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ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C §15.247 (DTS),
RSS-247 Issue 3:2023, RSS-Gen Issue 5

FOR:

Essence Future Living 2010 LTD

Indoor personal home device

Model: ES901BUL2

FCC ID: 2BEYK-ES901BUL2

IC: 33363-ES901BUL2

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. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

Table of contents

1 Applicant information

Client name:	Essence Future Living 2010 LTD
Address:	12 Abba Eban Avenue, Ackerstein Towers Bldg. D, P.O.Box 2073, Herzliya 4612001, Israel
Telephone:	+972(73)2447-742
E-mail:	lgalze@essence-grp.com
Contact name:	Mr. Igal Zertser

2 Equipment under test attributes

Product name:	Indoor personal home device
Product type:	Transmitter
Model(s):	ES901BUL2
Serial number:	3124095E0000336C
Hardware version:	3.C
Software release:	0.5
Receipt date	27-Aug-24

3 Manufacturer information

Manufacturer name:	Essence Future Living 2010 LTD
Address:	12 Abba Eban Avenue, Ackerstein Towers Bldg. D, P.O.Box 2073, Herzliya 4612001, Israel
Telephone:	+972 732 447 735
E-Mail:	israelgo@essence-grp.com
Contact name:	Mr. Israel Gottesman

4 Test details

Project ID:	55235
Location:	Hermon Laboratories Ltd. 66 HaTachana str., P.O. Box 23, Binyamina 3055001, Israel
Test started:	03-Nov-24
Test completed:	12-Nov-24
Test specification(s):	FCC 47CFR part 15 subpart C §15.247 (DTS)
	RSS-247 Issue 3:2023, RSS-Gen Issue 5

5 Tests summary

Test	Status
Transmitter characteristics	
FCC Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth	Pass
FCC Section 15.247(b)3/ RSS-247 section 5.4(4), Peak output power	Pass
FCC section 15.247(i) / RSS-102 section 2.5.1, RF exposure	Pass, the exhibit to the application of certification is provided
FCC Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions	Pass
FCC Section 15.247(d)/ RSS-247 section 5.5, Emissions at band edges	Pass
FCC Section 15.247(e) / RSS-247 section 5.2(2), Peak power density	Pass
FCC section 15.203 / RSS-Gen section 8.3, Antenna requirement	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 Mr. S. Sugatov, test engineer, EMC & Radio	03-Nov-24 – 12-Nov-24	
Reviewed by:	Mrs. S. Peysahov Sheynin, certification engineer, EMC & Radio	28-Nov-24	
Approved by:	Mr. M. Nikishin, group leader, EMC & Radio	01-Jan-25	

6 EUT description

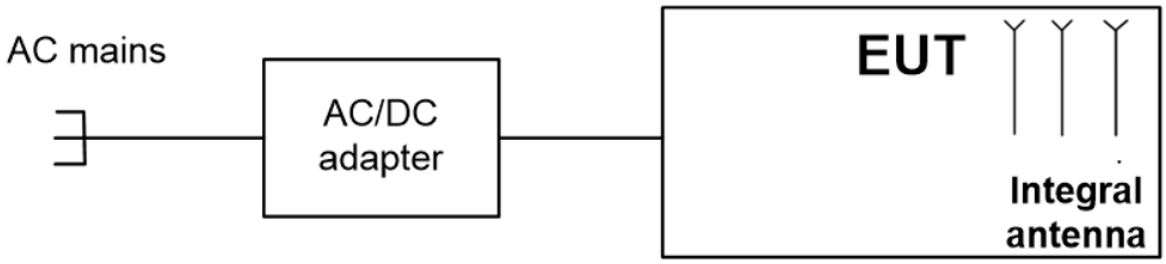
Note: The following data in this clause is provided by the customer and represents his sole responsibility

6.1 General information

The EUT is ES901BUL2 is Indoor personal home devices powered from 5 VDC external AC/DC adaptor through USD-C type connector and it is dedicated for indoor table-top home/domestic operation, assuming declared separation distance to humans is 20cm.

The device contains the following RF connections: BLE/WiFi used for maintenance and 5 GHz ASK, used as RF technology to support human day balance, and body resonance by light.

6.2 Test configuration



6.3 Transmitter characteristics

Type of equipment							
V	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)						
Assigned frequency range	2400 -2483.5 MHz						
Operating frequencies	2402-2480 MHz						
Maximum rated output power	Peak output power 12.22 dBm at 1 Mbps						
	Peak output power 12.60 dBm at 2 Mbps						
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			
				V without temporary RF connector			
Antenna/s technical characteristics							
Type	Manufacturer / Design	Model number	Gain				
Integral	Essence Security	printed	Typ peak gain: 2.5 dBi				
BLE interface							
Transmitter aggregate data rate/s	1 / 2 Mbps						
Type of modulation	GFSK						
Modulating test signal (baseband)	NA						
Transmitter power source							
	Battery	**Nominal rated voltage**		Battery type			
	DC	**Nominal rated voltage**					
V	AC mains	**Nominal rated voltage**	120	Frequency	60 Hz		

Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24 - 07-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-247 requirements

7.1 Minimum 6 dB bandwidth

7.1.1 General

This test was performed to measure 6 dB bandwidth of the EUT carrier frequency. Specification test limits are given in Table 7.1.1.

Table 7.1.1 6 dB bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Minimum bandwidth, kHz
2400.0 – 2483.5	6.0	500.0

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

Table 7.1.2 The 99% bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points	Limit, kHz
2400.0 – 2483.5	99%	NA

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

7.1.2 Test procedure

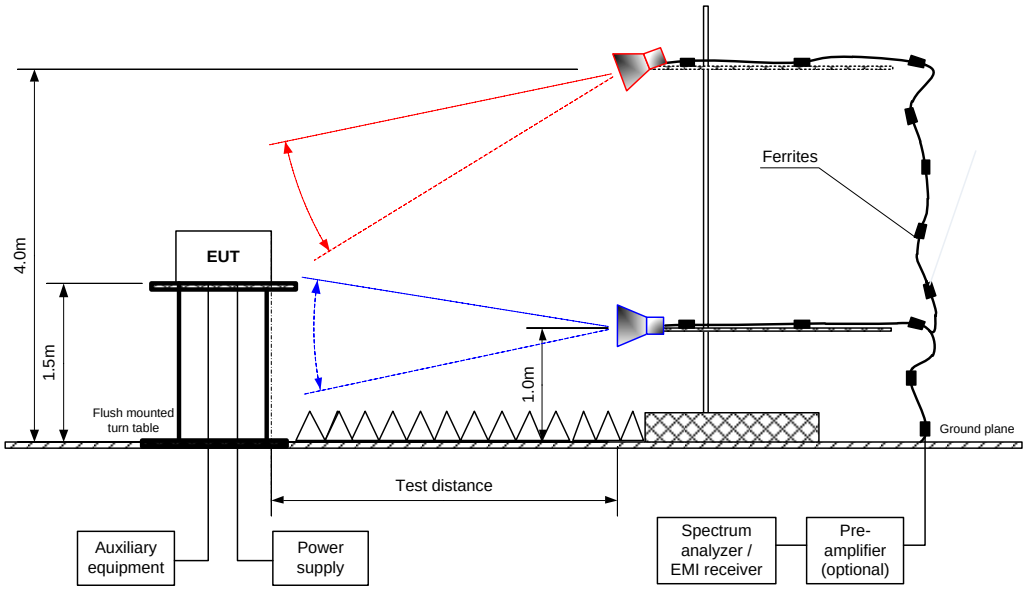
7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was set to transmit modulated carrier.

7.1.2.3 The transmitter minimum 6 dB bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.3 and associated plot.

Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	03-Nov-24 - 07-Nov-24		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1003 hPa	**Power:** 120 VAC, 60 Hz
Remarks: BLE			

Figure 7.1.1 6 dB bandwidth test setup



Test specification:	**Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth**		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	03-Nov-24 - 07-Nov-24		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1003 hPa	**Power:** 120 VAC, 60 Hz
Remarks: BLE			

Table 7.1.3 6 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 2402 – 2483. MHz
DETECTOR USED: Peak
SWEEP MODE: Single
SWEEP TIME: Auto
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION ENVELOPE REFERENCE POINTS: 6.0 dBc
MODULATION: GFSK
BIT RATE: 1 Mbps

Carrier frequency, MHz	6 dB bandwidth, kHz	99% bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
Low frequency					
2402	664.3	1063.7	500	-164.3	Pass
Mid frequency					
2440	689.3	1174.5	500	-189.3	Pass
High frequency					
2480	709.3	1132.8	500	-209.3	Pass

BIT RATE: 2 Mbps

Carrier frequency, MHz	6 dB bandwidth, kHz	99% bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
Low frequency					
2402	1350.0	2061.8	500	-850.0	Pass
Mid frequency					
2440	1420.0	2114.5	500	-920.0	Pass
High frequency					
2480	1400.0	2106.1	500	-900.0	Pass

