HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47 CFR part 15 section 15.258

FOR:

Neteera technologies Ltd.

Respiratory and cardiac rate monitor

Models: Neteera 130H-Plus/Neteera 131H-Plus

FCC ID: 2AYVONETEERA130PLUS

Table of contents

1 Applicant information

Client name:	Neteera Technologies Ltd.
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Contact name:	Mr. Shahar Yaron

2 Equipment under test attributes

Product name:	Respiratory and cardiac rate monitor
Product type:	Monitor
Model(s):	Neteera 130H-Plus
Serial number:	NA
Hardware version:	1.0
Software release:	4.0
Receipt date	19-Oct-22

3 Manufacturer information

Manufacturer name:	Neteera Technologies Ltd.
Address:	Prof. Rakah 3 St., Jerusalem, Israel 9139002
Telephone:	+972 526809220
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E-Mail:	Shahar.yaron@neteera.com
Contact name:	Mr. Shahar Yaron

4 Test details

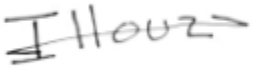
Project ID:	47235
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	30-Oct-22
Test completed:	27-Nov-22
Test specification(s):	FCC 47 CFR part 15 section 15.258

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.258(b), Transmiter power test	Pass
FCC section 15.215(c), Occupied bandwidth	Pass
FCC section 15.258(c)(2), Out of band radiated emissions below 40 GHz	Pass
FCC section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz	Pass
FCC Section 15.258(d), Frequency stability test	Pass
FCC Section 15.203, Antenna requirement	Pass

This test report supersedes the previously issued test report identified by Doc ID: NETRAD_FCC.47235

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. Ilouz, test engineer, EMC & Radio	30-Oct-22 – 27-Nov-22	
Reviewed by:	Mrs. S. Peysahov Sheynin, test engineer, EMC & Radio	22-Feb-23	
Approved by:	Mr. M. Nikishin, group leader, EMC & Radio	22-Feb-23	

6 EUT description

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

6.1 General information

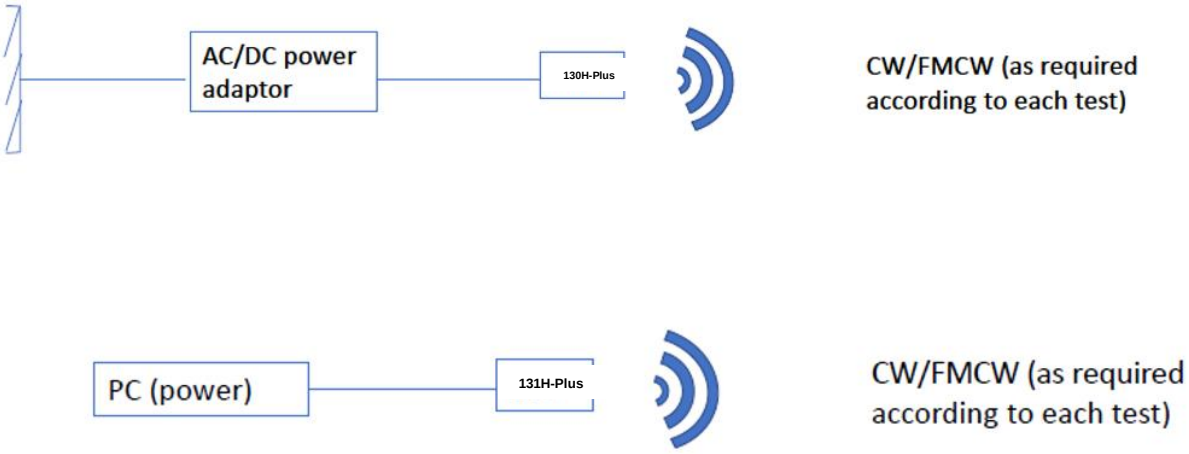
Neteera 130H-Plus / Neteera 131H-Plus has designed and developed a contact-free vital-signs monitoring technology capable of detecting a variety of parameters, based on a high frequency (116GHz-123GHz) micro-radar on-chip and algorithm.

According to manufacturer's declaration provided in Appendix F of the test report, the models Neteera 130H-Plus / Neteera 131H-Plus, are identical in components, assembly, technical specifications and performance operation principles, except the following distinctions:

Neteera 130H-Plus – uses a USB cable connected to a power supply and communicates with the data display monitor via Wi-Fi module approved FCC ID: 2AC7Z-ESPWROOM32DC.

Neteera 131H-Plus - uses a USB cable connects to display monitor and communicates with the data display monitor via wire connection.

6.2 Test configuration



6.3 Changes made in EUT

No changes were performed 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)

Intended use		**Condition of use**
	fixed	Always at a distance more than 2 m from all people
X	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency ranges	116000 – 123000 MHz
Operating frequencies	119000 – 122980 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector	dBm
	EIRP with maximum declared antenna gain	19.26 dBm

Is transmitter output power variable?	V	No			
		Yes		continuous variable	
				stepped variable with stepsize	dB
			minimum RF power		dBm
			maximum RF power		dBm

Antenna connection				
unique coupling	standard connector*	V	integral	with temporary RF connector
				without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Integral	Neteera	the antenna is part of the chip packaging , the dielectric lens model number is L7	19 dBi (antenna +lens)

Type of modulation	FMCW
Modulating test signal (baseband)	119000 – 122980 MHz

Transmitter power source					
	Battery	**Nominal rated voltage**	VDC	Battery type	
X	DC	**Nominal rated voltage**	5 VDC		
	AC mains	**Nominal rated voltage**	VAC	Frequency	Hz

Common power source for transmitter and receiver	X yes	no

Test specification:	**Section 15.258(b), Transmitter power**		
Test procedure:	ANSI C63.10, Section 9.11		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1008 hPa	**Power:** 5 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C

7.1 Transmitter power test

7.1.1 General

This test was performed to measure the peak output power. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Output power limits

Assigned frequency range, MHz	Maximum output power	
	EIRP, dBm	
	Peak	Average
116000 – 123000	43	40

7.1.1.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.1.2 The EUT was adjusted to produce maximum available for end user RF output power.

7.1.1.3 The average and peak voltage was measured at the low and high frequency channels with oscilloscope connected to RF detector and provided in the associated plots.

7.1.1.4 The unmodulated signal was applied to Zero-Biased Detector via variable attenuator as shown in Figure 7.1.2.

7.1.1.5 The variable attenuator was adjusted such that the oscilloscope indicated a voltage equal to the peak voltage recorded in the step 7.1.2.3.

7.1.1.6 The variable attenuator was disconnected from the Zero-Biased Detector.

7.1.1.7 Without changing any settings, the variable attenuator was connected to a power meter as shown in Figure 7.1.3.

7.1.1.8 The power was measured and result was recorded in Table 7.1.2 and Table 7.1.3.

7.1.1.9 The steps 7.1.2.4 through 7.1.2.8 were repeated for the average voltage recorded in the step 7.1.2.3 and 7.1.2.4.

Test specification:	Section 15.258(b), Transmitter power		
Test procedure:	ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Figure 7.1.1 Peak output power test setup

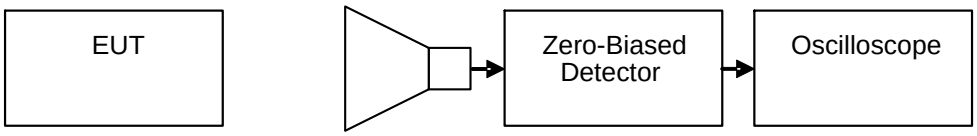


Figure 7.1.2 Peak output power test setup

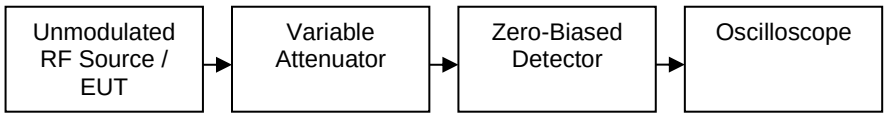
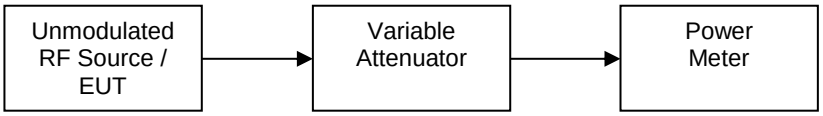


Figure 7.1.3 Peak output power test setup



Test specification:	Section 15.258(b), Transmitter power		
Test procedure:	ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 116.0 – 123.0 GHz
DETECTOR USED: Peak
MEASUREMENTS DISTANCE: 0.1 m
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EUT ANTENNA GAIN: 19 dBi
MODULATION: CW

Frequency, MHz	λ*, m	DSO, mV	Power measured, dBm	Antenna Gain, dBi	E_{meas}**, dBuV/m	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
119000	0.002521	-1.57	-13.86	24	140.90	16.20	43	-26.80	Pass
121000	0.002479	-1.65	-10.95	24	143.96	19.26	43	-23.74	Pass
122980	0.002439	-1.18	-13.05	24	142.00	17.30	43	-25.70	Pass

