

Test Report

Prepared for: Luna Products LLC

Model: LP.SMOKE01.345.1

Serial Number: 0000118

Description: Heiman Smoke Alarm

FCC ID: 2ATK4-LPSMOKE013451
IC ID: 27198-LPSMOKE3451

To

FCC Part 15.231
And
RSS-210 Issue 11: June 25, 2024

Test Result: PASS

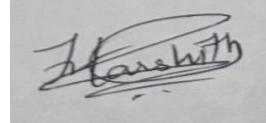
Date of Issue: September 16, 2025

On the behalf of the applicant: **Luna Products LLC**
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ANAB Cert#: AT-2901
FCC Site Reg. #750616
ISED Site Reg. #2044A-2

Reviewed / Authorized By:



Harshith Devaraja
EMC Engineer

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All results contained herein relate only to the sample tested.

Test Results Summary

Test Date Range: August 19, 2025 – September 16, 2025

Specification		Test Name	Pass, Fail, N/A	Comments
FCC	RSS 210 Issue 11			
15.231(a)(b)	A.1.2, A.1.3	Fundamental Field Strength	Pass	5 second transmission cease plot included
15.231(b)	A.1.3	Out of Band Spurious Emissions	Pass	
15.231(c)	A.1.4, RSS-Gen 6.7	Occupied Bandwidth	Pass	

Statements of conformity are reported as:

- Pass - the measured value is below the acceptance limit, *acceptance limit = test limit*.
- Fail - the measured value is above the acceptance limit, *acceptance limit = test limit*.

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	August 21, 2025	Harshith Devaraja	Original Document
2.0	September 16, 2025	Harshith Devaraja	Updated Test Summary Table (page 2) Updated Duty cycle correction factor (page 12) Updated Radiated Spurious Emission Limit (page 14-19)

Current revision of the test report replaces any prior versions. Only the current version of the test report is valid.

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ANAB

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The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.



FCC Site Reg. #750616

IC Site Reg. #2044A-2

The applicant has been cautioned as to the following

15.21: Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.10-2020 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (°C)	Humidity (%)	Pressure (Mbar)
25.74 – 29.2	34.9 – 42.7	964.7 – 970.2

EUT Description

Model:	LP.SMOKE01.345.1
Serial:	0000118
Firmware:	NA
Software:	0
Description:	Heiman Smoke Alarm
Additional Information:	Highest Frequency Generated: 345 MHz Usage: Table/Desktop
Receipt of Sample(s):	August 14, 2025
EUT Condition:	Visual Damage No State of Development Production/Production Equivalent

EUT Operation during Tests

The EUT was powered with a 3V CR123A battery and placed in a constant transmit mode during testing unless otherwise stated.

Accessories: NA

Cables: NA

Modifications: NA

Fundamental Field Strength

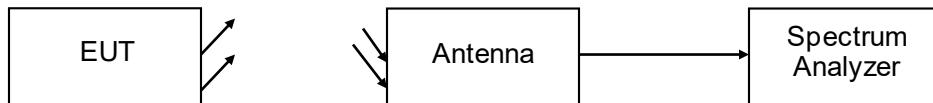
Engineer: Harshith Devaraja

Test Date: 8/19/25, 9/16/25

Test Procedure

The EUT was tested in a semi-anechoic chamber at a distance of 3 meters from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Fundamental Field Strength.

Test Setup



Spectrum Analyzer Settings

Detector Settings	RBW	VBW	Span
Peak	120 kHz	390 kHz	As Necessary

Sample Calculations:

Correction Factors include Antenna and cable insertion loss.

Measured Level includes correction factors that were entered into the spectrum analyzer before recording test data. All following limits were converted to dB μ V/m by the calculation stated below:

$20 \times \log(uV/m)$

Fundamental Frequency (MHz)	Field Strength of Fundamental (uV/m)	Field Strength of Spurious Emissions (uV/m)
260 - 470	3750 to 12500*	375 to 1250

