

TEST REPORT

ACCORDING TO: FCC 47CFR part 18: 2014

FOR:

PowerMat Ltd.

Wireless Power Charging Spot

Model: Spot 3.0

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1 Applicant information

Client name: PowerMat Ltd.
Address: Neve Ilan, Kiryat Hatikshoret 90850, Israel
Telephone: +972 2995 0530
E-mail: dshaingurten@powermat.com
Contact name: Mr. Daniel Shaingurten

2 Equipment under test attributes

Product name: Wireless Power Charging Spot
Model(s): Spot 3.0
Serial number: 616D6920313F
Hardware version: PBA0000189 Rev C, PBA0000190 Rev C
Software release: 0.14
Receipt date: 4-Mar-15

3 Manufacturer information

Manufacturer name: PowerMat Ltd.
Address: Neve Ilan, Kiryat Hatikshoret 90850, Israel
Telephone: +972 2995 0530
E-Mail: dshaingurten@powermat.com
Contact name: Mr. Daniel Shaingurten

4 Test details

Project ID: 26831
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 04-Mar-15
Test completed: 16-Mar-15
Test specification(s): FCC 47CFR part 18: 2014

5 Tests summary

Test	Status
FCC 47 CFR, Section 18.305, Field strength of emissions	Pass
FCC 47 CFR, Section 18.307, AC power lines conducted emissions	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. V. Einem, test engineer	March 16, 2015	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 30, 2015	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 26, 2015	

6 EUT description

6.1 General information

The EUT, Powermat's 3rd generation Wireless Charging Spot is the core of the Powermat Wireless Power Network. It enables users to wirelessly charge any PMA compatible device while simultaneously connected to a local network of wireless charging spots which communicates with Powermat's cloud services for remote control and maintenance.

The Charging Spots are an integral part of the venue wireless power infrastructure kit. This kit consists of the numerous products that comprise the entire infrastructure required to install a Wireless Power Network within a location/venue.

The EUT includes the Telegesis ZigBee module, FCC ID:S4GEM35XA.

The EUT was tested in operating modes shown in section 6.2 below.

6.2 EUT options/configurations

Number	Operating mode description
1	PMA 5 WATT
2	PMA 15WATT
3	QI 5 WATT

6.3 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	AC	AC mains	AC/DC adapter	1	Unshielded	0.80
Power	DC	AC/DC adapter	EUT	1	Unshielded	0.80

6.4 Support and test equipment

Description	Manufacturer	Model number	Serial number
QI Samsung S5 Backdoor	Samsung	EP-VG900BWU	NA
QI Motorola Droid Max embeded recelver	Motorola	Droid Max	NA
QI Nokia embeded recelver	Nokia	925	NA
PMA 5 Watt Backup Battery 8800	Durocell Powermat	33.4Wh Li Ion	R-BB-519B-513A
PMA 5 Watt ASUS Pad Phone embeded recelver	ASUS	Pad Phone	NA
PMA 5 Watt Samsung S5 backdoor	Samsung	EPCG900IBA	RF7F58
PMA15 Watt iPad 4 case	PowerMat	NA	NA
AC to DC	MeanWell	AS-120P-24	AS120P24P1M
Laptop	Lenovo	X220	R9-MAC46 12/03

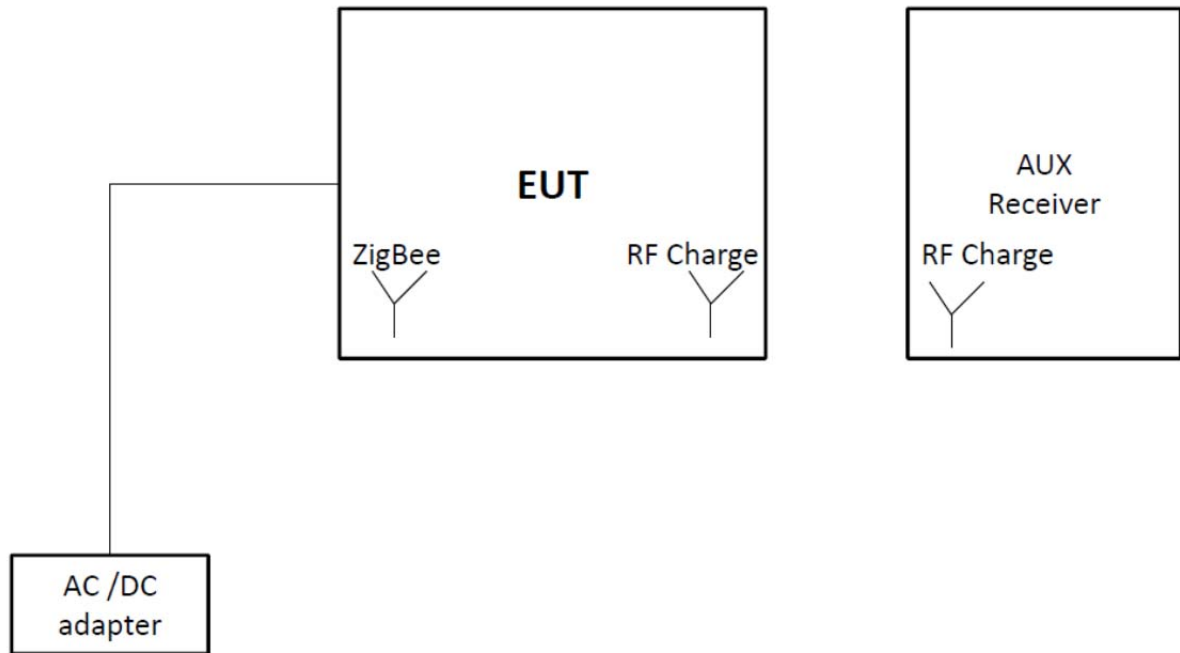
6.5 Operating frequencies

Source	Frequency, MHz		
LO	0.11-0.205	0.205-0.3	2400-2483.5

6.6 Changes made in EUT

No changes were performed in the EUT during testing.

6.7 Test configuration





Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

7 Emissions tests according to FCC 47CFR part 18 requirements

7.1 Field strength of emissions

7.1.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given Table 7.1.1.

