

TEST REPORT

ACCORDING TO: FCC CFR 47 Part 15 subpart C, section 15.231 and subpart B,
RSS-210 issue 10 Annex A, RSS-Gen issue 5, ICES-003 Issue 7:2020

FOR:

Paradox Security Systems Ltd.

Wireless Control Panel

Model: MG5050+/MG5000+

FCC ID: KDYMG5050PLUS

IC: 2438A-MG5050PLUS

This report is in conformity with ISO/IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.
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1 Applicant information

Client name: Paradox Security Systems Ltd.
Address: 780 Industrial Boulevard St.Eustache, Quebec J7R 5V3 Canada
Telephone: 450-491-7444
Fax: 450-497-1095
E-mail: alex@paradox.com
Contact name: Mr. Alex Chaplik

2 Equipment under test attributes

Product name: Wireless Control Panel
Product type: Transeiver
Model(s): MG5050+
Serial number: 21FFFF11
Hardware version: 910-2022-991
Software release: V1.00
Receipt date 10-Sep-21

3 Manufacturer information

Manufacturer name: Paradox Security Systems Ltd.
Address: 780 Industrial Boulevard St.Eustache, Quebec J7R 5V3 Canada
Telephone: 450-491-7444
Fax: 450-497-1095
E-Mail: alex@paradox.com
Contact name: Mr. Alex Chaplik

4 Test details

Project ID: 44733
Location: Primary: Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Satellite: Hermon Laboratories Ltd. Hefetz-Haim 10, Tel Aviv 6744124, Israel
Test started: 03-Nov-21
Test completed: 08-Nov-21
Test specification(s): FCC 47CFR part 15, subpart C, §15.231 and subpart B;
RSS-210 issue 10 Annex A, RSS-Gen issue 5, ICES-003 Issue 7:2020




5 Tests summary

Test	Status
Transmitter characteristics	
FCC Part 15, Section 231(a) / RSS-210, Section A1.1, Periodic operation requirements	Pass
FCC Part 15, Section 231(a) / RSS-210, Section A1.2, Field strength of emissions	Pass
FCC Part 15, Section 231(c) / RSS-210, Section A1.3, Occupied bandwidth	Pass
FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission	Pass
FCC Part 15, Section 203 / RSS-Gen, Section 8.3, Antenna requirements	Pass
Unintentional emissions	
FCC Part 15, Section 107 / ICES-003, Section 6.1 class B, Conducted emission at AC power port	Pass
FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2/ ICES-003, Section 6.2 class B, Radiated emission	Pass

This test report supersedes the previously issued test report identified by Doc ID: PARRAD_FCC.44733

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. I. Zilberstein, test engineer, EMC & Radio	03-Nov-21 – 08-Nov-21	
Reviewed by:	Mrs. S. Peysahov Sheynin, test engineer, EMC & Radio	20-Dec-21	
Approved by:	Mr. S. Samokha, technical manager, EMC & Radio	20-Dec-21	



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 wireless control panel used for alarm system.

The EUT operated at 433.92 MHz. The EUT has a receiver of Class 2.

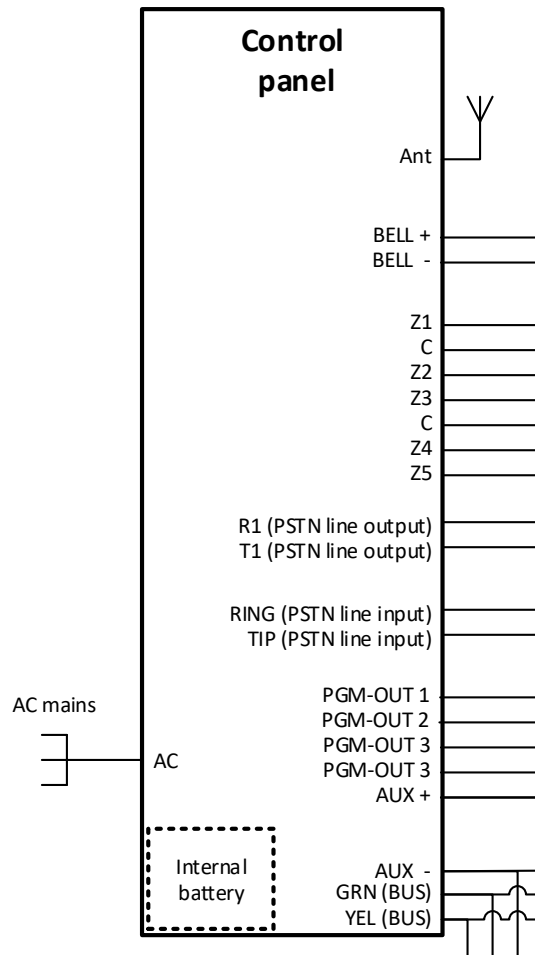
The MG5000+ is a variant of MG5050+. The only difference is in number of terminal blocks (on-board zones and PGMs):

MG5050+ (5 zones, 4 PGMs) vs MG5000+ (2 zones, 2 PGMs) -> same layout, HW and FW. K32LCD+ (Wired Keypad) connected to Control panel by BUS (+, -, Data, CLK)

According to manufacturer's declaration provided in Appendix G of the test report, the EUT models MG5050+ and MG5000+ are identical and differ only in number of terminal blocks (on-board zones and PGMs):

That's why only the EUT model MG5050+ was tested as a representative of the worst-case option.

6.2 Test configuration



6.3 Changes made in EUT

No changes were implemented in the EUT during testing.



6.4 Transmitter characteristics

Type of equipment						
X	Stand-alone (Equipment with or without its own control provisions)					
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)					
	Plug-in card (Equipment intended for a variety of host systems)					
Operating frequency		433.92 MHz				
Maximum rated output power		At transmitter 50 Ω RF output connector				
		Field strength at 3 m distance			97.57 dB(μV/m) – peak 80.62 dB(μV/m) -average	
Is transmitter output power variable?		X	No			
			Yes	continuous variable		
				stepped variable with stepsize		dB
				minimum RF power		dBm
		maximum RF power		dBm		
Antenna connection						
unique coupling	standard connector	X	integral	with temporary RF connector		
				X	without temporary RF connector	
Antenna/s technical characteristics						
Type	Manufacturer	Model number		Gain		
Integral	FORESIGHT INT. Ltd.	125-0433-400		0 dBi		
Transmitter aggregate data rate/s		1.67 kbps				
Type of modulation		OOK				
Modulating test signal (baseband)		ID code				
Transmitter power source						
	Battery	Nominal rated voltage	VDC	Battery type		
	DC	Nominal rated voltage	VDC			
X	AC mains	Nominal rated voltage	110 VAC	Frequency	60 Hz	
Common power source for transmitter and receiver			X	yes	no	



Test specification: FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements	
Test procedure:	Supplier declaration
Test mode:	Compliance
Date(s):	08-Nov-21
Temperature: 25 °C	Relative Humidity: 38 %
Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:	
Verdict: PASS	

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 requirements

7.1 Periodic operation requirements

7.1.1 General

The EUT was verified for compliance with periodic operation requirements listed below:

- Continuous transmissions such as voice, video and the radio control of toys are not permitted;
- A manually operated transmitter shall employ switch that will automatically deactivate the transmitter within not more than 5 seconds of being released;
- A transmitter activated automatically shall cease transmission within 5 seconds after activation;
- Periodic transmissions, excluding polling or supervision transmissions, at regular predetermined intervals are not permitted;
- Total duration of polling or supervision transmissions, including data, to determine system integrity in security or safety applications shall not exceed 2 seconds per hour;
- Transmission of set-up information for security systems may exceed the transmission duration limits of 5 seconds, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

The rationale for compliance with the above requirements was either test results or supplier declaration. The summary of results is provided in Table 7.1.1.

7.1.2 Test procedure for transmitter shut down test

7.1.2.1 The EUT was set up as shown in Figure 7.1.1.

7.1.2.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

7.1.2.3 The transmitter was activated either manually or automatically. Once manually operated transmitter was activated, the switch was immediately released.