Note: Max peak conducted power is 19.26 dBm – 19 dBi = 0.26 dBm
* - λ = 300/Frequency(MHz)
** - E_{meas}= 126.8 – 20log(λ) + Power measured – Measurement Antenna Gain (24 dBi)
*** - EIRP= E_{meas} + 20log(Measurements distance) – 104.7
**** - Margin = EIRP – Limit

Table 7.1.3 Average output power test results

ASSIGNED FREQUENCY RANGE: 116.0 – 123.0 GHz
DETECTOR USED: Average
MEASUREMENTS DISTANCE: 0.1 m
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EUT ANTENNA GAIN: 19 dBi
MODULATION: CW

Frequency, MHz	λ*, m	DSO, mV	Power measured, dBm	Antenna Gain, dBi	E_{meas}**, dBuV/m	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
119000	0.002521	-1.61	-16.74	24	138.02	13.32	40	-26.68	Pass
121000	0.002479	-1.69	-15.61	24	139.30	14.60	40	-25.40	Pass
122980	0.002439	-1.21	-17.28	24	137.77	13.07	40	-26.93	Pass

* - λ = 300/Frequency(MHz)
** - E_{meas}= 126.8 – 20log(λ) + Power measured – Measurement Antenna Gain (24 dBi)
*** - EIRP= E_{meas} + 20log(Measurements distance) – 104.7
**** - Margin = EIRP – Limit

Reference numbers of test equipment used

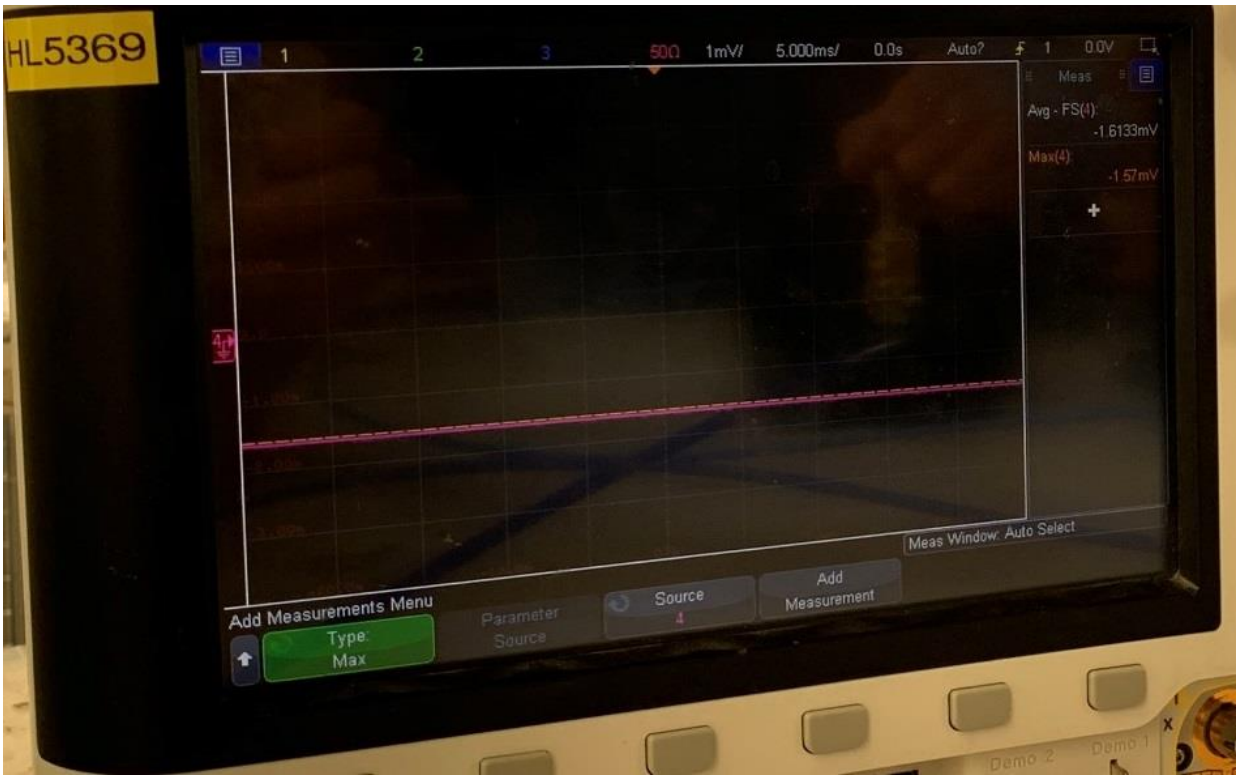
HL 5373	HL 3536	HL 5371	HL 5378	HL 5981			

Full description is given in Appendix A.

Test specification:	Section 15.258(b), Transmitter power		
Test procedure:	ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.1.1 Output power test result at the 119.00 GHz frequency

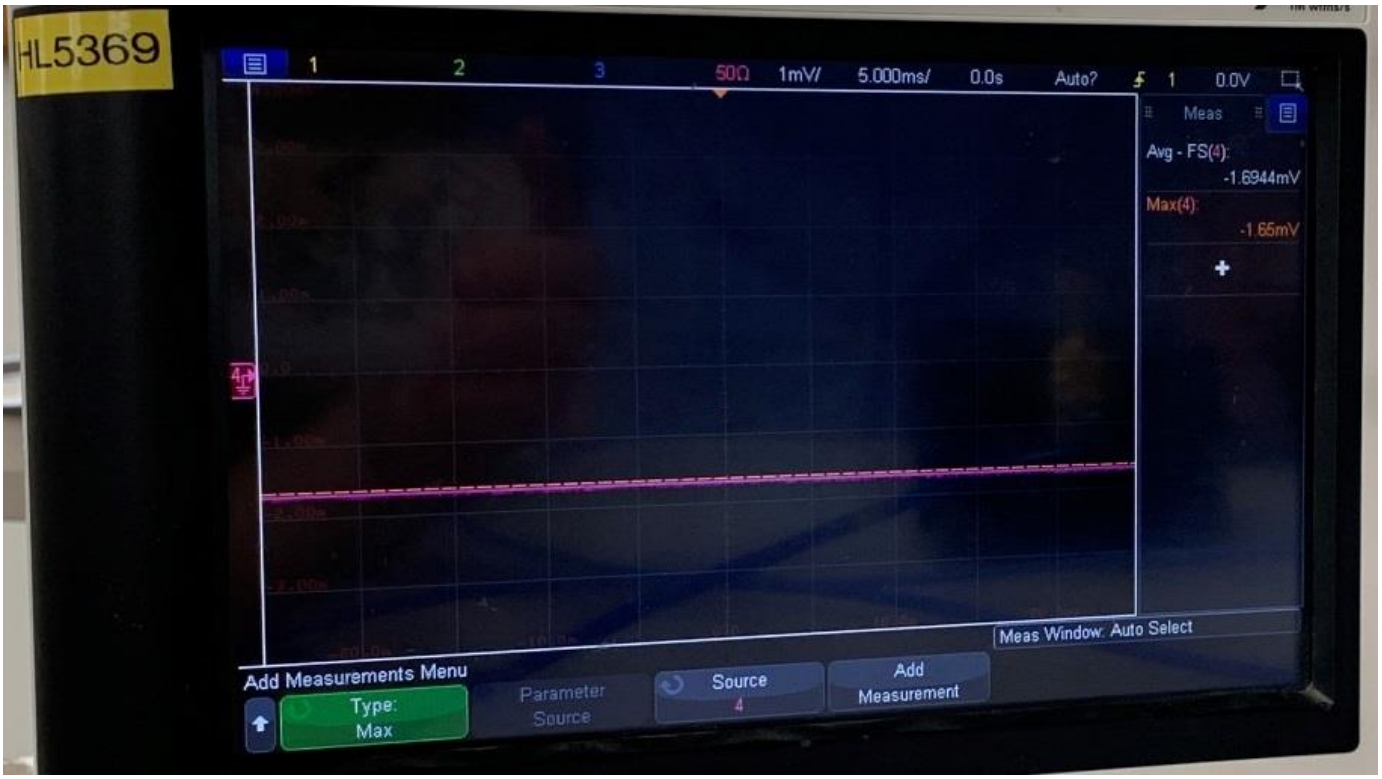
DETECTOR:	Peak/Average
MODULATION:	CW
EUT POLARIZATION:	Vertical
TEST ANTENNAPOLARIZATION:	Vertical



Test specification:	Section 15.258(b), Transmitter power		
Test procedure:	ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.1.2 Output power test result at the 121.00 GHz frequency

