

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.

Video Doorbell

Model: DB7

FCC ID: KDYDB7

IC: 2438A-DB7

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: alexc@paradox.com
Contact name: Mr. Alex Chaplik

2 Equipment under test attributes

Product name: Video doorbell
Product type: Transceiver
Model(s): DB7
Serial number: YSYN9F
Hardware version: 428-5001-997
Software release: V1.00
Receipt date 24-Oct-22

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: alexc@paradox.com
Contact name: Mr. Alex Chaplik

4 Test details

Project ID: 48750
Location: Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started: 24-Oct-22
Test completed: 25-Oct-22
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	
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

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:	Mrs. E. Pitt, test engineer, EMC & Radio	24-Oct-22 – 25-Oct-22	
Reviewed by:	Mrs. S. Peysahov Sheynin, test engineer, EMC & Radio	14-Nov-22	
Approved by:	Mr. M. Nikishin, group leader, EMC & Radio	28-Nov-22	



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 Paradox DB7 Video Doorbell adds surveillance protection to home or business security. DB7 works with wide supply range of 12-24 VAC or DC.

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			86.131 dB(μV/m) – peak 79.731 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		
				without temporary RF connector		
Antenna/s technical characteristics						
Type	Manufacturer	Model number		Gain		
Integral	Paradox	1250433950		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	50 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):	25-Oct-22
Verdict: PASS	
Temperature: 23 °C	Relative Humidity: 45 %
Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:	

7 Transmitter tests according to 47CFR part 15 subpart C 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 **Error! Reference source not found.**

Figure 7.1.1 Setup for transmitter shut down test





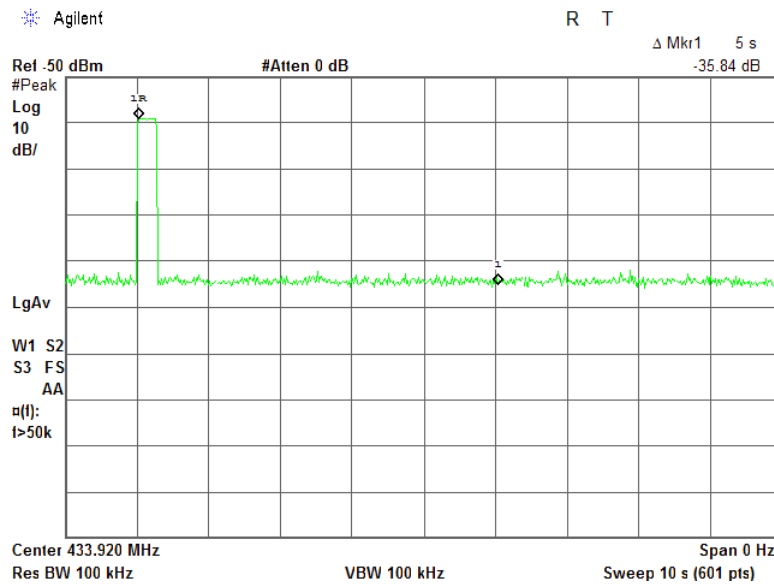
Test specification: FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements			
Test procedure: Supplier declaration			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Oct-22			
Temperature: 23 °C	Relative Humidity: 45 %	Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:			

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	Plot 7.1.1	Comply
Transmitter activated automatically shall cease transmission within 5 seconds	NA	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	NA	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.	NA	Comply

* Provided in Appendix F.

Plot 7.1.1 Transmitter shut down test result



Reference numbers of test equipment used

HL5838	HL 4135	HL 3818	HL 5409			
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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):	24-Oct-22 - 25-Oct-22		
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 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(μ V/m)	
	Peak	Average
433.92	100.8	80.8

Table 7.2.2 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m, dB(μ V/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			

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.



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): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

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

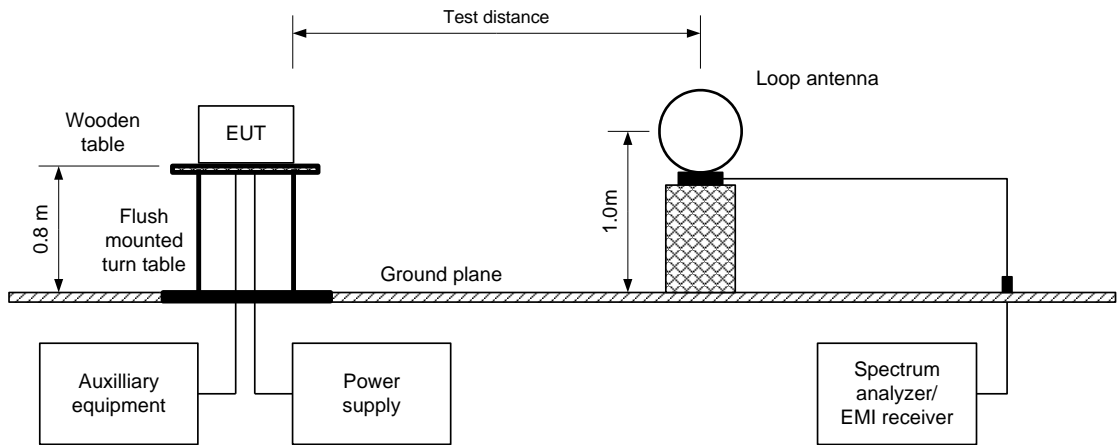
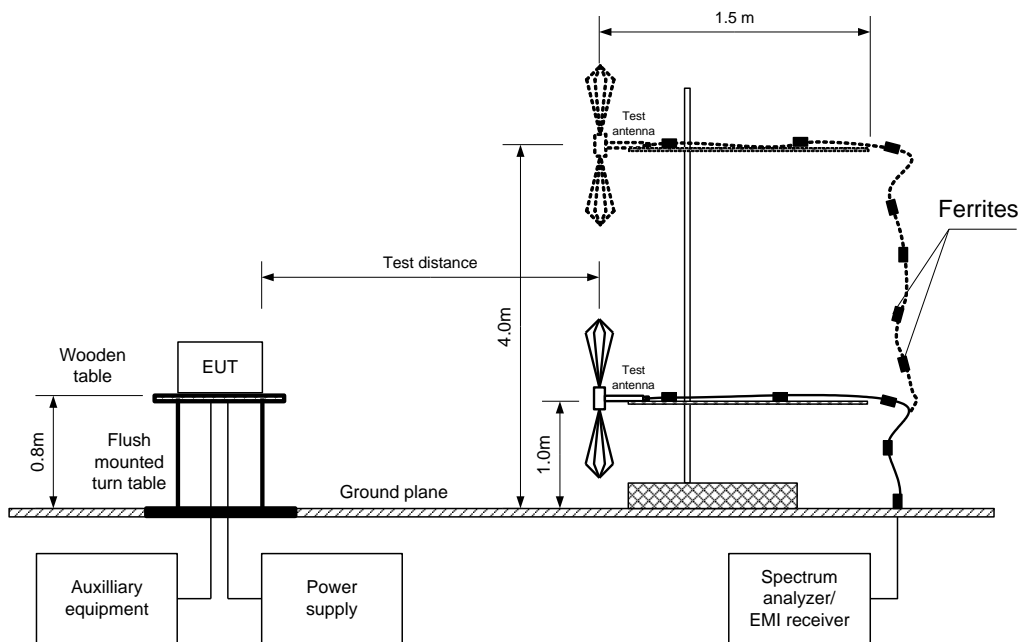