7.1.2.4 The transmission time was captured and shown in Plot 7.1.1.

7.1.3 Test procedure for measurements of polling / supervision transmission duration

7.1.3.1 The EUT was set up as shown in Figure 7.1.1.

7.1.3.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

7.1.3.3 The transmission time was captured and shown in Plot 7.1.2, Plot 7.1.3.

Figure 7.1.1 Setup for transmitter shut down test





Test specification: FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements			
Test procedure: Supplier declaration			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 38 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.1.1 Periodic operation requirements

Requirement	Rationale	Verdict
Continuous transmissions are not permitted	Supplier declaration*	Comply
A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released	NA	NA
Transmitter activated automatically shall cease transmission within 5 seconds	Plot 7.1.1	Comply
Periodic transmissions at regular predetermined intervals are not permitted	Supplier declaration*	Comply
Total duration of polling or supervision transmissions shall not exceed 2 seconds per hour	Plot 7.1.2, Plot 7.1.3	Comply
Transmission of set-up information for security systems may exceed the transmission duration limits of 5 seconds, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.	Supplier declaration*	Comply

* Provided in Appendix F.

Plot 7.1.1 Transmitter shut down test result





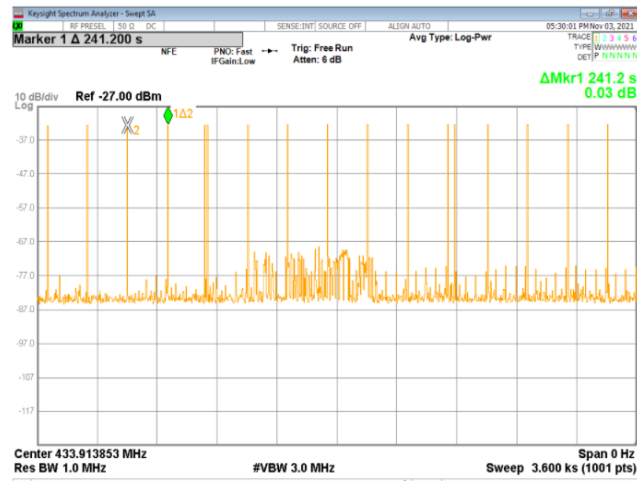
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Test specification: FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements			
Test procedure: Supplier declaration			
Test mode: Compliance			Verdict: PASS
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 38 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.1.2 Polling / supervision transmission duration



Plot 7.1.3 Polling / supervision transmission period





Test specification: FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements			
Test procedure: Supplier declaration			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 38 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.1.2 Total duration of polling / supervision transmissions

Duration, ms	Repetition period, s	Maximum number of transmissions within 1 hour	Total duration within 1 hour, ms
27.9	241.2	16	446.4

Reference numbers of test equipment used

HL 5376	HL 5397						
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Full description is given in Appendix A.



Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

7.2 Field strength of emissions

7.2.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.2.1 and Table 7.2.2.

Table 7.2.1 Radiated fundamental emission limits

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)	
	Peak	Average
433.9185	100.8	80.8

Table 7.2.2 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m, dB(μV/m)				
	Within restricted bands			Outside restricted bands	
	Peak	Quasi Peak	Average	Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	80.8	60.8
0.090 – 0.110	NA	108.5 – 106.8**	NA		
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**		
0.490 – 1.705	NA	73.8 – 63.0**	NA		
1.705 – 30.0*		69.5			
30 – 88		40.0			
88 – 216		43.5			
216 – 960		46.0			
960 - 1000		54.0			
Above 1000	74.0	NA	54.0		

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:
$$Lims_2 = Lims_1 + 40 \log (S_1/S_2),$$

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

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

Note 1: The fundamental emission limit in dB(μV/m) was calculated as follows:

$$Lim_{AVR} = 20 \times \log (41.6667 \times F - 7083.3333) - \text{within } 260 - 470 \text{ MHz band,}$$

where F is the carrier frequency in MHz.

The limit for spurious emissions was 20 dB lower than fundamental emission limit.

The above limits provided in terms of average values, peak limit was 20 dB above the average limit.

Note 2: The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.



Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance	Verdict: PASS		
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

7.2.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and the performance check was conducted.

7.2.2.2 The measurements were performed in three EUT orthogonal positions.

7.2.2.3 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated around its vertical axis.

7.2.2.4 The worst test results (the lowest margins) were found in the EUT vertical (X, Y, Z-axis) position, recorded in Table 7.2.3, Table 7.2.4 and shown in the associated plots.

7.2.3 Test procedure for spurious emission field strength measurements above 30 MHz

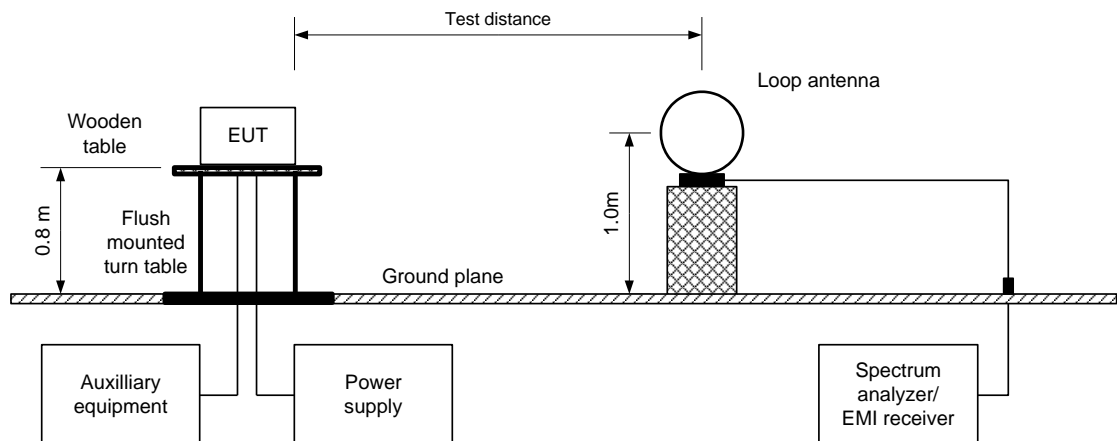
7.2.3.1 The EUT was set up as shown in Figure 7.2.2, Figure 7.2.3, energized and the performance check was conducted.

7.2.3.2 The measurements were performed in three EUT orthogonal positions.

7.2.3.3 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.2.3.4 The worst test results (the lowest margins) were found in the EUT vertical (X, Y, Z-axis) position, recorded in Table 7.2.3, Table 7.2.4 and shown in the associated plots.

Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz





Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Figure 7.2.2 Setup for spurious emission field strength measurements in 30 -1000 MHz

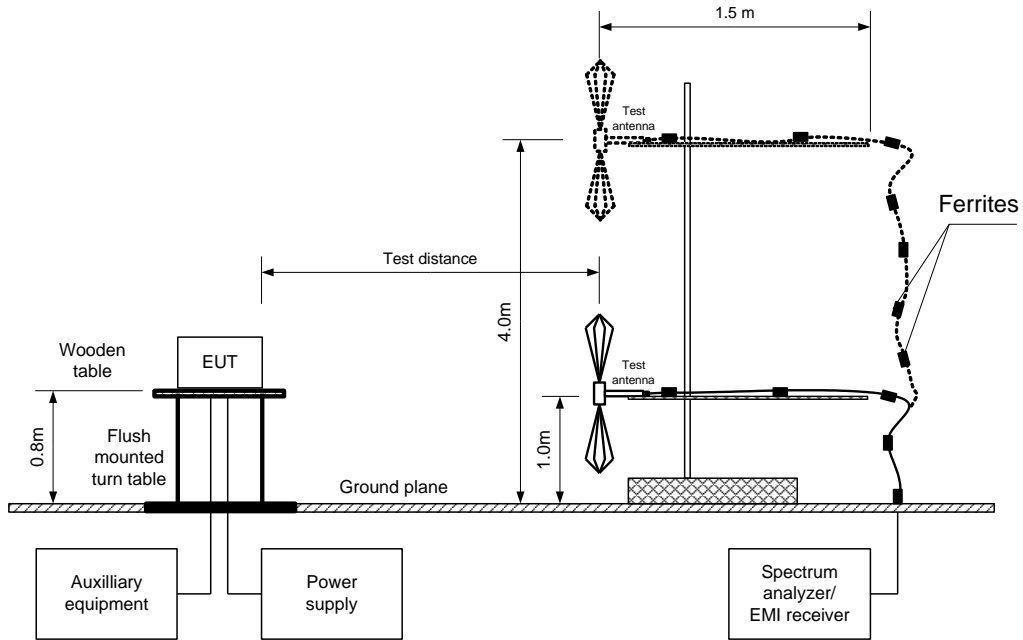
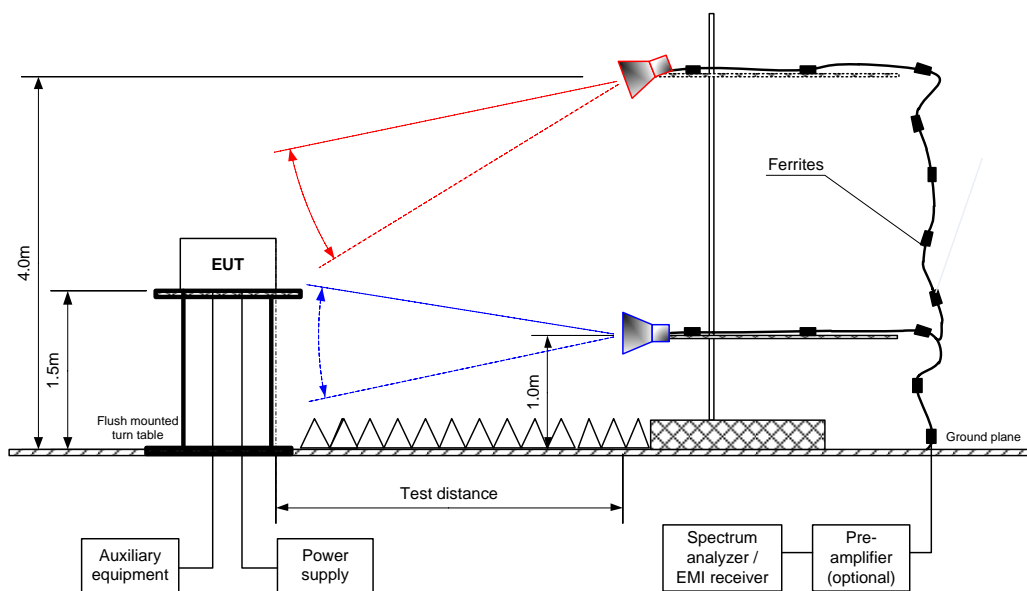