*Linear interpolations

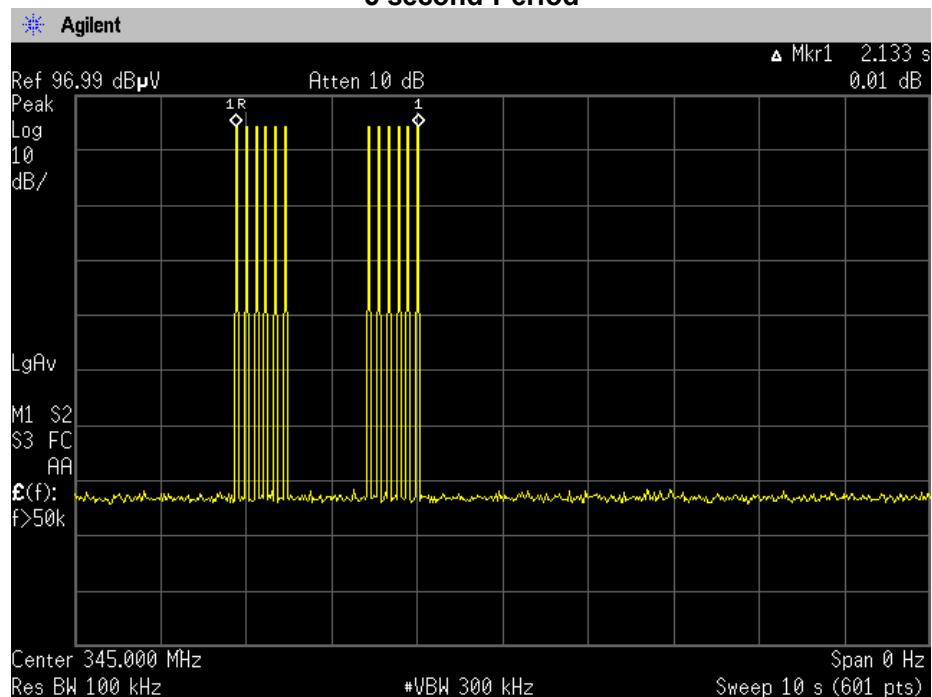
Linear interpolation of the fundamental emission for an intentional transmitter at 345 MHz = 77.26 dB μ V/m at 3 meters

Fundamental Field Strength

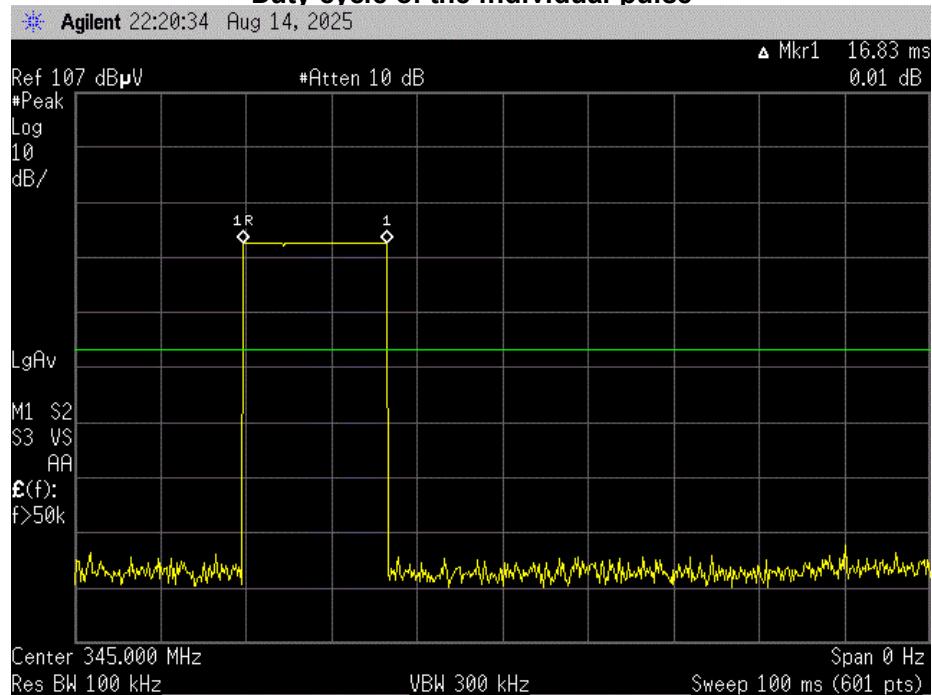
Tuned Frequency (MHz)	Peak Measured Level (dB μ V/m)	Peak. Limit (dB μ V/m)	Avg. Measured Level (dB μ V/m)	Avg. Limit (dB μ V/m)	Avg. Margin (dB)	Result
345	89.310	97.26	73.831	77.26	-3.429	Pass

Duty cycle correction = -15.47 dB

5 second Period



Duty cycle of the individual pulse



Duty cycle correction calculation

T(On) ms	T (ms)	Duty Cycle dB
16.83	100	-15.47

Since the pulse train exceeds 100 ms, the Pulse on time is measured over 100ms.