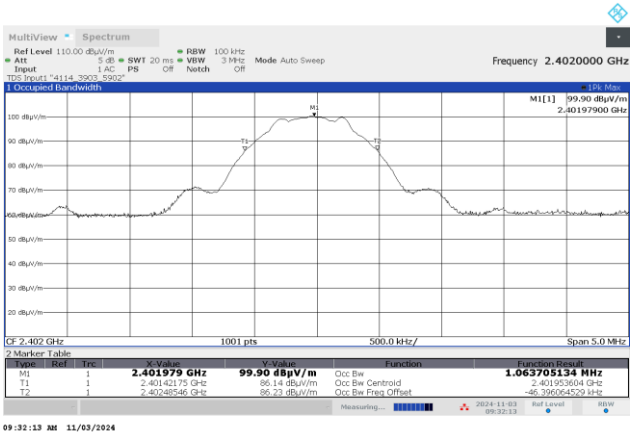
Reference numbers of test equipment used

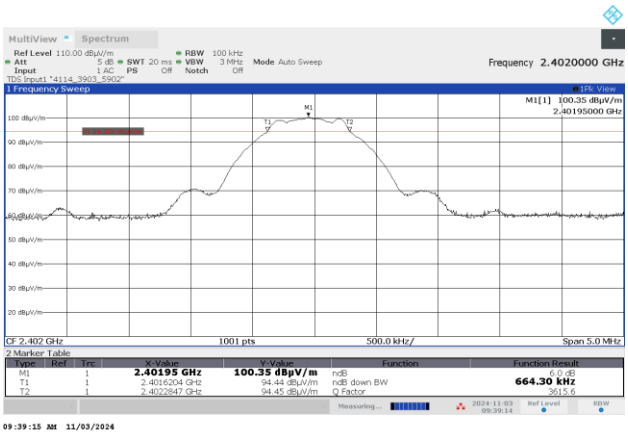
HL 3903	HL 4114	HL 5902	HL 7585					

Full description is given in Appendix A.

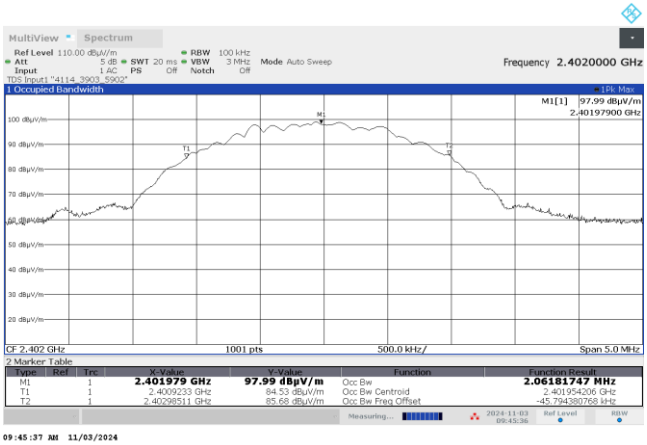
Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24 - 07-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

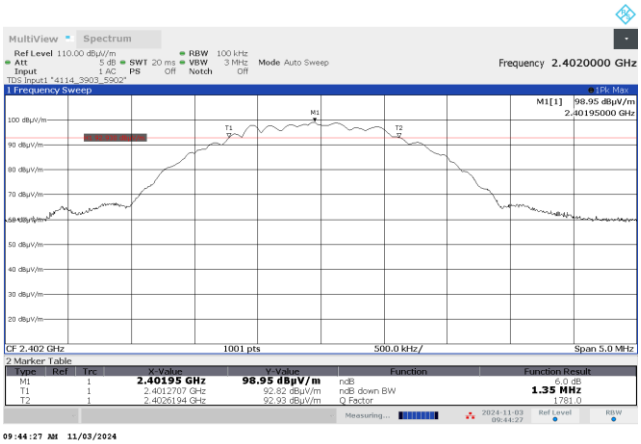
Plot 7.1.1 6 dB and 99% bandwidth test result at low frequency (1 Mbps)





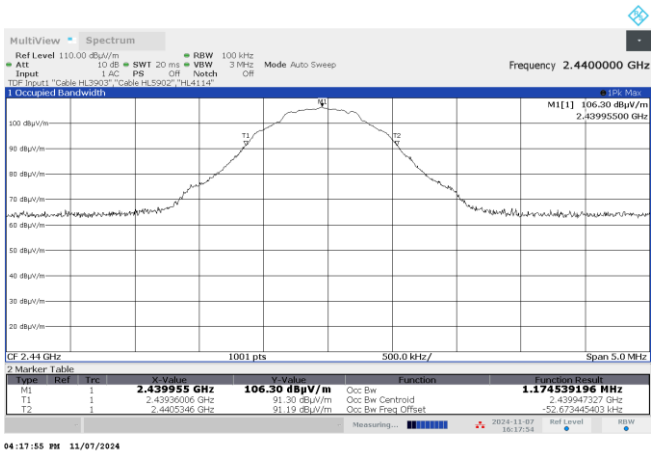
Plot 7.1.2 6 dB and 99% bandwidth test result at low frequency (2 Mbps)

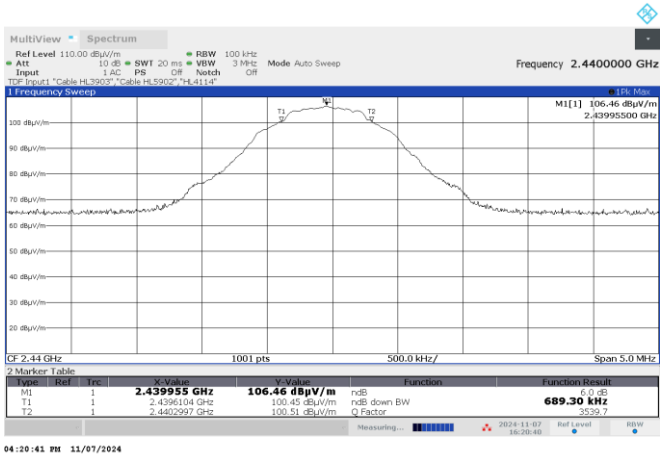




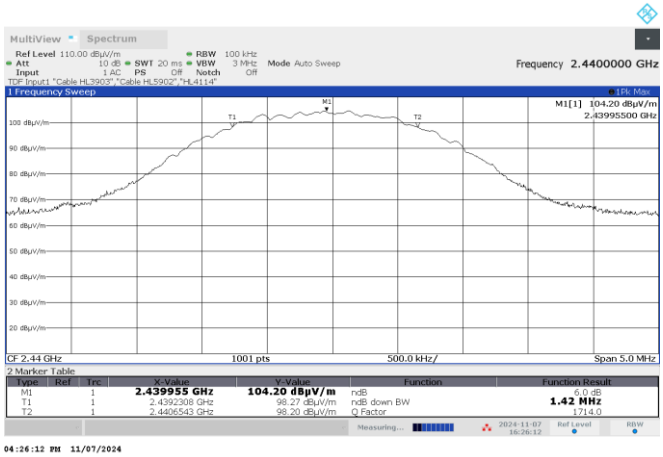
Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24 - 07-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

Plot 7.1.3 6 dB and 99% bandwidth test result at mid frequency (1 Mbps)



