**2517U01367**
9	**Microwave Sweep Generator Plug In Unit 0.01-20GHz**	**HP Model 83592B**	**2509A00667**
10	**Preamplifier**	**Microwave Technology p/n SAO-4868**	**14026**

8. Summary of Test Results.

All radiated emissions detected from the EUT were below the standard limits when tested in Up-Link and Down-Link transmit operational modes of the MW-CBDA-ESMR-1W60 BDA.

The lowest safety margin equal to 21.1dB was measured for the 2-nd harmonic of the carrier frequency (1630MHz), for vertical polarization.

9. Details of Test Results.

Radiated emission tests were performed in Up-Link and Down-Link Transmit operational modes of the MW-CBDA-ESMR-1W60 BDA.

9.1 Up-Link (Mobile-to-Base) Transmit Mode.

In Up-Link (Mobile-to-Base) transmit mode the tests were performed at three operational frequencies 806, 816 and 821MHz. All radiated emissions were at levels below the FCC, Part 90 standard level. Test results in this report are presented for the center operational frequency 816MHz only.

The lowest safety margin of 71.07dB was recorded for the 2-nd harmonic of carrier frequency (1632MHz), for vertical polarization.

Derivation of the standard limit in the frequency range 1.632GHz to 8.160GHz, in terms of power received at input port of the spectrum analyzer, is given in Appendix A.

More details are given in Table 1 for the radiated emissions at harmonics of the carrier frequency.

Table 1. Up_link Transmit Mode @ 816MHz.

Test Results for Radiated Emission

at Harmonics of the Carrier Frequency in TX Mode.

Harmonic No.	Frequency in MHz	Received Voltage in dBm versus Standard Limit			
		Vertical Polarization (dBm)	Std. Limit (dBm) for Vertical Polarization	Horizontal Polarization	Std. Limit (dBm) for Horizontal Polarization
2	1632	-92.67	-21.6	-103.5	-23.4
3	2448	-106.3	-25.7	-104.1	-27.6
4	3264	L.T.-115.3	-32.5	L.T.-115.0	-32.7
5	4080	L.T.-116.2	-28.7	L.T.-115.7	-33.9
6	4896	L.T.-118.2	-27.6	L.T.-113.3	-31.4
7	5712	L.T.-111.2	-32.1	L.T.-111.2	-38.9
8	6528	L.T.-111.2	-34.4	L.T.-114.8	-40.5
9	7344	L.T.-114.0	-39.9	L.T.-115.8	-38.6
10	8160	L.T.-116.2	-41.8	L.T.-116.5	-39.6

9.2 Down-Link (Base-to-Mobile) Transmit Mode.

In Down-Link (Base-to-Mobile) transmit mode the tests were performed at center frequency 851, 860 and 866MHz. All radiated emissions were at levels below the FCC, Part 90 standard level. Test results in this report are presented for the center operational frequency 860MHz only

The lowest safety margin of 67.9dB was recorded for the 2-nd harmonic of carrier frequency (1720MHz), for vertical polarization.

Derivation of the standard limit in the frequency range 1.632GHz to 8.160GHz, in terms of power received at input port of the spectrum analyzer, is given in Appendix A.

More details are given in Table 2 for the radiated emissions at harmonics of the carrier frequency.

Table 2. Down_Link Transmit Mode @ 860MHz. Test Results for Radiated Emission at Harmonics of the Carrier Frequency in TX Mode

Harmonic No.	Frequency in MHz	Received Voltage in dBm versus Standard Limit			
		Vertical Polarization (dBm)	Std. Limit (dBm) for Vertical Polarization	Horizontal Polarization	Std. Limit (dBm) for Horizontal Polarization
2	1720	-83.8	-15.9	-88.5	-15.9
3	2580	-93.5	-19.5	L.T.-99.2	-18.7
4	3440	L.T.-99.5	-23.9	L.T.-97.1	-22.0
5	4300	L.T.-99.5	-25.2	L.T.-101.2	-26.5
6	5160	L.T.-99.8	-25.3	L.T.-98.0	-27.1
7	6020	L.T.-100.7	-27.1	L.T.-99.0	-27.9
8	6880	L.T.-97.3	-28.6	L.T.-98.6	-29.5
9	7740	L.T.-98.5	-31.3	L.T.-98.3	-30.7
10	8600	L.T.-100.0	-33.4	L.T.-98.0	-34.2