Figure 7.2.3 Setup for spurious emission field strength measurements above 1000 MHz





Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.2.3 Field strength of fundamental emission, spurious emissions outside restricted bands below 1 GHz

TEST DISTANCE: 3 m
 EUT POSITION: Typical (Vertical)
 MODULATION: OOK
 BIT RATE: 1.67 kbps
 INVESTIGATED FREQUENCY RANGE: 0.009 – 4500 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 1.0 MHz (above 1000 MHz)
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Calculated, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Fundamental emission***											
433.920	V	1.1	-50	97.57	100.8	-3.23	97.57	80.62	80.8	-0.184	Pass
Spurious emissions											
30.62	V	1.0	55	38.30	80.8	-42.50	38.30	21.35	60.8	-39.454	Pass
51.46	V	1.0	-149	42.51	80.8	-38.29	42.51	25.56	60.8	-35.244	
90.49	V	1.1	43	30.30	80.8	-50.50	30.30	13.35	60.8	-47.454	
114.47	V	1.0	-31	31.25	74.0	-42.75	31.25	14.30	54.0	-39.704	
867.79	V	1.0	-130	35.66	80.8	-45.14	35.66	18.71	60.8	-42.094	

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

**- Margin, dB =Measured (calculated) value, dB(μV/m)-Limit, dB(μV/m)



Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.2.4 Field strength of fundamental emission, spurious emissions within restricted above 1 GHz

TEST DISTANCE: 3 m
 EUT POSITION: Typical (Vertical)
 MODULATION: OOK
 BIT RATE: 1.67 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 INVESTIGATED FREQUENCY RANGE: 1000 - 4500 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 1.0 MHz (above 1000 MHz)
 VIDEO BANDWIDTH: ≥ Resolution bandwidth

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Pol.	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	Measured, dB(µV/m)	Calculated, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	
All emissions were found more than 20 dB below limit											Pass

*- EUT front panel refers to 0 degrees position of turntable.
 **- Margin, dB = Measured (calculated) value, dB(µV/m) - Limit, dB(µV/m)

Table 7.2.5 Average factor calculation

Transmission pulse A during burst		Transmission pulse B during burst		Transmission pulse C during burst		Quantity bursts during 100 msec	Average factor, dB
Duration, ms	Quantity	Duration, ms	Quantity	Duration, ms	Quantity		
0.18	15	0.78	2	0.30	33	1	-16.95

*- Average factor was calculated as follows
 $20 \log ((0.18 \times 15 + 0.78 \times 2 + 0.30 \times 33) \times 1 / 100) = -16.95 \text{ dB}$

Reference numbers of test equipment used

HL 0446	HL 4360	HL 4933	HL 5288	HL 5405	HL 3903	HL5372	
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Full description is given in Appendix A.



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-21		
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.2.6 Restricted bands according to FCC 15, Section 205

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.290 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.420 - 16.423	156.7 - 156.9	1660 - 1710	5350 - 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 - 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

Table 7.2.7 Restricted bands according to RSS-Gen, Table 3

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.291 - 8.294	16.80425 - 16.80475	399.9 - 410	3260 - 3267	10.6 - 12.7
2.1735 - 2.190	8.362 - 8.366	25.5 - 25.67	608 - 614	3332 - 3339	13.25 - 13.4
3.020 - 3.026	8.37625 - 8.38675	37.5 - 38.25	960 - 1427	3345.8 - 3358	14.47 - 14.5
4.125 - 4.128	8.41425 - 8.41475	73 - 74.6	1435 - 1626.5	3500 - 4400	15.35 - 16.2
4.17725 - 4.17775	12.290 - 12.293	74.8 - 75.2	1645.5 - 1646.5	4500 - 5150	17.7 - 21.4
4.20725 - 4.20775	12.51975 - 12.52025	108 - 138	1660 - 1710	5350 - 5460	22.01 - 23.12
5.677 - 5.683	12.57675 - 12.57725	156.52475 - 156.52525	1718.8 - 1722.2	7250 - 7750	23.6 - 24.0
6.215 - 6.218	13.36 - 13.41	156.7 - 156.9	2200 - 2300	8025 - 8500	31.2 - 31.8
6.26775 - 6.26825	16.42 - 16.423	240 - 285	2310 - 2390	9000 - 9200	36.43 - 36.5
6.31175 - 6.31225	16.69475 - 16.69525	322 - 335.4	2655 - 2900	9300 - 9500	Above 38.6



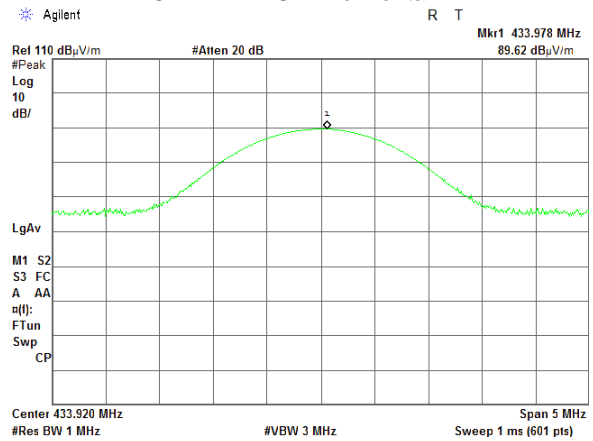
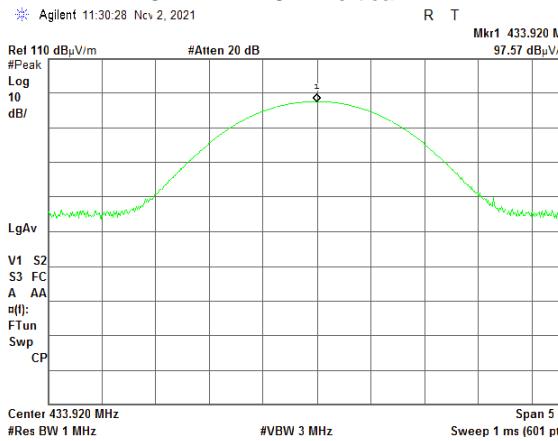
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Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance	Verdict: PASS		
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.2.1 Radiated emission measurements at the fundamental frequency