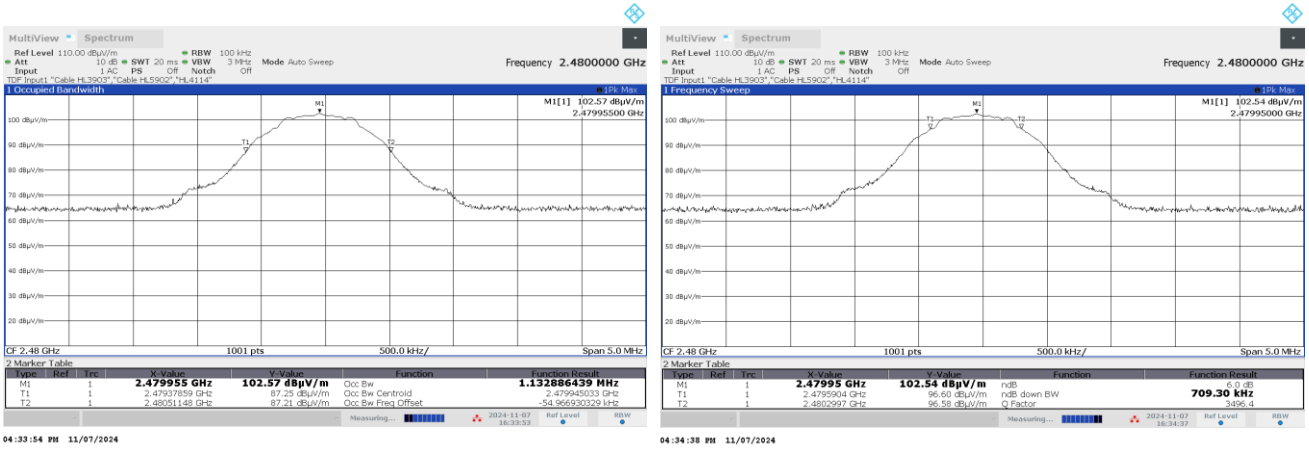


Plot 7.1.4 6 dB and 99% bandwidth test result at mid frequency 2Mbps

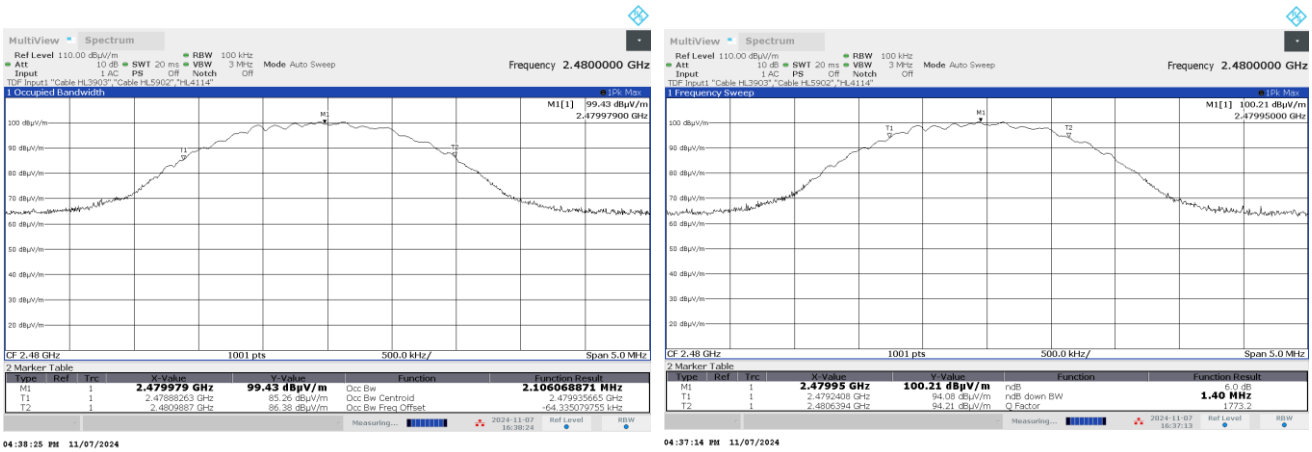


Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24 - 07-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

Plot 7.1.5 6 dB and 99% bandwidth test result at high frequency at 1Mbps



Plot 7.1.6 6 dB and 99% bandwidth test result at high frequency at 2Mbps



Test specification:	**Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power**		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1003 hPa	**Power:** 120 VAC, 60 Hz
Remarks: BLE			

7.2 Peak output power

7.2.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits according to FCC part 15 section 15.247(b)(3) and RSS-210 section A8.4(4) are given in Table 7.2.1.

Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum antenna gain, dBi	Peak output power*		Equivalent field strength limit @ 3m, dB(μV/m)**
		W	dBm	
2400.0 – 2483.5	**6.0**	**1.0**	**30.0**	**131.2**

*- The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;
without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;
by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

**- Equivalent field strength limit was calculated from the peak output power as follows: E=sqrt(30×P×G)/r, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

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 adjusted to produce maximum available to end user RF output power.

7.2.2.3 The resolution bandwidth of spectrum analyzer was set wider than 6 dB bandwidth of the EUT and the field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.2.2.4 The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.2.2 and associated plots.

7.2.2.5 The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

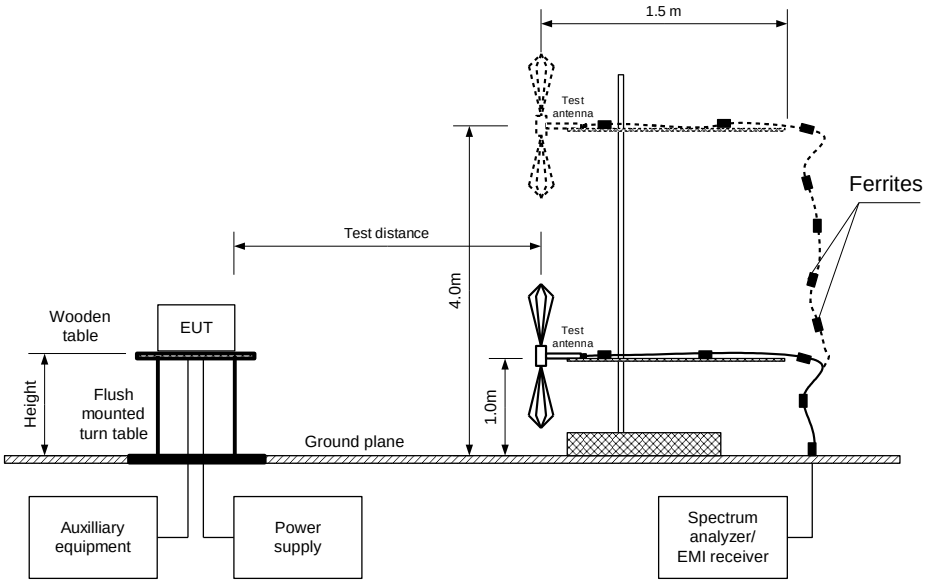
where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.
The above equation was converted in logarithmic units for 3 m test distance:

Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi – 95.2 dB

7.2.2.6 The worst test results (the lowest margins) were recorded in Table 7.2.2.

Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

Figure 7.2.1 Setup for carrier field strength measurements



Test specification:	**Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power**		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	**Relative Humidity:** 42 %	**Air Pressure:** 1003 hPa	**Power:** 120 VAC, 60 Hz
Remarks: BLE			

Table 7.2.2 Peak output power test results

ASSIGNED FREQUENCY: 2402 – 2483.5 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 1.5 m
DETECTOR USED: Peak
TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)
MODULATION: GFSK
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
RESOLUTION BANDWIDTH: 3 MHz
VIDEO BANDWIDTH: 10 MHz

Frequency, MHz	Field strength, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin, dB***	Verdict
BIT RATE: 1 Mbps									
2402	109.92	Horizontal	2.46	-35	2.5	12.22	30	-17.78	Pass
2440	109.91	Horizontal	2.74	-40	2.5	12.21	30	-17.79	Pass
2480	107.36	Horizontal	2.55	-40	2.5	9.66	30	-20.34	Pass
BIT RATE: 2 Mbps									
2402	109.48	Horizontal	2.43	-40	2.5	11.78	30	-18.22	Pass
2440	110.30	Horizontal	2.70	-30	2.5	12.60	30	-17.40	Pass
2480	107.46	Horizontal	2.49	-40	2.5	9.76	30	-20.24	Pass

*****- EUT front panel refer to 0 degrees position of turntable.
******- Peak output power was calculated from the field strength of carrier as follows: $P = (E \times d)^2 / (30 \times G)$,
where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(µV/m) - Transmitter antenna gain in dBi – 95.2 dB*
***- Margin = Peak output power – specification limit.
Note: Maximum peak output power was obtained at Unom (115%Unom, 85%Unom) input power voltage.

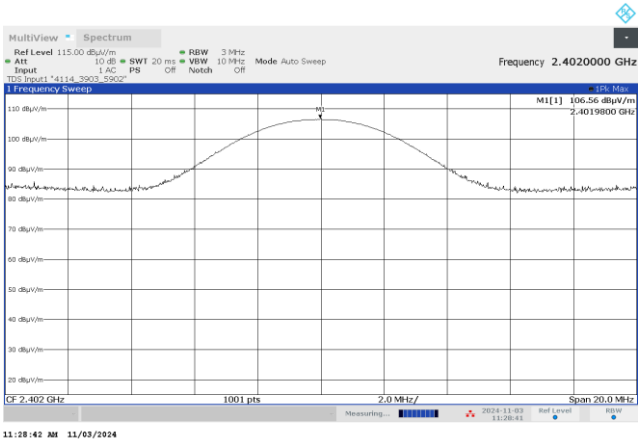
Reference numbers of test equipment used

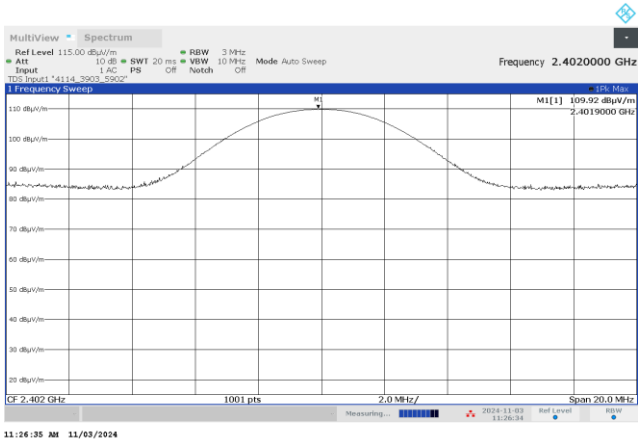
HL 3903	HL 4114	HL 5902	HL 7585				

Full description is given in Appendix A.