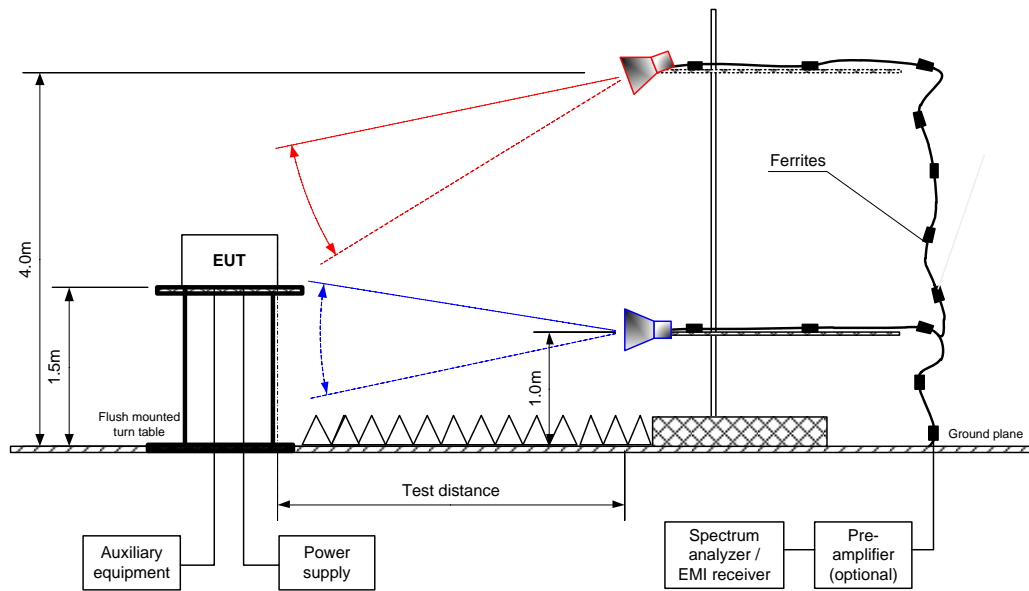
Figure 7.2.2 Setup for spurious emission field strength measurements in 30 -1000 MHz





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): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

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): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.2.3 Field strength of fundamental emission, spurious emissions 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											
433.92	V	1.0	-40	86.131	100.8	-14.67	86.131	79.731	80.8	-1.069	Pass
Spurious emissions											
504.015	V	1.00	-39	48.28	80.8	-32.52	48.28	41.88	60.8	-18.92	Pass
552.008	V	1.00	124	45.04	80.8	-35.76	45.04	38.64	60.8	-22.16	
648.015	V	1.00	-180	42.24	80.8	-38.56	42.24	35.84	60.8	-24.96	
695.999	V	1.00	-136	42.36	80.8	-38.44	42.36	35.96	60.8	-24.84	
744.002	V	1.00	180	41.99	80.8	-38.81	41.99	35.59	60.8	-25.21	
867.837	V	1.00	43	46.96	80.8	-33.84	46.96	40.56	60.8	-20.24	

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



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): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.2.4 Field strength of fundamental emission, spurious emissions 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**	
1301.70	V	1.00	-39	54.79	74.0	-19.21	54.79	48.39	54.0	-5.61	Pass
1735.68	V	1.00	-39	41.30	80.8	-39.50	41.30	34.90	60.8	-25.90	
2169.60	V	1.00	124	53.20	80.8	-27.60	53.20	46.80	60.8	-14.00	
2603.52	V	1.00	-180	54.10	80.8	-26.70	54.10	47.70	60.8	-13.10	
3037.46	V	1.00	124	53.87	80.8	-26.93	53.87	47.47	60.8	-13.33	
3471.35	V	1.00	-180	53.32	80.8	-27.48	53.32	46.92	60.8	-13.88	
3905.46	V	1.00	-136	57.11	74.0	-16.89	57.11	50.71	54.0	-3.29	
4339.20	V	1.00	-136	50.50	74.0	-23.50	50.50	44.10	54.0	-9.90	

*- 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		
0.4333	11	1.367	14	NA	NA	2	-6.4

*- Average factor was calculated as follows

Ton during 1 burst=0.4333x11 + 1.367x14=23.9 msec

Ton during 100msec= 47.8 msec

AVR Factor= 20 Log(47.8/100)= -6.4 dB

Reference numbers of test equipment used

HL 7585	HL 5288	HL 446	HL 3903	HL 5902	HL 4933		
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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):	24-Oct-22 - 25-Oct-22		
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 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

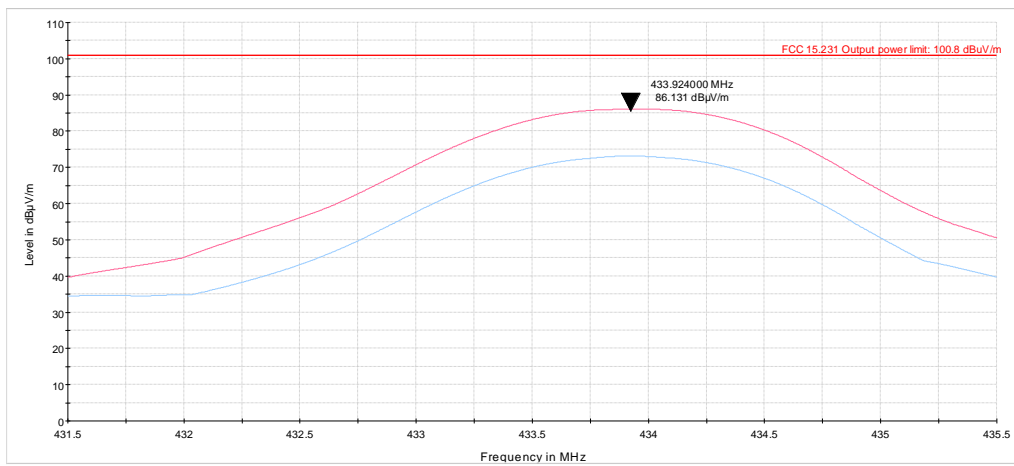
MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.291 - 8.294	16.80425 - 16.80475	399.9 - 410	3260 - 3267	10.6 - 12.7
2.1735 - 2.190	8.362 - 8.366	25.5 - 25.67	608 - 614	3332 - 3339	13.25 - 13.4
3.020 - 3.026	8.37625 - 8.38675	37.5 - 38.25	960 - 1427	3345.8 - 3358	14.47 - 14.5
4.125 - 4.128	8.41425 - 8.41475	73 - 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



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): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.2.1 Radiated emission measurements at the fundamental frequency