TEST SITE:
TEST DISTANCE:
EUT POSITION:
ANTENNA POLARIZATION: Vertical

Semi anechoic chamber
3 m
Typical
ANTENNA POLARIZATION: Horizontal

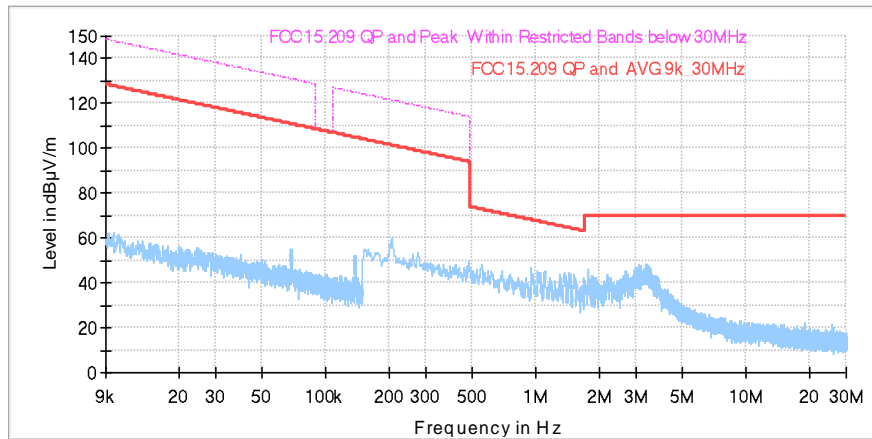




Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure: ANSI C63.10 sections 6.5, 6.6	
Test mode: Compliance	Verdict: PASS
Date(s): 03-Nov-21	
Temperature: 25 °C	Relative Humidity: 48 %
Remarks:	

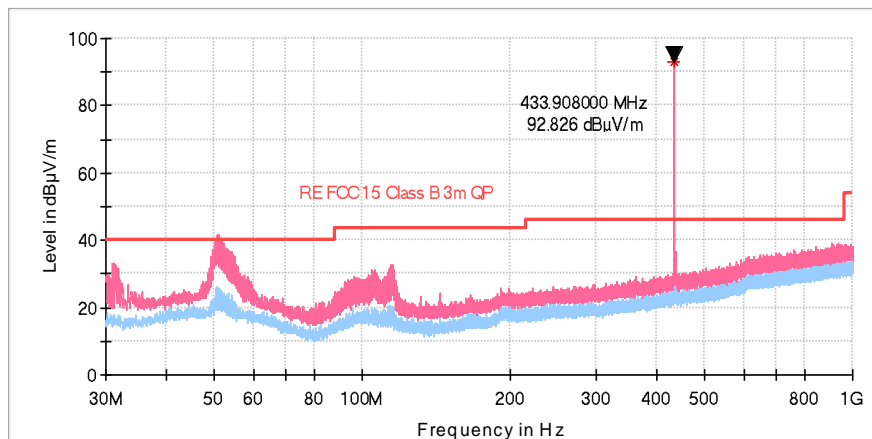
Plot 7.2.2 Radiated emission measurements from 9 kHz to 30 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.2.3 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: Typical

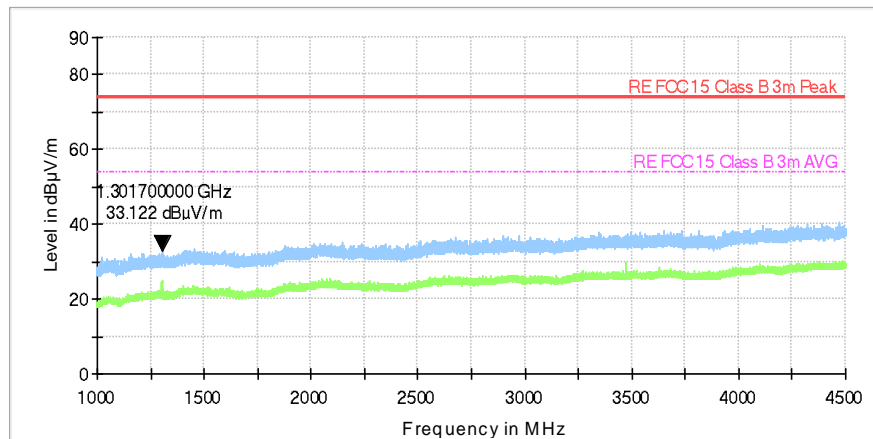




Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance	Verdict: PASS		
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.2.4 Radiated emission measurements from 1000 to 4500 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: Typical

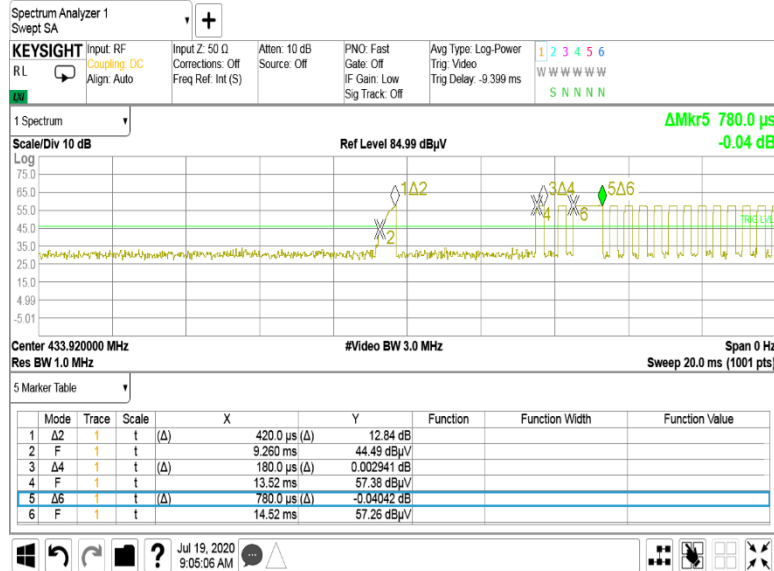




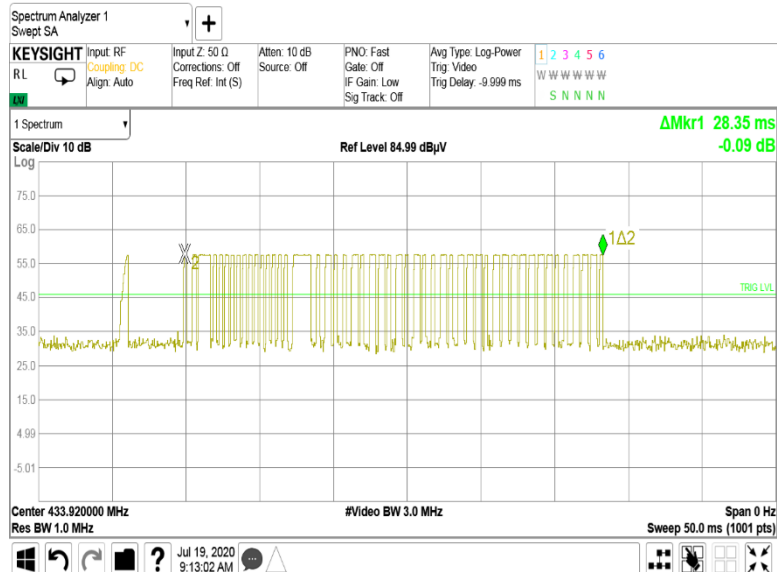
HERMON LABORATORIES

Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure: ANSI C63.10 sections 6.5, 6.6	
Test mode: Compliance	Verdict: PASS
Date(s): 03-Nov-21	
Temperature: 25 °C	Relative Humidity: 48 %
Air Pressure: 1013 hPa	Power: 110 VAC, 50 Hz
Remarks:	

Plot 7.2.5 Transmission pulse period



Plot 7.2.6 Transmission burst duration





Test specification: FCC Part 15, Section 231(c) / RSS-210, Section A1.3, Occupied bandwidth			
Test procedure: ANSI C63.10 section 6.9.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 37 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, % of the carrier frequency
70 - 900	20.0	0.25
Above 900		0.50

*- Modulation envelope reference points provided in terms of attenuation below modulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit modulated carrier.

7.3.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.3.2 and associated plot.