Table 7.1.1 Radiated emission limits

Frequency, MHz	Test limit, dB(μV/m)	
	300 m distance	3 m distance
0.009 - 30	23.52	103.5

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S2} = \text{Lim}_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

** - The limit decreases linearly with the logarithm of frequency.

7.1.2 Test procedure for fundamental and spurious emission field strength measurements in 9 kHz to 30 MHz

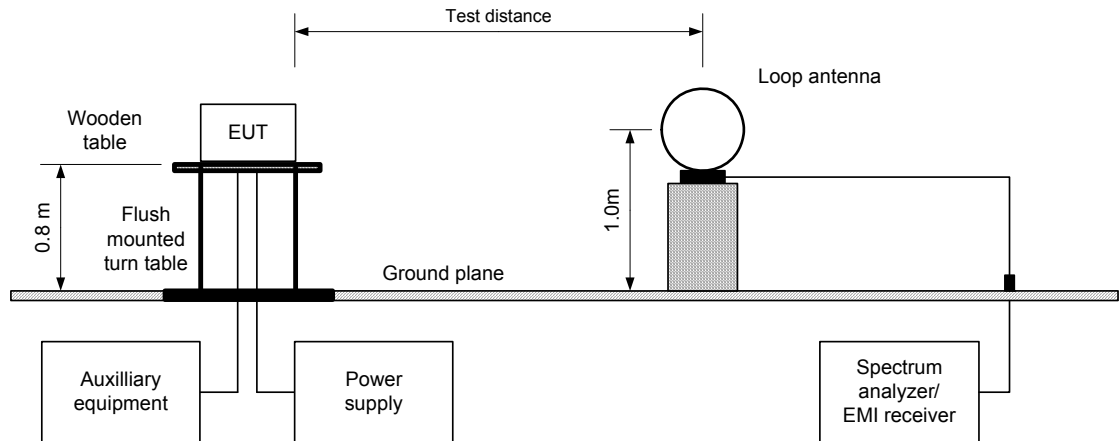
7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and the performance check was conducted.

7.1.2.2 The specified frequency range was investigated with a loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical and horizontal axes. The measuring antenna polarization was switched from vertical to horizontal.

7.1.2.3 The worst test results (the lowest margins) were recorded in Table 7.1.2 and shown in the associated plots.

Test specification: FCC 47 CFR, Section 18.305, Field strength of emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Mar-15			
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Figure 7.1.1 Setup for spurious emission field strength measurements below 30 MHz

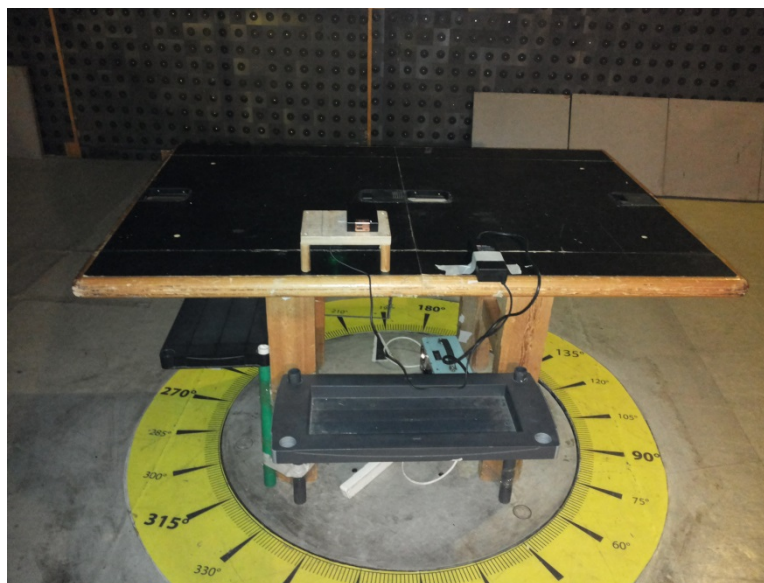


Photograph 7.1.1 Setup for spurious emission field strength measurements below 30 MHz



Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.1.2 Setup for spurious emission field strength measurements, EUT cabling





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Test specification: FCC 47 CFR, Section 18.305, Field strength of emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode:	Compliance	Verdict: PASS	
Date(s):	04-Mar-15		
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.2 Field strength of fundamental emission

TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT POSITION: Typical (Horizontal)
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 INVESTIGATED FREQUENCY RANGE: 0.009 – 30 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)

Aux Reciever antenna:	Frequency, kHz	Peak field strength			Antenna		Verdict
		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Polarization	Azimuth, degrees*	
PMA 5Watt							
Backup Battery 8800	220.38	86.44	103.5	-17.06	Vertical	214	Pass
Asus Pad Phone Embedded Receiver	270.30	73.27	103.5	-30.23	Vertical	273	Pass
Samsung S5 Backdoor	252.25	84.00	103.5	-30.36	Vertical	221	Pass
QI 5Watt							
Motorola Droid Max Embedded Receiver	130.344	86.79	103.5	-16.71	Vertical	145	Pass
Nokia Embedded Receiver	122.870	87.83	103.5	-15.67	Vertical	275	Pass
Samsung S5 Back Door	131.993	80.23	103.5	-23.27	Vertical	277	Pass
PMA 15Watt							
IPAD 4 Case	218.35	82.40	103.5	-21.1	Vertical	121	Pass

*- EUT front panel refers to 0 degrees position of turntable.

**- Margin (dB) = measured result - specification limit.

Reference numbers of test equipment used

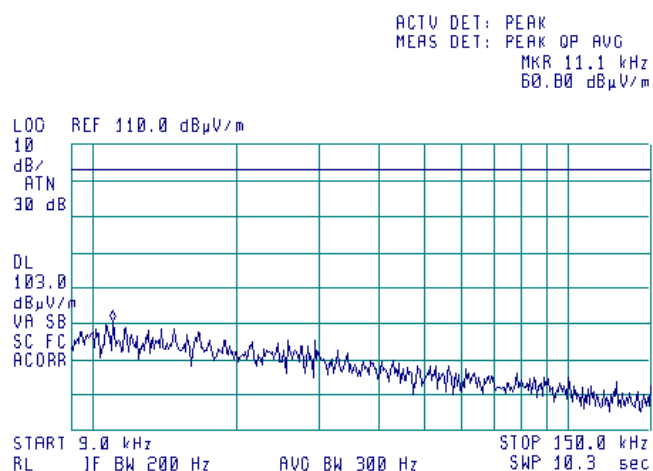
HL 0446	HL 0521	HL 4279	HL 4353				
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Full description is given in Appendix A.

Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Verdict: PASS	
Date(s):			
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

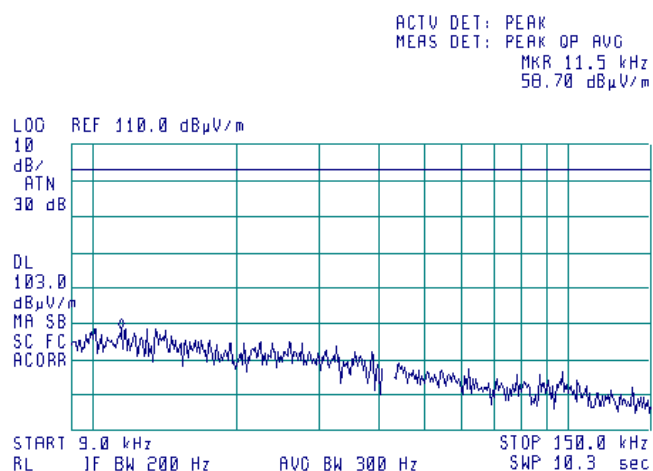
Plot 7.1.1 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Backup Battery 8800



Plot 7.1.2 Radiated emission measurements in 0.009 – 0.150 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Backup Battery 8800



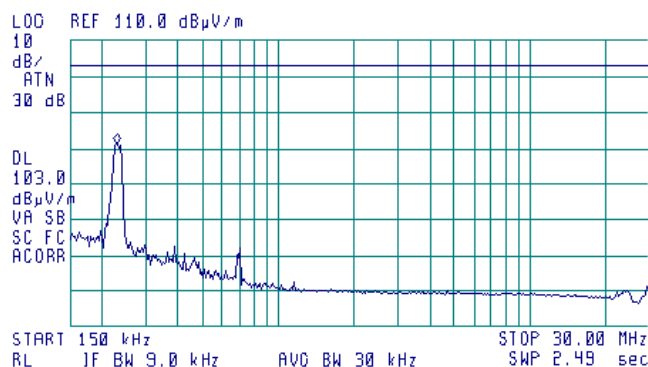
Test specification: FCC 47 CFR, Section 18.305, Field strength of emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Mar-15			
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.3 Radiated emission measurements in 0.15 – 30 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Backup Battery 8800



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 230 kHz
81.21 dBμV/m

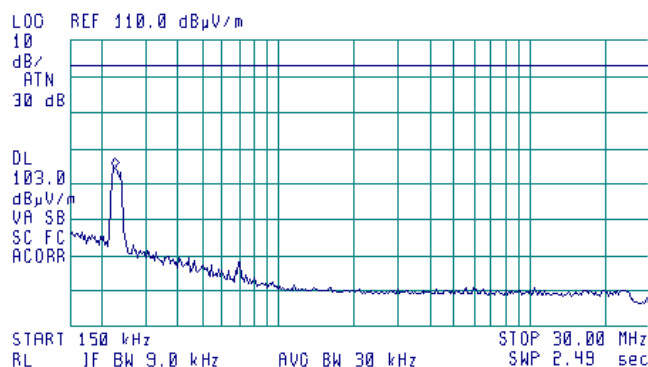


Plot 7.1.4 Radiated emission measurements in 0.15 – 30 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Backup Battery 8800



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 230 kHz
74.59 dBμV/m





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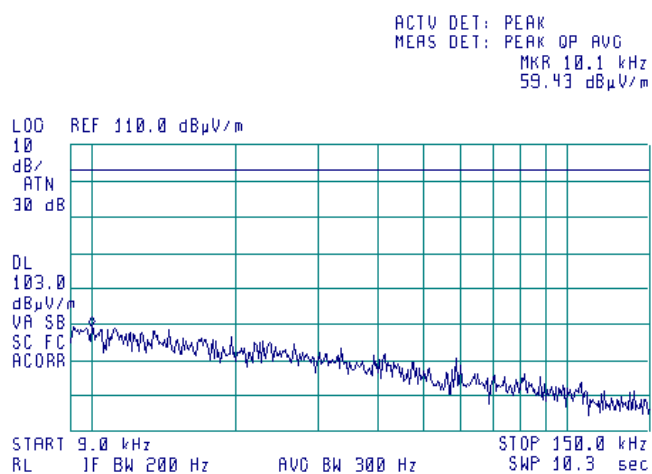
Report ID: POWRAD_FCC.26831.docx

Date of Issue: 30-Mar-15

Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

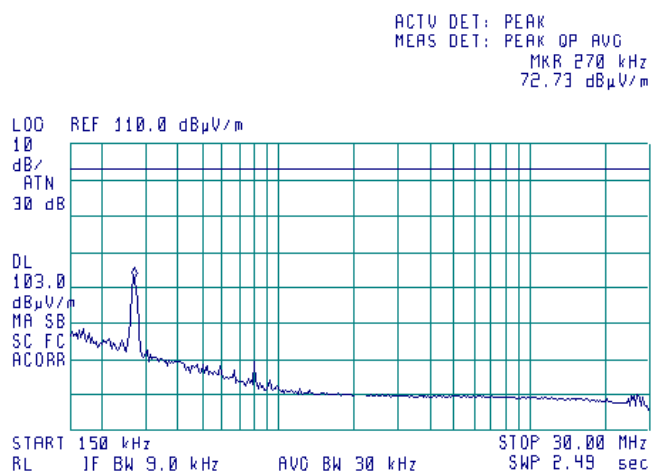
Plot 7.1.5 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Asus Pad Phone Embedded Receiver



Plot 7.1.6 Radiated emission measurements in 0.15 – 30 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Asus Pad Phone Embedded Receiver



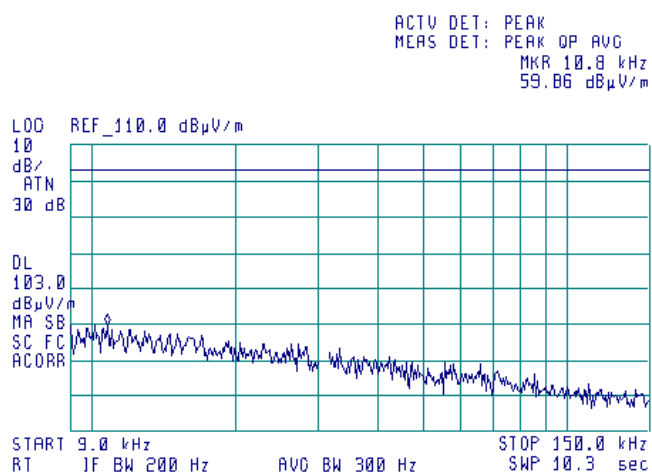


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Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