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

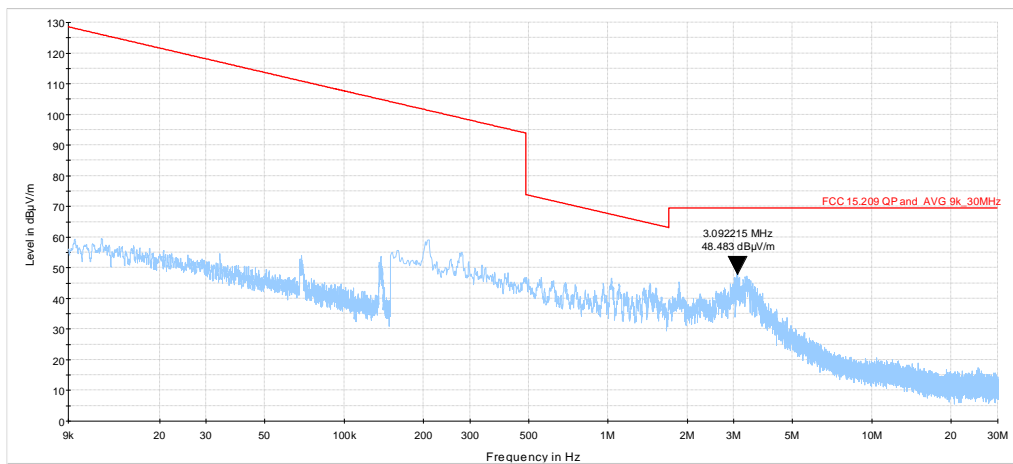




Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

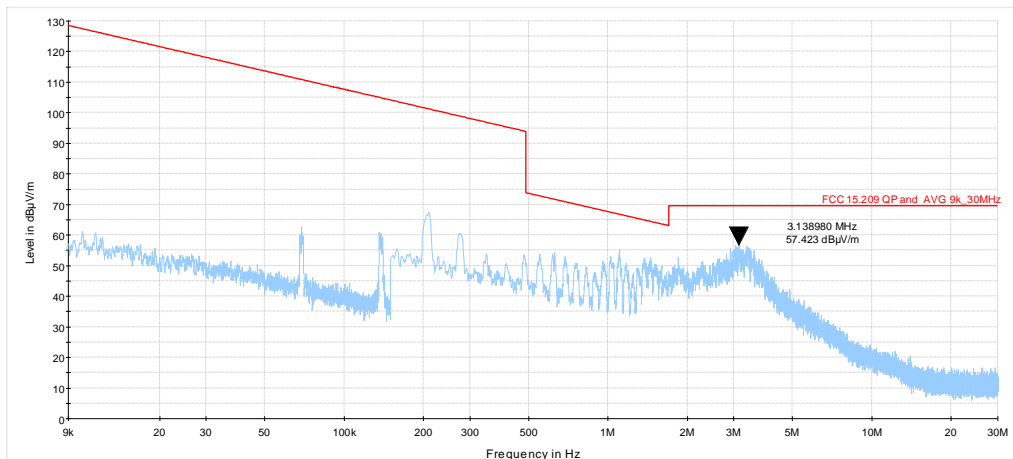
Plot 7.2.2 Radiated emission measurements from 9 kHz to 30 MHz

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



Plot 7.2.3 Radiated emission measurements from 9 kHz to 30 MHz

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

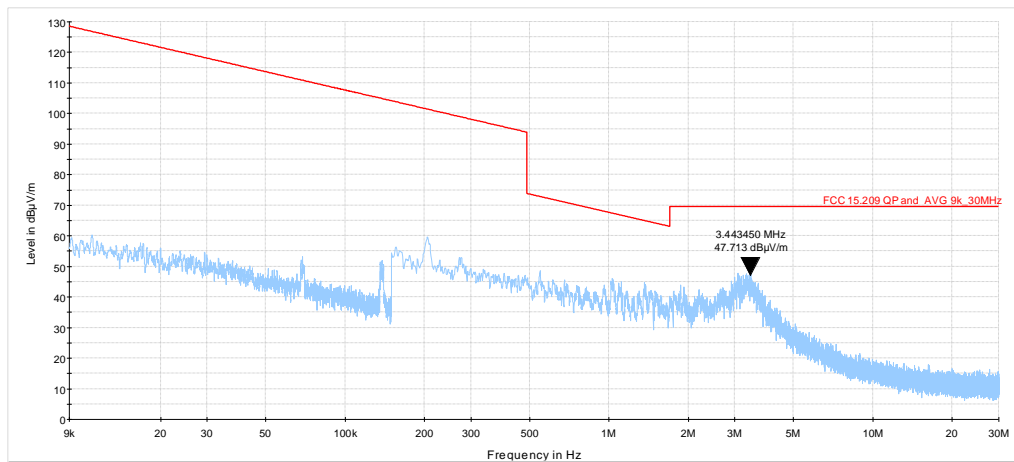




Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance	Verdict: PASS		
Date(s): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.2.4 Radiated emission measurements from 9 kHz to 30 MHz

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

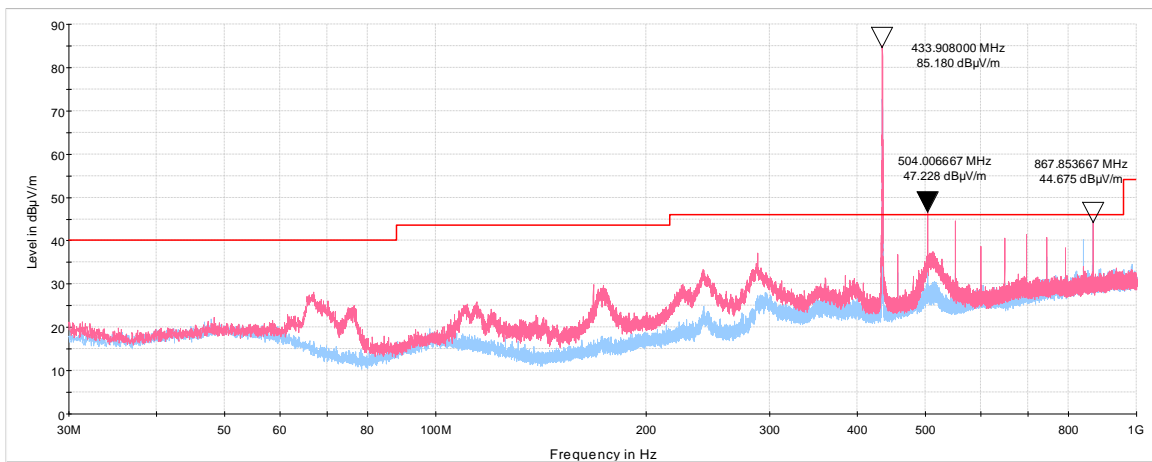




Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance	Verdict: PASS		
Date(s): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