Figure 7.3.1 Occupied bandwidth test setup





Test specification: FCC Part 15, Section 231(c) / RSS-210, Section A1.3, Occupied bandwidth			
Test procedure: ANSI C63.10 section 6.9.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 37 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 1 kHz
 VIDEO BANDWIDTH: 3 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 99%
 MODULATION: OOK
 BIT RATE: 1.67 kbps

MODULATION ENVELOPE REFERENCE POINTS 20 dBc

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.92	26.08	0.25	1084.8	1058.72	Pass

MODULATION ENVELOPE REFERENCE POINTS 99%

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.92	39.53	0.25	1084.8	1045.27	Pass

Reference numbers of test equipment used

HL 0337	HL 3901	HL 5376						
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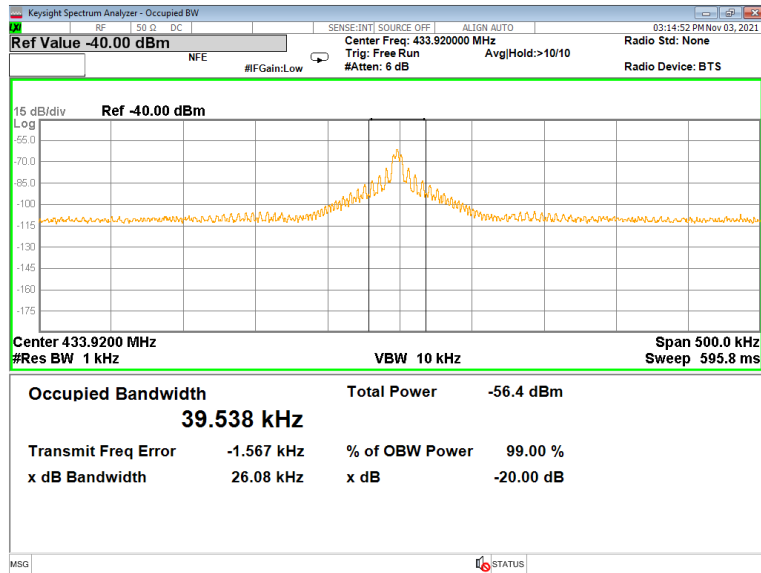
Full description is given in Appendix A.



HERMON LABORATORIES

Test specification: FCC Part 15, Section 231(c) / RSS-210, Section A1.3, Occupied bandwidth			
Test procedure: ANSI C63.10 section 6.9.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 37 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.3.1 Occupied bandwidth test result





Test specification: FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission			
Test procedure: ANSI C63.4, Section 7.3 and 12.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 35 °C	Relative Humidity: 35 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

7.4 Conducted emissions

7.4.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Limits for conducted emissions

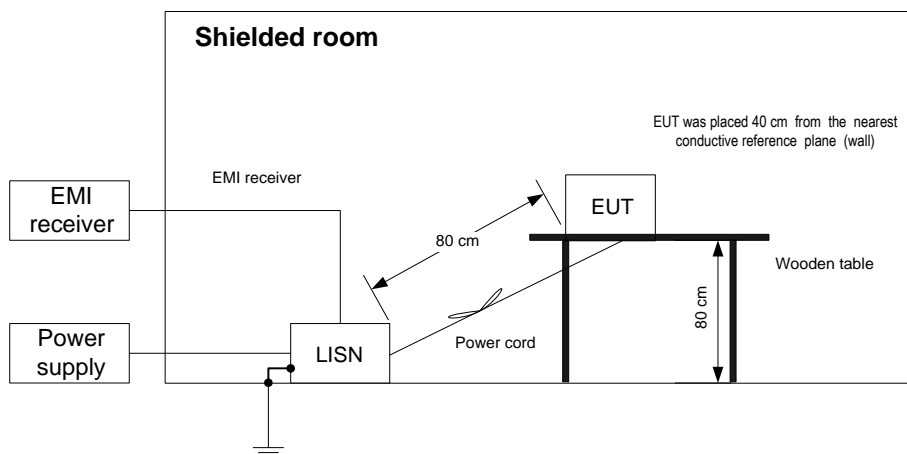
Frequency, MHz	Class B limit, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

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

7.4.2 Test procedure

- 7.4.2.1 The EUT was set up as shown in Figure 7.4.1 and associated photographs, energized and the performance check was conducted.
- 7.4.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.
- 7.4.2.3 The position of the device cables was varied to determine maximum emission level.
- 7.4.2.4 The worst test results (the lowest margins) were shown in the associated plots.

Figure 7.4.1 Setup for conducted emission measurements, table-top equipment





Test specification: FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission			
Test procedure: ANSI C63.4, Section 7.3 and 12.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 35 °C	Relative Humidity: 35 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.4.2 Conducted emission test results

LINE: AC mains
EUT OPERATING MODE: Transmit
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
All emissions were found more than 20 dB below limit								L1	Pass
All emissions were found more than 20 dB below limit								L2	Pass

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0787	HL 3016	HL 4778					
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Full description is given in Appendix A.

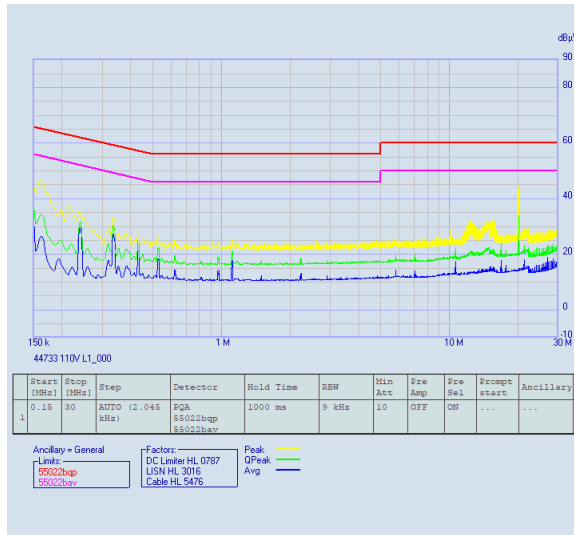


HERMON LABORATORIES

Test specification: FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission			
Test procedure: ANSI C63.4, Section 7.3 and 12.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 35 °C	Relative Humidity: 35 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.4.1 Conducted emission measurements

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



44733 110V L1_000 03-11-2021 12:19:44
Rel. SW 2.37 (June 2019)
Rel. FW 1.93 01/10/19
Margin: 24.8 dB

	Frequency [MHz]	QPeak [dBµV]	Limit 55022bqp [dBµV]	Delta [dB]	Avg [dBµV]	Limit 55022bav [dBµV]	Delta [dB]	Factor DC Limite.. [dB]	Factor LISN HL 3.. [dB]	Factor Cable HL .. [dB]
1	0.15	37.60	66.00	---	33.10	56.00	-22.90	10.00	0.08	0.11
2	0.237935	31.27	62.17	---	29.19	52.17	-22.98	10.00	0.09	0.12
3	0.23998	31.64	62.10	---	29.55	52.10	-22.55	10.00	0.09	0.12
4	0.242025	31.49	62.03	---	29.31	52.03	-22.72	10.00	0.09	0.12
5	0.33405	30.07	59.35	---	26.93	49.35	-22.42	10.00	0.09	0.13
6	0.336095	30.40	59.30	---	27.29	49.30	-22.01	10.00	0.09	0.13
7	0.33814	30.20	59.25	---	27.04	49.25	-22.21	10.00	0.09	0.13

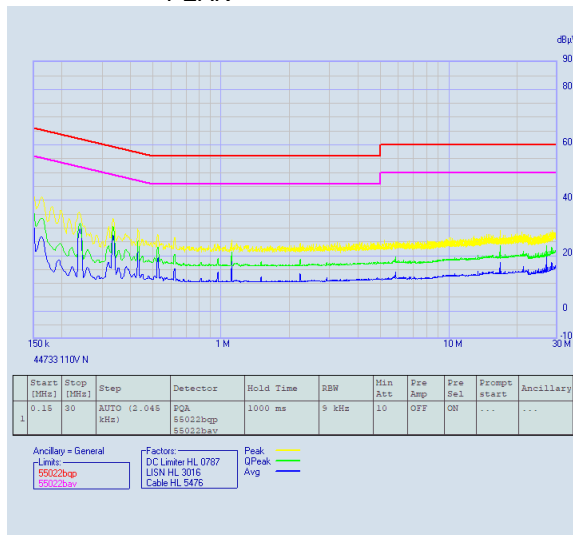


HERMON LABORATORIES

Test specification: FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission			
Test procedure: ANSI C63.4, Section 7.3 and 12.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 35 °C	Relative Humidity: 35 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.4.2 Conducted emission measurements

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



44733 110V N 03-11-2021 12:23:19
Rel. SW 2.37 (June 2019)
Rel. FW 1.93 01/10/19
Margin: 24.8 dB

	Frequency [MHz]	QPeak [dBµV]	Limit 55022bqp [dBµV]	Delta [dB]	Avg [dBµV]	Limit 55022bav [dBµV]	Delta [dB]	Factor DC Limite.. [dB]	Factor LISN HL 3.. [dB]	Factor Cable HL ... [dB]
1	0.15	37.05	66.00	---	32.88	56.00	-23.12	10.00	0.08	0.11
2	0.237935	31.34	62.17	---	29.25	52.17	-22.92	10.00	0.09	0.12
3	0.23998	31.73	62.10	---	29.61	52.10	-22.49	10.00	0.09	0.12
4	0.242025	31.55	62.03	---	29.37	52.03	-22.66	10.00	0.09	0.12
5	0.33405	30.15	59.35	---	26.99	49.35	-22.36	10.00	0.09	0.13
6	0.336095	30.49	59.30	---	27.36	49.30	-21.94	10.00	0.09	0.13
7	0.33814	30.34	59.25	---	27.11	49.25	-22.14	10.00	0.09	0.13



Test specification: FCC Part 15, Section 203 / RSS-Gen, Section 6.8, Antenna requirements			
Test procedure: Visual inspection / supplier declaration			
Test mode: Compliance		Verdict: PASS	
Date(s): 08-Nov-21			
Temperature: 25 °C	Relative Humidity: 36 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

7.5 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.5.1.

