Test Report No. 9512312315

***Applicant*: Green Point Systems Ltd.**

***Equipment Under Test:* RF transceiver**

***Model:* IGHF**
***FCC ID:* 2AFMJ-IGHF**

From The Standards Institution
Of Israel
Industry Division
Electronics & Telematics Laboratory
EMC Branch

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

Certificate Number: AT-1359

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Applicant:	Green Point Systems Ltd.
Address:	7 Haeshel St., South Industrial Park, P.O.Box 3136, Caesarea, 3088900, Israel
Sample for test selected by:	The customer
The date of tests:	11, 17 May 2015

Description of Equipment Under Test (EUT):	RF transceiver.
Model:	IGHF
Software version of radio unit	B1
Manufactured by:	Green Point Systems Ltd.

Reference Documents:

- CFR 47 FCC: Rules and Regulations;
  Part 15. “Radio frequency devices”;
  Subpart B: “Unintentional radiators” (2010)

This Test Report contains16 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

Table of Contents

1. Test summary

Parameter	FCC Part 15 Subpart B Reference paragraph	Verdict
Conducted emission on AC line Frequency range: 0.15 - 30 MHz	Section 15.107 Class B	Comply
Radiated emission from unintentional radiator Frequency range: 30 MHz – 6GHz	Section 15.109 Class B	Comply

Electronics & Telematics Laboratory
September 29, 2015

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Name: Michael Feldman
Position: Test Technician

Measurement uncertainty.

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error.
The laboratory calibrates its standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.
In the following table the uncertainty calculation is given.

Type of disturbance Test description	Calculated uncertainty U_{LAB}
Radiated disturbance electric field strength in a SAR at 3 m distance 30 MHz – 1.0 GHz	±4.32 dB
electric field strength in a FAR at 3 m distance 1.0 – 18 GHz. 18 – 40 GHz.	 ±4.47 dB ±2.78 dB
Conducted disturbance at mains port (150 kHz to 30 MHz)	2.8 dB

Normative References.

FCC 47 CFR Part 15, Subpart B (2010)	Radio frequency devices", Subpart B: Unintentional radiators
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

2. EUT Description and operation

2.1. General description:

* Note: the customer supplied all information in clause below.

RF transceiver IGHF is integrated in IGHH smart switch that is a part of smart home system. The IGHF enables smart control over lights shutters, air conditioning and power appliances and can be operated locally or from Internet via the Internet Gateway. Switch is built with touch technology and no mechanical parts. The switch is designed with subtle LED lights which display the current switch mode.

Type of modulation:	FSK
Antenna type:	Integrated

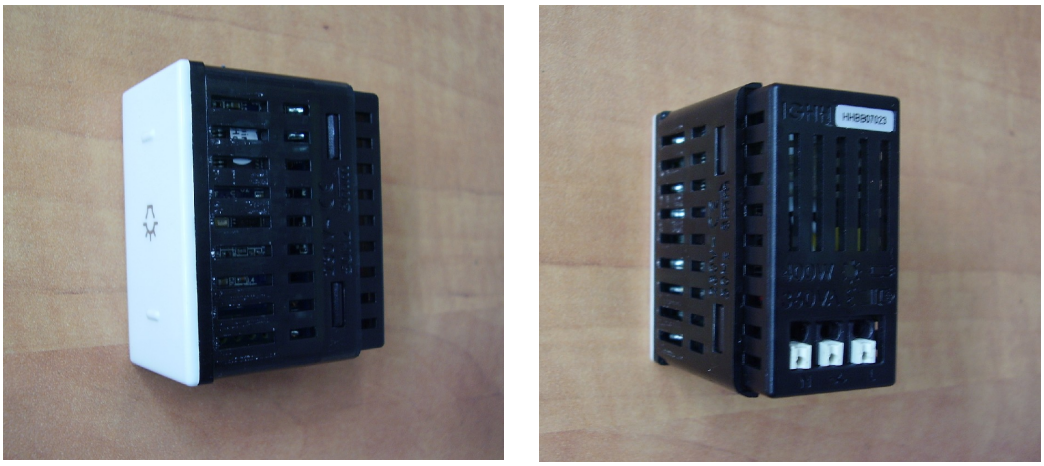


Photo 1. Smart switch side and rear view.

