HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

Hermon Laboratories Ltd.
P.O. Box 23, Binyamina 3055001, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO:

FCC 47CFR part 15: 2021, subpart B, Class B

ICES-003: 2020 Issue 7, Class B

FOR:

MAYTRONICS LTD

Robotic pool cleaner system

Model: WAVE140

Report ID: MAYEMC_FCC_ICES_49057_WAVE140.doc
Date of Issue: 29-Jun-23

Table of contents

1 Applicant information

Client name:	MAYTRONICS LTD
Address:	Kibbutz Yizre'el 1836000, Israel
Telephone:	+972 (0)4-6598111
Fax:	+972 (0)4-6522485
E-mail:	Eugene.Plotnichenko@Maytronics.com
Contact name:	Mr. Eugene Plotnichenko

2 Equipment under test attributes

Product name:	Robotic pool cleaner system
Model:	WAVE140
Part number:	99997140
Serial number:	W90919WBAM
Receipt date:	21-Dec-22

3 Manufacturer information

Manufacturer name:	MAYTRONICS LTD
Address:	Kibbutz Yizre'el 1836000, Israel
Telephone:	+972 (0)4-6598111
Fax:	+972 (0)4-6522485
E-mail:	Eugene.Plotnichenko@Maytronics.com
Contact name:	Mr. Eugene Plotnichenko

4 Test details

Project ID:	49057
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	21-Dec-22
Test completed:	21-Dec-22
Test specifications:	FCC 47CFR part 15: 2021, subpart B, Class B
	ICES-003: 2020 Issue 7, Class B

5 Tests summary

Test	Status
FCC 47 CFR part 15, subpart B	
FCC 47 CFR, Section 15.107, Class B, AC power lines conducted emissions	Pass
FCC 47 CFR, Section 15.109, Class B, Radiated emissions	Pass
ICES-003	
ICES-003, Section 3.2.1, Class B, AC power lines conducted emissions	Pass
ICES-003, Section 3.2.2, Class B, Radiated emissions	Pass

Testing was completed against all relevant requirements of the test standard. 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. B. Attar, EMC Team Leader	December 21, 2022	
Reviewed by:	Ms. N. Averin, Certification Specialist, EMC & Radio	June 25, 2023	
Approved by:	Mr. A. Troupiansky, Team Leader, EMC & Radio	June 29, 2023	

6 EUT description

Note: The following data in this clause is provided by the customer and represents his sole responsibility.

6.1 General information

The EUT is a commercial robotic pool cleaner powered by an AC/DC power supply via floating DC cable. The AC/DC power supply has a wireless communication with RC intended for monitoring robot performance, setting schedule, and remote start/stop of the cleaning mode.

6.2 EUT system parts

Description	Manufacturer	Model or P/N	Serial number
WAVE140			
Pumping unit	Maytronics	9995391	W90919WB
Drive unit	Maytronics	9995390	1. DRV3722WB8266 2. DRV3722WB8281
Power supply unit (PSU)	Maytronics	9995027-US	WPS31017

6.3 EUT modes/configurations

Operating mode	Configuration
Cleaning	Robotic cleaner inside water tank, fully covered by water. The cleaner operates both impeller and drive motors constantly. LEDs on the PSU indicate the mode of operation and the power status.

6.4 Ports and lines

Port type	Port description	Connected		Qty.	Cable type	Cable length	Indoor / outdoor
		From	To				
Power	AC power	PSU	AC mains	1	Unshielded	8 m	Outdoor
Power & signal	Floating (DC & signal)	PSU	Cleaner	1	Unshielded	40 m	Outdoor
Control	Control	PSU	Control panel	1	Unshielded	1 m	Outdoor