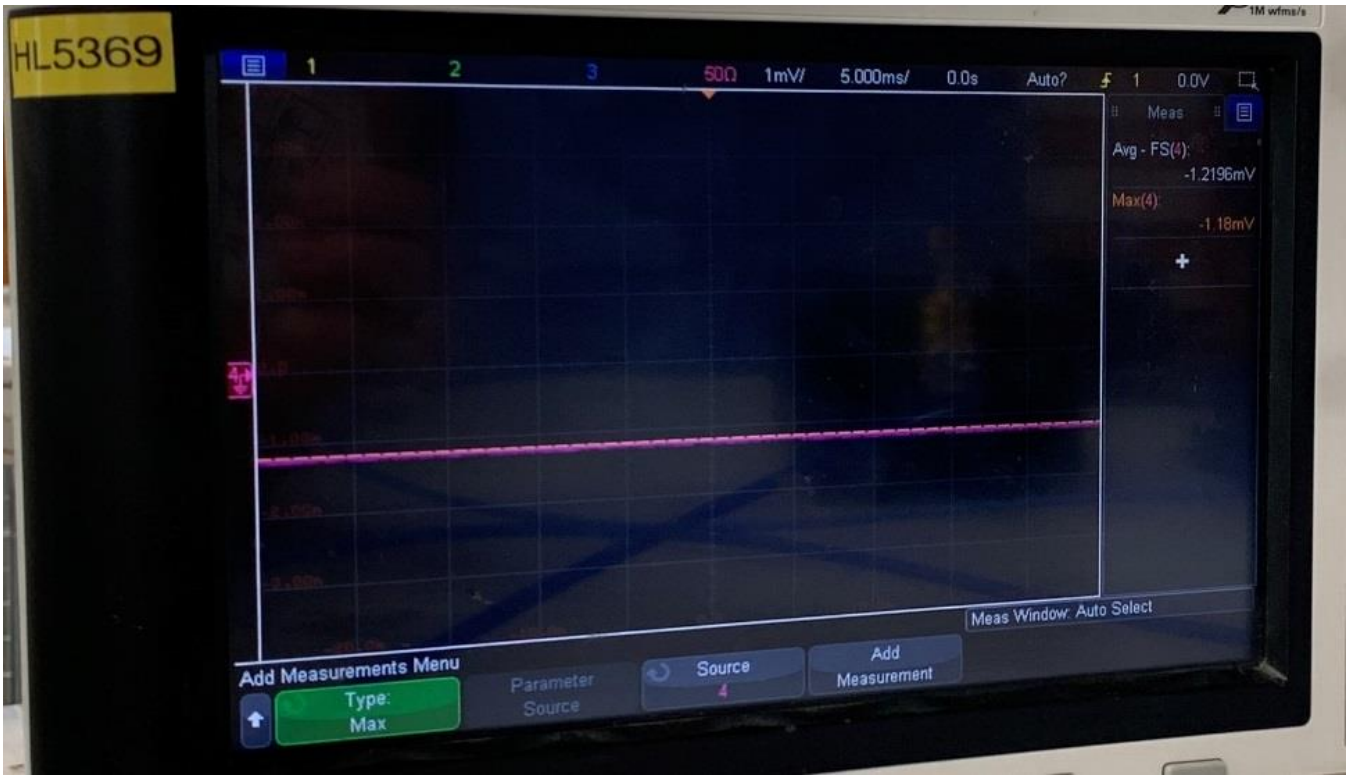
DETECTOR:	Peak/Average
MODULATION:	CW
EUT POLARIZATION:	Vertical
TEST ANTENNAPOLARIZATION:	Vertical



Test specification:	Section 15.258(b), Transmitter power		
Test procedure:	ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.1.3 Output power test result at the 122.98 GHz frequency

DETECTOR:	Peak/Average
MODULATION:	CW
EUT POLARIZATION:	Vertical
TEST ANTENNAPOLARIZATION:	Vertical



Test specification:	Section 15.215(c), Occupied bandwidth		
Test procedure:	ANSI C63.10, Section 9.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1

Table 7.2.1 Occupied bandwidth limits

Assigned frequency range, MHz	Modulation envelope reference points
116000 – 123000	6 dBc

NOTE: Modulation envelope reference points provided in terms of attenuation below unmodulated carrier.

7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

7.2.2.2 The EUT was set to transmit modulated carrier as provided in Table 7.2.2.

7.2.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope. The test results are provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup

Test specification:	**Section 15.215(c), Occupied bandwidth**		
Test procedure:	ANSI C63.10, Section 9.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1008 hPa	**Power:** 5 VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

OPERATING FREQUENCY RANGE:	116000 – 123000 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	100 kHz
VIDEO BANDWIDTH:	300 kHz

Frequency, GHz	Occupied bandwidth, MHz	Verdict
119.00	1282	Pass
121.00	1302	Pass

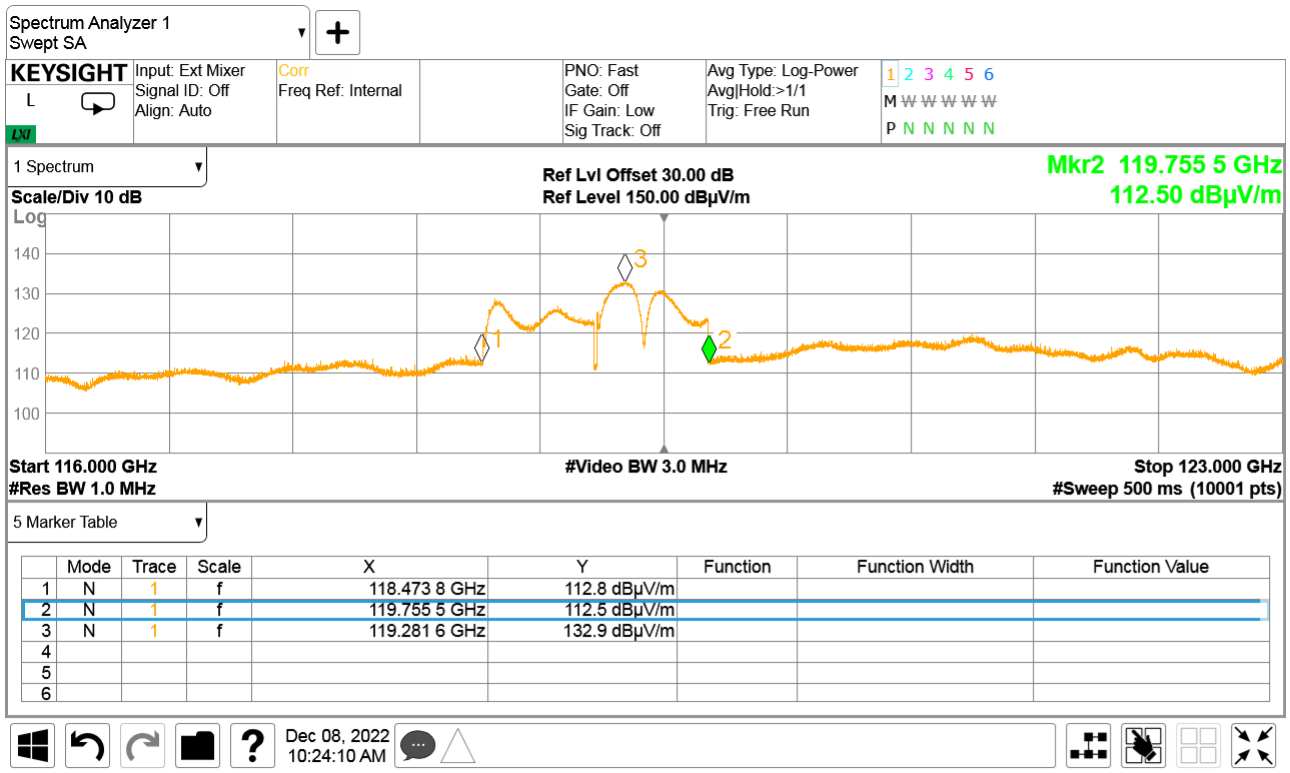
Reference numbers of test equipment used

HL 5373	HL 3536	HL 5376					

Full description is given in Appendix A.