10. Signatures.

Test measurements were performed by:

Dr.A.Axelrod
(EMI Test Ltd.)

19 March 1999

(Date, Signature)

Test report was prepared by:

Dr.A.Axelrod
(EMI Test Ltd.)

19 March 1999

(Date, Signature)

Approved by:

Dr. Alexander Axelrod
(EMI Test Ltd.)

19 March 1999

(Date, Signature)

The testing was observed by:

Mr.Shmuel Auster
(Elisra Electronic Systems Ltd.

12 Apr. 1999

(Date, Signature)

Appendix A.

Derivation of Standard Limit for FCC, Part 90

in the Frequency Range 0.8 to 9.0 GHz.

Maximum nominal radiated power during Up-Link and Down-Link operations of MW-CBDA-ESMR-1W60 BDA is +20dBm. As a worst case condition, emission of harmonics and spurious signals was tested at +30dBm.

Standard limit for radiation of harmonics was derived under the following assumptions:

- Power at output ports of substitution generator should be 43+10log(Pwatts)=43.0dB below the carrier frequency. The carrier frequency was radiated at the 1.0Watt=30dBm power level, which means that the substitution generator must be leveled to 30dBm-43dB = -13dBm;

- Spacing between transmit and receive antennas equals to 3 meters;

- Antenna gains of both transmit and receive antennas are as given in the Table A-1;

- Far-field conditions are satisfied in all frequency range from 1 to 10 GHz.

The test setup used for calibration of the test site is shown in Fig.A-1.

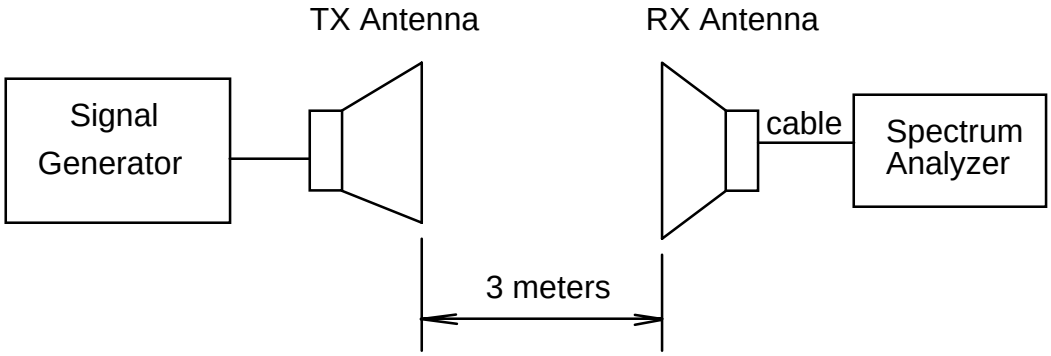


FIG.A-1 Setup for the test site calibration for FCC, Part 90 measurements.

Power expected at the input port of the spectrum analyzer can be calculated using Friis formula:

$$Prec = Pt \bullet Gt \bullet Gr\ [â/4\pi R]^2 \bullet Lc\ ,$$

where

Pt - the power at the generator output port (-13dBm);
Prec - the power at output port of receive antenna;
Gt - numeric gain of transmit antenna
(EMCO, Model 3105 Double-Ridge Guide Antenna)
Gr - numeric gain of receive antenna
(EMCO, Model 3115 Double-Ridge Guide Antenna);
R - spacing between the two antennas, equal to 3 meters;
Lc - cable losses.