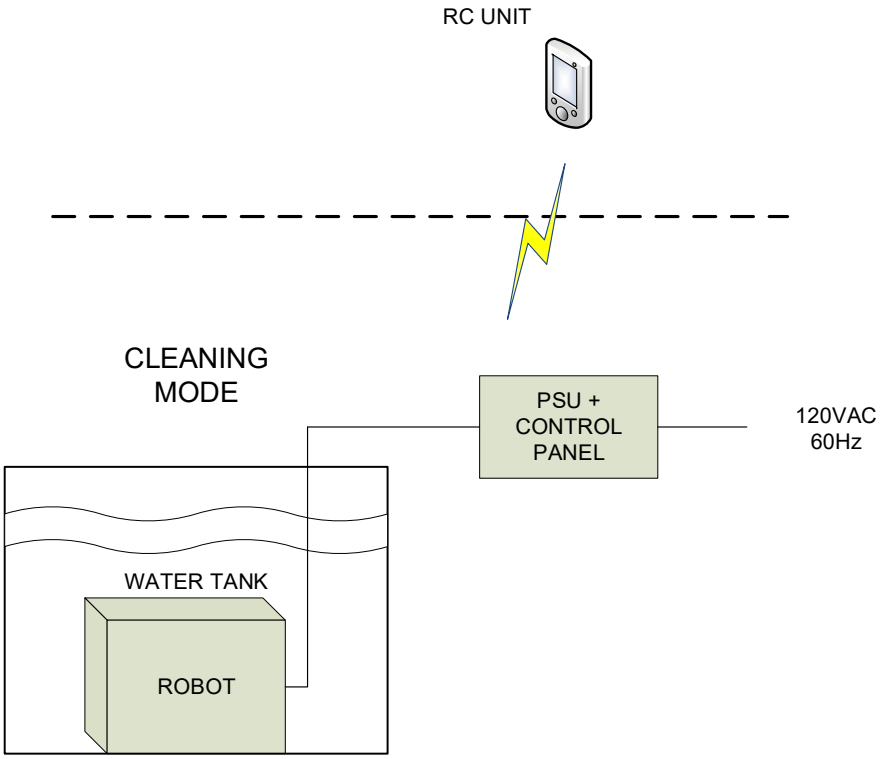
6.5 Auxiliary equipment

Description	Manufacturer	Model or P/N
RCU	Maytronics	99954120

6.6 Operating frequencies

Source	Frequency, MHz					
Rx	433.92	---	---	---	---	---

6.7 Test configuration



Test specification:	FCC 47 CFR, Section 15.107 / ICES-003, Section 3.2.1, Class B, AC power lines conducted emissions		
Test procedure:	ANSI C63.4, Section 7.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 22 ºC	Relative Humidity: 60 %	Air Pressure: 1011 hPa	Power: 120 VAC, 60 Hz
Remarks:			

7 Emissions tests according to FCC 47CFR part 15 subpart B and ICES-003 requirements

7.1 Conducted emissions

7.1.1 General

This test was performed to measure common mode conducted emissions at the EUT power port. The specification test limits are given in Table 7.1.1.

Table 7.1.1 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.

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1 and the associated photograph, energized and the EUT performance was checked.

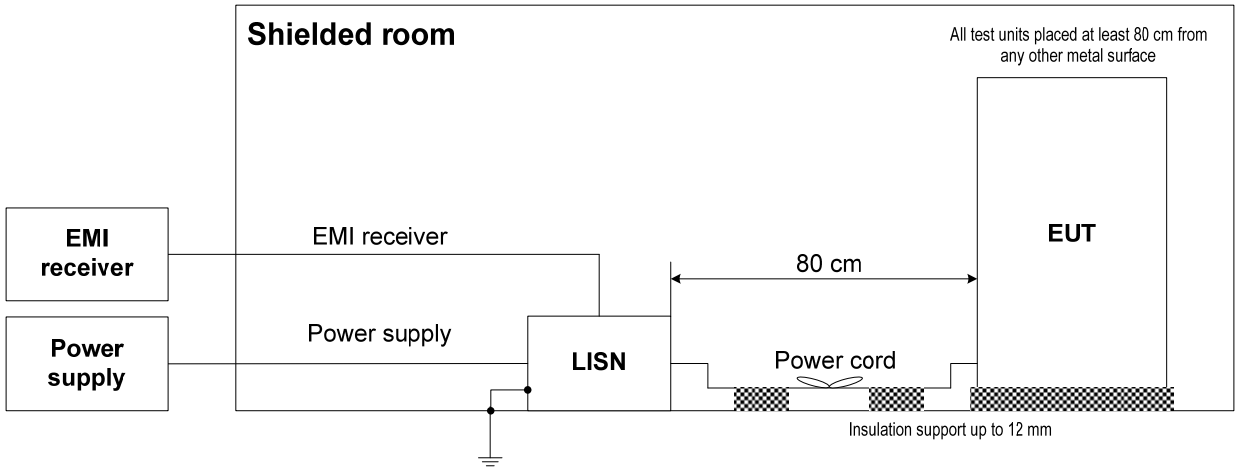
7.1.2.2 The measurements were performed at the EUT power terminals with the LISN connected to the EMI receiver in the frequency range referred to in Table 7.1.2. The unused coaxial connector of the LISN was terminated with 50 Ohm.