Plot 7.2.1 The 6dBc occupied bandwidth

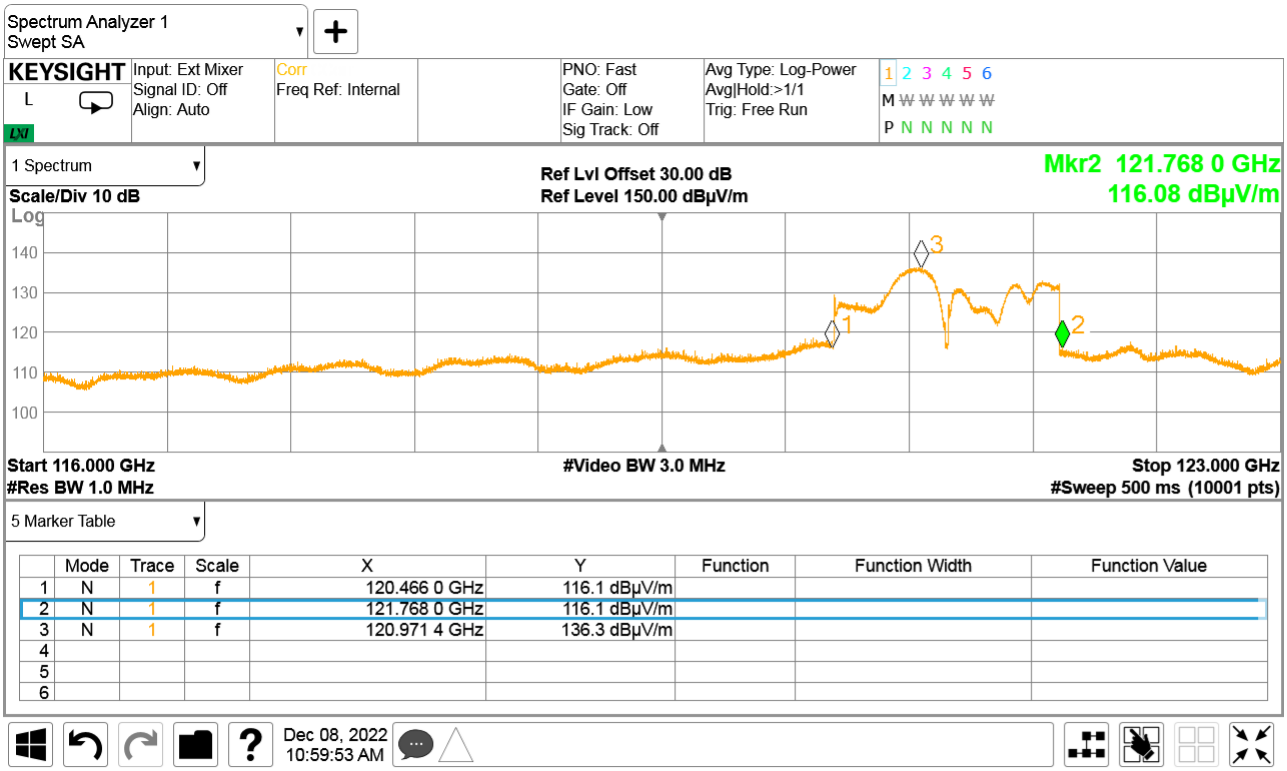
START FREQUENCY:	119000 MHz
MODULATION:	FMCW
ENVELOPE POINT:	6 dBc



Test specification:	**Section 15.215(c), Occupied bandwidth**		
Test procedure:	ANSI C63.10, Section 9.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1008 hPa	**Power:** 5 VDC
Remarks:			

Plot 7.2.2 The 6dBc occupied bandwidth

START FREQUENCY:	121000 MHz
MODULATION:	FMCW
ENVELOPE POINT:	6 dBc



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	120.466 0 GHz	116.1 dBµV/m			
2	N	1	f	121.768 0 GHz	116.1 dBµV/m			
3	N	1	f	120.971 4 GHz	136.3 dBµV/m			
4								
5								
6								

Test specification:	**Section 15.258(c)(2), Out of band radiated emissions below 40 GHz**		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1008 hPa	**Power:** 5 VDC
Remarks:			

7.3 Out of band radiated emissions below 40GHz

7.3.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.4.1.

Table 7.3.1 Radiated spurious emissions limits

Frequency range, MHz	Field strength at 3 m, dB(μV/m)*		
	Within restricted bands		
	Peak	Quasi Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**
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	
1000 – 40000	74.0	NA	54.0

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

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

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

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

Note: The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the third harmonic of the highest fundamental
frequency or to 750 GHz, whichever is lower if the intentional radiator operates at or above 95 GHz.

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

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

7.3.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.

7.3.2.3 The worst test results (the lowest margins) were recorded in Table 7.3.3 and shown in the associated plots.

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

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

7.3.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.3.3.3 The worst test results (the lowest margins) were recorded in Table 7.3.2 and Table 7.3.3 and shown in the associated plots.

Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Figure 7.3.1 Setup for spurious emission field strength measurements below 30 MHz

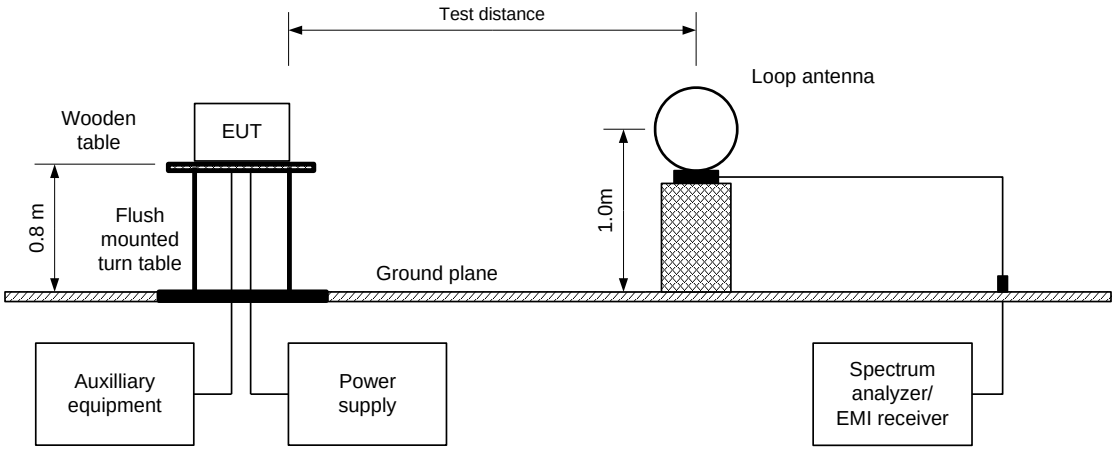
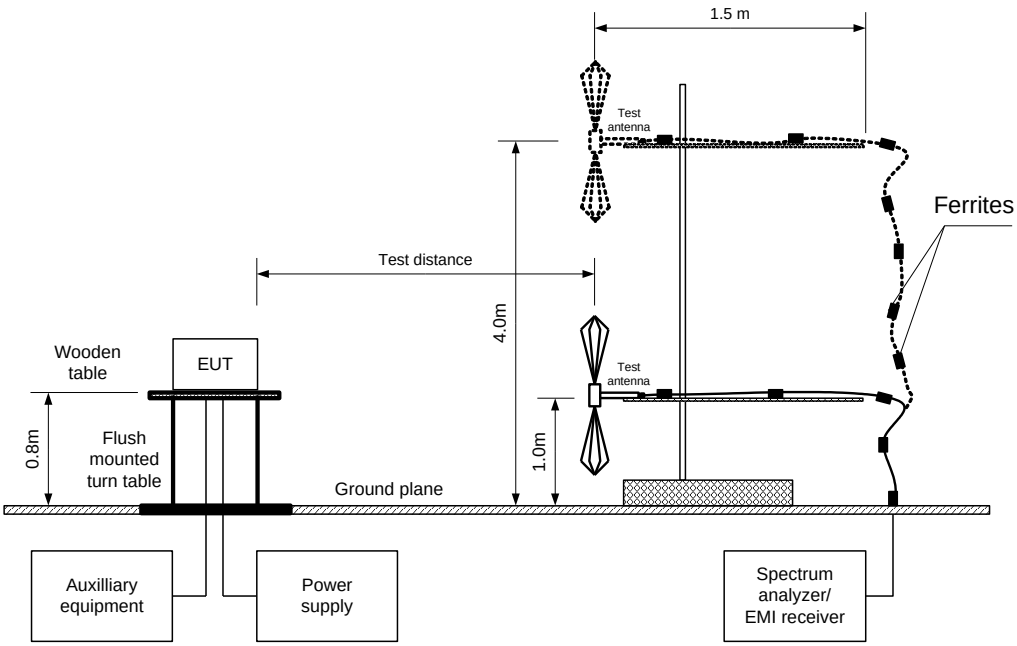
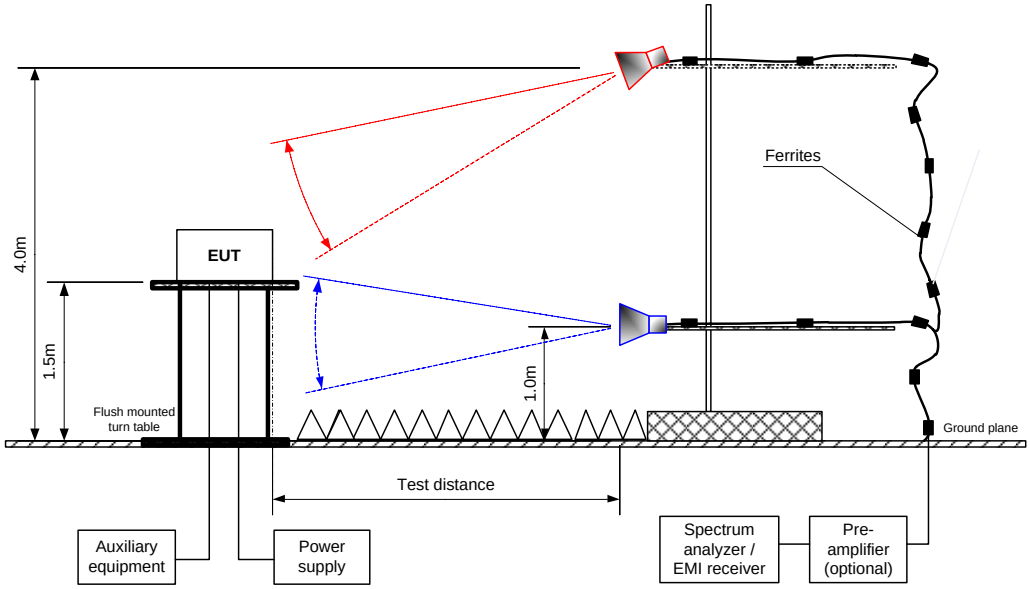