The same equation can be written in the decibel form:

$$Prec(dBm) == Pt(dBm)+Gt(dB)+Gr(dB)+20\log[1/(4\pi R)]+ + 20 \log â(m)+Lc(dB);$$

The latter formula was used for calculations of power received by spectrum analyzer (Prec,theor). Prec,theor (column 8 in Table A-1) was then compared with measured received power, Prec,meas (column 9 in Table A-1).

Measured and calculated results for the case of Up-Link transmission at 816MHz are given in the Table A-1, and for the case of Dow-Link transmission at 860MHz are given in Table A-2. Calculation procedure and example are given in notes to the Table A-1.

Table A-1. Derivation of Standard Limit for Measurement of Radiated Harmonics and Spurious (per FCC Part 90).
Up-Link Transmission at 816MHz.

Freq (GHz)	Pt (dBm)	Gt (dBi)	Gr (dBi)	20× log(1/4πR)	20log(â)	Meas Cable Loss L(dB)	G preamp (db)	Prec theor (dBm)	Prec, Meas Vert.Pol. (dBm)	Delta Ptheor-Pmeas Vert.Pol. (dB)	Gt-Gdip (dbi)	Std. Limit from Measurements Vertical Pol. (dBm)
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(7a)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
1.632	**-13**	**7.2**	**8.8**	**-31.5**	**-14.70**	**--6.0**	**30**	**-19.2**	**-15.0**	**-4.2**	**6.6**	**-21.6**
2.448	**-13**	**8.0**	**9.2**	**-31.5**	**-18.22**	**-5.3**	**30**	**-20.82**	**-18.3**	**-2.5**	**7.4**	**-25.7**
3.264	**-13**	**8.3**	**9.45**	**-31.5**	**-20.72**	**-5.8**	**30**	**-23.27**	**-24.8**	**1.53**	**7.7**	**-32.5**
4.080	**-13**	**8.3**	**9.0**	**-31.5**	**-22.66**	**-6.7**	**30**	**-26.56**	**-21.0**	**-5.56**	**7.7**	**-28.7**
4.896	**-13**	**8.7**	**10.2**	**-31.5**	**-24.24**	**-7.6**	**30**	**-27.44**	**-19.5**	**-7.94**	**8.1**	**-27.6**
5.712	**-13**	**9.5**	**10.45**	**-31.5**	**-25.58**	**-8.5**	**30**	**-28.63**	**-23.2**	**5.43**	**8.9**	**-32.1**
6.528	**-13**	**9.8**	**11.1**	**-31.5**	**-26.74**	**-9.4**	**30**	**-29.74**	**-25.2**	**4.54**	**9.2**	**-34.4**
7.344	**-13**	**10**	**10.9**	**-31.5**	**-27.77**	**-12.2**	**30**	**-32.27**	**-30.5**	**9.4**	**9.4**	**--39.9**
8.160	**-13**	**10.2**	**10.8**	**-31.5**	**-28.68**	**-12.5**	**30**	**-32.28**	**-32.2**	**9.6**	**9.6**	**-41.8**

Table A-2. Derivation of Standard Limit for Measurement of Radiated Harmonics and Spurious (per FCC Part 90).
Down-Link Transmission at 860MHz.