2.2. Potential emission sources:

Table 1. Potential emission sources

Frequency	Location
30.0 MHz	RF Lo oscillator
433.04 – 434.4 MHz	RF signal

2.3. EUT setup and operation:

Settings: RF communication disabled.

3. Measurements and derived results

3.1. Location of the Test Site:

The tests were conducted at the EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

3.2. Test condition:

Temperature: 24 °C. Humidity: 53 %. Atmospheric pressure: 1008 mbar.

3.3. Radiated emission test.

3.3.1. General:

The test performed per FCC Part 15 Subpart B Section 15.109 Class B.

The initial scan was made using a peak detector but still using the appropriate CISPR 16 (Quasi-Peak) detector IF bandwidth.

A tolerance limit was set 10 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector.

3.3.2. Radiated emission test procedure:

Preliminary investigation was performed from the lowest radio frequency signal generated in the equipment up to ten harmonic of a carrier frequency.
The final radiated emission measurements were performed in the semi Anechoic chamber at the 3 m test distances.
Settings: RF communication disabled.
The transmitter was installed on a turn - table.
Biconilog and Double Ridged Guide antennas were used.

The frequency range from 30 MHz to 6 GHz was investigated.
The measurements were performed at frequencies at which the signal level was 10 dB below the limit or less. The levels were maximized by rotating turntable through 360° and changing antenna-to-EUT polarization from vertical to horizontal.

Unless stated otherwise, the measuring equipment settings were:

Initial scan:	
Detector type	Peak
Mode	Max hold
Bandwidth	120 kHz
Step size	Continuous sweep
Sweep time	>1 seconds/MHz

Measurements	
Detector type	Quasi-peak (CISPR)/Avg
Bandwidth	120 kHz/ 1MHz
Measurement time	20 seconds/MHz
Observation	>15 seconds

3.3.3. Radiated emission test results:

The test results are presented in **table 2** (30-1000 MHz range) and in **plots ## 1 – 2** (1-6GHz range).

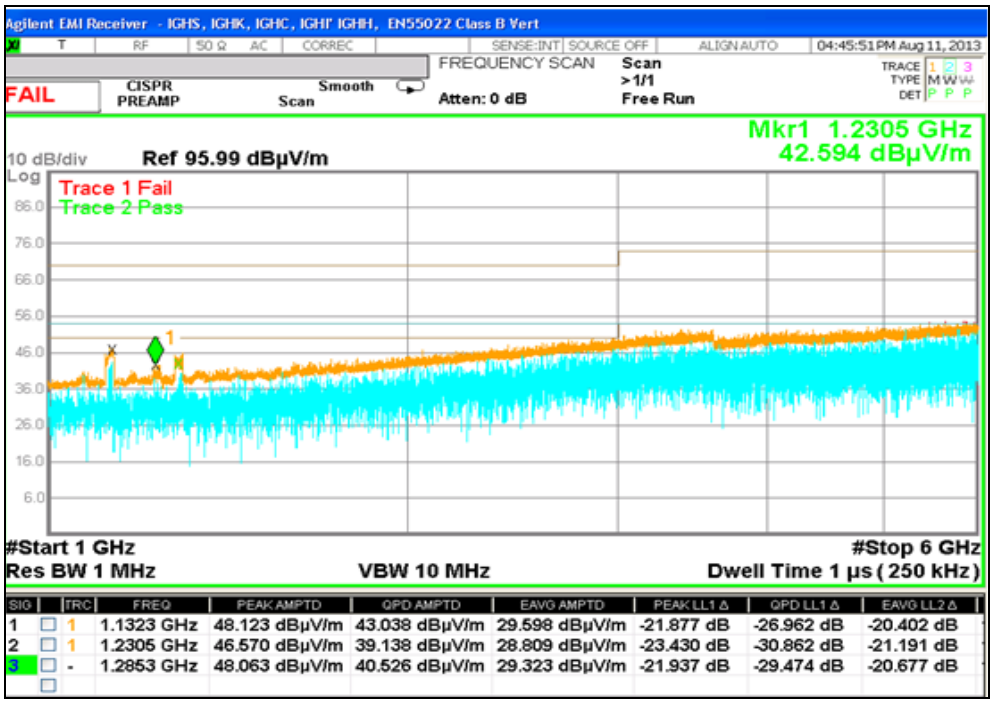
30-1000 MHz range: All QP and Avg emissions are 12dB at least below limit Class B.