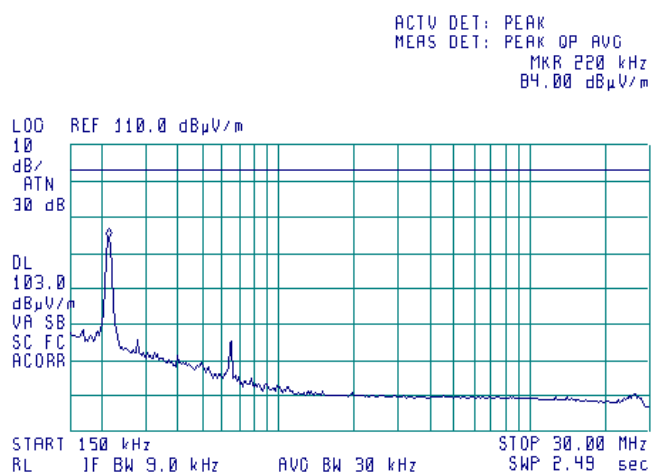
Plot 7.1.7 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5 Watt
RECIEVER ANTENNA: Samsung S5 Backdoor



Plot 7.1.8 Radiated emission measurements in 0.15 – 30 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 5Watt
RECIEVER ANTENNA: Samsung S5 Backdoor



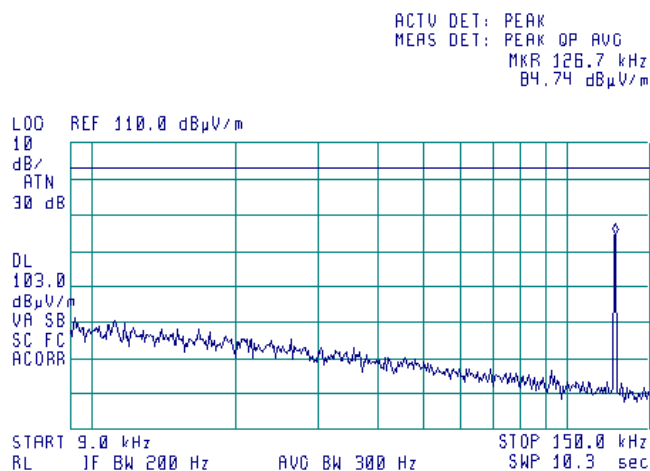


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Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Verdict: PASS	
Date(s):			
04-Mar-15			
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

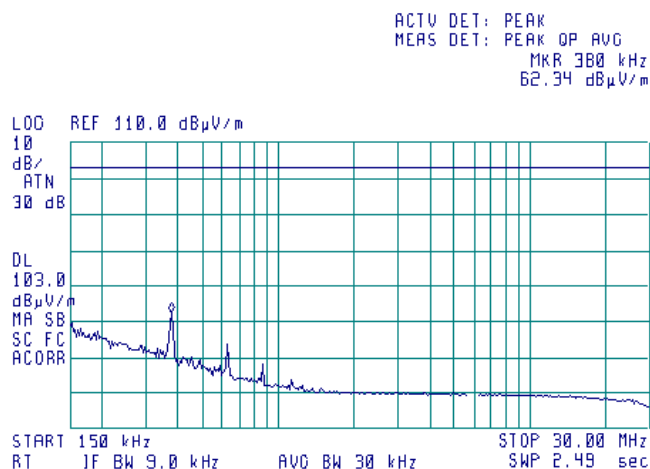
Plot 7.1.9 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: QI 5Watt
RECIEVER ANTENNA: Motorola Droid Max Embedded Receiver



Plot 7.1.10 Radiated emission measurements in 0.15 – 30 MHz range, vertical and horizontal antenna polarization

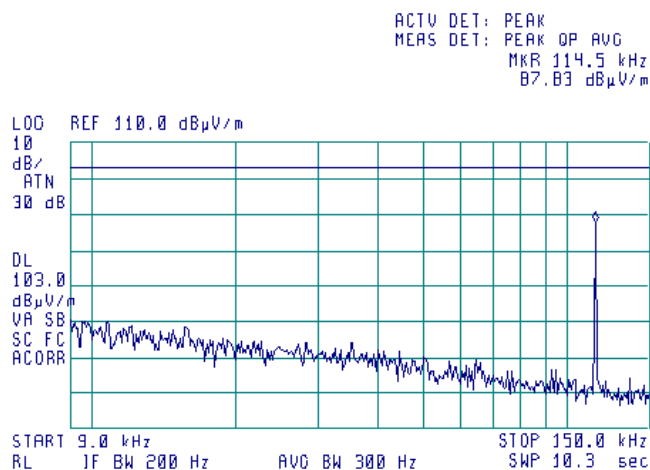
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: QI 5Watt
RECIEVER ANTENNA: Motorola Droid Max Embedded Receiver



Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

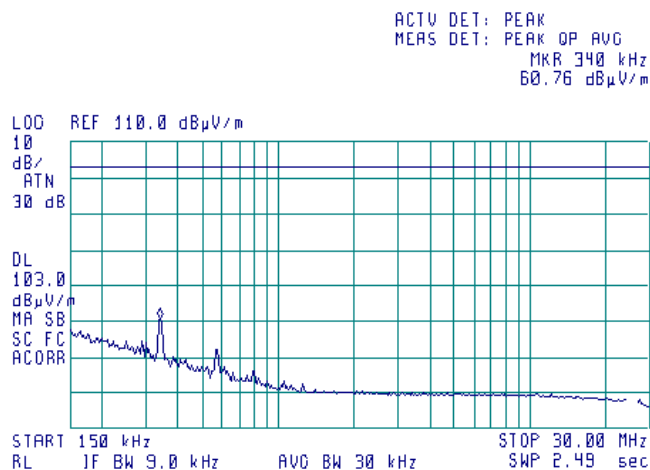
Plot 7.1.11 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: QI 5Watt
RECIEVER ANTENNA: Nokia Embedded Receiver



Plot 7.1.12 Radiated emission measurements in 0.15 – 30 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: QI 5Watt
RECIEVER ANTENNA: Nokia Embedded Receiver





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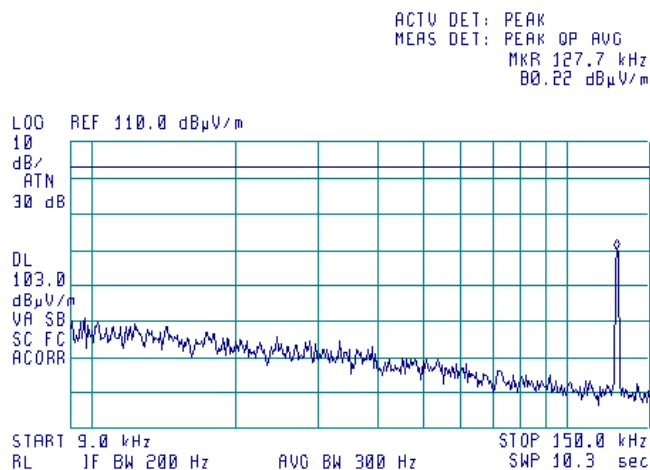
Report ID: POWRAD_FCC.26831.docx