Figure 7.3.2 Setup for spurious emission field strength measurements in 30 – 1000 MHz



Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Figure 7.3.3 Setup for spurious emission field strength measurements above1000 MHz



Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Table 7.3.2 Field strength of spurious emissions at frequencies above 1 GHz

TEST DISTANCE:	3 m
EUT POSITION:	Typical (Vertical)
MODULATION:	CW
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 - 40000 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1.0 MHz
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	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)	Limit, dB(µV/m)	Margin, dB**	
Low frequency 119.000 GHz										
No emissions for measurements were found										Pass
Mid frequency 121.000 GHz										
7562.45	Hor	1.50	-28	54.74	74.0	-19.26	52.57	54.0	-1.43	Pass
26468.53	Hor	1.50	9.0	54.70	74.0	-19.30	52.99	54.0	-1.01	Pass
High frequency 122.980 GHz										
7886.11	Hor	1.65	0	55.82	74.0	-18.18	53.71	54.0	-0.29	Pass
24979.86	Hor	1.50	11.0	54.87	74.0	-19.13	52.61	54.0	-1.39	Pass

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = dB below (negative if above) specification limit.

Reference numbers of test equipment used

HL 0446	HL 3903	HL 4933	HL 4956	HL 5112	HL 5286	HL 5288	HL 7585

Full description is given in Appendix A.

Test specification:	**Section 15.258(c)(2), Out of band radiated emissions below 40 GHz**		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1008 hPa	**Power:** 5 VDC
Remarks:			

Table 7.3.3 Field strength of emissions below 1 GHz

TEST DISTANCE: 3 m
EUT POSITION: Typical (Vertical)
MODULATION: CW
INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 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)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)

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***				
Low frequency 119.000 GHz								
50.003	33.22	28.86	40.0	-11.14	Vertical	1.81	111	
112.186	36.55	33.15	43.5	-10.35	Vertical	1.00	-21	
350.008	32.90	28.71	46.0	-17.29	Vertical	1.47	26	Pass
399.968	32.15	27.28	46.0	-18.72	Horizontal	1.00	-102	
449.984	33.96	29.48	46.0	-16.52	Vertical	1.02	-22	
650.014	35.73	30.66	46.0	-15.34	Vertical	1.00	180	
Mid frequency 121.000 GHz								
49.955	32.96	26.28	40.0	-13.72	Vertical	2.01	180	
99.474	38.75	35.46	43.5	-8.04	Vertical	1.02	76	
112.225	36.94	33.32	43.5	-10.18	Vertical	1.00	-22	Pass
450.019	34.03	30.04	46.0	-15.96	Vertical	1.04	-38	
600.009	35.58	30.62	46.0	-15.38	Vertical	1.00	140	
650.012	37.13	31.75	46.0	-14.25	Vertical	1.00	141	
High frequency 122.980 GHz								
50.013	33.24	28.69	40.0	-11.31	Vertical	2.03	180	
112.211	36.31	32.83	43.5	-10.67	Vertical	1.00	-22	
400.018	35.08	31.61	46.0	-14.39	Vertical	1.02	-4	Pass
450.001	34.50	30.65	46.0	-15.35	Vertical	1.02	-37	
599.992	35.59	30.50	46.0	-15.50	Vertical	1.02	140	
650.047	36.01	30.83	46.0	-15.17	Vertical	1.02	124	

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

Reference numbers of test equipment used

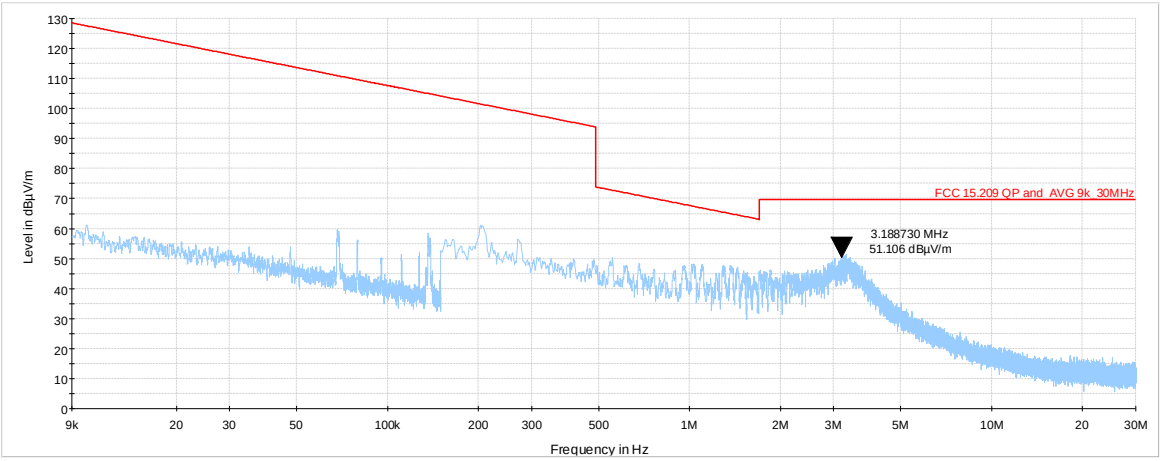
HL 5372	HL 3903	HL 0446					

Full description is given in Appendix A.

Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

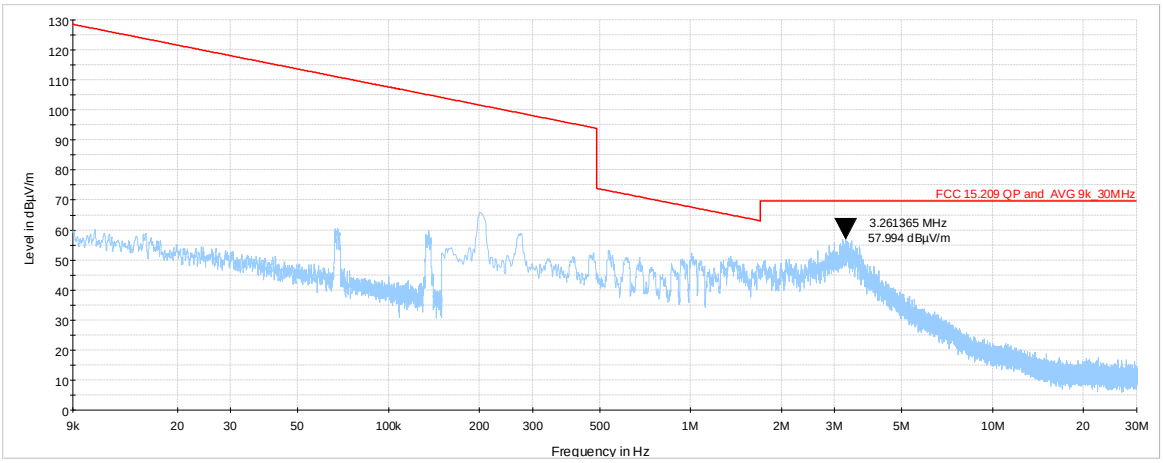
Plot 7.3.1 Radiated emission measurements from 9 KHz to 30 MHz at low frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Orthogonal (worst case)