Pulse on-time = 16.83 ms

Time period = 100ms

Duty cycle = Pulse on-time / Time period = $16.83 / 100 = 0.1683 = 16.83\%$

Duty Cycle Correction (Averaging factor) = $20 \log (\text{duty cycle}) = 20 \log (0.1683) = -15.47 \text{ db}$

Radiated Spurious Emissions

Engineer: Harshith Devaraja

Test Date: 9/16/25

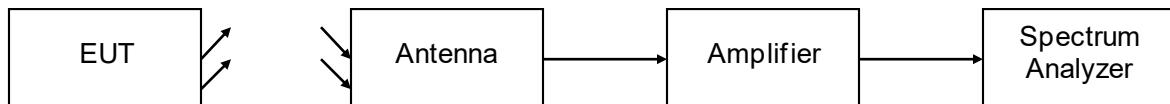
Test Procedure

The EUT was tested in a semi-anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the limits for Radiated Spurious Emissions. The antenna, band reject filter, amplifier and cable correction factors were input into the spectrum analyzer before recording data. The spectrum for each tuned frequency was examined to the 10th harmonic.

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

Linear interpolation of the spurious emission limit for an intentional transmitter at 345 MHz = 57.26 dB μ V/m at 3 meters.

Test Setup



Analyzer Settings

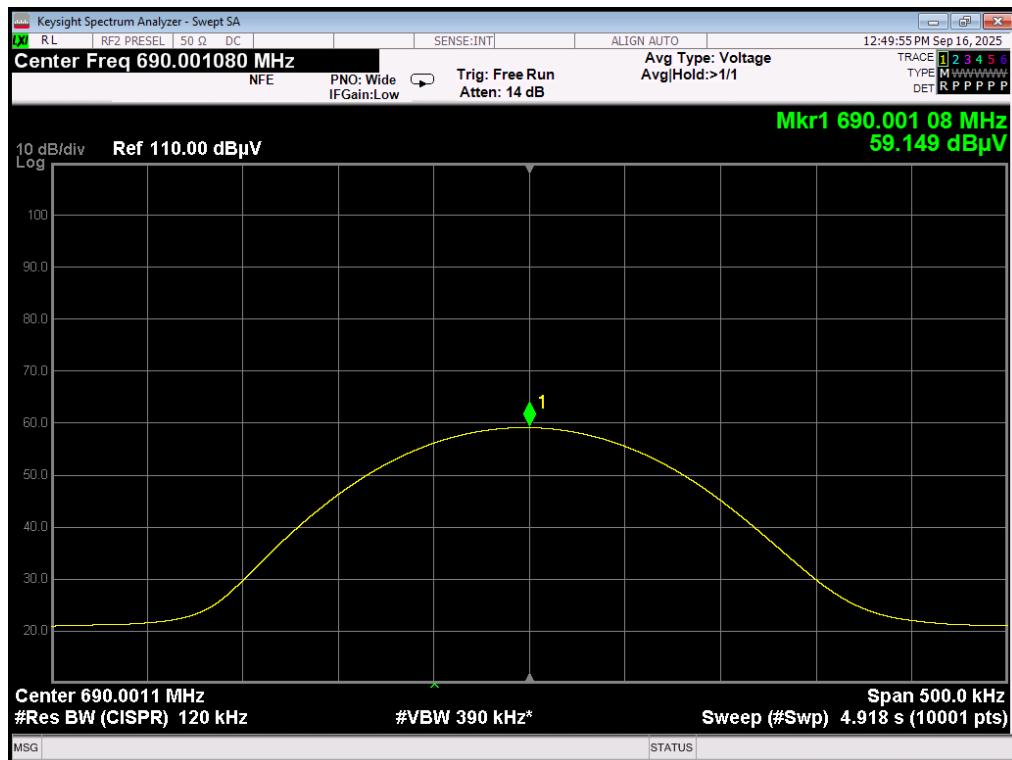
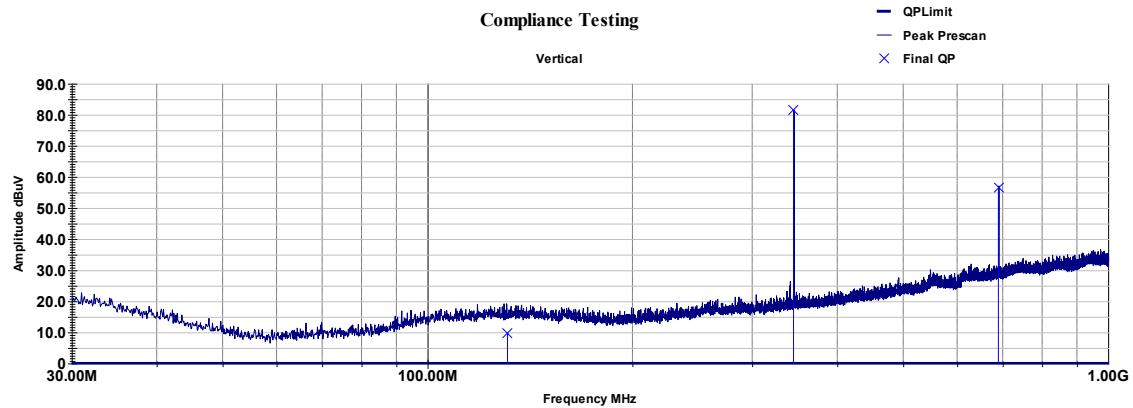
	Settings Below 1GHz	Settings Above 1GHz
RBW	120 kHz	1 MHz
VBW	390 kHz	3 MHz
Detector	Quasi Peak	Peak / Average