Date of Issue: 30-Mar-15

Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

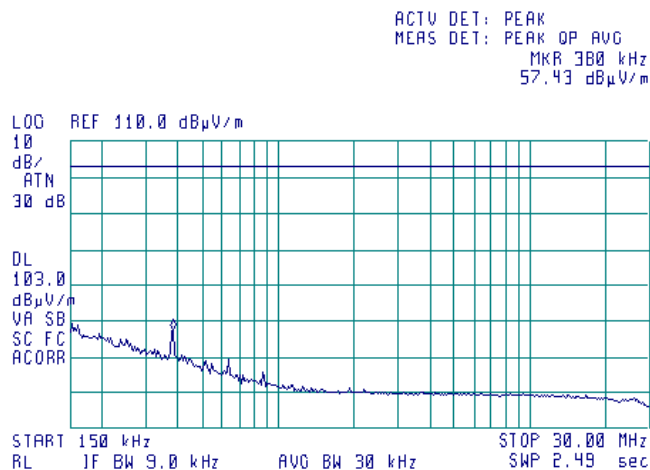
Plot 7.1.13 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: QI 5Watt
RECIEVER ANTENNA: Samsung S5 Back Door



Plot 7.1.14 Radiated emission measurements in 0.15 – 30 MHz range, vertical and horizontal antenna polarization

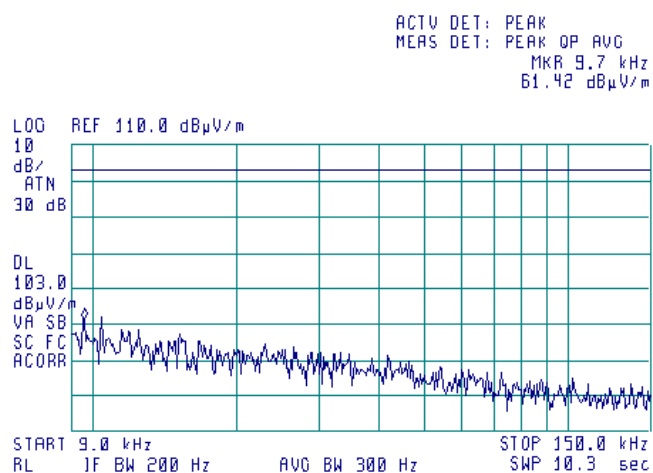
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: QI 5Watt
RECIEVER ANTENNA: Samsung S5 Back Door



Test specification:		FCC 47 CFR, Section 18.305, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 8.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 21 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

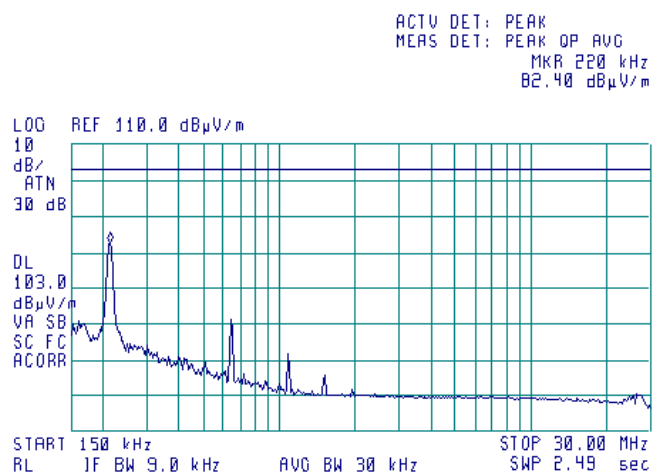
Plot 7.1.15 Radiated emission measurements in 0.009 – 0.150 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 15 Watt
RECIEVER ANTENNA: IPAD 4 Case



Plot 7.1.16 Radiated emission measurements in 0.15 – 30 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: PMA 15Watt
RECIEVER ANTENNA: IPAD 4 Case





Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

7.2 Conducted emissions

7.2.1 General

This test was performed to measure the common mode conducted emissions at the EUT power port. The specification test limits are given in Table 7.2.1.

Table 7.2.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

* - The limit decreases linearly with the logarithm of frequency.

7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1 and the associated photographs, energized and the EUT performance was checked.

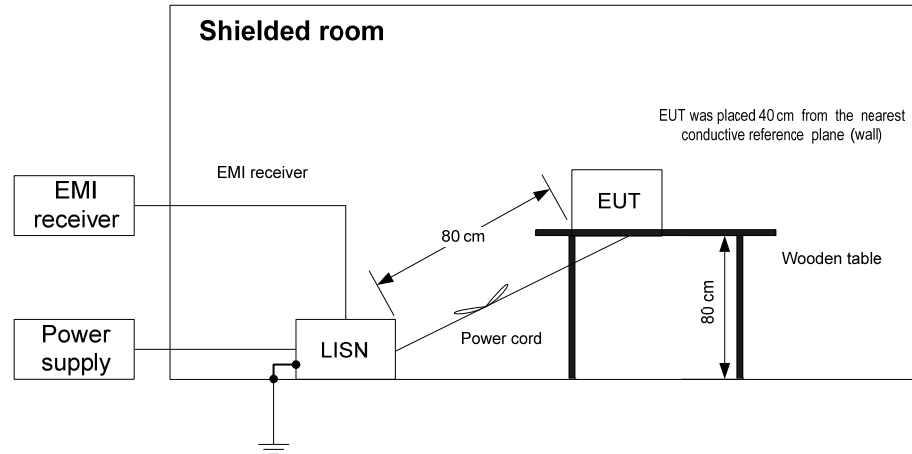
7.2.2.2 The measurements were performed at the EUT power terminals with the LISN connected to the EMI receiver in the frequency range referred to in Table 7.2.2. The unused coaxial connector of the LISN was terminated with 50 Ohm.

7.2.2.3 The position of the EUT cables was varied to find the highest emission.

7.2.2.4 The worst test results with respect to the limits were recorded in Table 7.2.2 and shown in the associated plots.