Plot 7.3.2 Radiated emission measurements from 9 KHz to 30 MHz at mid frequency

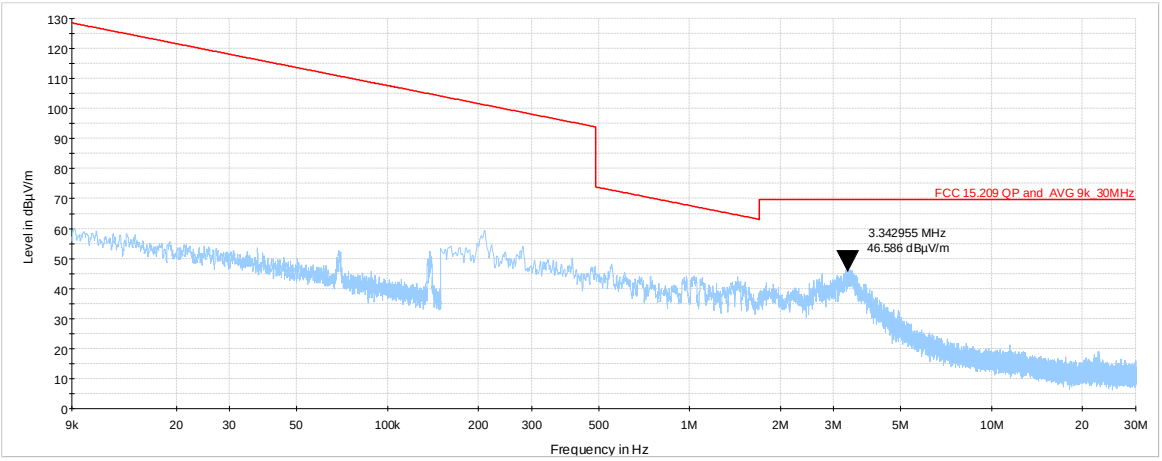
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Orthogonal (worst case)



Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.3.3 Radiated emission measurements from 9 KHz to 30 MHz at high frequency

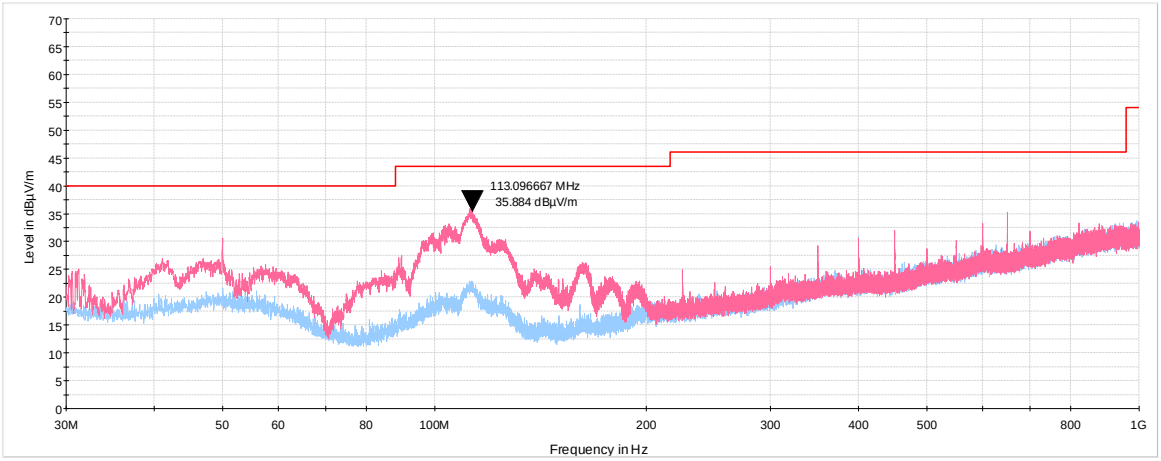
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical
EUT POSITION:	Orthogonal (worst case)



Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

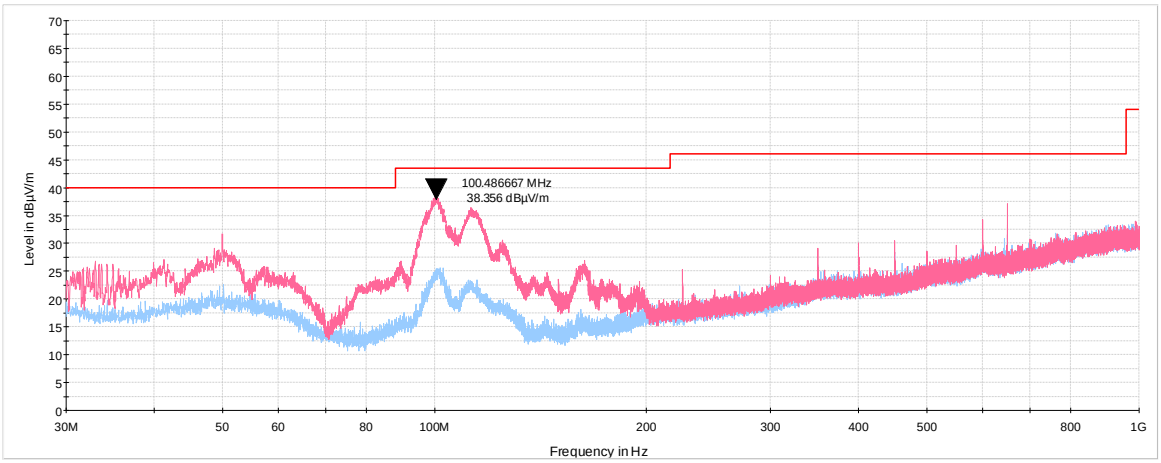
Plot 7.3.4 Radiated emission measurements from 30 to 1000 MHz at low frequency

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



Plot 7.3.5 Radiated emission measurements from 30 to 1000 MHz at mid frequency

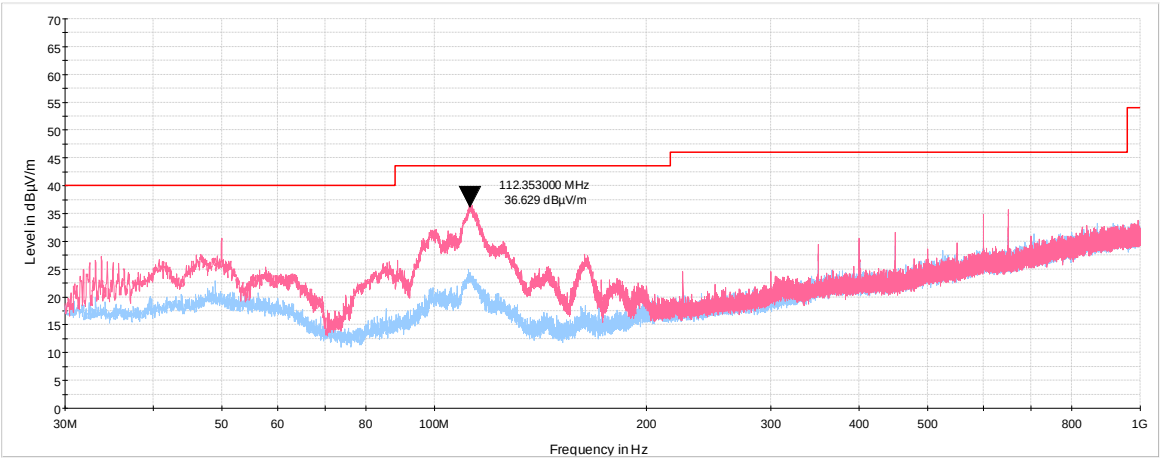
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.3.6 Radiated emission measurements from 30 to 1000 MHz at high frequency

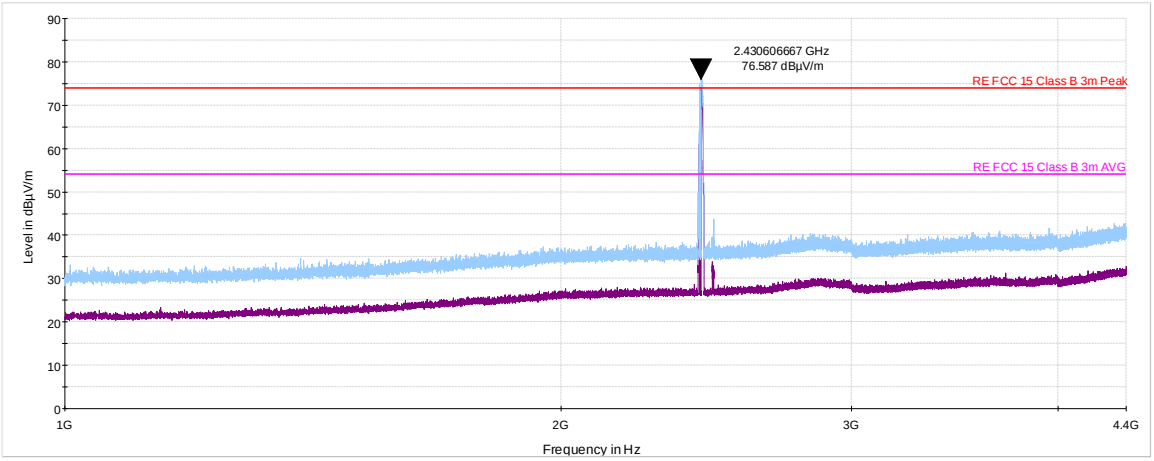
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