1 – 6GHz range: All peaks/ Avg are below Peak/ Avg limit Class B.

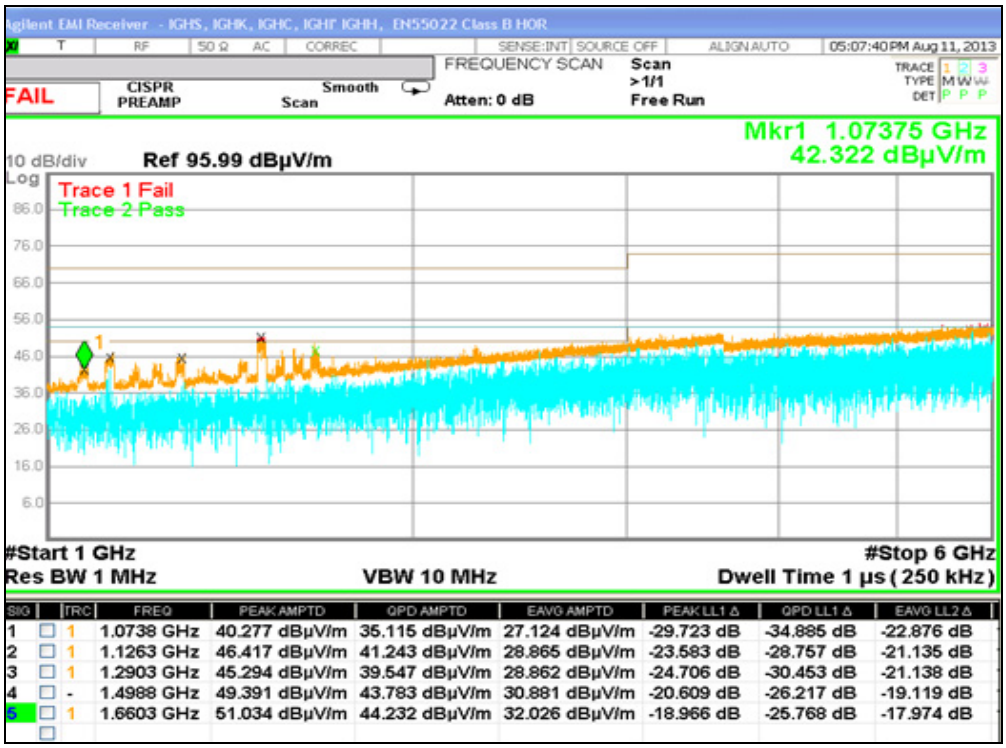
Table 2. Unintentional radiated emissions test result.
Frequency range 30-1000MHz

Freq. MHz	Antenna Polariz. V/H	Antenna Height (m)	Turn table Angle (°)	QP. Emission Level (dBμV/m)	Limit Class B @ 3 m (dBμV/m)	Margin (dB)
36.5	V	1.0	204	27.7	40.0	12.3
194.4	H	1.5	271	27.7	43.5	15.8
227.1	H	1.5	238	31.3	46.0	14.7