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

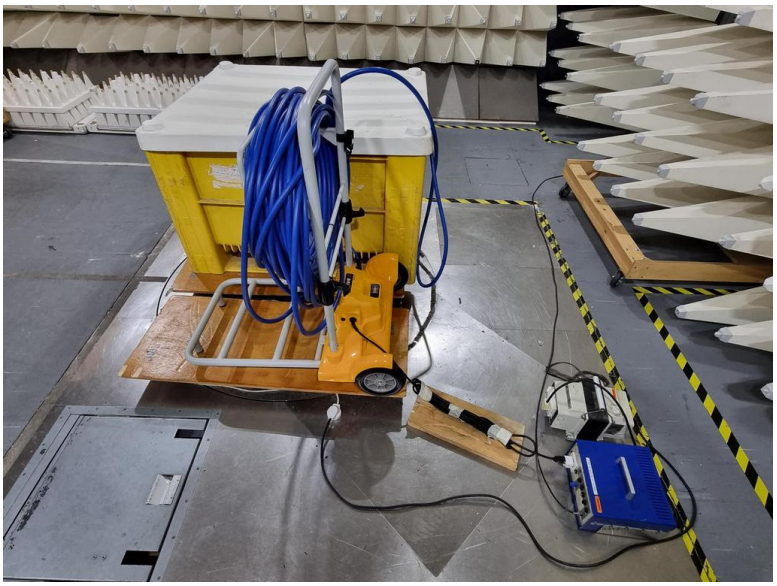
7.1.2.4 The worst test results with respect to the limits were recorded in Table 7.1.2 and shown in the associated plots.

Test specification:	FCC 47 CFR, Section 15.107 / ICES-003, Section 3.2.1, Class B, AC power lines conducted emissions		
Test procedure:	ANSI C63.4, Section 7.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 22 ºC	Relative Humidity: 60 %	Air Pressure: 1011 hPa	Power: 120 VAC, 60 Hz
Remarks:			

Figure 7.1.1 Setup for conducted emission measurements, floor standing EUT



Photograph 7.1.1 Setup for conducted emission measurements



Test specification:	FCC 47 CFR, Section 15.107 / ICES-003, Section 3.2.1, Class B, AC power lines conducted emissions		
Test procedure:	ANSI C63.4, Section 7.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 22 ºC	Relative Humidity: 60 %	Air Pressure: 1011 hPa	Power: 120 VAC, 60 Hz
Remarks:			

Table 7.1.2 Conducted emission test results

LINE: AC mains input of PSU
EUT SET UP: FLOOR STANDING
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

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*		
0.590	45.07	56.00	-10.93	44.14	46.00	-1.86	L1	Pass
0.595	46.14	56.00	-9.86	45.32	46.00	-0.68		
0.596	46.33	56.00	-9.67	45.32	46.00	-0.68		
0.598	45.22	56.00	-10.78	43.74	46.00	-2.26		
0.612	42.08	56.00	-13.92	41.31	46.00	-4.69		
0.614	41.95	56.00	-14.05	41.21	46.00	-4.79		
0.592	44.65	56.00	-11.35	43.63	46.00	-2.37	L2	Pass
0.594	45.64	56.00	-10.36	44.82	46.00	-1.18		
0.596	45.77	56.00	-10.23	44.82	46.00	-1.18		
0.601	44.63	56.00	-11.37	43.22	46.00	-2.78		
0.612	41.63	56.00	-14.37	40.75	46.00	-5.25		
0.612	41.44	56.00	-14.56	40.64	46.00	-5.36		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

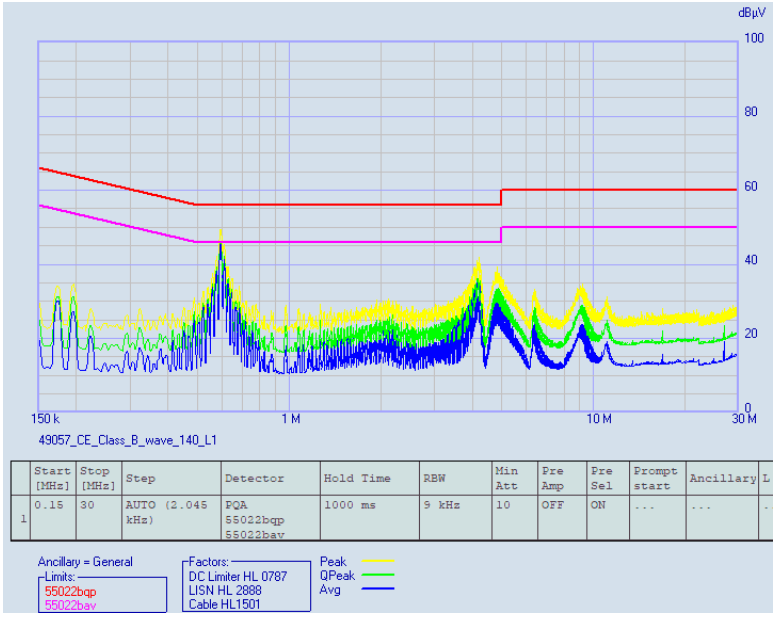
HL 0787	HL 1501	HL 2364	HL 2382	HL 2417	HL 2666	HL 2888	HL 4018
HL 5707							

Full description is given in Appendix A.