Table 7.5.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	



Test specification: FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

8 Unintentional emissions according to 47CFR part 15 subpart B and ICES-003 requirements

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Limits for conducted emissions

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

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

8.1.2 Test procedure

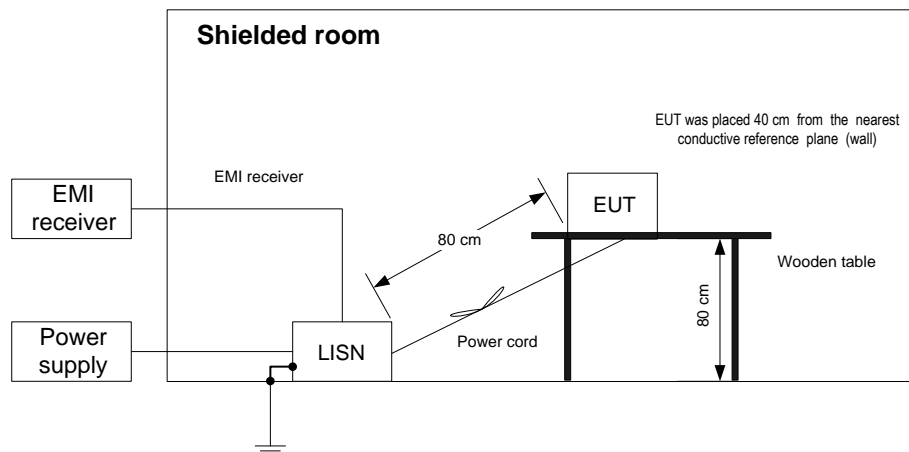
8.1.2.1 The EUT was set up as shown in Figure 8.1.1 Setup for conducted emission measurements, table-top equipment and associated photographs, energized and the performance check was conducted.

8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.

8.1.2.3 The position of the device cables was varied to determine maximum emission level.

8.1.2.4 The worst test results (the lowest margins) were shown in the associated plots.

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment





Test specification: FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
EUT OPERATING MODE: Transmit
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
All emissions were found more than 20 dB below limit								L1	Pass
All emissions were found more than 20 dB below limit								L2	Pass

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0787	HL 3016	HL 4778					
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Full description is given in Appendix A.

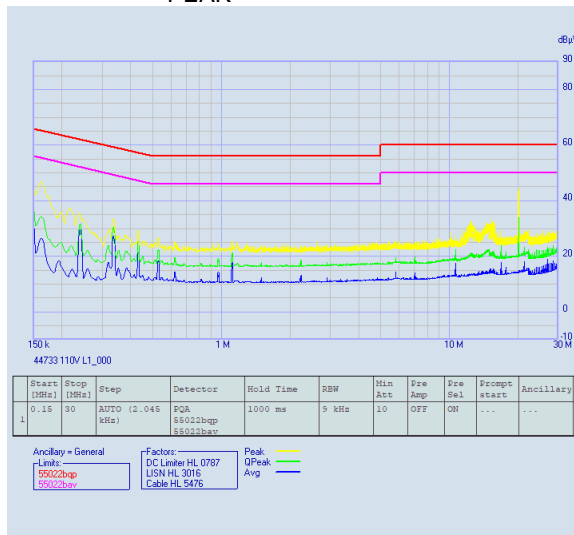


HERMON LABORATORIES

Test specification: FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 8.1.1 Conducted emission measurements according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



44733 110V L1_000 03-11-2021 12:19:44
Rel. SW 2.37 (June 2019)
Rel. FW 1.93 01/10/19
Margin: 24.8 dB

	Frequency [MHz]	QPeak [dBµV]	Limit 55022bqp [dBµV]	Delta [dB]	Avg [dBµV]	Limit 55022bav [dBµV]	Delta [dB]	Factor DC Limite.. [dB]	Factor LISN HL 3.. [dB]	Factor Cable HL .. [dB]
1	0.15	37.60	66.00	---	33.10	56.00	-22.90	10.00	0.08	0.11
2	0.237935	31.27	62.17	---	29.19	52.17	-22.98	10.00	0.09	0.12
3	0.23998	31.64	62.10	---	29.55	52.10	-22.55	10.00	0.09	0.12
4	0.242025	31.49	62.03	---	29.31	52.03	-22.72	10.00	0.09	0.12
5	0.33405	30.07	59.35	---	26.93	49.35	-22.42	10.00	0.09	0.13
6	0.336095	30.40	59.30	---	27.29	49.30	-22.01	10.00	0.09	0.13
7	0.33814	30.20	59.25	---	27.04	49.25	-22.21	10.00	0.09	0.13

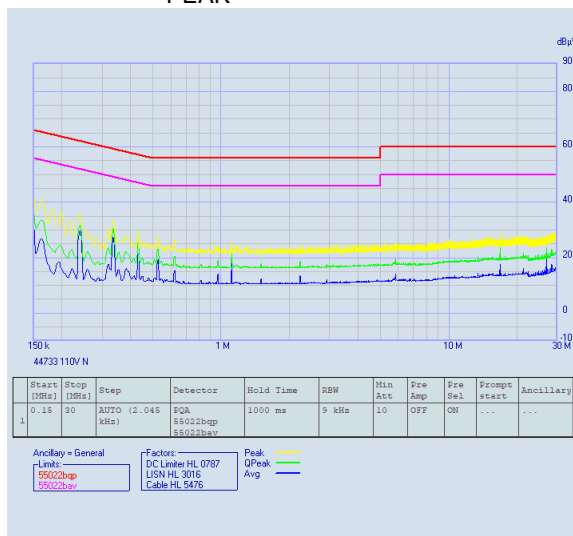


HERMON LABORATORIES

Test specification: FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port			
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 8.1.2 Conducted emission measurements according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



44733 110V N 03-11-2021 12:23:19
Rel. SW 2.37 (June 2019)
Rel. FW 1.93 01/10/19
Margin: 24.8 dB

	Frequency [MHz]	QPeak [dBµV]	Limit 55022bqp [dBµV]	Delta [dB]	Avg [dBµV]	Limit 55022bav [dBµV]	Delta [dB]	Factor DC Limite.. [dB]	Factor LISN HL 3.. [dB]	Factor Cable HL ... [dB]
1	0.15	37.05	66.00	---	32.88	56.00	-23.12	10.00	0.08	0.11
2	0.237935	31.34	62.17	---	29.25	52.17	-22.92	10.00	0.09	0.12
3	0.23998	31.73	62.10	---	29.61	52.10	-22.49	10.00	0.09	0.12
4	0.242025	31.55	62.03	---	29.37	52.03	-22.66	10.00	0.09	0.12
5	0.33405	30.15	59.35	---	26.99	49.35	-22.36	10.00	0.09	0.13
6	0.336095	30.49	59.30	---	27.36	49.30	-21.94	10.00	0.09	0.13
7	0.33814	30.34	59.25	---	27.11	49.25	-22.14	10.00	0.09	0.13



Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 110 VAC, 50 Hz
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 8.2.1.

Table 8.2.1 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
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*

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

- 8.2.1.1 30 – 1000 MHz range.** The EUT was set up as shown in Figure 8.2.1 and the associated photograph/s, energized and the EUT performance was checked.
- 8.2.1.2** The measurements were performed in the 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 3600 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.
- 8.2.1.3 1000 – 40000 MHz range.** The EUT was set up as shown in Figure 8.2.2 and the associated photograph/s, energized and the EUT performance was checked.
- 8.2.1.4** 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 3600 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.
- 8.2.1.5** The worst test results with respect to the limits were recorded in Figure 8.2.2 and shown in the associated plots.



Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance	Verdict: PASS		
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Figure 8.2.1 Setup for radiated emission measurements in 30 – 1000 MHz range, floor standing EUT

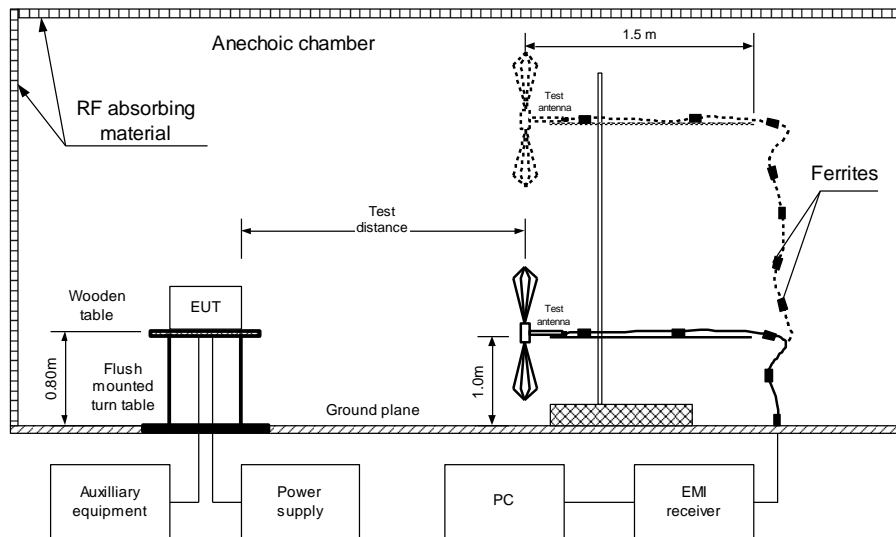
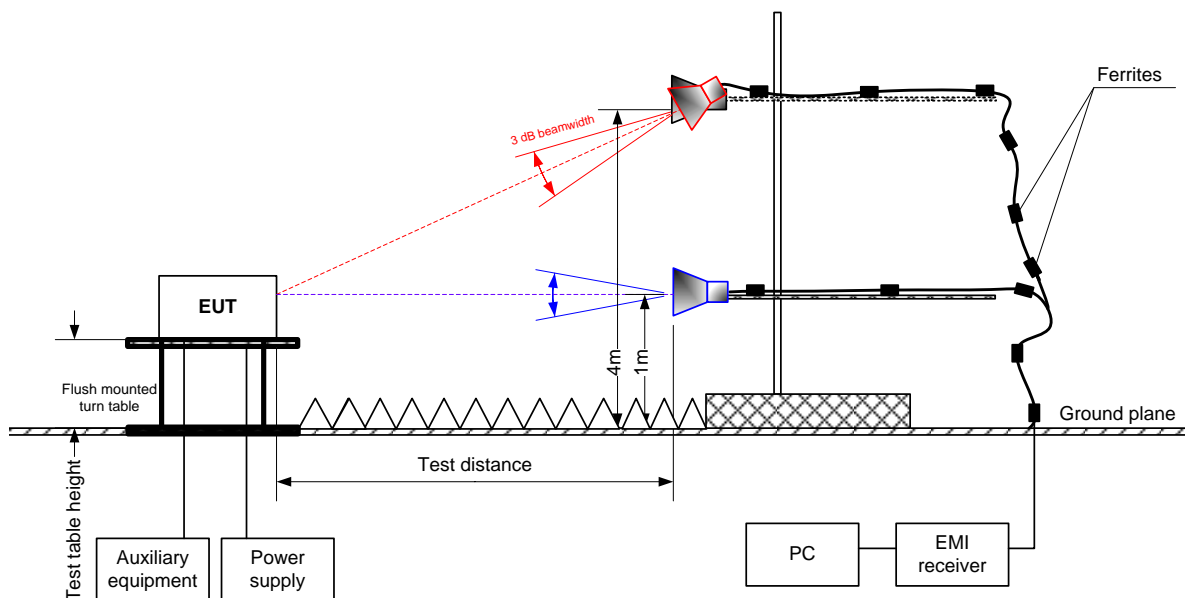


Figure 8.2.2 Setup for radiated emission measurements in 1000 – 40000 MHz range, floor standing EUT





Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
 TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / QUASI-PEAK
 FREQUENCY RANGE: 30 MHz – 1000 MHz
 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*				
52.36	39.44	37.59	40.0	-2.41	Vertical	1.00	32	Pass
113.60	28.89	26.57	43.5	-16.93	Vertical	1.00	71	
167.68	26.72	22.92	43.5	-20.58	Vertical	1.00	322	
192.01	30.78	26.24	43.5	-17.26	Horizontal	1.60	327	
291.99	30.49	24.75	46.0	-21.25	Horizontal	1.00	342	
403.98	37.18	32.77	46.0	-13.23	Vertical	1.00	143	

TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m
 FREQUENCY RANGE: 1000 MHz - 6000 MHz
 DETECTORS USED: PEAK / AVERAGE
 RESOLUTION BANDWIDTH: 1 MHz

Frequency, MHz	Peak			Average			Antenna polarization	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*				
All emissions are more than 20 dB below the limit										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 4360	HL 4933	HL 5288	HL 5405			
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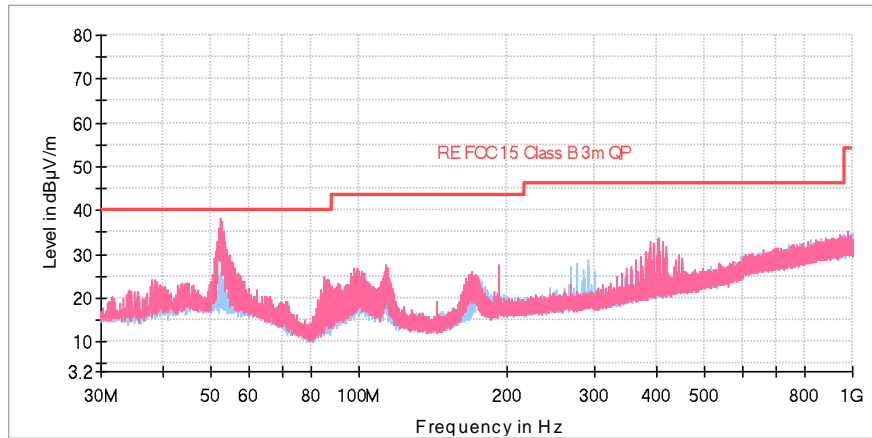
Full description is given in Appendix A.



Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 03-Nov-21			
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 110 VAC, 50 Hz
Remarks:			

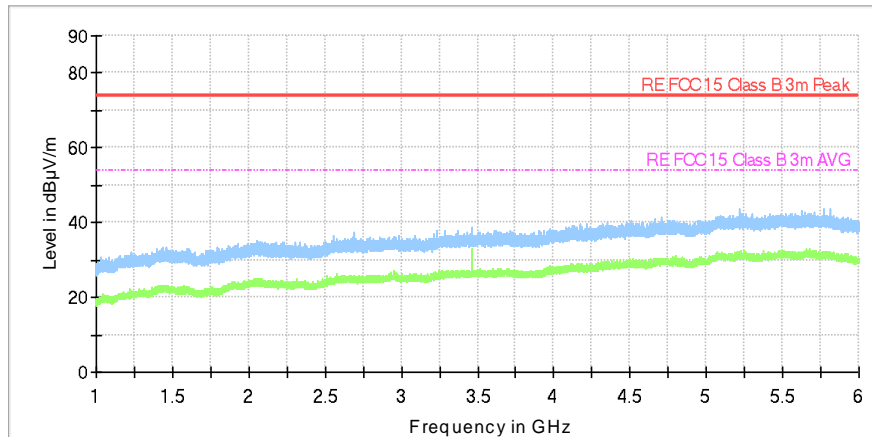
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.2.2 Radiated emission measurements in 1000 – 6000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