Plot 1 - Plot 2: Radiated emission scan.
Frequency range 1 – 6 GHz



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ
1	1	1.1323 GHz	48.123 dBµV/m	43.038 dBµV/m	29.598 dBµV/m	-21.877 dB	-26.962 dB	-20.402 dB
2	1	1.2305 GHz	46.570 dBµV/m	39.138 dBµV/m	28.809 dBµV/m	-23.430 dB	-30.862 dB	-21.191 dB
3	-	1.2853 GHz	48.063 dBµV/m	40.526 dBµV/m	29.323 dBµV/m	-21.937 dB	-29.474 dB	-20.677 dB



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ
1	1	1.0738 GHz	40.277 dBµV/m	35.115 dBµV/m	27.124 dBµV/m	-29.723 dB	-34.885 dB	-22.876 dB
2	1	1.1263 GHz	46.417 dBµV/m	41.243 dBµV/m	28.865 dBµV/m	-23.583 dB	-28.757 dB	-21.135 dB
3	1	1.2903 GHz	45.294 dBµV/m	39.547 dBµV/m	28.862 dBµV/m	-24.706 dB	-30.453 dB	-21.138 dB
4	-	1.4988 GHz	49.391 dBµV/m	43.783 dBµV/m	30.881 dBµV/m	-20.609 dB	-26.217 dB	-19.119 dB
5	1	1.6603 GHz	51.034 dBµV/m	44.232 dBµV/m	32.026 dBµV/m	-18.966 dB	-25.768 dB	-17.974 dB

3.4. Conducted emission test on AC mains line.

3.4.1. General:

The test performed per FCC Part 15 Subpart B Section 15.107 Class B.

The initial scan was made using a peak detector but still using the appropriate CISPR 16 (Quasi-Peak) detector IF bandwidth.

A tolerance limit was set 6 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector or an Average detector..

3.4.2. Conducted emission test procedure:

The test was started with an initial scan. The final measurements were performed at each frequency where the signal was 10 dB below the limit or less.

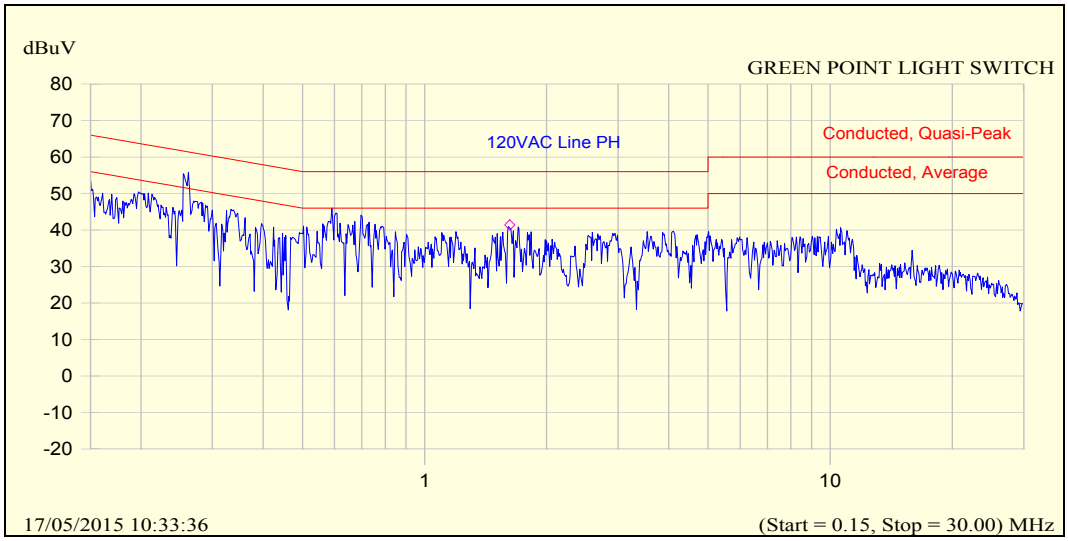
Test equipment (EMI receiver) setup was as follow:

Initial scan:		**Measurements**	
Detector type	Peak	Detector type	Quasi-peak (CISPR)
Mode	Max hold	Bandwidth	9 kHz
Bandwidth	9 kHz	Observation	>15 seconds
Step size	Continuous sweep		
Sweep time	>100 msec		

3.4.3. Conducted emission test results:

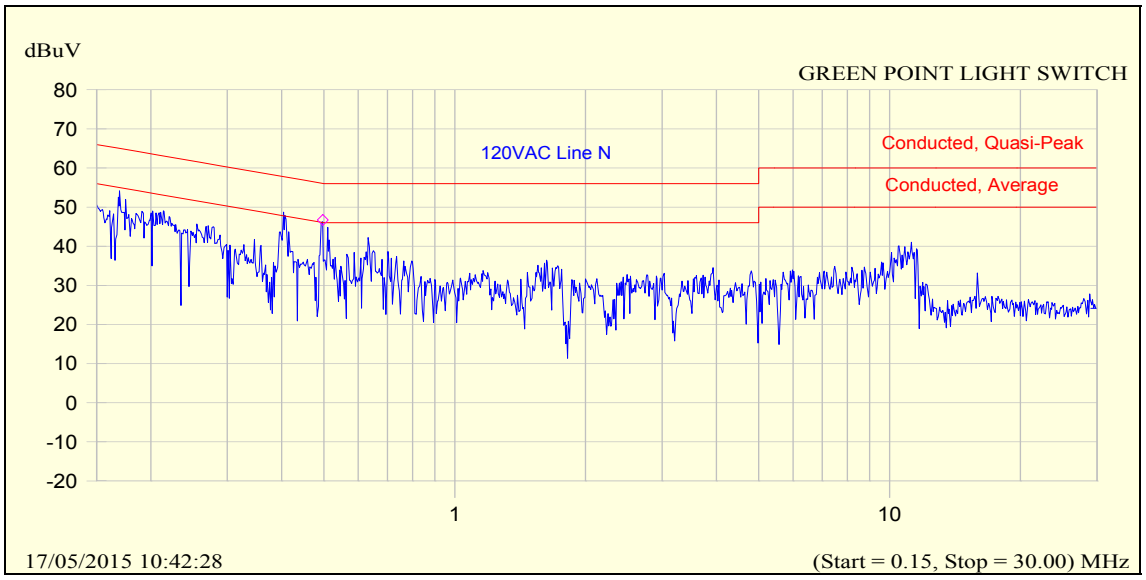
The test results are presented in **plots ## 3-4.**

All QP and Avg emissions are 6.2dB at least below limit Class B.



Frequency	QP dBµV	Limit QP dBµV	Margin dB	Avg dBµV	Limit Avg dBµV	Margin dB
0.153	58.6	65.8	7.2	47.1	55.8	8.7
0.210	57.0	63.2	6.2	45.5	53.2	7.7
0.271	52.9	61.1	8.2	42.4	51.1	8.7
0.570	42.0	56.0	14.0	33.2	46.0	12.8
0.706	40.5	56.0	15.5	33.0	46.0	13.0
1.622	38.6	56.0	17.4	31.7	46.0	14.3

Plot # 3. AC line conducted emissions test. Line PH.



Frequency	QP dBµV	Limit QP dBµV	Margin dB	Avg dBµV	Limit Avg dBµV	Margin dB
0.152	58.0	65.9	7.8	46.6	55.9	9.3
0.203	56.0	63.5	7.5	44.8	53.5	8.8
0.272	52.1	61.0	9.0	41.0	51.0	10.0
0.347	48.5	59.0	10.6	37.0	49.0	12.1
0.497	41.5	56.0	14.6	28.7	46.0	17.4
0.578	40.2	56.0	15.8	30.7	46.0	15.3
1.622	32.8	56.0	23.2	26.0	46.0	20.0

Plot # 4. AC line conducted emissions test. Line N.