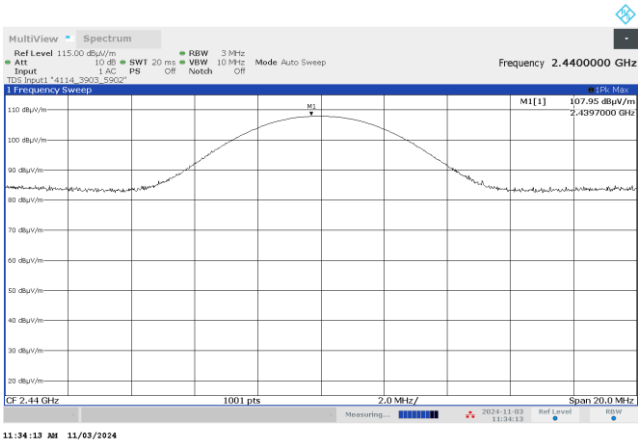
Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

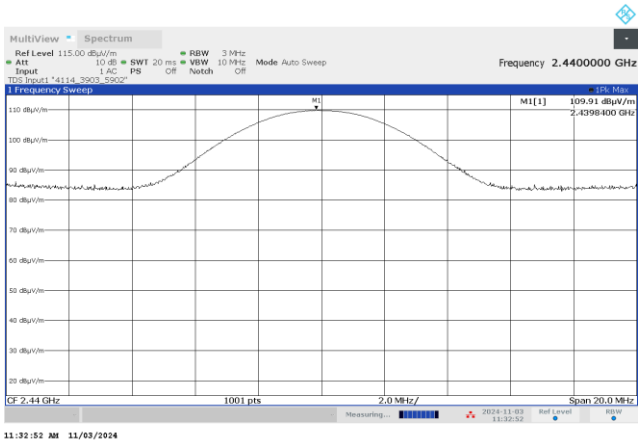
Plot 7.2.1 Field strength of carrier at low frequency (1 Mbps)





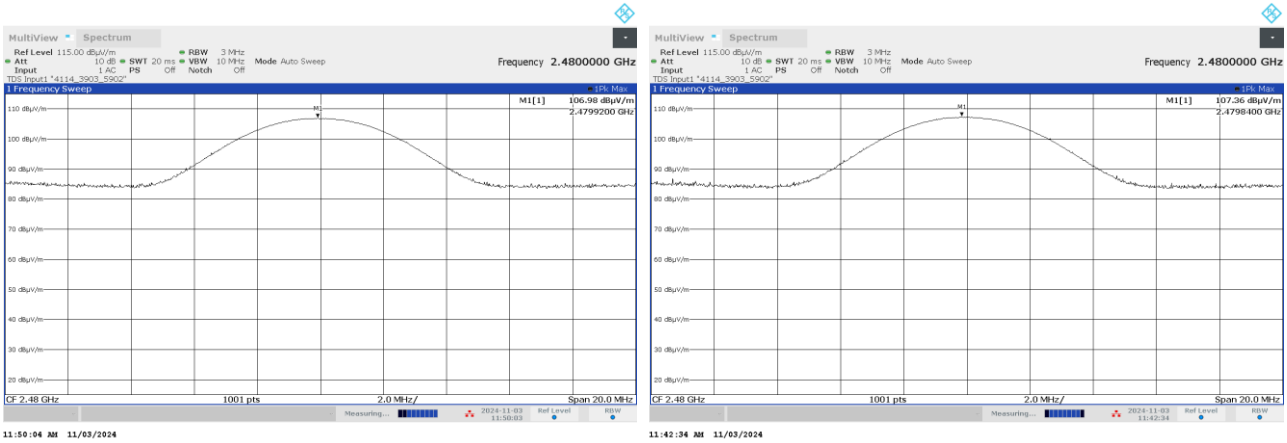
Plot 7.2.2 Field strength of carrier at mid frequency (1 Mbps)





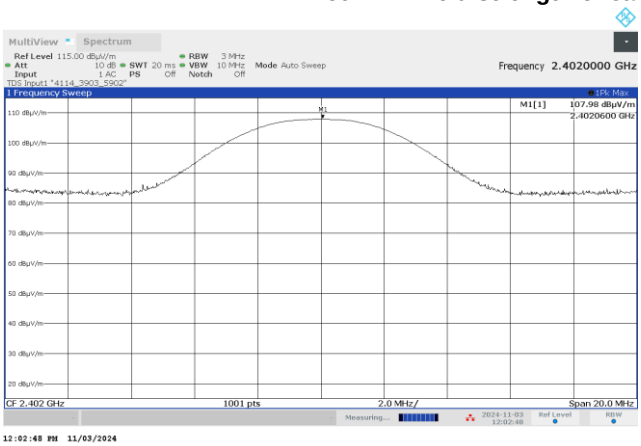
Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

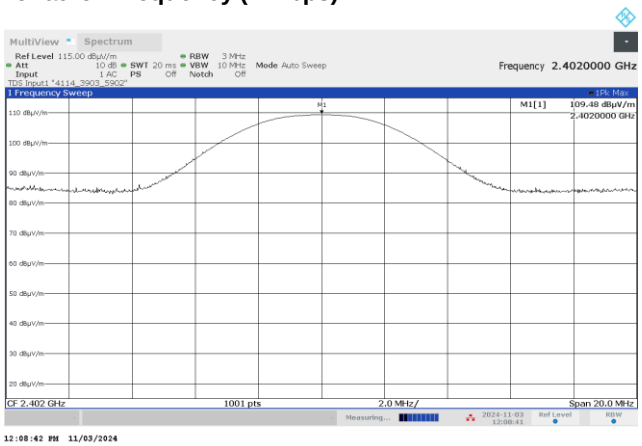
Plot 7.2.3 Field strength of carrier at high frequency (1 Mbps)



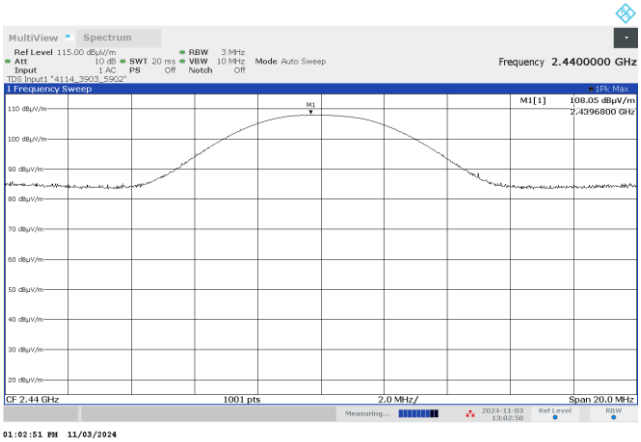
Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

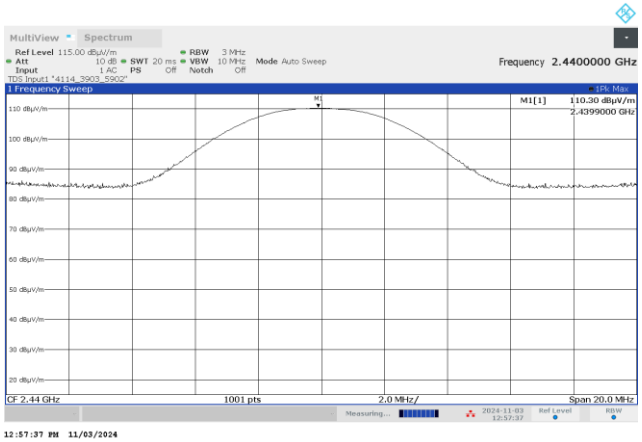
Plot 7.2.4 Field strength of carrier at low frequency (2 Mbps)





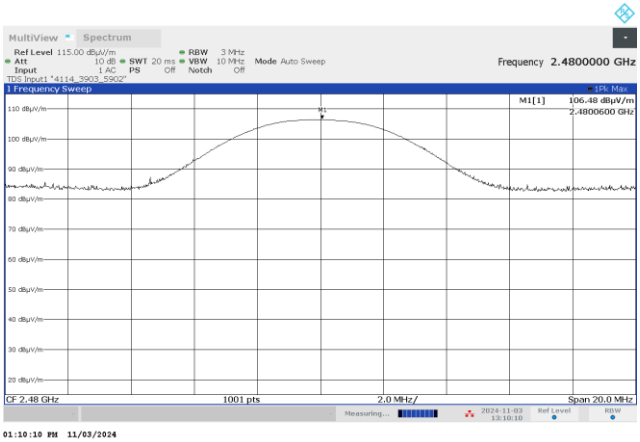
Plot 7.2.5 Field strength of carrier at mid frequency (2 Mbps)

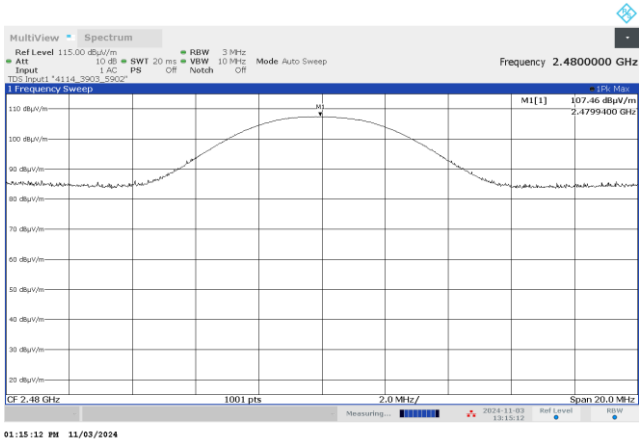




Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Maximum output power		
Test procedure:	ANSI C63.10 sections 11.9.2.2.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	03-Nov-24		
Temperature: 24 ºC	Relative Humidity: 42 %	Air Pressure: 1003 hPa	Power: 120 VAC, 60 Hz
Remarks: BLE			

Plot 7.2.6 Field strength of carrier at high frequency (2 Mbps)





Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

7.3 Field strength of spurious emissions

7.3.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.3.2.