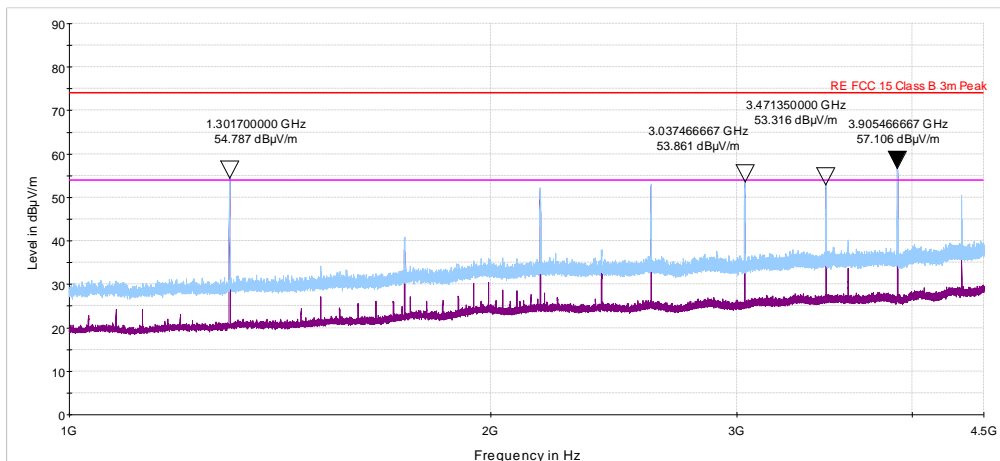
Plot 7.2.5 Radiated emission measurements from 30 to 1000 MHz

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



Plot 7.2.6 Radiated emission measurements from 1000 to 4500 MHz

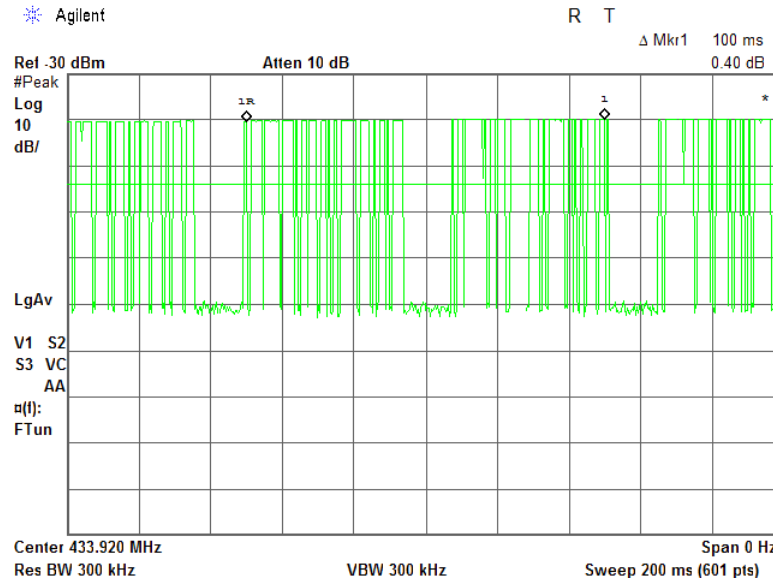
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 EUT POSITION: Typical



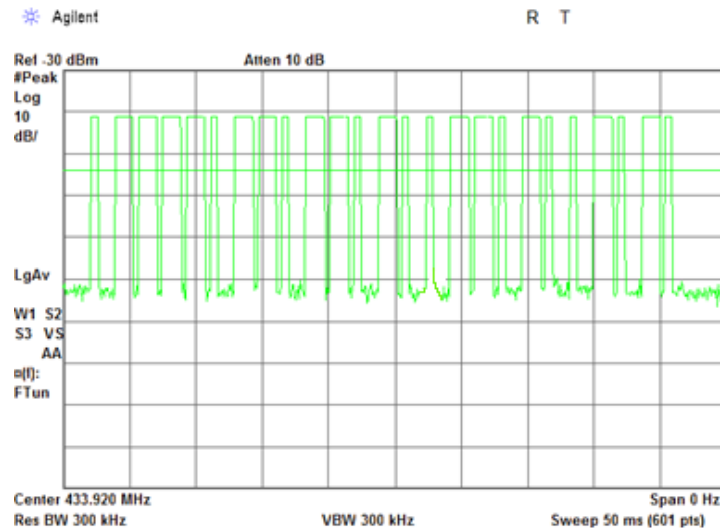


Test specification: FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure: ANSI C63.10 sections 6.5, 6.6			
Test mode: Compliance	Verdict: PASS		
Date(s): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.2.7 Transmission during 100 msec



Plot 7.2.8 Transmission burst duration



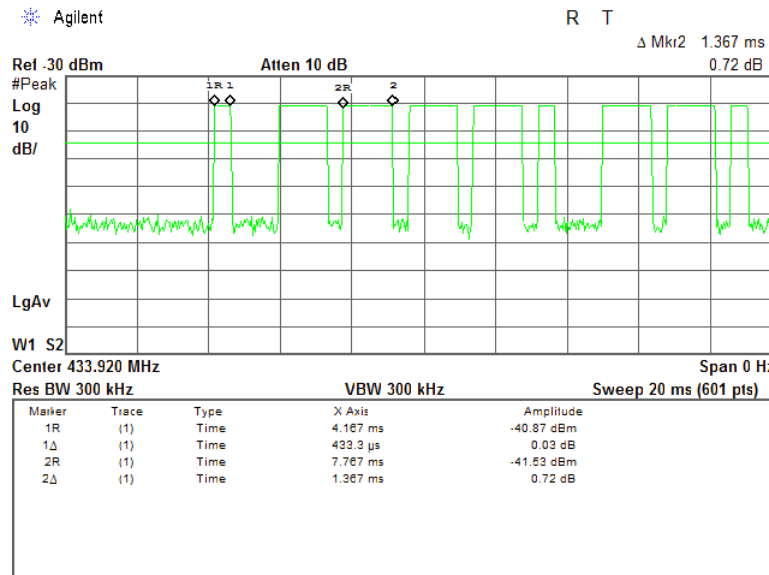
*numbers of pulses within one burst



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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): 24-Oct-22 - 25-Oct-22			
Temperature: 25 °C	Relative Humidity: 41 %	Air Pressure: 1010 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Plot 7.2.9 Transmission pulse 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): 25-Oct-22			
Temperature: 23 °C	Relative Humidity: 45 %	Air Pressure: 1012 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. The test results are provided in Table 7.3.2 and associated plots.

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): 25-Oct-22			
Temperature: 23 °C	Relative Humidity: 45 %	Air Pressure: 1012 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: 10 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 20 dBc
 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	7.064	0.25	1084.8	-1077.74	Pass

MODULATION ENVELOPE REFERENCE POINTS 99%

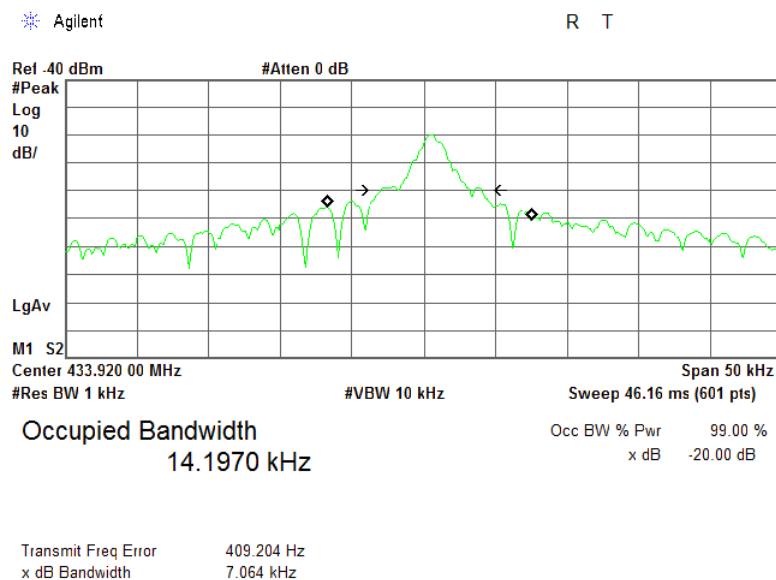
Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.92	14.197	0.25	1084.8	-1045.27	Pass

Reference numbers of test equipment used

HL 5838	HL 4135	HL 3818	HL 5409					
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Full description is given in Appendix A.