Test specification:	FCC 47 CFR, Section 15.107 / ICES-003, Section 3.2.1, Class B, AC power lines conducted emissions		
Test procedure:	ANSI C63.4, Section 7.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 22 ºC	Relative Humidity: 60 %	Air Pressure: 1011 hPa	Power: 120 VAC, 60 Hz
Remarks:			

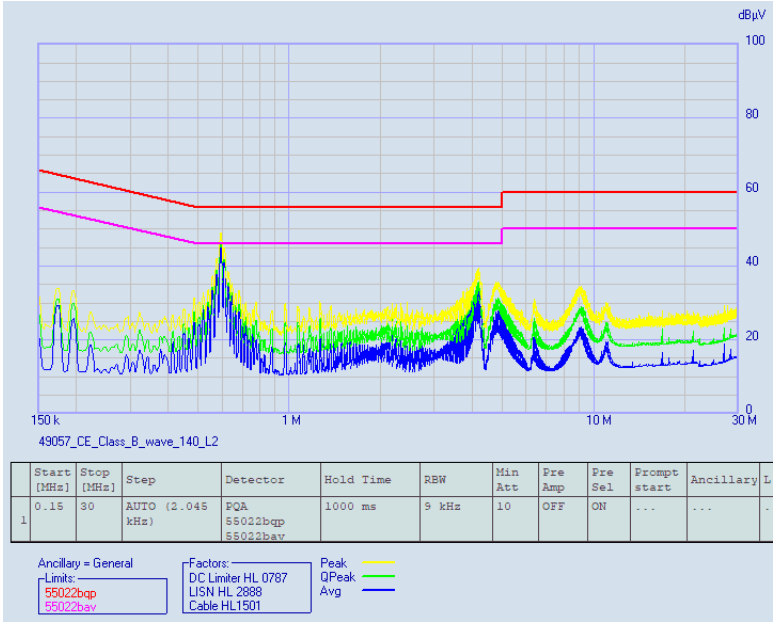
Plot 7.1.1 Conducted emission measurements, AC mains input of PSU

LINE: L1
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 7.1.2 Conducted emission measurements, AC mains input of PSU

LINE: L2
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	FCC 47 CFR, Section 15.109 / ICES-003, Section 3.2.2, Class B, Radiated emissions		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1012 hPa	Power: 120 VAC, 60 Hz
Remarks: The highest frequency used in the EUT in 433 MHz; the test was performed in 30 – 3000 MHz range.			

7.2 Radiated emission measurements

7.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 7.2.1.

Table 7.2.1 Radiated emission test limits

Frequency, MHz	Class B limit, dB(μV/m)			Class A limit, dB(μV/m)		
	10 m distance	3 m distance		10 m distance	3 m distance	
FCC 47 CFR, Section 15.109						
30 - 88	29.5*	40.0		39.0	49.5*	
88 - 216	33.0*	43.5		43.5	54.0*	
216 - 960	35.5*	46.0		46.4	56.9*	
Above 960	43.5*	54.0		49.5	60.0*	
ICES-003, Section 3.2.2						
30 - 88	30.0	40.0		40.0	50.0	
88 - 216	33.1	43.5		43.5	54.0	
216 - 230	35.6	46.0		46.4	56.9	
230 - 960	37.0	47.0		47.0	57.0	
960 - 1000	43.5	54.0		49.5	60.0	
1000 - 40000	---	74 (Peak)	54 (AVR)	---	80 (Peak)	60 (AVR)

* - The limit for a test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$,
where S_1 and S_2 – the standard defined and the test distance respectively in meters.

7.2.2 Test procedure

7.2.2.1 **30 – 1000 MHz range.** 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 in the semi anechoic chamber at 3 m test distance. The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. The EUT cables position was varied to maximize emission.

7.2.2.3 **1000 – 3000 MHz range.** The EUT was set up as shown in Figure 7.2.2 and the associated photographs, energized and the EUT performance was checked.

7.2.2.4 The measurements were performed in the semi anechoic chamber at 3 m test distance. The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. In order to stay within the 3 dB beamwidth while keeping the antenna height scanned from 1 to 4 m, a few sweeps with different antenna angles over the entire height were performed.

7.2.2.5 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 15.109 / ICES-003, Section 3.2.2, Class B, Radiated emissions		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1012 hPa	Power: 120 VAC, 60 Hz
Remarks: The highest frequency used in the EUT in 433 MHz; the test was performed in 30 – 3000 MHz range.			