Table 7.3.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)*			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
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 – 10thharmonic	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.

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

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 7.3.1, 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 and shown in the associated plots.

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

The EUT was set up as shown in Figure 7.3.2, Figure 7.3.3, energized and the performance check was conducted.

7.3.3.1 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.

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

Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	**Relative Humidity:** 56 %	**Air Pressure:** 1012 hPa	**Power:** 110 VAC, 60 Hz
Remarks: BLE			

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

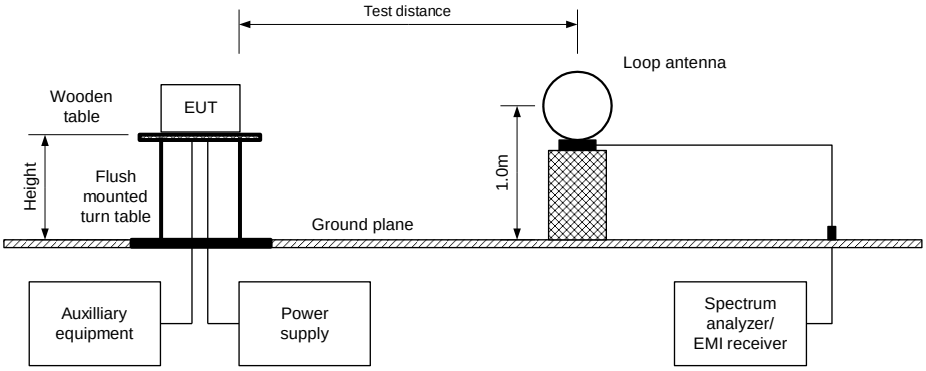
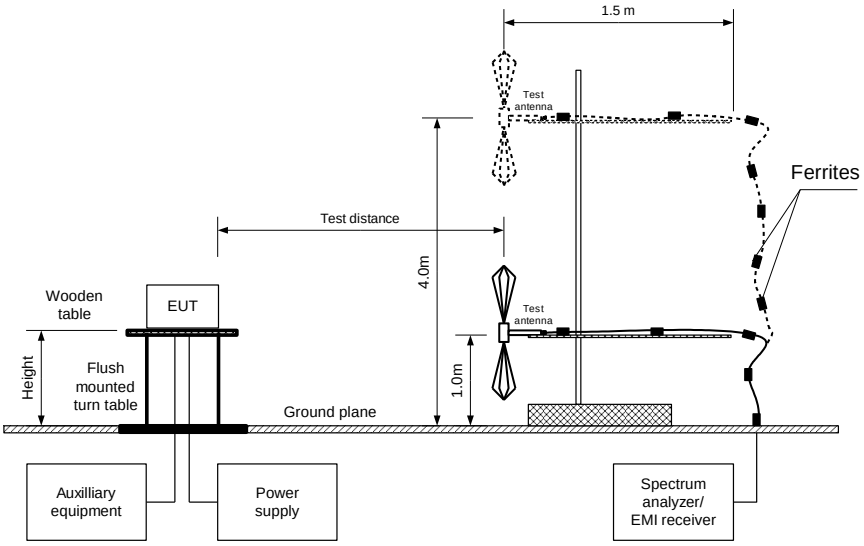
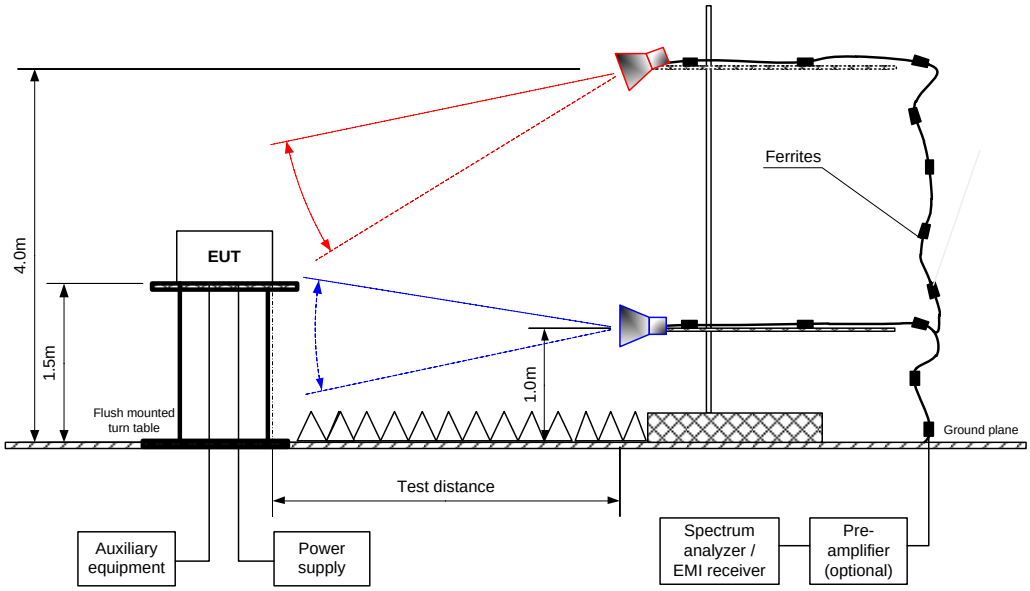


Figure 7.3.2 Setup for spurious emission field strength measurements in 30 -1000 MHz



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

Figure 7.3.3 Setup for spurious emission field strength measurements above1000 MHz



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	**Relative Humidity:** 56 %	**Air Pressure:** 1012 hPa	**Power:** 110 VAC, 60 Hz
Remarks: BLE			

Table 7.3.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY:	2400-2483.5 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 - 25000 MHz
TEST DISTANCE:	3 m
MODULATION:	GFSK
BIT RATE:	1 Mbps
DUTY CYCLE:	100 %
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	100 kHz
VIDEO BANDWIDTH:	300 kHz
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength of spurious, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(µV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
Low, mid, high carrier frequency									
No emissions were found									Pass

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = Attenuation below carrier – specification limit.

Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	**Relative Humidity:** 56 %	**Air Pressure:** 1012 hPa	**Power:** 110 VAC, 60 Hz
Remarks: BLE			

Table 7.3.3 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY:	2400-2483.5 MHz
INVESTIGATED FREQUENCY RANGE:	1000 -25000 MHz
TEST DISTANCE:	3 m
MODULATION:	GFSK
BIT RATE:	1 Mbps
DUTY CYCLE:	100 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1000 kHz
TEST ANTENNA TYPE:	Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Polarization	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**	
Low carrier frequency											
4804	Horizontal	1.5	-44	48.1	74	-25.9	41.4	NA	54	-12.6	Pass
7206	Horizontal	1.5	180	50.3	74	-23.7	44.7	NA	54	-9.3	
Mid carrier frequency											
4880	Horizontal	1.5	-60	46.4	74	-27.6	39.8	NA	54	-12.2	Pass
7320	Horizontal	1.5	180	50.1	74	-23.9	44.3	NA	54	-9.7	
High carrier frequency											
4960	Horizontal	1.6	45	45.6	74	-28.4	41.5	NA	54	-12.5	Pass
7440	Horizontal	1.5	65	49.0	74	-25.0	45.3	NA	54	-8.7	

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

Table 7.3.4 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
NA	NA	NA	NA	NA	NA

*- Average factor was calculated as follows

for pulse train shorter than 100 ms: $$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{Train\ duration} \times Number\ of\ bursts\ within\ pulse\ train\right)$$

for pulse train longer than 100 ms: $$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{100\,ms} \times Number\ of\ bursts\ within\ 100\,ms\right)$$

Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	**Relative Humidity:** 56 %	**Air Pressure:** 1012 hPa	**Power:** 110 VAC, 60 Hz
Remarks: BLE			