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): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 44 %	Air Pressure: 1012 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 according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

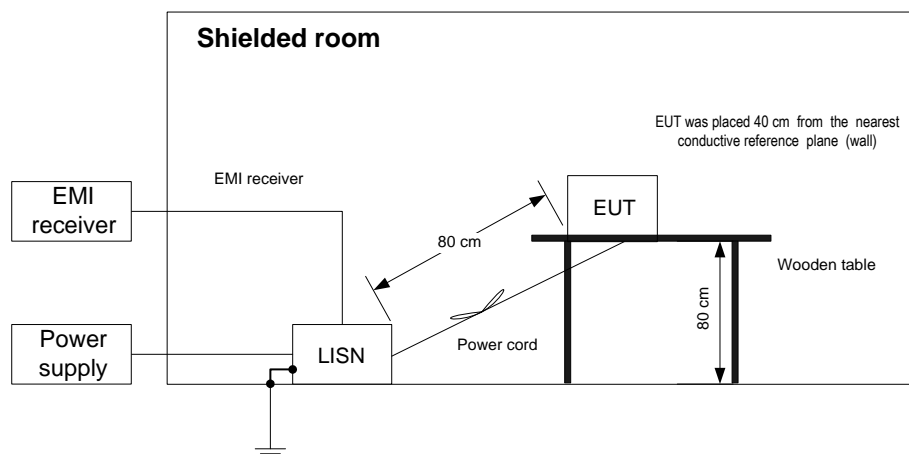
Frequency, MHz	Class B limit, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

* - 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 recorded in Table 7.4.2 and Table 7.4.3 and 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): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 44 %	Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 7.4.2 Conducted emission test results with adapter Power Supply RC0653-1504000CU

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, L2	Pass

*- Margin = Measured emission - specification limit.

Table 7.4.3 Conducted emission test results with adapter Codex SPE-G/1640

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, L2	Pass

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 5708	HL 5707	HL 0787	HL 1501	HL 3016	HL 5476		
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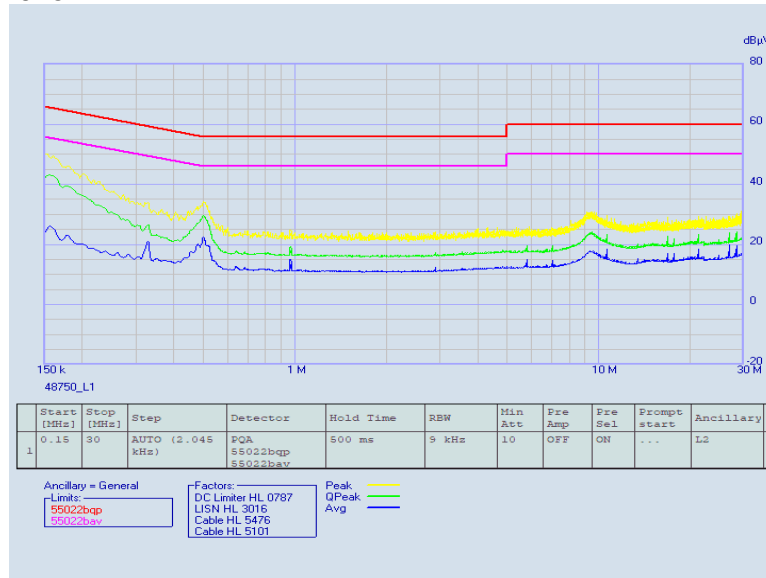
Full description is given in Appendix A.



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): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 44 %	Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:			

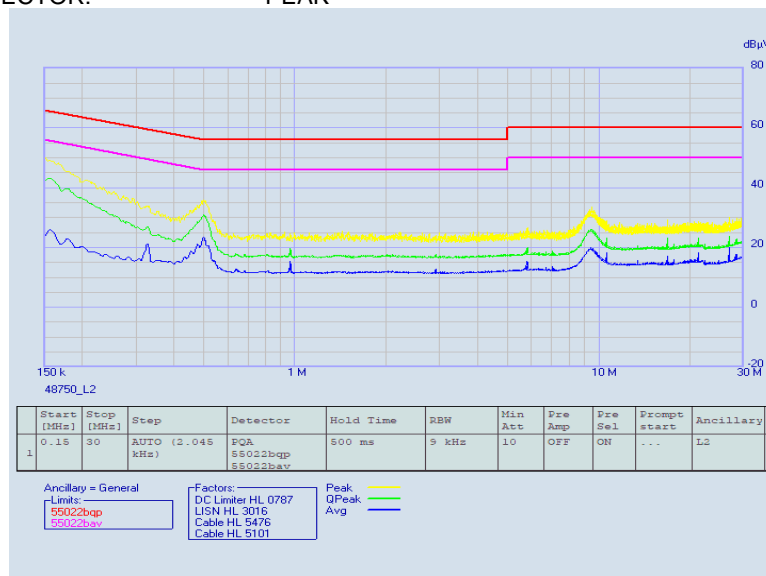
Plot 7.4.1 Conducted emission measurements with adapter Power Supply RC0653-1504000CU

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



Plot 7.4.2 Conducted emission measurements with adapter Power Supply RC0653-1504000CU

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

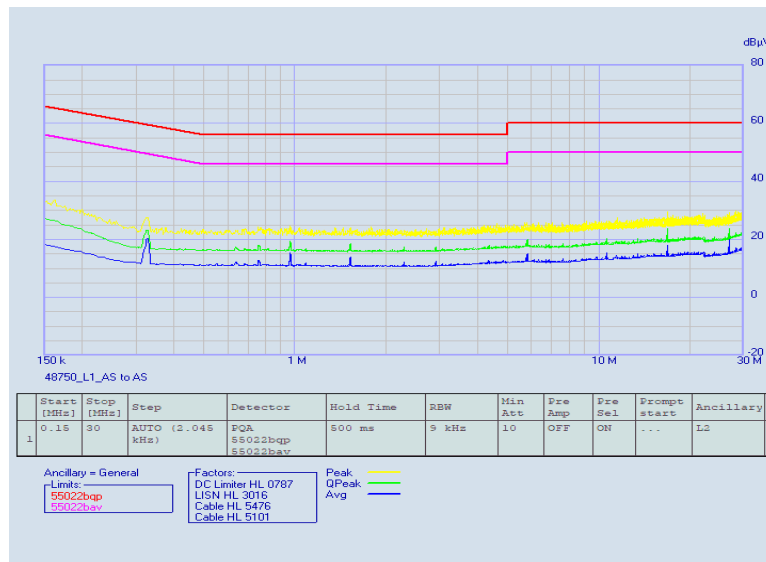




Test specification: FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission			
Test procedure: ANSI C63.4, Section 7.3 and 12.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 44 %	Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:			