Freq (GHz)	Pt (dBm)	Gt (dBi)	Gr (dBi)	20× log(1/4πR)	20log(â)	Meas Cable Loss L(dB)	G preamp (db)	Prec theor (dBm)	Prec, Meas Vert.Pol. (dBm)	Delta Ptheor-Pmeas Vert.Pol. (dB)	Gt-Gdip (dbi)	Std. Limit from Measurements Vertical Pol. (dBm)
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(7a)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
1.720	**-13**	**7.2**	**8.5**	**-31.5**	**-14.70**	**--6.0**	**30**	**-19.50**	**-9.3**	**-10.2**	**6.6**	**-15.9**
2.580	**-13**	**8.1**	**9.5**	**-31.5**	**-18.69**	**-5.3**	**30**	**-20.89**	**-12.0**	**-8.89**	**7.5**	**-19.5**
3.440	**-13**	**8.3**	**9.4**	**-31.5**	**-21.19**	**-5.8**	**30**	**-23.79**	**-16.2**	**-7.59**	**7.7**	**-23.9**
4.300	**-13**	**8.3**	**9.25**	**-31.5**	**-24.71**	**-6.7**	**30**	**-28.36**	**-17.5**	**-10.86**	**7.7**	**-25.2**
5160	**-13**	**8.9**	**10.45**	**-31.5**	**-24.71**	**-7.6**	**30**	**-27.46**	**-17.0**	**-10.45**	**8.3**	**-25.3**
6020	**-13**	**9.7**	**10.7**	**-31.5**	**-26.04**	**-8.5**	**30**	**-30.61**	**-18.0**	**-12.01**	**9.1**	**-27.1**
6.880	**-13**	**9.9**	**10.6**	**-31.5**	**-27.21**	**-9.4**	**30**	**-30.61**	**-19.3**	**-10.71**	**9.3**	**-28.6**
7.740	**-13**	**10.1**	**10.6**	**-31.5**	**-28.23**	**-12.2**	**30**	**-34.23**	**-21.8**	**-13.03**	**9.5**	**-31.3**
8.600	**-13**	**10.3**	**10.8**	**-31.5**	**-29.14**	**-12.5**	**30**	**-35.04**	**-23.7**	**-11.34**	**9.7**	**-33.4**

Notes:

1. Transmit Antennas:
Double Ridge Horn EMCO Model 3115 at 0.9GHz to 9.0GHz.

2. Receive Antenna:
Double Ridge Horn EMCO Model 3105 at 0.9GHz to 9.0GHz.

3. The column (10) shows an absolute value of difference between calculated (Prec,theor.) and measured (Prec,meas.) powers received at input port of the spectrum analyzer, while transmitting from the substitution generator.

4. Column (11) contains standard values of the power received by the spectrum analyzer from the tested equipment. This value was obtained from Prec,meas by taking into account the difference in gains between double ridged guide and half-wave dipole. These values were adopted as limit values for measurements of harmonics and spurious emissions from the EUT.

5. Example of calculation of the theoretical received power (Prec,theor):

$$Prec,theor(dbm)=Pt(dB)+Gt(dB)+Gr(dB)+$$
$$+ 20\log(1/4\pi R)+20\log\hat{a}(m)+Lc(dB)+Gpreamp(dB);$$

Example.

For the 4-th harmonic (3.264GHz, see Table A-1):

$$Prec(dBm),theor. = -13 + 8.3 + 10.0 - 31.5 - 20.72 - 5.8 +30 =$$
$$= -23.42dBm$$

(6) For cases when both measured and theoretical values of received power were available, standard limit was calculated using the measured received power, Prec,meas.

Calculations of the standard limit for power received from the tested equipment was done using the following formula and took into account the difference between gains of /â2 tuned dipole and horn antenna used in tests:

Std.Limit (dBm) = Prec,meas - (Gt - Gdipole)

(12) = (9) - (11) ,

where Gdipole is the gain of /â2 tuned dipole antenna
(taken equal to 0.6 dB in all cases),is the gain of thorn antenna used in tests.
The Gdipole took into account 1dB loss in the dipole balun.

Example:

For the 4-th harmonic:

Std.Limit (dBm) = -24.8 - 7.7 = -32.5dBm

7. Translation of the standard limit from dBm to dBμV presentation done using the formula:

Std.Limit (dBμV) = Std.Limit (dBm) + 107 dB

(which is valid for 50Ω input impedance of the EMI spectrum analyzer).

Example:

For 4-th harmonic:

Std.Limit (dBμV) = - 32.5 + 107 = 74.5dBμV