Table 7.3.5 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY:	2400-2483.5 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 1000 MHz
TEST DISTANCE:	3 m
MODULATION:	GFSK
BIT RATE:	1 Mbps
DUTY CYCLE:	100 %
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.mid, high carrier frequency								
35.2	29.7	20.4	40	-19.6	Vertical	1.0	-22	Pass
45.8	30.3	21.6	40	-18.4	Vertical	1.0	-22	
90.5	30.2	27.4	40	-12.6	Vertical	1.0	89	
74.7	29.3	21.6	40	-18.4	Vertical	1.0	-22	

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

Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	**Relative Humidity:** 56 %	**Air Pressure:** 1012 hPa	**Power:** 110 VAC, 60 Hz
Remarks: BLE			

Table 7.3.6 Restricted bands according to FCC section 15.205

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	12.29 - 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	16.42 - 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 7.3.7 Restricted bands according to RSS-Gen

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 - 2.1905	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	12.29 – 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
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

Reference numbers of test equipment used

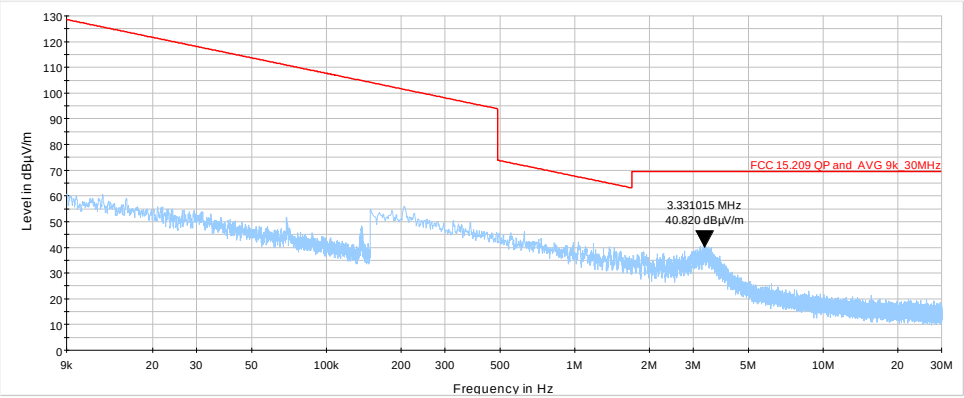
HL 446	HL 5288	HL4933	HL4956	HL 3903	HL 5902	HL 5112	HL 4338

Full description is given in Appendix A.

Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

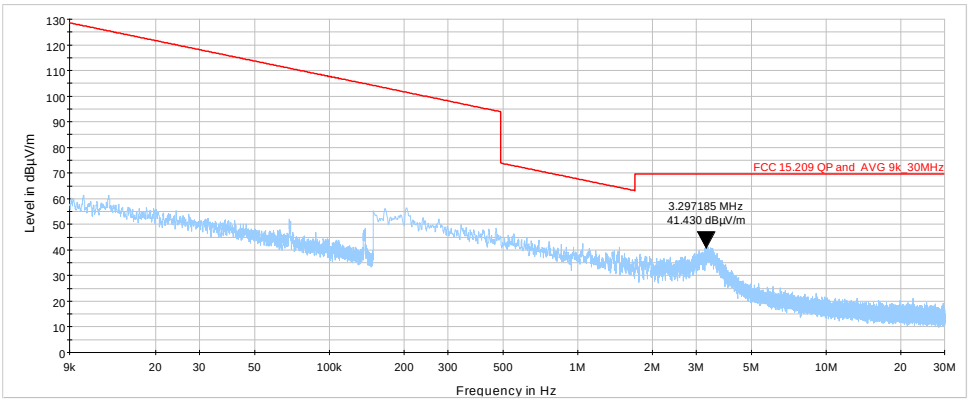
Plot 7.3.1 Radiated emission measurements from 9 kHz to 30 MHz at the low carrier frequency

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



Plot 7.3.2 Radiated emission measurements from 9 kHz to 30 MHz at the mid carrier frequency

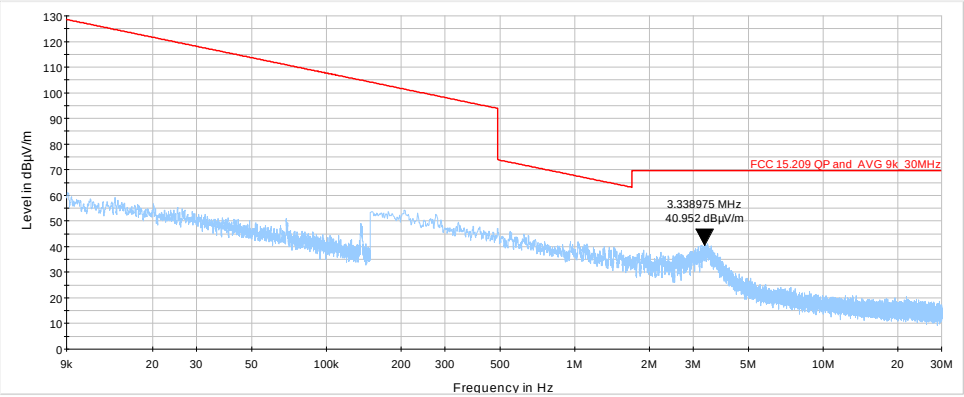
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

Plot 7.3.3 Radiated emission measurements from 9 kHz to 30 MHz at the high carrier frequency

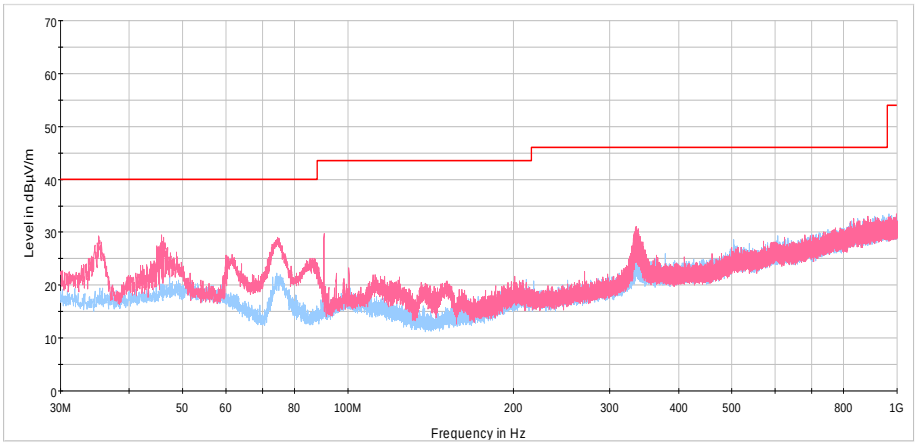
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

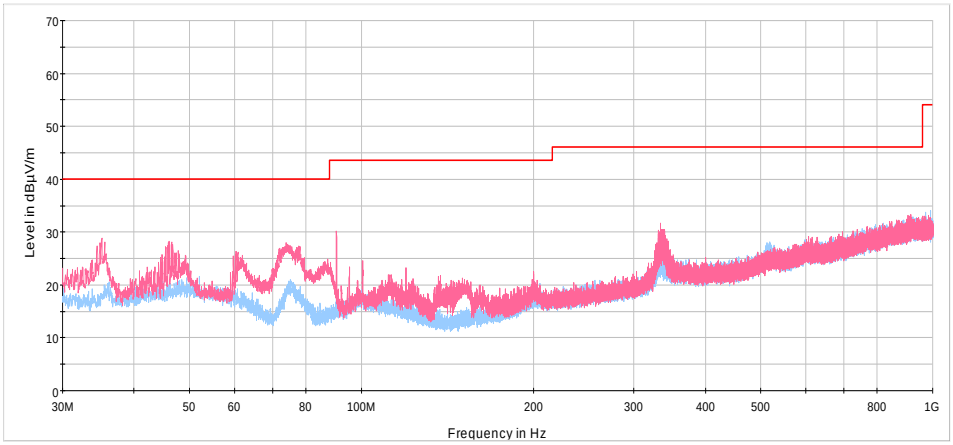
Plot 7.3.4 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



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

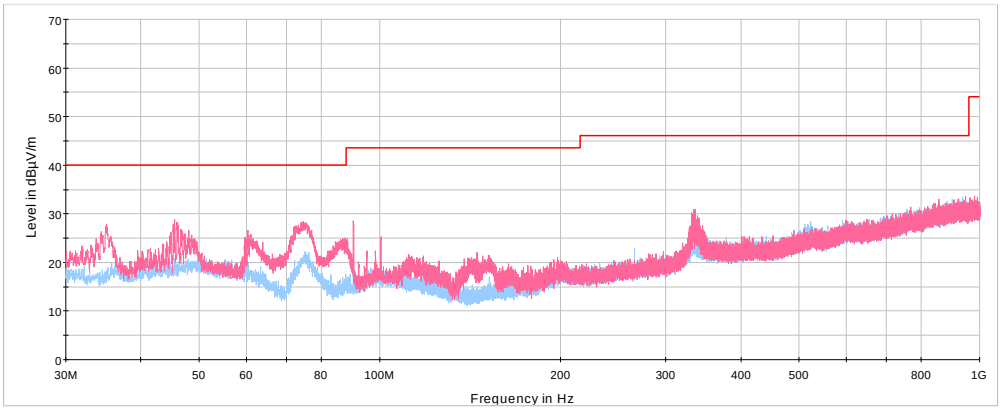
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