Test specification: FCC 47 CFR, Section 18.307, AC power lines conducted emissions			
Test procedure: ANSI C63.4, Section 7.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 04-Mar-15			
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Figure 7.2.1 Setup for conducted emission measurements, table-top EUT



Photograph 7.2.1 Setup for conducted emission measurements, PMA 15 Watt mode



Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.2.2 Setup for conducted emission measurements, PMA 5 Watt mode



Photograph 7.2.3 Setup for conducted emission measurements, QI 5 Watt mode



Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Table 7.2.2 Conducted emission test results

LINE: AC mains
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

OPERATING MODE

PMA 15 Watt

Frequency, MHz	Quasi-peak			Average			Line ID	Verdict
	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
4.930386	44.2	56.0	-11.8	43.5	46.0	-2.5	L1	Pass
5.37742	44.8	60.0	-15.2	44.7	50.0	-5.3		
6.27543	44.1	60.0	-15.9	42.8	50.0	-7.2		
7.617846	44.0	60.0	-16.0	43.5	50.0	-6.5		
8.735972	43.0	60.0	-17.0	41.2	50.0	-8.8		
10.52862	46.0	60.0	-14.0	42.1	50.0	-7.9		
29.13054	44.6	60.0	-15.4	42.0	50.0	-8.0	L2	Pass
0.207648	38.1	63.3	-25.2	37.8	53.3	-15.5		
0.271930	44.0	61.1	-17.1	27.0	51.1	-24.1		
3.427796	38.4	56.0	-17.6	37.0	46.0	-9.0		
4.708840	41.2	56.0	-14.8	40.7	46.0	-5.3		
18.409060	43.5	60.0	-16.5	42.0	50.0	-8.0		
18.835360	43.6	60.0	-16.4	42.4	50.0	-7.6		
28.892900	44.3	60.0	-15.7	42.2	50.0	-7.8		

OPERATING MODE

PMA 5 Watt

Frequency, MHz	Quasi-peak			Average			Line ID	Verdict
	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
4.930386	44.2	56.0	-11.8	43.5	46.0	-2.5	L1	Pass
5.37742	44.8	60.0	-15.2	44.7	50.0	-5.3		
7.617846	44.0	60.0	-16.0	43.5	50.0	-6.5		
8.735972	43.0	60.0	-17.0	41.2	50.0	-8.8		
10.52862	46.0	60.0	-14.0	42.1	50.0	-7.9		
29.13054	44.6	60.0	-15.4	42.0	50.0	-8.0		
0.226558	47.1	62.6	-15.5	45.9	52.6	-6.7	L2	Pass
2.926076	41.2	56.0	-14.8	40.2	46.0	-5.8		
3.605284	42.0	56.0	-14.0	35.9	46.0	-10.1		
5.853710	45.2	60.0	-14.8	34.4	50.0	-15.6		
6.335430	46.5	60.0	-13.5	36.7	50.0	-13.3		
10.63460	47.6	60.0	-12.4	39.0	50.0	-11.0		



HERMON LABORATORIES

Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Mar-15		
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.2 Conducted emission test results (continued)

LINE: AC mains
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

OPERATING MODE

QI 5 Watt

Frequency, MHz	Quasi-peak			Average			Line ID	Verdict
	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.154	52.9	65.8	-12.9	30.4	55.8	-25.4	L1	Pass
2.990134	38.9	56.0	-17.1	21.0	46.0	-25.0		
3.222308	39.3	56.0	-16.7	37.8	46.0	-8.2		
3.665342	39.1	56.0	-16.9	38.6	46.0	-7.4		
4.112376	39.4	56.0	-16.6	35.2	46.0	-10.8		
4.33255	39.5	56.0	-16.5	38.0	46.0	-8.0		
4.999758	39.5	56.0	-16.5	37.1	46.0	-8.9		
10.184958	42.1	60.0	-17.9	24.8	50.0	-25.2		
2.767274	39.2	56.0	-16.8	38.6	46.0	-7.4	L2	Pass
2.990134	38.9	56.0	-17.1	38.3	46.0	-7.7		
3.210308	40.3	56.0	-15.7	38.9	46.0	-7.1		
3.430482	39.0	56.0	-17.0	38.5	46.0	-7.5		
4.318038	39.6	56.0	-16.4	39.3	46.0	-6.7		
4.760898	39.6	56.0	-16.4	39.3	46.0	-6.7		
10.2226	42.9	60.0	-17.1	41.5	50.0	-8.5		
28.11224	41.0	60.0	-19.0	39.9	50.0	-10.1		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0787	HL 1194	HL 1513	HL 3016	HL 4360			
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Full description is given in Appendix A.