**9 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
337	Probe Set, Hand held, 5 probes	Electro-Metrics	EHFP-30	238	24-Jun-21	24-Jun-22
0446	Antenna, Loop, Active, 10 (9) kHz - 30 MHz	EMCO	6502	2857	28-Feb-21	28-Feb-22
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A01877	04-Oct-21	04-Oct-22
3016	LISN, Two-line V-network, 9 kHz to 30 MHz, (50 uH+5 Ohm), CISPR16-1, MIL-461E	Rohde & Schwarz	ESH 3-Z5	892239/002	09-Feb-21	09-Feb-22
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFL EX 102A	1225/2A	06-Apr-21	06-Apr-22
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFL EX 102A	1226/2A	06-Apr-21	06-Apr-22
4360	EMI Test Receiver, 20 Hz to 40 GHz.	Rohde & Schwarz	ESU40	100322	19-Jan-21	19-Jan-22
4778	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL4777	Hewlett Packard	8542E	30807A00262, 3427A00123	09-Nov-20	09-Nov-21
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	26-Jan-21	26-Jan-22
5288	Trilog Antenna, 25 MHz - 8 GHz, 100W	Frankonia	ALX-8000E	00809	08-Feb-19	08-Feb-22
5372	MXE EMI receiver, 3 Hz to 44 GHz	Keysight Technologies	N9038A	MY57290155	15-Mar-21	15-Mar-22
5376	EXA Signal Analyzer, 10 Hz - 32 GHz	Keysight Technologies	N9010B	MY57470404	01-Nov-21	01-Nov-22
5397	H-field near field probe, 3 cm	ETS Lindgren	7405-902	NA	16-Aug-20	16-Aug-22
5405	RF cable, 18 GHz, N-N, 6 m	Huber-Suhner	SF118/11N(x2)	500023/118	19-Nov-20	19-Nov-21
5644	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	01-Nov-21	01-Nov-22
5838	Set near field probes	COM-POWER CORPORATION	PS-400	151724	05-Jul-20	05-Jul-22



10 APPENDIX B Test equipment correction factors

HL 0446: Active Loop Antenna
EMCO, model: 6502, s/n 2857

Frequency,	Measured antenna factor, dBS/m	Measurement uncertainty, dB
10	-33.4	±1.0
20	-37.8	±1.0
50	-40.5	±1.0
75	-41.0	±1.0
100	-41.2	±1.0
150	-41.2	±1.0
250	-41.1	±1.0
500	-41.2	±1.0
750	-41.3	±1.0
1000	-41.3	±1.0

Frequency,	Measured antenna factor, dBS/m	Measurement uncertainty, dB
2000	-41.4	±1.0
3000	-41.4	±1.0
4000	-41.5	±1.0
5000	-41.5	±1.0
10000	-41.7	±1.0
15000	-42.1	±1.0
20000	-42.7	±1.0
25000	-44.2	±1.0
30000	-45.8	±1.0

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ A/m.

HL 4933: Active Horn Antenna
COM-POWER CORPORATION, model: AHA-118, s/n 701046

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
1000	-16.1
1500	-15.1
2000	-10.9
2500	-11.9
3000	-11.1
3500	-10.6
4000	-8.6
4500	-8.3
5000	-5.9
5500	-5.7
6000	-3.3
6500	-4.0
7000	-2.2
7500	-1.7
8000	1.1
8500	-0.8
9000	-1.5
9500	-0.2

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
10000	1.8
10500	1.0
11000	0.3
11500	-0.5
12000	3.1
12500	1.4
13000	-0.3
13500	-0.4
14000	2.5
14500	2.2
15000	1.9
15500	0.5
16000	2.1
16500	1.2
17000	0.6
17500	3.1
18000	4.2

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 5288: Trilog Antenna
Frankonia, model: ALX-8000E, s/n: 00809
30-1000 MHz

Frequency, MHz	Antenna factor, dB/m
30	14.96
35	15.33
40	16.37
45	17.56
50	17.95
60	16.87
70	13.22
80	10.56
90	13.61
100	15.46
120	14.03
140	12.23

Frequency, MHz	Antenna factor, dB/m
160	12.67
180	13.34
200	15.40
250	16.42
300	17.28
400	19.98
500	21.11
600	22.90
700	24.13
800	25.25
900	26.35
1000	27.18

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.
above 1000 MHz

Frequency, MHz	Antenna factor, dB/m
1000	26.9
1100	28.1
1200	28.4
1300	29.6
1400	29.1
1500	30.4
1600	30.7
1700	31.5
1800	32.3
1900	32.6
2000	32.5
2100	32.9
2200	33.5
2300	33.2
2400	33.7
2500	34.6
2600	34.7
2700	34.6
2800	35.0
2900	35.5
3000	36.2
3100	36.8
3200	36.8
3300	37.0
3400	37.5
3500	38.2

Frequency, MHz	Antenna factor, dB/m
3600	38.9
3700	39.4
3800	39.4
3900	39.6
4000	39.7
4100	39.8
4200	40.5
4300	40.9
4400	41.1
4500	41.4
4600	41.3
4700	41.6
4800	41.9
4900	42.3
5000	42.7
5100	43.0
5200	42.9
5300	43.5
5400	43.6
5500	44.3
5600	44.7
5700	45.0
5800	45.0
5900	45.3
6000	45.9

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 5405: RF Cable
Huber-Suhner, model: SF118/11N(x2), s/n: 500023/118
Calibration date: 01-Aug-2018

Set / Applied, MHz	Measured, dB	Uncertainty, dB
0.1	0.01	±0.07
50	0.23	±0.07
100	0.32	±0.07
200	0.45	±0.08
300	0.55	±0.08
400	0.64	±0.08
500	0.71	±0.08
600	0.78	±0.08
700	0.85	±0.08
800	0.91	±0.08
900	0.97	±0.08
1000	1.02	±0.08
1100	1.07	±0.08
1200	1.12	±0.08
1300	1.16	±0.08
1400	1.21	±0.08
1500	1.25	±0.08
1600	1.30	±0.08
1700	1.34	±0.08
1800	1.38	±0.08
1900	1.42	±0.08
2000	1.47	±0.08
2500	1.64	±0.10
3000	1.81	±0.10
3500	1.97	±0.10
4000	2.11	±0.10
4500	2.25	±0.10
5000	2.38	±0.10
5500	2.48	±0.10
6000	2.59	±0.10
6500	2.72	±0.10
7000	2.84	±0.13
7500	2.97	±0.13
8000	3.08	±0.13
8500	3.21	±0.13
9000	3.31	±0.13
9500	3.42	±0.13
10000	3.52	±0.13



11 APPENDIX C 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 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
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Occupied bandwidth	± 8.0 %

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.



12 APPENDIX D 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

13 APPENDIX E Specification references

47CFR part 15: 2020	Radio Frequency Devices.
ANSI C63.10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
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.
RSS-210 Issue 10: 2019	Licence-Exempt Radio Apparatus: Category I Equipment
RSS-Gen Issue 5: 2018	General Requirements and Information for the certification of Radiocommunication Equipment
ICES-003 Issue 7: 2020	Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement



HERMON LABORATORIES

14 APPENDIX F Manufacturer's declaration about periodic operation

P ▲ R ▲ D O X™

November 17th, 2021

To: Hermon Laboratories

Attention: Mr. Michael Nikishin and Mr. Sergey Samokha

Manufacturer's Declaration

We, Paradox Security Systems Ltd. located in 780 Industrial Boulevard St-Eustache, Quebec J7R 5V3, Canada declare under our sole responsibility that the product Wireless Control Panel MG5050+ is operate on 433.92 MHz and designed to comply and satisfy periodic operational requirements.

Wireless Control Panel MG5000+ is a variant of MG5050+ panel.

MG5050+/MG5000+ panels do not allow continuous transmitting (such as voice, video and radio control).

The Wireless Control Panels MG5050+/MG5000+ are not manually operated devices.

The transmissions of MG5050+/MG5000+ are not periodical and occur upon intrusion only.

MG5050+/MG5000+ panels are an intrusion alarm system device and will send automatically its synchronization message to two-way devices (wireless sirens and wireless keypads) in a certain interval (once in 4 minutes).

Since, there is no periodical behavior except synchronization transmissions, there are no predetermined intervals of any kind included in device's algorithm.

Alex Chaplik
Certification Manager

Ref : FCC Declaration MG5050+/MG5000+_rev0

780 boul. Industriel, St-Eustache (Montréal), Québec, Canada J7R 5V3 Tel. : (450) 491-7444
PARADOX.COM



HERMON LABORATORIES

APPENDIX G Manufacturer's declaration

P ▲ R ▲ D O X™

To: Hermon Labs

Declaration of Similarity

It is hereby declared that Wireless Control Panel MG5000+ operates on 433/868 MHz is a variant of MG5050+ Wireless Control Panel.

Both Control Panel models have the same Layout, Electronic Hardware, Firmware and Metal Enclosure.

The only difference between MG5050+ and MG5000+ is in number of terminal blocks (on-board zones and PGMs):

MG5050+ (5 zones, 4 PGMs) vs MG5000+ (2 zones, 2 PGMs)

The setup includes MG5050+ Control Panel (MG5000+ similar product and will not be tested).

Nov-12-2021

Alex Chaplik

Certification Manager

Ref: MG5050+_MG5000+_Similarity_Declaration_Rev0.docx



15 APPENDIX H Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
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
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
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
WB	wideband

END OF DOCUMENT