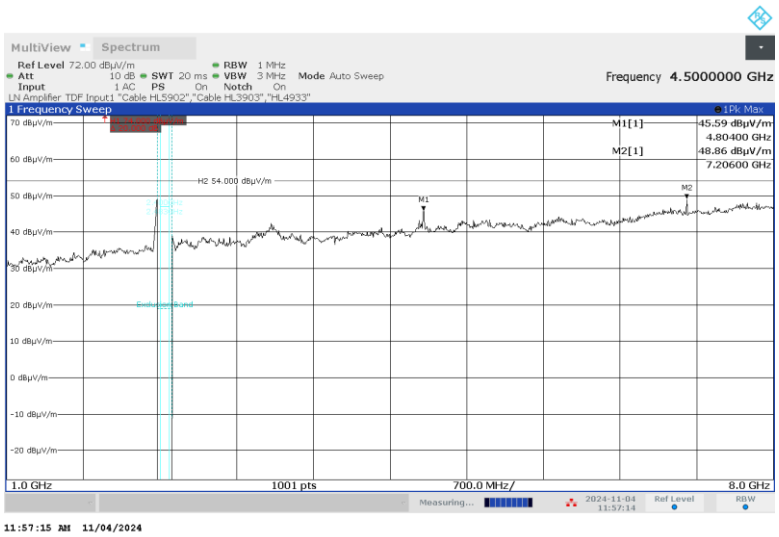
Plot 7.3.6 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



Plot 7.3.7 Radiated emission measurements from 1000 to 8000 MHz at the low carrier frequency

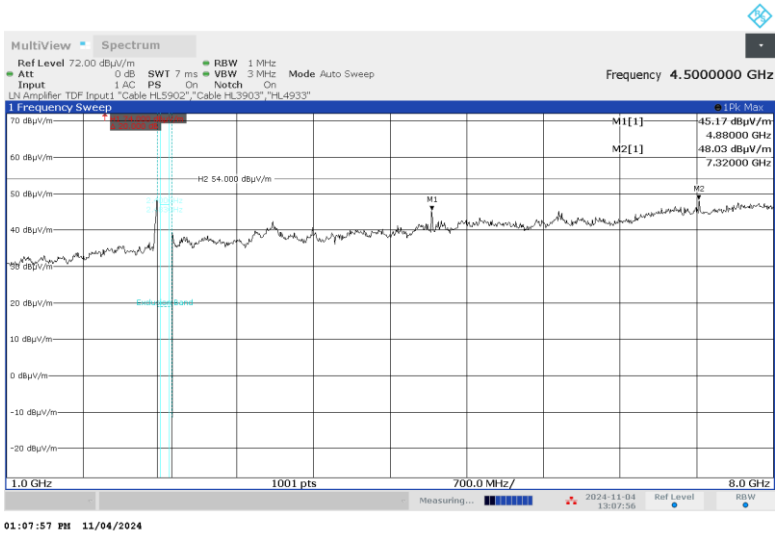
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

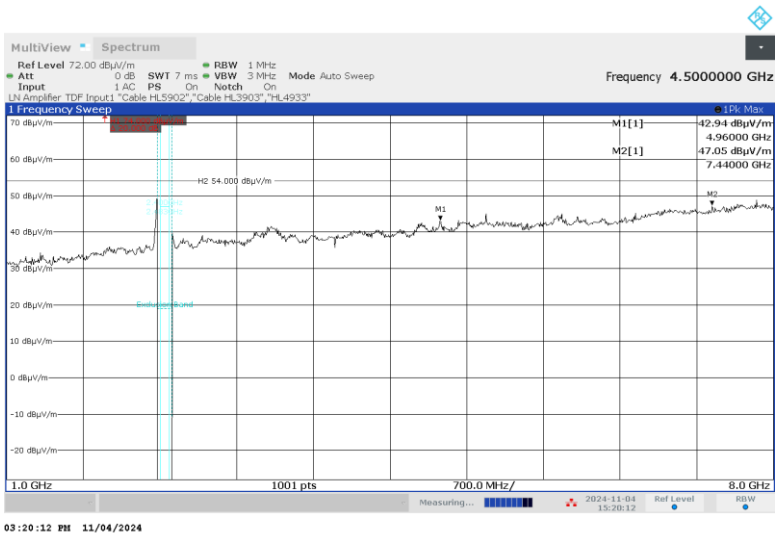
Plot 7.3.8 Radiated emission measurements from 1000 to 8000 MHz at the mid carrier frequency

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



Plot 7.3.9 Radiated emission measurements from 1000 to 8000 MHz at the high carrier frequency

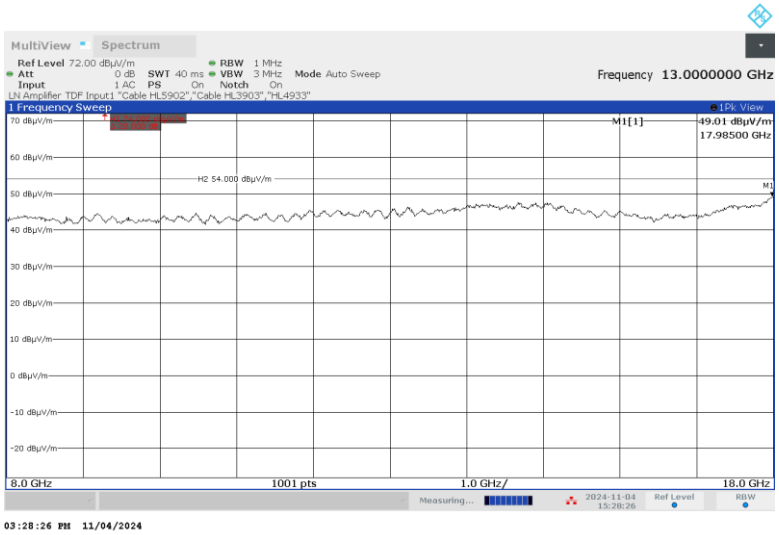
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

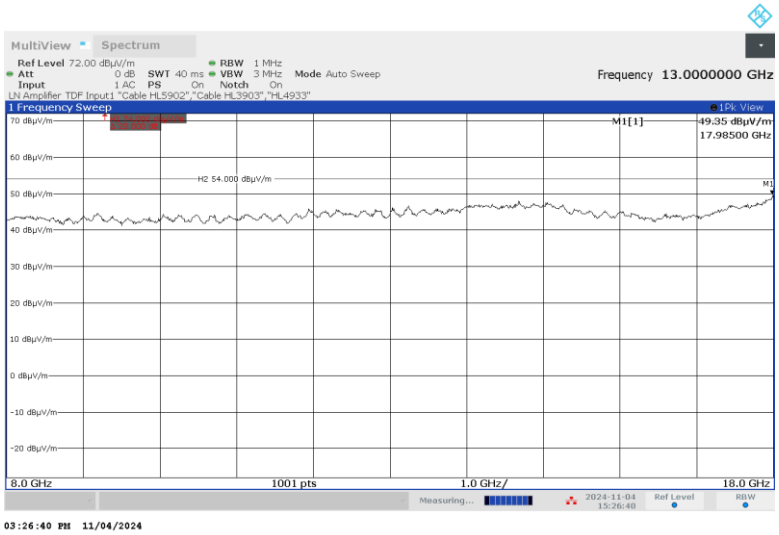
Plot 7.3.10 Radiated emission measurements from 8000 to 18000MHz at the low carrier frequency

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



Plot 7.3.11 Radiated emission measurements from 8000 to 18000 MHz at the mid carrier frequency

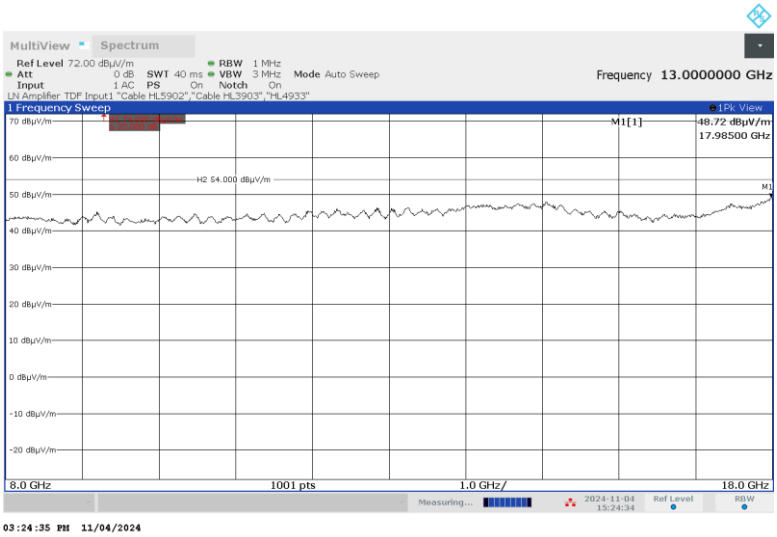
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