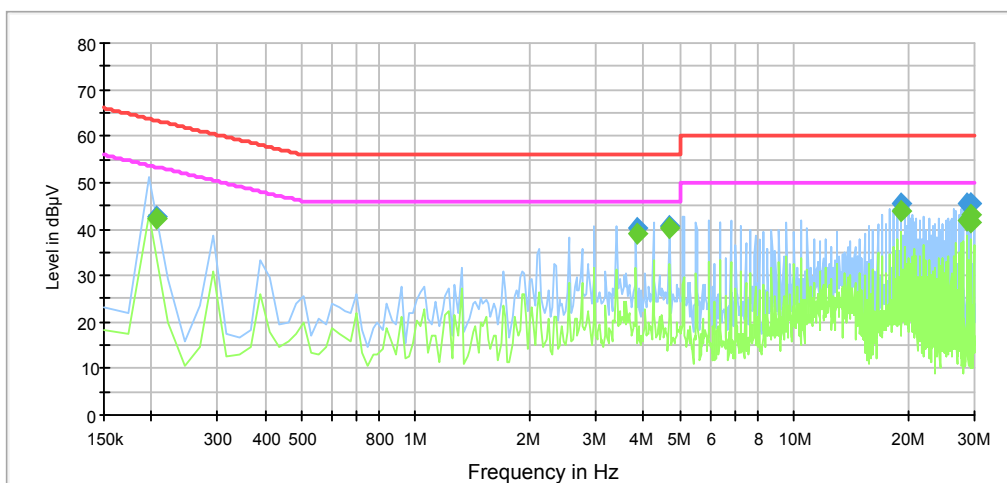


HERMON LABORATORIES

Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

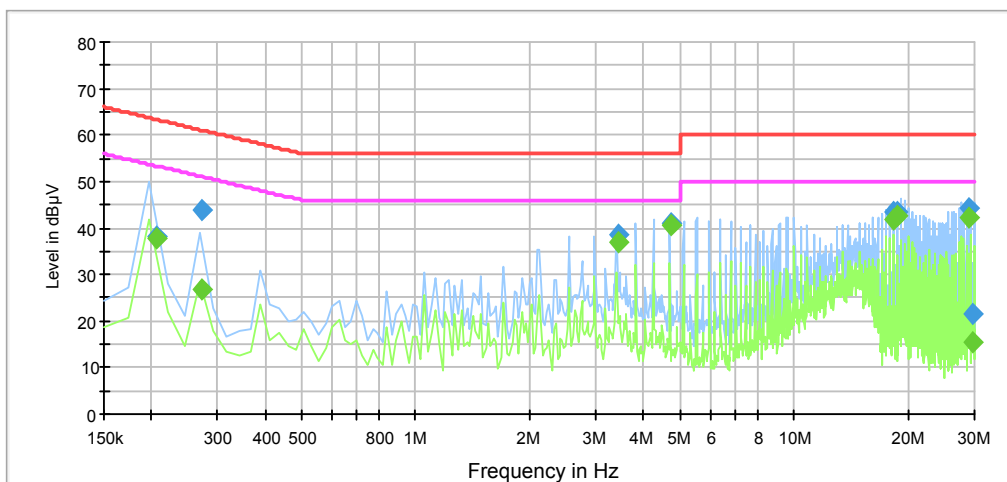
Plot 7.2.1 Conducted emission measurements

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Stand-by and receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Operating Mode PMA 15 Watt



Plot 7.2.2 Conducted emission measurements

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Stand-by and receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Operating Mode PMA 15Watt



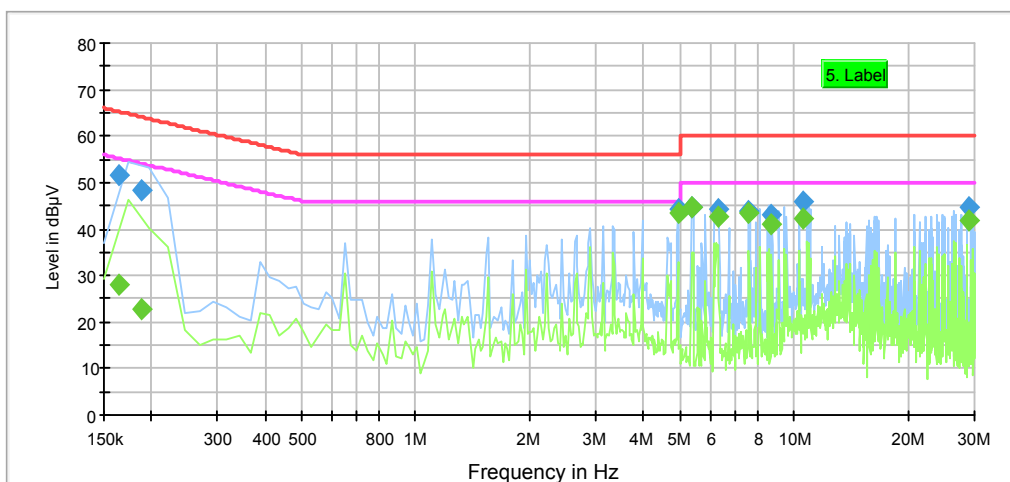


HERMON LABORATORIES

Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

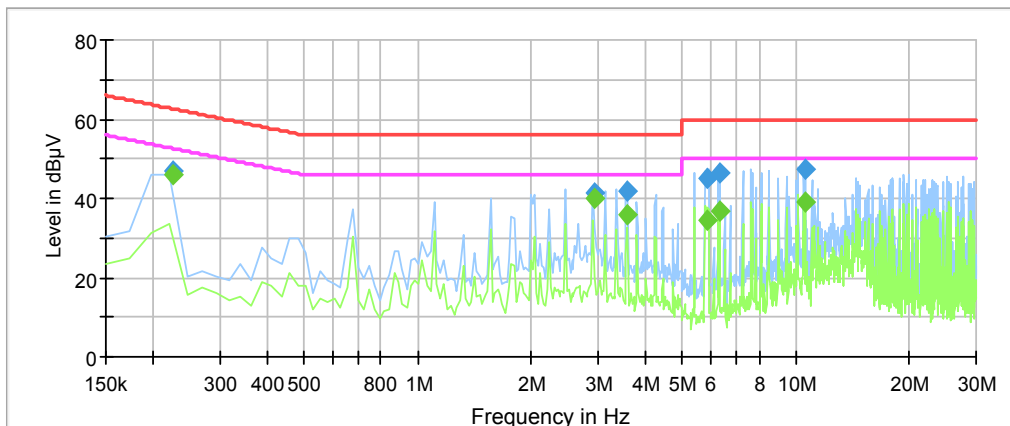
Plot 7.2.3 Conducted emission measurements

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Stand-by and receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Operating Mode: PMA 5 Watt



Plot 7.2.4 Conducted emission measurements

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Stand-by and receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Operating Mode: PMA 5 Watt



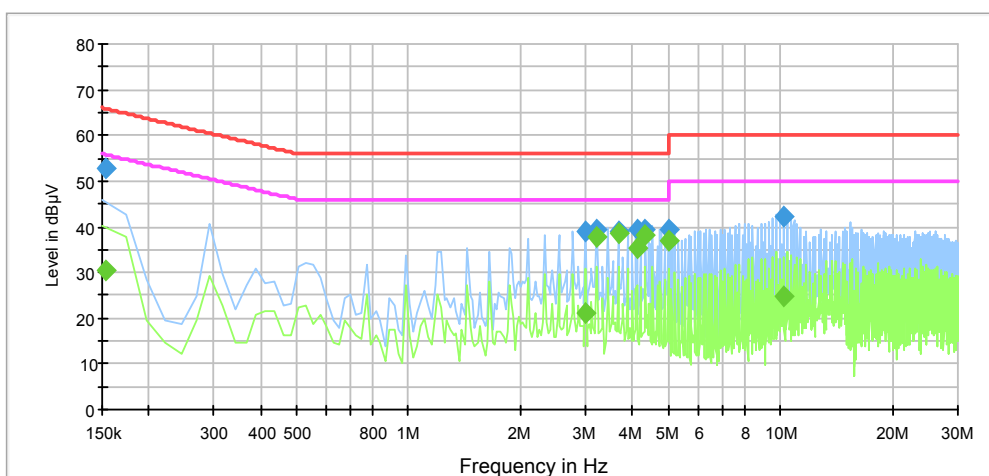


HERMON LABORATORIES

Test specification:		FCC 47 CFR, Section 18.307, AC power lines conducted emissions	
Test procedure:		ANSI C63.4, Section 7.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		04-Mar-15	
Temperature: 22 °C	Air Pressure: 1018 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks:			