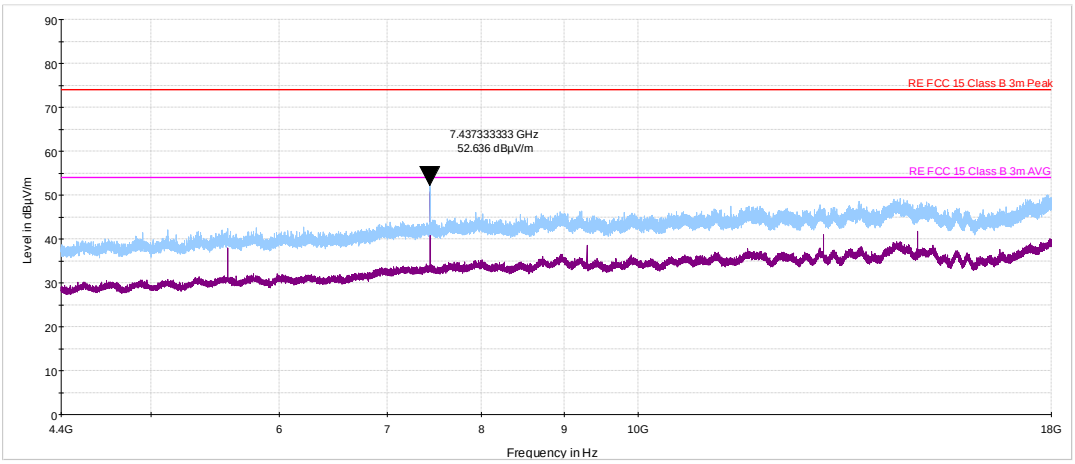
Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.3.7 Radiated emission measurements from 1 to 18 MHz at low frequency

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



Note: Frequencie at 2.43 GHz – WiFi signal

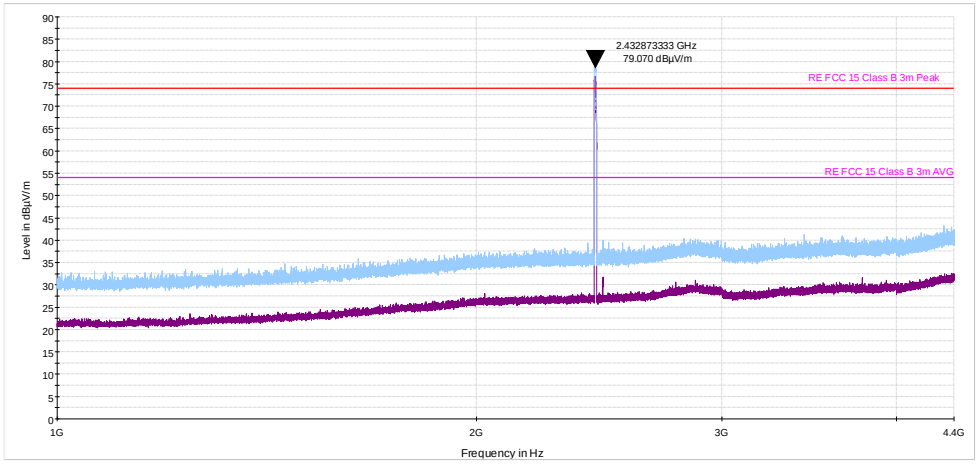


Note: Frequencie at 7.43 GHz – WiFi signal

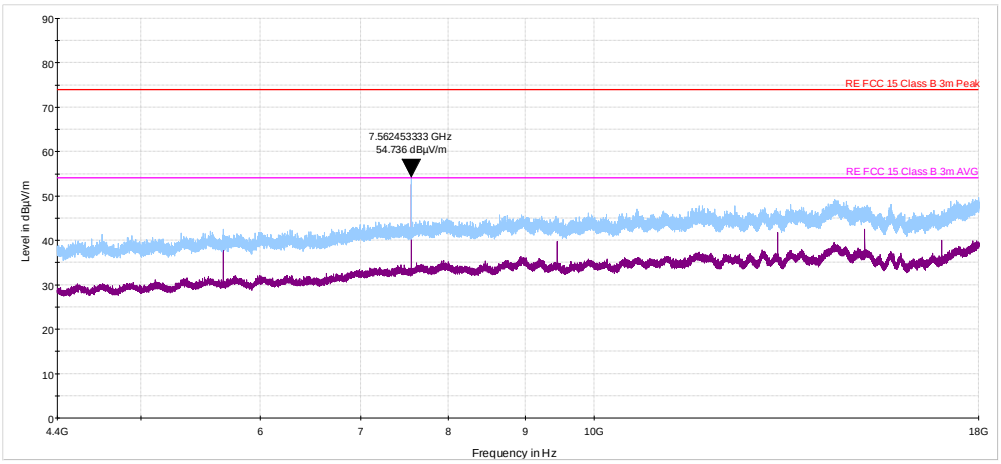
Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.3.8 Radiated emission measurements from 1 to 18 MHz at mid frequency

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



Note: Frequencie at 2.43 GHz – WiFi signal

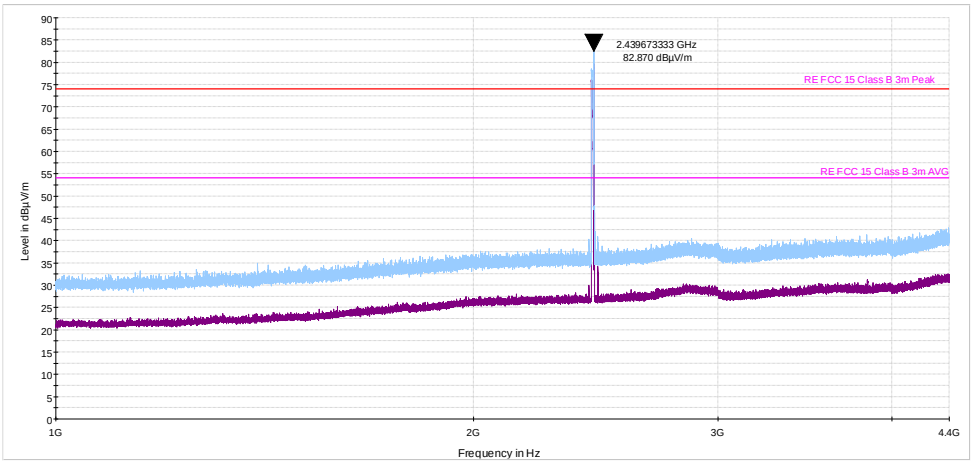


Note: Frequencie at 7.56 GHz – WiFi signal

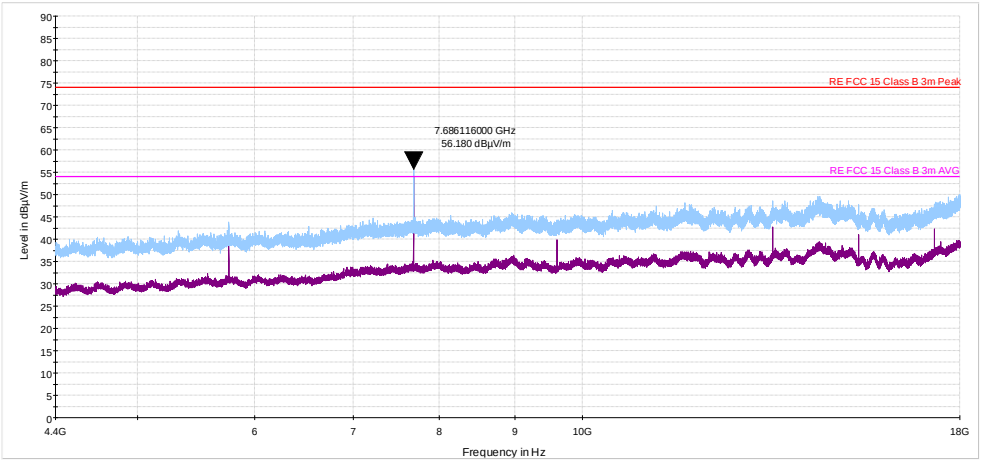
Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.3.9 Radiated emission measurements from 1 to 18 MHz at high frequency