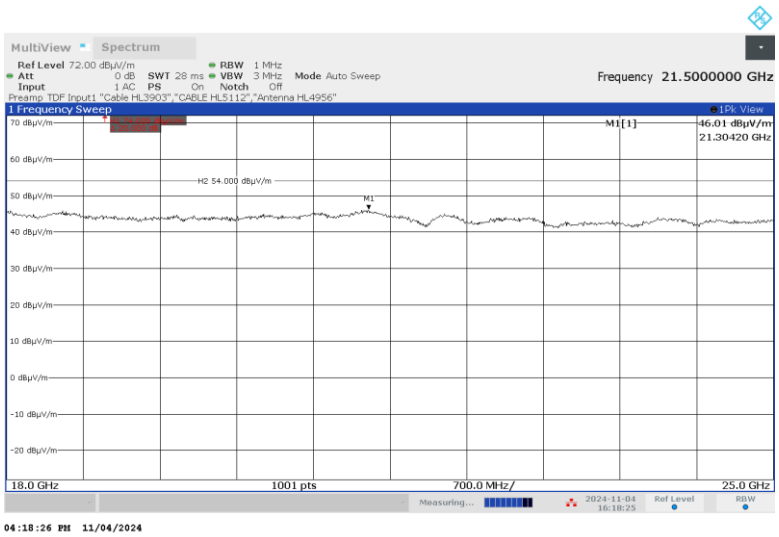
Plot 7.3.12 Radiated emission measurements from 8000 to 1800 MHz at the high carrier frequency

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



Plot 7.3.22 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency

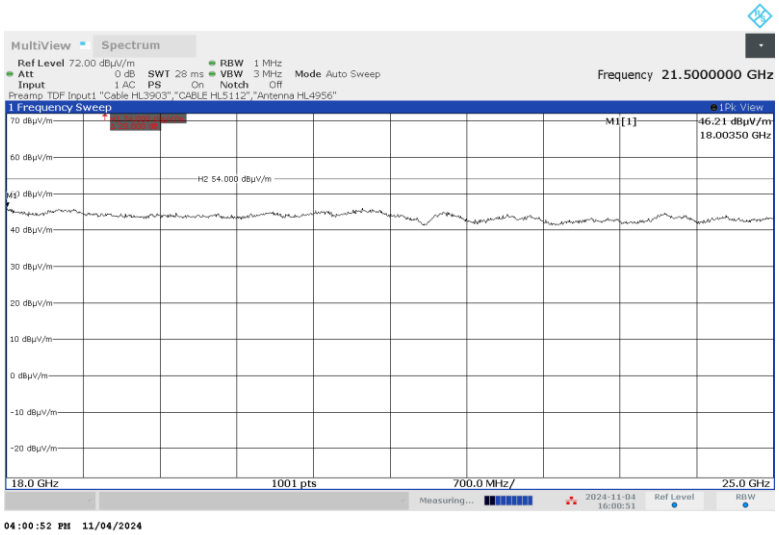
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

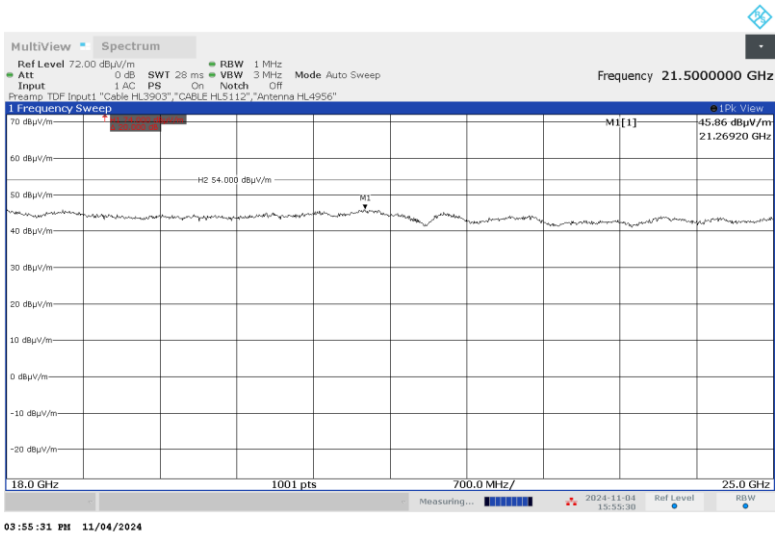
Plot 7.3.23 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency

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



Plot 7.3.24 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency

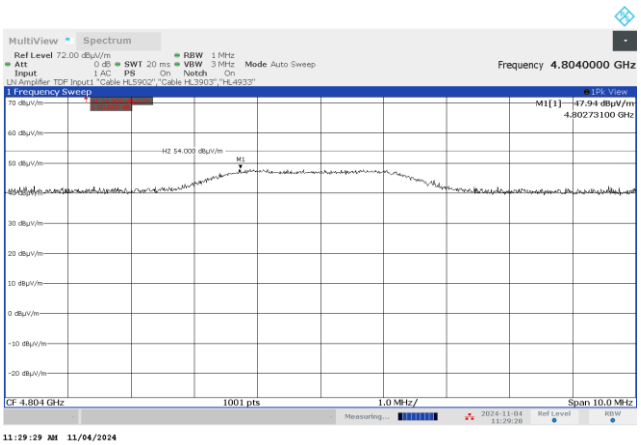
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



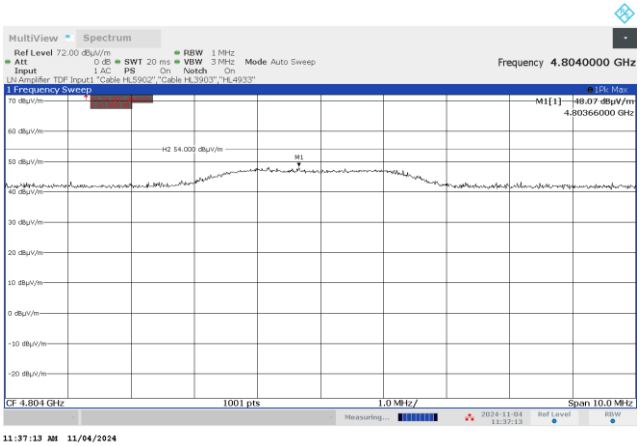
Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Nov-24		
Temperature: 23 ºC	Relative Humidity: 56 %	Air Pressure: 1012 hPa	Power: 110 VAC, 60 Hz
Remarks: BLE			

Plot 7.3.13 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



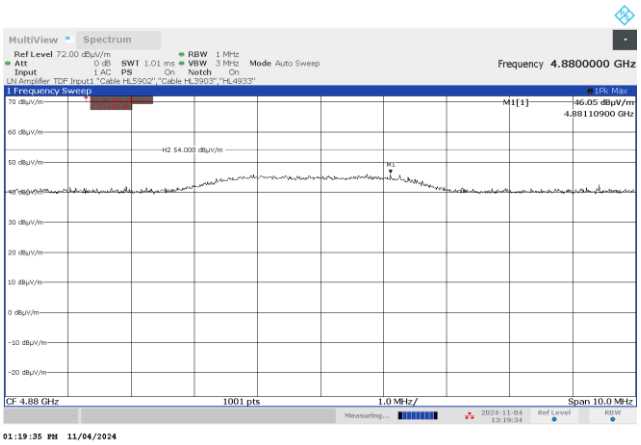
Vertical antenna polarization



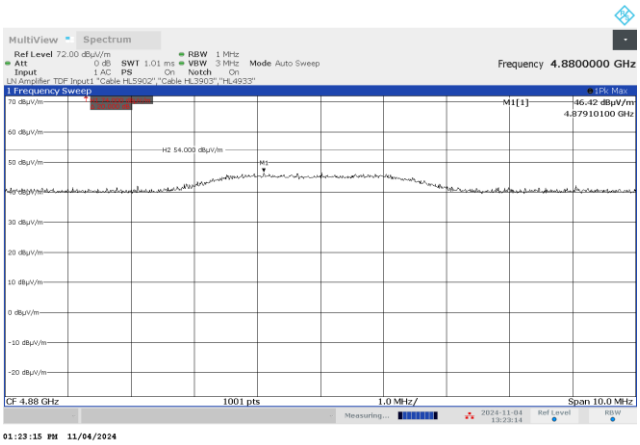
Horizontal antenna polarization

Plot 7.3.14 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Vertical antenna polarization



Horizontal antenna polarization