Figure 7.2.1 Setup for radiated emission measurements in semi anechoic chamber in 30 – 1000 MHz range, floor standing EUT

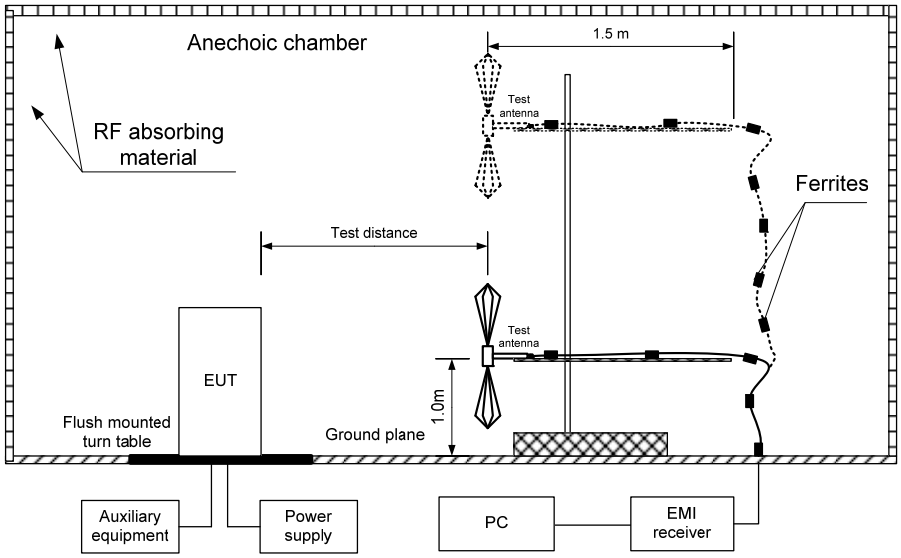
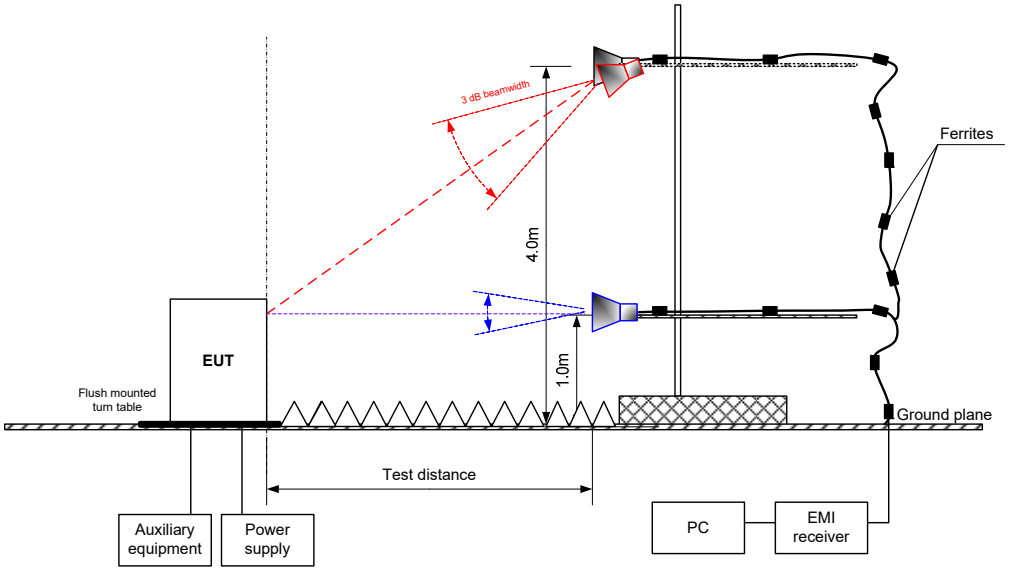
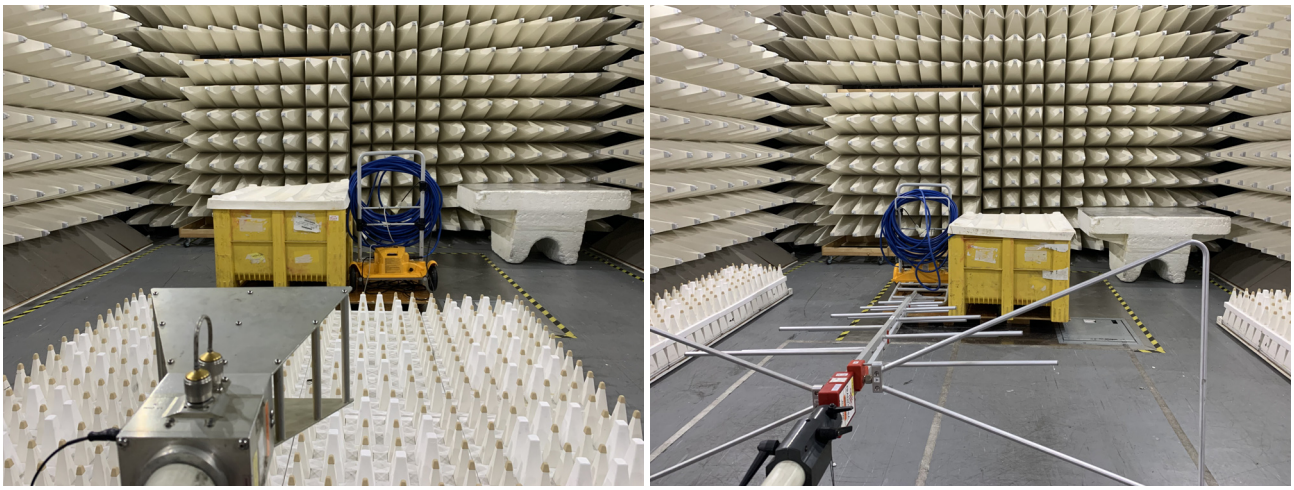