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



Note: Frequencie at 2.43 GHz – WiFi signal

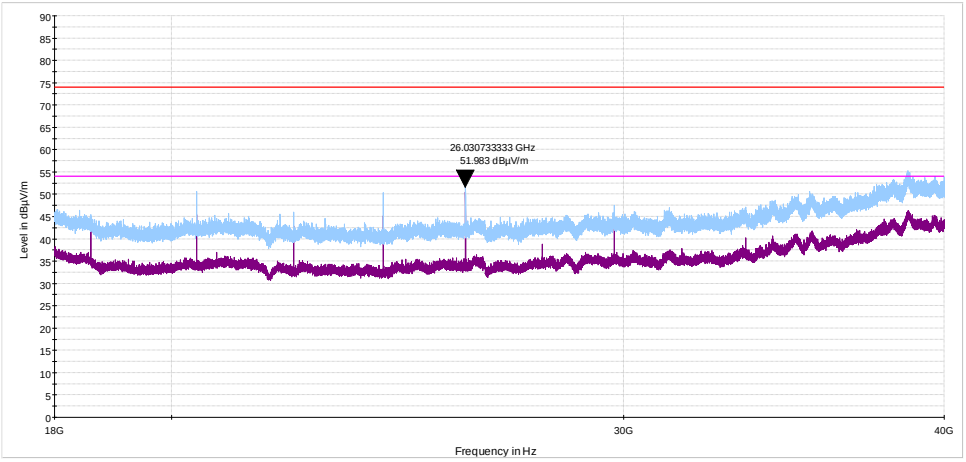


Note: Frequencie at 7.68 GHz – WiFi signal

Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

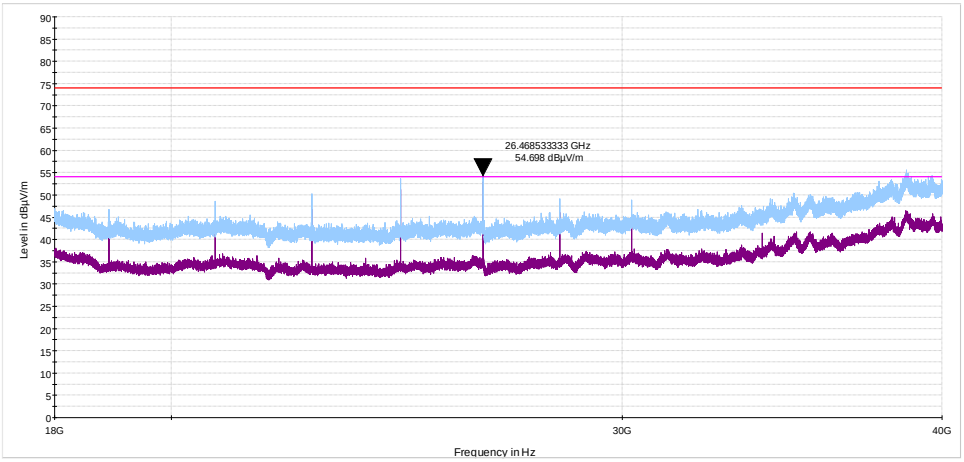
Plot 7.3.10 Radiated emission measurements from 18 to 40 GHz at low frequency

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



Plot 7.3.11 Radiated emission measurements from 18 to 40 GHz at mid frequency

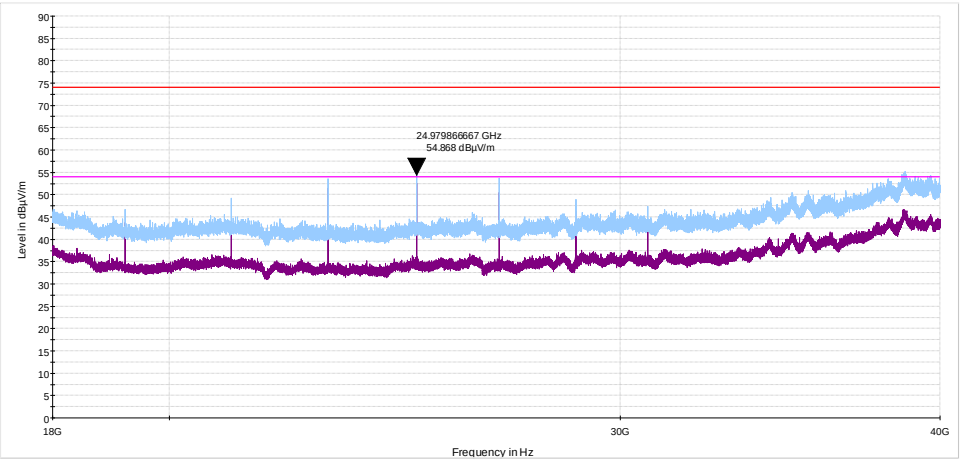
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Test specification:	Section 15.258(c)(2), Out of band radiated emissions below 40 GHz		
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Oct-22 - 31-Oct-22		
Temperature: 25 ºC	Relative Humidity: 43 %	Air Pressure: 1008 hPa	Power: 5 VDC
Remarks:			

Plot 7.3.12 Radiated emission measurements from 18 to 40 GHz at high frequency

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



Test specification:	Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz		
Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	31-Oct-22 - 21-Nov-22		
Temperature: 27 ºC	Relative Humidity: 50 %	Air Pressure: 1010 hPa	Power: 5 VDC
Remarks:			

7.4 Out of band radiated emissions above 40 GHz up to 370 GHz

7.4.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Spurious emission field strength limits

Frequency, GHz	Power density at 3 m distance pW/cm^2	Distance, m	Field strength dB(µV/m)*, peak	Field strength dB(µV/m)*, average
40 – 370	90.0	3.0	105.30	85.30
90 - 140	90.0	0.10	134.84**	114.84**
140 - 220	90.0	0.01	154.84**	134.84**
220 - 325	90.0	0.005	160.86**	140.86**
325-370	90.0	0.01	154.84	134.84

*- The limit is provided in average values.

**- The limit for 1 m and other test distance was calculated using the inverse distance extrapolation factor as follows:

for far field: $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$,

where S_1 – standard defined distance in meters;

S_2 – measurement distance in meters (according to ANSI C63.10)

7.4.2 Test procedure for spurious emission field strength measurements

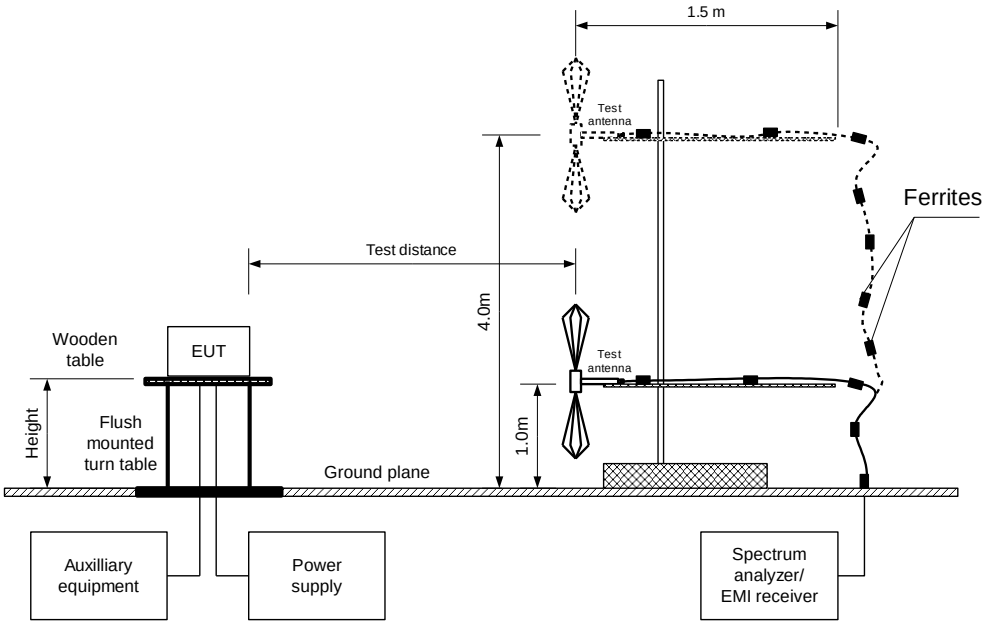
7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

7.4.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.4.2.3 The test results were recorded in Table 7.4.2 and are shown in the associated plots.

Test specification:	**Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz**		
Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	31-Oct-22 - 21-Nov-22		
Temperature: 27 ºC	**Relative Humidity:** 50 %	**Air Pressure:** 1010 hPa	**Power:** 5 VDC
Remarks:			

Figure 7.4.1 Spurious emission field strength above 40 GHz test set up



Test specification:	**Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz**		
Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	31-Oct-22 - 21-Nov-22		
Temperature: 27 ºC	**Relative Humidity:** 50 %	**Air Pressure:** 1010 hPa	**Power:** 5 VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

TEST DISTANCE: 0.005 - 3 m
EUT POSITION: Typical (Vertical)
MODULATION: CW
TRANSMITTER OUTPUT POWER: Maximum
INVESTIGATED FREQUENCY RANGE: 40 – 370 GHz
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Standard Gain Horn 24dB (40-60 GHz)
Standard Gain Horn 24dB (50-75 GHz)
Standard Gain Horn 24dB (75-110 GHz)
Standard Gain Horn 24dB (90-140 GHz)
Standard Gain Horn 24dB (140-220 GHz)
Standard Gain Horn 24dB (220-330 GHz)…
Standard Gain Horn 24dB (330-370 GHz)…

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength			Verdict
	Polariz.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Low frequency 119.000 GHz										
No emissions for measurements were found										Pass
Mid frequency 121.000 GHz										
No emissions for measurements were found										Pass
High frequency 122.980 GHz										
No emissions for measurements were found										Pass

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

Reference numbers of test equipment used

HL 5373	HL 0770	HL 0771	HL 1312	HL 3235	HL 3329	HL 3536	HL 4023
HL 5376	HL 5979	HL 5980	HL 6038	HL 6039			

Full description is given in Appendix A.