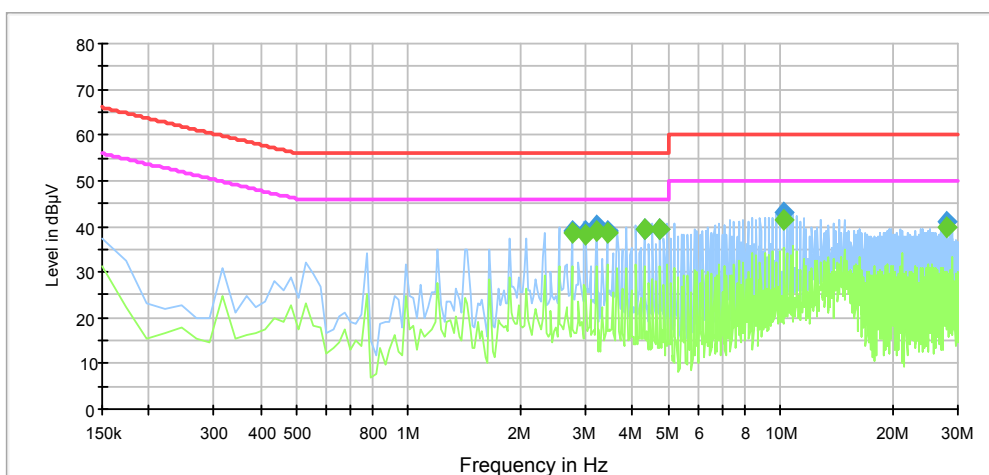
Plot 7.2.5 Conducted emission measurements

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Stand-by and receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Operating Mode QI 5 Watt



Plot 7.2.6 Conducted emission measurements

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Stand-by and receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Operating Mode QI 5 Watt



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	13-Jan-15	13-Jan-16
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	22-Oct-14	22-Oct-15
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	13-Oct-14	13-Oct-15
1194	Variac, 220 V/ 2.5 A	Matsunaga	NA	2962	26-May-14	26-May-15
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	09-Sep-14	09-Sep-15
3016	LISN, Two-line V-network, 9 kHz to 30 MHz, (50 uH+5 Ohm), CISPR16-1, MIL-461E	Rohde & Schwarz	ESH 3-Z5	892239/00 2	12-Jan-15	12-Jan-16
4279	Test Cable , DC-18 GHz, 4.6 m, N/M - N/M	Mini-Circuits	APC- 15FT- NMNM+	0757A	20-Nov-14	20-Nov-15
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29- N1N1-244	12025101 003	15-Mar-15	15-Mar-16
4360	EMI Test Receiver, 20 Hz to 40 GHz	Rohde & Schwarz	ESU40	100322	04-Sep-14	04-Sep-15

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB
Vertical polarization	Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

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e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

FCC 47CFR part 18: 2014	Industrial, Scientific, and Medical Equipment
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

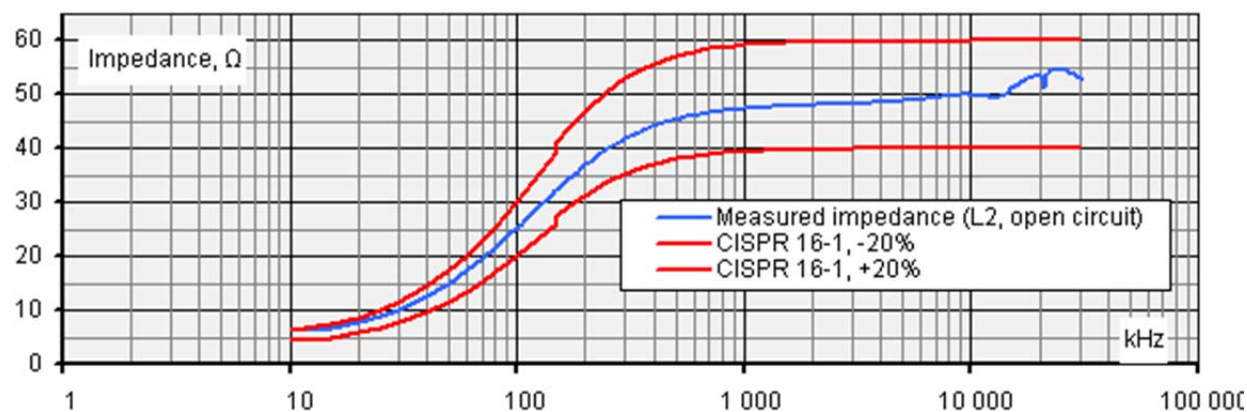
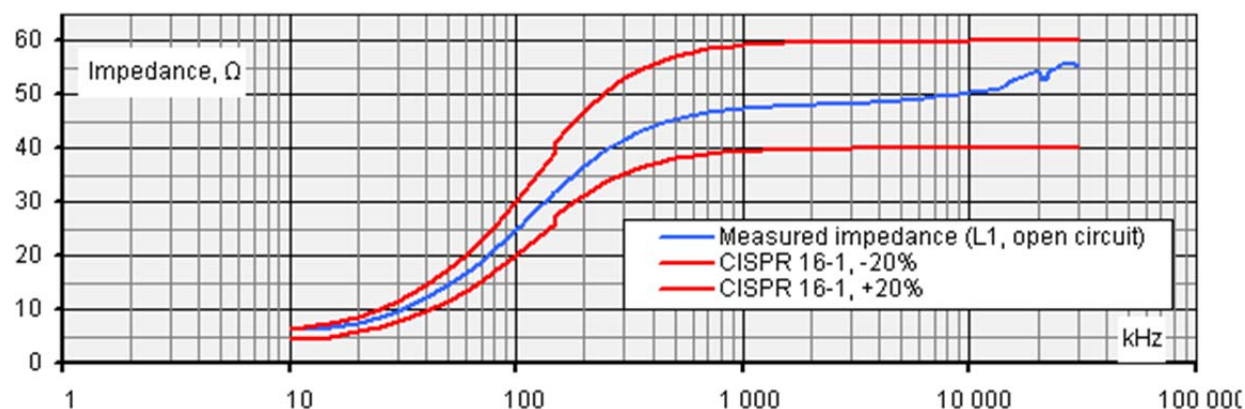
12 APPENDIX E Test equipment correction factors

Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field strength in dB(μ V/m).

Correction factor
Line impedance stabilization network
Model ESH 3-Z5, Rhode&Schwarz, HL 3016



13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AVRG	average (detector)
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
dB(μ A)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
OATS	open area test site
Ω	Ohm
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt

END OF DOCUMENT