Figure 7.2.2 Setup for radiated emission measurements in semi anechoic chamber in 1000 – 3000 MHz range, floor standing EUT



Test specification:	FCC 47 CFR, Section 15.109 / ICES-003, Section 3.2.2, Class B, Radiated emissions		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1012 hPa	Power: 120 VAC, 60 Hz
Remarks: The highest frequency used in the EUT in 433 MHz; the test was performed in 30 – 3000 MHz range.			

Photograph 7.2.1 Setup for radiated emission measurements, general view



Photograph 7.2.2 Setup for radiated emission measurements, EUT cabling

Test specification:	FCC 47 CFR, Section 15.109 / ICES-003, Section 3.2.2, Class B, Radiated emissions		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Dec-22		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1012 hPa	Power: 120 VAC, 60 Hz
Remarks: The highest frequency used in the EUT in 433 MHz; the test was performed in 30 – 3000 MHz range.			

Table 7.2.2 Radiated emission test results

EUT SET UP: FLOOR STANDING
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
FREQUENCY RANGE: 30 MHz – 1000 MHz
DETECTORS USED: PEAK / QUASI-PEAK
RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
45.797	50.86	31.16	40.00	-8.84	Vertical	2.04	-110	Pass
59.374	58.66	39.20	40.00	-0.80	Vertical	2.83	-180	
67.979	47.37	26.31	40.00	-13.69	Horizontal	4.00	-146	
96.293	39.88	18.44	43.50	-25.06	Horizontal	1.81	-87	
140.038	43.95	24.13	43.50	-19.37	Horizontal	3.00	-146	
911.228	33.70	23.09	46.00	-22.91	Horizontal	3.76	180	

FREQUENCY RANGE: 1000 MHz – 3000 MHz
DETECTORS USED: PEAK / AVERAGE
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak			Average			Antenna polarization	Antenna tilt, degrees	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*					
No emissions were found.											Pass

*- Margin = Measured emission - specification limit.
**- EUT front panel refers to 0 degrees position of turntable.

Reference numbers of test equipment used

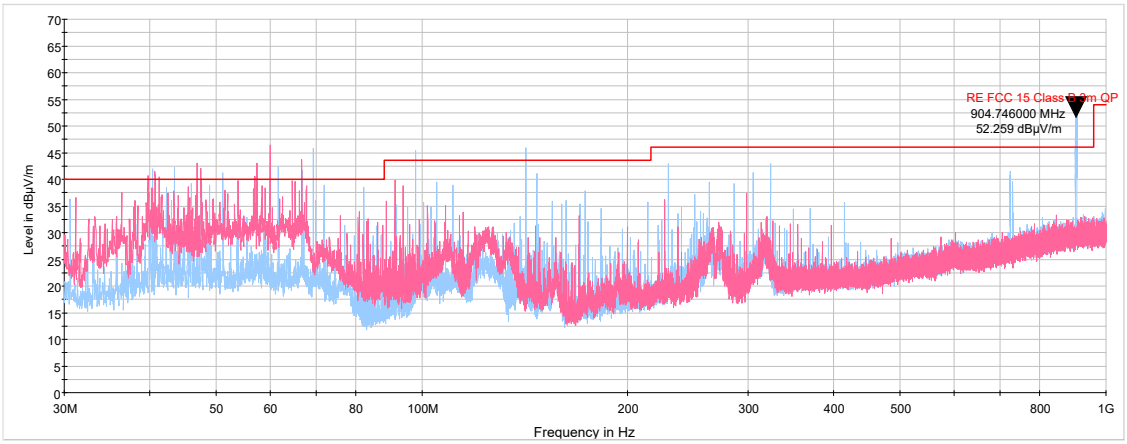
HL 3903	HL 4933	HL 5288	HL 5902	HL 7585			

Full description is given in Appendix A.

Test specification:	**FCC 47 CFR, Section 15.109 / ICES-003, Section 3.2.2, Class B, Radiated emissions**		
Test procedure:	ANSI C63.4, Section 8.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	21-Dec-22		
Temperature: 24 ºC	**Relative Humidity:** 54 %	**Air Pressure:** 1012 hPa	**Power:** 120 VAC, 60 Hz
Remarks: The highest frequency used in the EUT in 433 MHz; the test was performed in 30 – 3000 MHz range.			