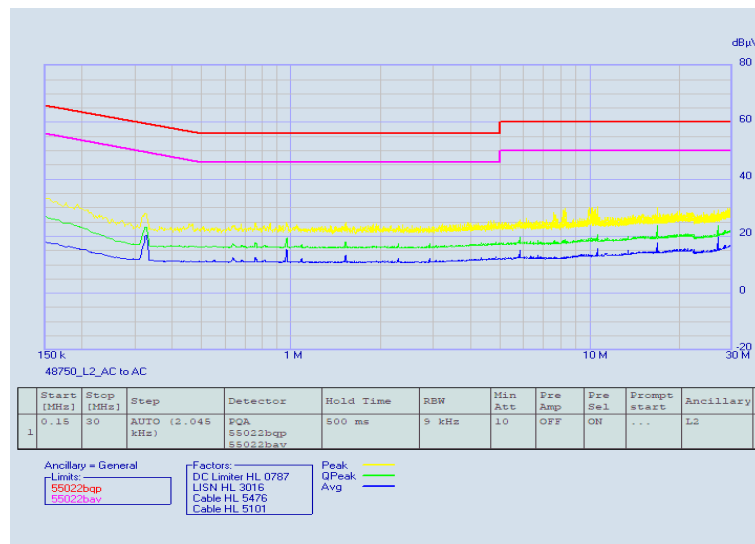
Plot 7.4.3 Conducted emission measurements with adapter Codex SPE-G/1640

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



Plot 7.4.4 Conducted emission measurements with adapter Codex SPE-G/1640

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





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): 25-Oct-22			
Temperature: 23 °C	Relative Humidity: 45 %	Air Pressure: 1012 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			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 45 %	Air Pressure: 1012 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 according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

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

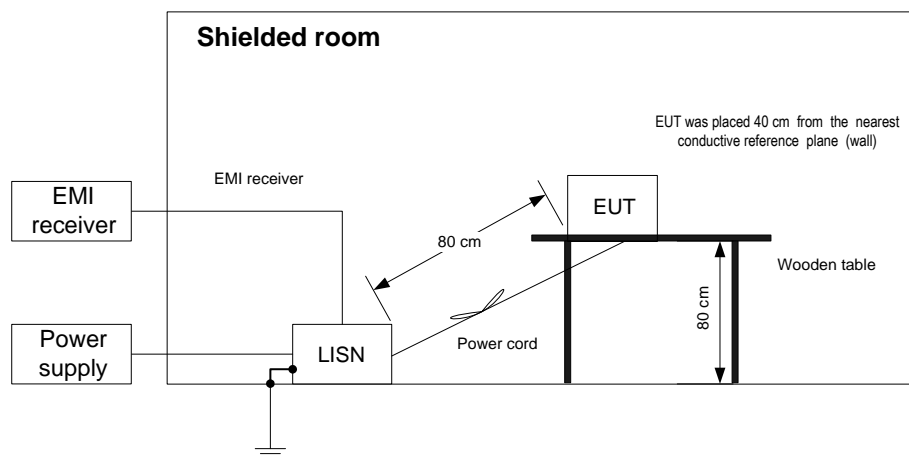
8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and associated photographs, energized and the performance check was conducted.

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 recorded in Table 8.1.2 and Table 8.1.3 and 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			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 45 %	Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 8.1.2 Conducted emission test results with adapter Power Supply RC0653-1504000CU

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, L2	Pass

*- Margin = Measured emission - specification limit.

Table 8.1.3 Conducted emission test results with adapter Codex SPE-G/1640

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, L2	Pass

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 5708	HL 5707	HL 0787	HL 1501	HL 3016	HL 5476		
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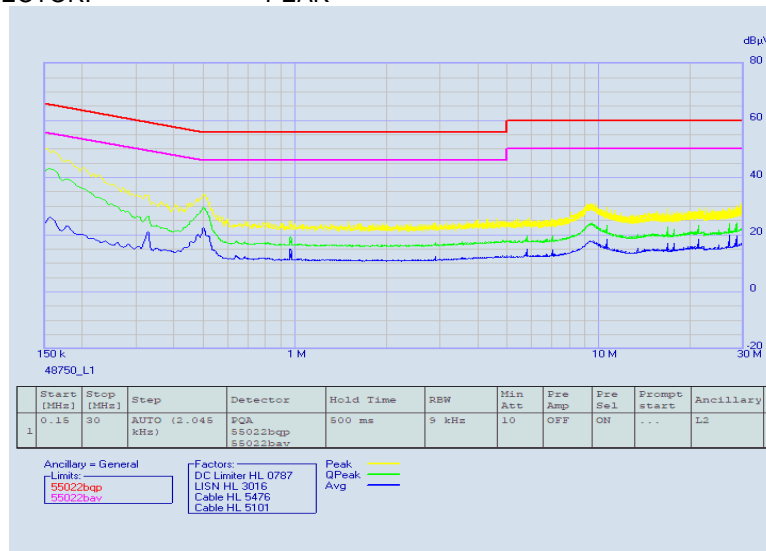
Full description is given in Appendix A.



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			
Test mode: Compliance		Verdict: PASS	
Date(s): 25-Oct-22			
Temperature: 22.8 °C	Relative Humidity: 45 %	Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:			

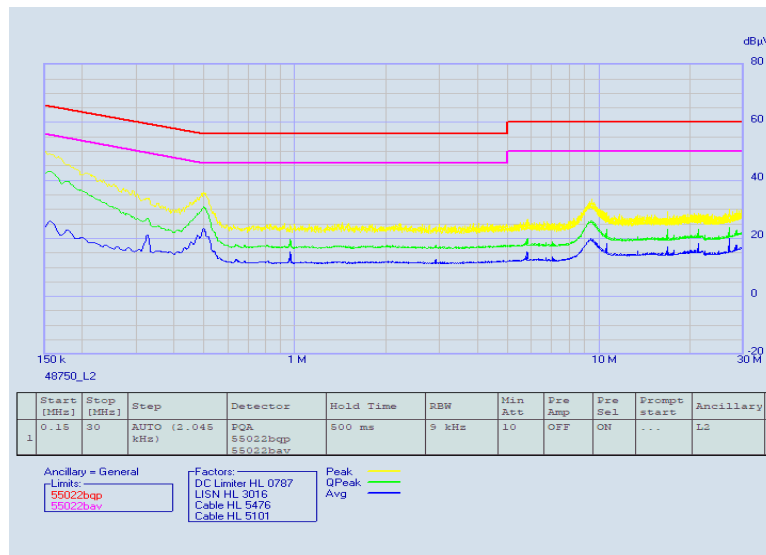
Plot 8.1.1 Conducted emission measurements with adapter Power Supply RC0653-1504000CU

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



Plot 8.1.2 Conducted emission measurements with adapter Power Supply RC0653-1504000CU