4. Appendix 1. Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding one year.

Test equipment used

No	Description	Manufacturer information			Due Calibration date
		Name	Model	Serial No	
1	MXE EMI Receiver 20 Hz -26.5 GHz	Agilent	N9038A	SII 650114	February 2016
2	Double Ridged Guide Antenna 0.75 – 18 GHz	ETS-Lindgren	3115	00143138	December 2015
3	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	December 2015
4	Double Ridged Waveguide Horn Antenna 1 – 18 GHz	ETS-Lindgren	3117	00139055	December 2015
5	Antenna Biconilog 30 – 6000 MHz	ETS-Lindgren	31142D	0146490	December 2015
6	Spectrum analyzer 9 kHz-6.0 GHz	Rohde&Schwarz	FSL	SII5912	May 2015
7	EMI Analyser 9 kHz - 26.5 GHz	HP	E7405A	SII 4944	May 2015
8	Attenuator 3 dB DC – 12.4 GHz	HP	8491A	50469	October 2015
9	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	October 2015
10	Transient limiter 0.009-200 MHz	HP	11947A	3107105	August 2015
11	Cable RF 1m	Huber-Suhner	Sucoflex 104PE	21325/4PE	October 2015
12	Cable RF 4m	Huber-Suhner	Sucoflex 104PE	21329/4PE	October 2015
13	Cable RF 0.5m	Huber-Suhner	Multiflex 141	520201	October 2015

5. Appendix 2: Antenna Factor and Cable Loss

Cable Loss. Mast 6 m set cable.

Point	Frequency, MHz	Cable Loss, dB	Point	Frequency, MHz	Cable Loss, dB
1	30	0.3	21	1000	2.5
2	50	0.4	22	1100	2.6
3	100	0.6	23	1200	2.8
4	150	0.8	24	1300	2.9
5	200	1.0	25	1400	3.1
6	250	1.1	26	1500	3.2
7	300	1.2	27	1600	3.3
8	350	1.3	28	1700	3.5
9	400	1.5	29	1800	3.6
10	450	1.6	30	1900	3.7
11	500	1.7	31	2000	3.9
12	550	1.8	32	2100	4.0
13	600	1.9	33	2200	4.1
14	650	1.9	34	2300	4.2
15	700	2.0	35	2400	4.4
16	750	2.1	36	2500	4.6
17	800	2.1	37	2600	4.7
18	850	2.2	38	2700	4.8
19	900	2.3	39	2800	4.9
20	950	2.4	40	2900	5.0

Antenna factor
Biconilog Antenna, ETS-Lindgren mod. 31142D, S/N: 0146490 3m calibration.

No.	f / MHz	AF / dB/m	f / MHz	AF / dB/m	f / MHz	AF / dB/m
1	30	18.7	250	12.0	2750	31.0
2	35	15.7	300	13.8	3000	31.2
3	40	12.9	400	16.2	3250	32.7
4	45	10.6	500	18.6	3500	34.5
5	50	9.0	600	20.2	3750	34.3
6	60	7.3	700	21.8	4000	34.5
7	70	7.7	800	22.9	4250	35.3
8	80	8.2	900	24.1	4500	35.5
9	90	9.2	1000	24.8	4750	36.1
10	100	9.4	1250	26.9	5000	37.4
11	120	8.5	1500	30.2	5250	38.4
12	140	8.5	1750	28.5	5000	39.9
13	160	9.1	2000	28.9	5750	38.2
14	180	10.5	2250	29.8	6000	39.1
15	200	10.9	2500	32.5		

Antenna Factor
Double Ridged Guide Antenna mfr ETS-Lindgren model 3115 1m calibration