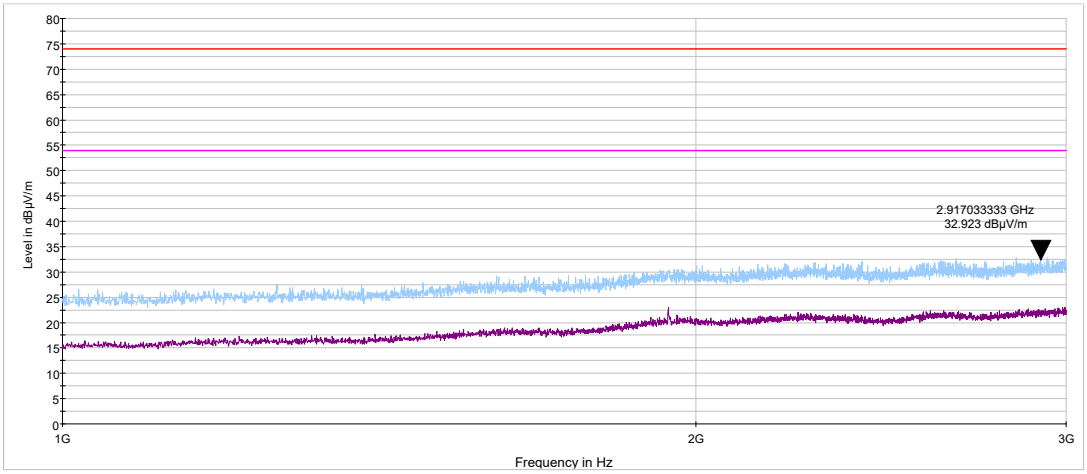
Plot 7.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.2.2 Radiated emission measurements in 1000 – 3000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./Check	Due Cal./Check
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A01877	11-Sep-22	11-Sep-23
1501	Cable RF, 6 m, BNC/BNC	Belden	M17/167 MIL-C-17	1501	13-Oct-22	13-Oct-23
2364	SmartWave Switching Amplifier	Elgar	SW5250AE-4	0317A00596	07-Nov-22	07-Nov-23
2382	Transformer, Isolation, 230/230, 1.8 kVA	Taiyo Yuden, Inc.	LGY1.8-21	FJ0411	15-Mar-23	15-Mar-24
2417	Power source connection panel (for HL2364)	Hermon Laboratories	PCP-1	2417	06-Jul-22	06-Jul-23
2666	Compliance Test System	California Instruments	PACS-3	72342	22-Sep-22	22-Sep-23
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB-2/16Z	02/10018	13-Mar-23	13-Mar-24
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1226/2A	16-Apr-23	16-Apr-24
4018	Temp. & Humidity Meter, (-50 - +70) deg, (20 - 99)% RH	Mad Electronics	HTC-1	NA	25-Aug-22	25-Aug-23
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	19-Jan-23	19-Jan-24
5288	Trilog Antenna, 25 MHz - 8 GHz, 100W	Frankonia	ALX-8000E	00809	24-Mar-22	24-Mar-25
5707	EMI receiver	PMM / Narda	PMM 9010F	060WW91101	07-Feb-23	07-Mar-24
5902	RF cable, 18 GHz, 6.0m, N-type	Huber-Suhner	SF126EA/11N/11N/6000	NA	08-Dec-22	08-Dec-23
7585	EMI Test Receiver, 1 Hz to 44 GHz	Rohde & Schwarz	ESW44	103130	19-May-22	19-May-23

9 APPENDIX B Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.
Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), ISED #2186A, CAB identifier is IL1001; Certified by VCCI, Japan (the registration numbers for OATS are R-10808 for RE measurements below 1 GHz, G-20112 for RE measurements above 1 GHz, R-11082 for anechoic chamber for RE measurements below 1 GHz, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).
The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

Address: P.O. Box 23, Binyamina 3055001, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Michael Nikishin, EMC&Radio group manager

10 APPENDIX C Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
CDN	coupling/ decoupling network
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
dBΩ	decibel referred to one Ohm
DC	direct current
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EUT	equipment under test
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
kV	kilovolt
L	length
LISN	line impedance stabilization network
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
NP	normal performance
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
s	second
V	volt
VA	volt-ampere
W	width

11 APPENDIX D Test equipment correction factors

Correction factor
Line impedance stabilization network
Model LISN NNB-2/16Z
Rolf Heine