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



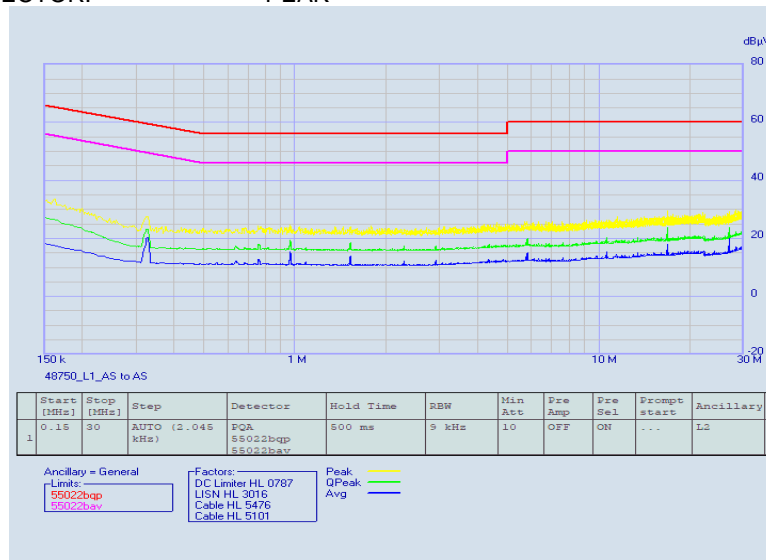


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Test specification: FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port	
Test procedure: ANSI C63.4, Sections 11.5 and 12.1.3	
Test mode: Compliance	Verdict: PASS
Date(s): 25-Oct-22	
Temperature: 22.8 °C	Relative Humidity: 45 %
Air Pressure: 1012 hPa	Power: 110 VAC, 50 Hz
Remarks:	

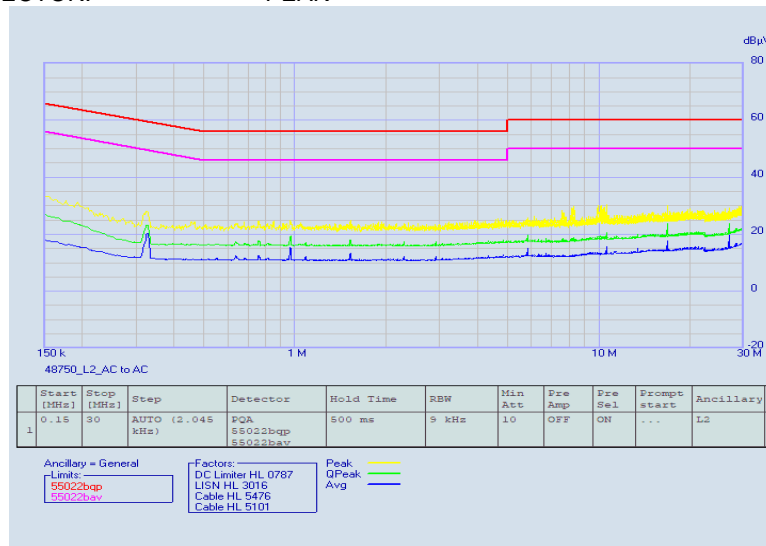
Plot 8.1.3 Conducted emission measurements with adapter Codex SPE-G/1640

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



Plot 8.1.4 Conducted emission measurements with adapter Codex SPE-G/1640

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





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): 24-Oct-22			
Temperature: 24 °C	Relative Humidity: 43 %	Air Pressure: 1009 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. Specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

FCC part 15

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: $Lims_2 = Lims_1 + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

ICES-003

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	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
Above 1000	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	Peak	Average	Peak	Average
	74.0	54.0	80.0	60.0

*The more stringent limit applies at transition frequencies

- 8.2.1.1 **30 – 1000 MHz range.** The EUT was set up as shown in Figure 7.2.1 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 Table 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 Table 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): 24-Oct-22			
Temperature: 24 °C	Relative Humidity: 43 %	Air Pressure: 1009 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment

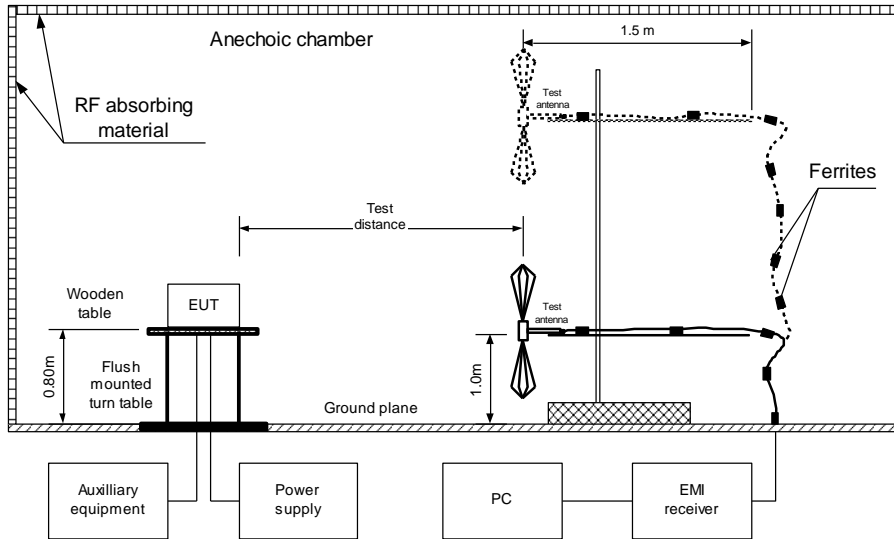
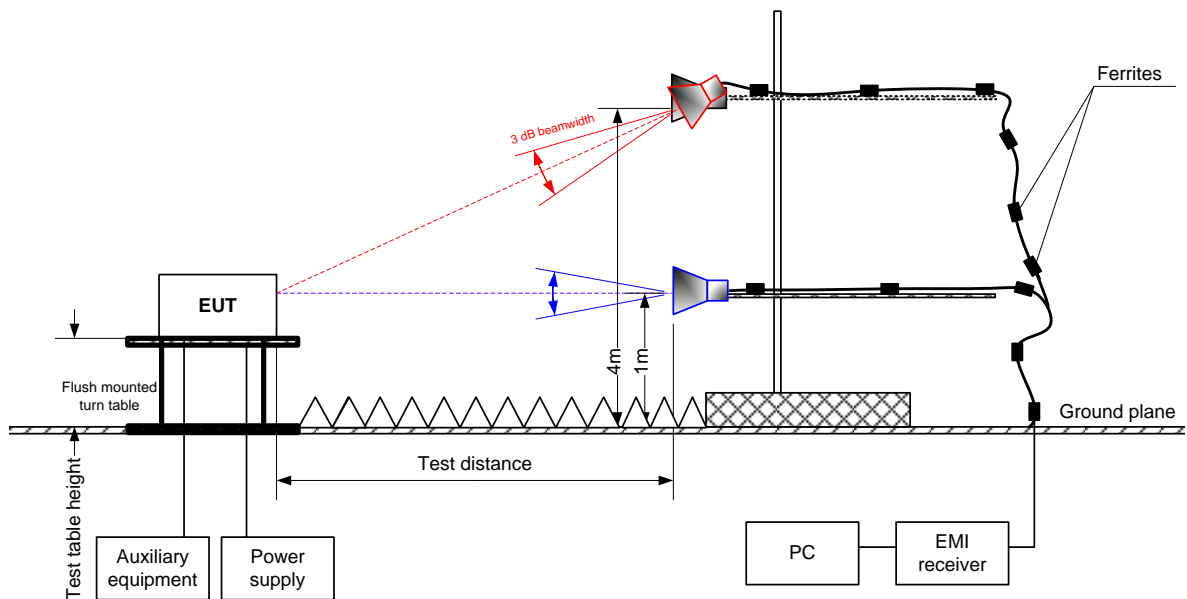


Figure 8.2.2 Setup for radiated emission measurements in 1000 – 40000 MHz range, floor standing EUT





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): 24-Oct-22			
Temperature: 24 °C	Relative Humidity: 43 %	Air Pressure: 1009 hPa	Power: 110 VAC, 50 Hz
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Stand-by and Receive
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
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*				
277.120	40.92	36.80	46.0	-9.20	Vertical	1.00	-119	Pass
551.996	42.26	40.34	46.0	-5.66	Vertical	1.00	160	
647.998	41.77	39.60	46.0	-6.40	Vertical	1.00	156	

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

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										

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

Reference numbers of test equipment used

HL 4933	HL 5288	HL 7585					
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Full description is given in Appendix A.