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.7
2	2000	28.5
3	3000	29.6
4	4000	32.5
5	4500	32.6
6	5000	33.5
7	6000	36.1
8	6500	36.5
9	7000	37.3
10	7500	38.0
11	8000	37.3
12	8500	37.9
13	9000	38.1
14	9500	38.5
15	10000	38.7
16	10500	38.8
17	11000	38.6
18	11500	38.8
19	12000	38.9
20	12500	39.3
21	13000	40.2
22	13500	40.8
23	14000	40.6
24	14500	40.4
25	15000	39.6
26	15500	39.5
27	16000	39.8
28	16500	40.4
29	17000	41.3
30	17500	42.8
31	18000	43.2

Cable Loss
Type: Sucoflex 104PE; Ser.No.21329/4PE; 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

6. Appendix 3: Test setups photo

Photo 2. Radiated emission test setup

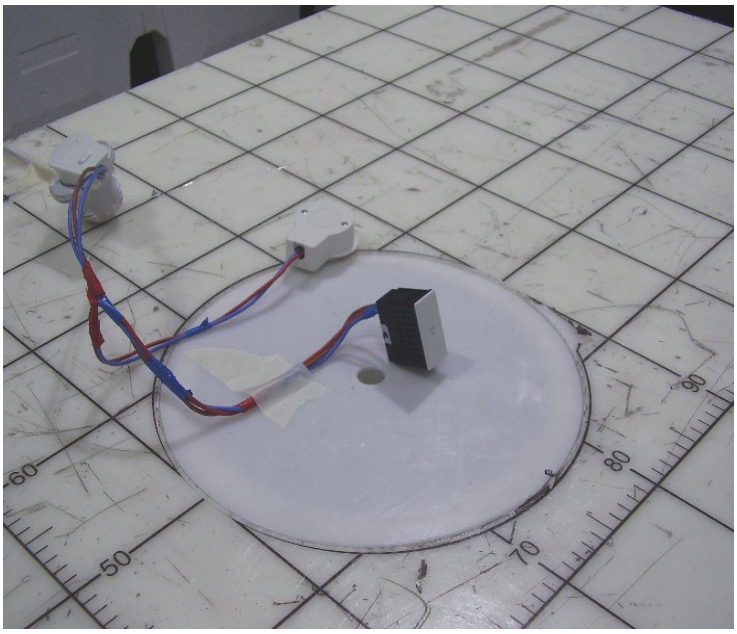


Photo 3. Radiated emission test

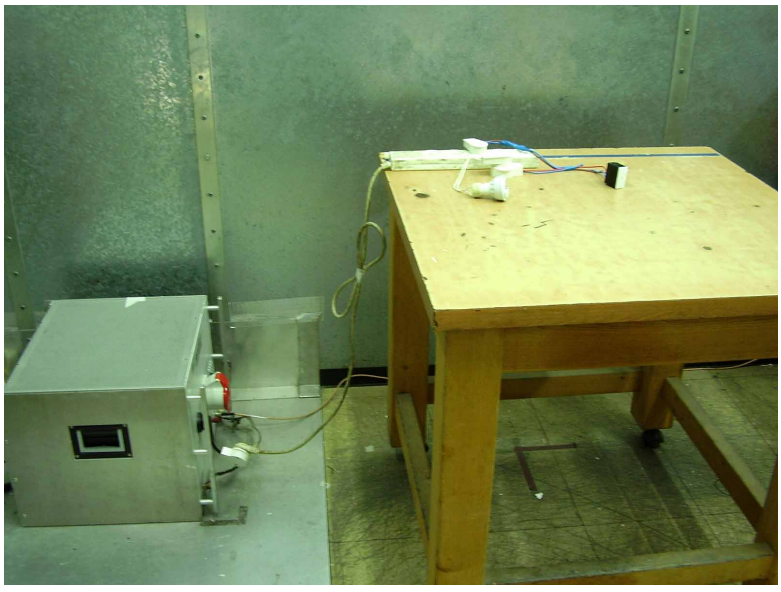


Photo 4. Conducted emission test setup