Frequency, kHz	Voltage division factor (insertion loss) All knobs "OFF"		Voltage division factor (insertion loss) Limiter knob "ON"		Voltage division factor (insertion loss) "Attenuator"&"Filter" knobs "ON"		Uncertainty, dB
	L1, dB	L2 (N), dB	L1, with limiter, dB	L2 (N), with limiter, dB	L1, with Attenuator, with Filter, dB	L2 (N), with Attenuator, with Filter, dB	
150	0.09	0.08	0.10	0.07	21.77	21.75	±0.09
170	0.09	0.07	0.10	0.07	21.43	21.39	±0.09
200	0.09	0.07	0.10	0.07	20.95	20.91	±0.09
250	0.10	0.07	0.10	0.07	20.74	20.69	±0.09
300	0.09	0.07	0.10	0.07	20.78	20.73	±0.09
350	0.09	0.08	0.11	0.07	20.80	20.75	±0.09
400	0.10	0.07	0.10	0.07	20.81	20.77	±0.09
500	0.11	0.08	0.10	0.08	20.75	20.71	±0.09
600	0.11	0.07	0.11	0.08	20.70	20.65	±0.09
700	0.12	0.08	0.12	0.08	20.63	20.58	±0.09
800	0.11	0.09	0.12	0.08	20.59	20.54	±0.09
900	0.12	0.09	0.13	0.09	20.55	20.49	±0.09
1000	0.12	0.09	0.13	0.09	20.52	20.46	±0.09
1200	0.13	0.10	0.14	0.10	20.47	20.42	±0.16
1500	0.14	0.11	0.14	0.10	20.42	20.37	±0.16
2000	0.16	0.12	0.16	0.12	20.40	20.33	±0.16
2500	0.17	0.14	0.17	0.13	20.39	20.31	±0.16
3000	0.18	0.15	0.19	0.15	20.38	20.30	±0.16
4000	0.21	0.18	0.22	0.18	20.38	20.30	±0.16
5000	0.26	0.22	0.24	0.21	20.40	20.32	±0.16
7000	0.33	0.28	0.33	0.27	20.45	20.33	±0.16
10000	0.49	0.42	0.48	0.41	20.56	20.39	±0.16
15000	0.73	0.65	0.72	0.62	20.79	20.54	±0.16
20000	0.98	0.90	0.96	0.86	20.99	20.68	±0.16
30000	1.44	1.38	1.42	1.31	21.43	21.05	±0.32

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

Trilog antenna factor, 25 MHz - 8 GHz, 100W
Frankonia, model ALX-8000E, serial number00809

Freq (MHz)	ACF (dB)	Gain (dBi)
30	15.3	-15.5
35	14.9	-13.8
40	16.3	-14.1
45	17.6	-14.3
50	18.2	-14.0
55	17.8	-12.8
60	16.7	-11.0
70	13.3	-6.2
80	10.8	-2.5
90	13.6	-4.4
100	16.0	-5.8
120	14.1	-2.3
140	12.0	1.1
160	12.9	1.4
180	13.6	1.7
200	15.6	0.6
250	16.5	1.6
300	17.5	2.2
350	19.3	1.8
400	20.0	2.2
450	20.1	3.1
500	21.4	2.8
550	22.1	2.9
600	23.4	2.4
650	23.6	2.8
700	24.4	2.7
750	25.3	2.4
800	25.5	2.7
850	26.4	2.4
900	27.0	2.3
950	27.1	2.7
1000	27.5	2.7

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

Horn antenna factor
COM-POWER CORPORATION, Model AHA-118, Serial number 701046

Frequency, MHz	Measured antenna factor, dB/m
1000	-15.59
1050	-14.07
1100	-14.65
1150	-14.87
1200	-14.33
1250	-14.11
1300	-13.57
1350	-14.30
1400	-14.34
1450	-14.82
1500	-14.69
1550	-14.64
1600	-14.06
1650	-14.73
1700	-14.31
1750	-13.34
1800	-13.35
1850	-13.03
1900	-12.67
1950	-12.26
2000	-11.69
2050	-11.46
2100	-10.84
2150	-11.79
2200	-12.60
2250	-12.57
2300	-12.25
2350	-12.21
2400	-12.13
2450	-10.96
2500	-11.35
2550	-11.61
2600	-11.17
2650	-10.71
2700	-10.82
2750	-10.64
2800	-9.96
2850	-10.91
2900	-10.61
2950	-10.04
3000	-10.74

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

12 APPENDIX E Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted emissions with HP 8542E or HP 8546A receiver	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 10 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.0 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.1 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 5.5 dB Biconical antenna: ± 5.5 dB Log periodic antenna: ± 5.6 dB Double ridged horn antenna: ± 5.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB 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.

13 APPENDIX F Specification references

FCC 47CFR part 15: 2021 subpart B	Radio Frequency Devices
ICES-003: 2020, Issue 7	Information Technology Equipment (Including Digital Apparatus)
ANSI C63.4-2014	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.
CISPR 16-1-1: 2010	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus

END OF DOCUMENT