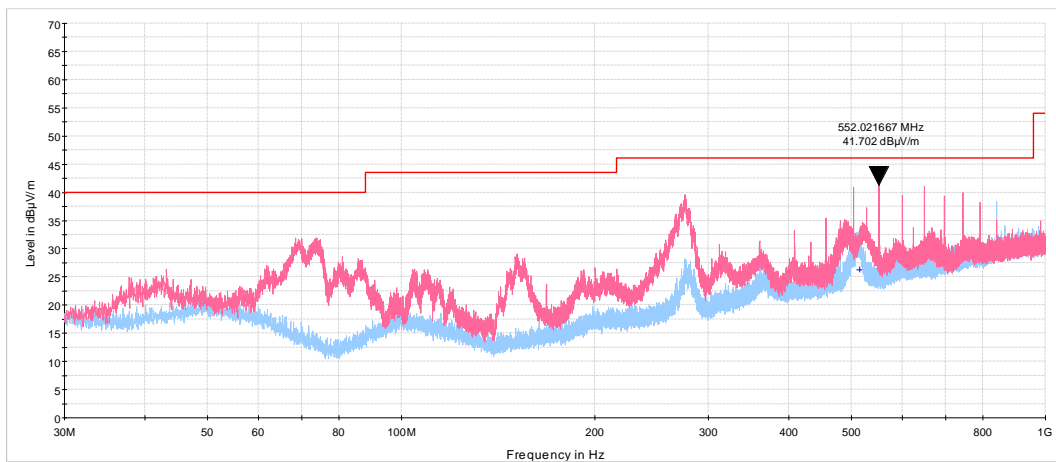


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Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Section 8.3			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Oct-22			
Temperature: 24 °C	Relative Humidity: 43 %	Air Pressure: 1009 hPa	Power: 110 VAC, 50 Hz
Remarks:			

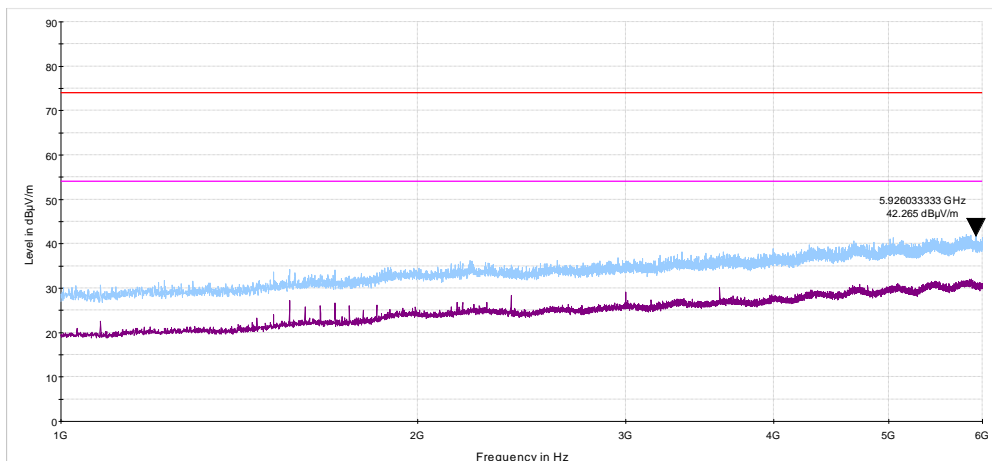
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by



Plot 8.2.2 Radiated emission measurements above 1000 MHz, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by



**9 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 (9) kHz - 30 MHz	EMCO	6502	2857	28-Feb-22	28-Feb-23
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
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	08-Feb-22	08-Feb-23
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	19-Jul-22	19-Jul-23
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFL EX 102A	1226/2A	07-Apr-22	07-Apr-23
4135	Shield Box	TESCOM CO., LTD	TC-5916A	5916A000136	28-Apr-22	28-Apr-23
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	13-Jan-22	13-Jan-23
5288	Trilog Antenna, 25 MHz - 8 GHz, 100W	Frankonia	ALX-8000E	00809	24-Mar-22	24-Apr-25
5409	RF cable, 40 GHz, SMA-SMA, 2 m	Huber-Suhner	SF102EA/11SK/11SK/2000MM	503973/2EA	25-Jul-22	25-Jul-23
5476	Cable, BNC/BNC, 10.5 m	Western wire	MIL-C-17G	NA	22-May-22	22-May-23
5707	EMI receiver	PMM / Narda	PMM 9010F	060WW91101	02-Feb-22	02-Feb-23
5708	Click analyzer	PMM / Narda	CA0010	010WX90602	29-Nov-19	29-Nov-22
5838	Set near field probes	COM-POWER CORPORATION	PS-400	151724	05-Jul-22	05-Jul-24
5902	RF cable, 18 GHz, 6.0m, N-type	Huber-Suhner	SF126EA/11N/11N/6000	NA	16-Jan-22	16-Jan-23
7585	EMI Test Receiver, 1 Hz to 44 GHz	Rohde & Schwarz	ESW44	103130	19-May-22	19-May-23



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.



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.



HERMON LABORATORIES

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).

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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

ANSI C63.10: 2013

ANSI C63.4: 2014

RSS-210 Issue 10: 2019

RSS-Gen Issue 5: 2018

ICES-003 Issue 7: 2020

Radio Frequency Devices.

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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.

Licence-Exempt Radio Apparatus: Category I Equipment

General Requirements and Information for the certification of Radiocommunication Equipment

Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement



14 APPENDIX F 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



HERMON LABORATORIES

15 APPENDIX G Manufacturer's declaration about periodic operation

P ▲ R ▲ D O X™

November 16th, 2022

To: Hermon Laboratories

Attention: Ms. Ella Pitt

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 Outdoor Wireless Video Doorbell DB7 is operate on 433.92 MHz and designed to comply and satisfy periodic operational requirements.

DB7 does not allow continuous transmitting (such as voice, video and radio control).

The Wireless Video Doorbell DB7 is manually operated device, transmission occurs each time when user press Bell button.

Based on above, the transmissions of DB7 are not periodical and occur randomly upon user action.

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

Alex Chaplik
Certification Manager

Ref : FCC Declaration DB7 rev0

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

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