Sample Calculations:

Correction Factors include Antenna and cable insertion loss correction factors.

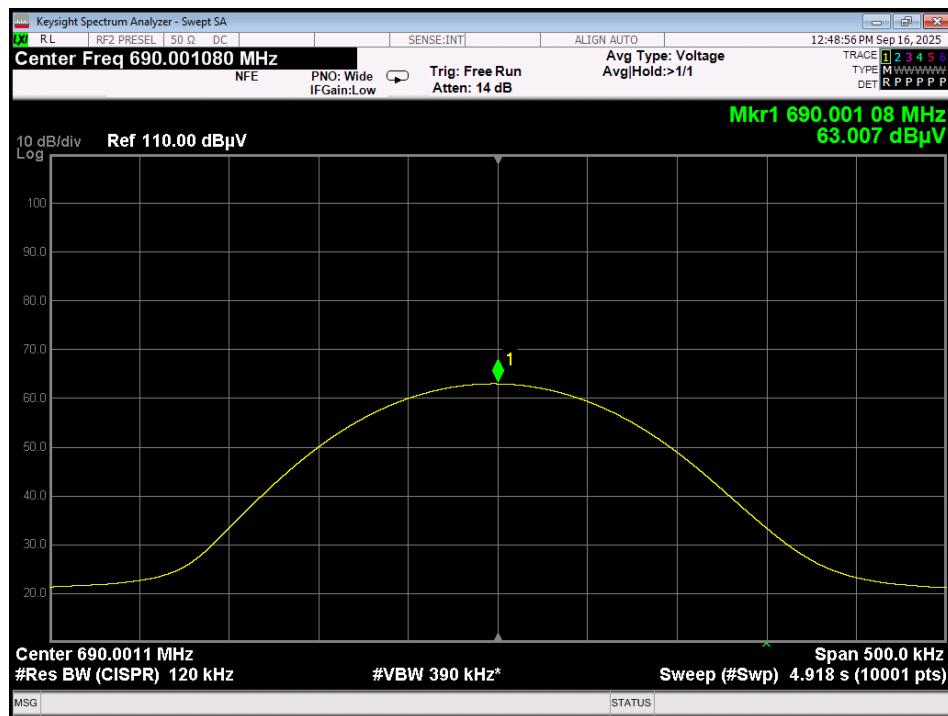
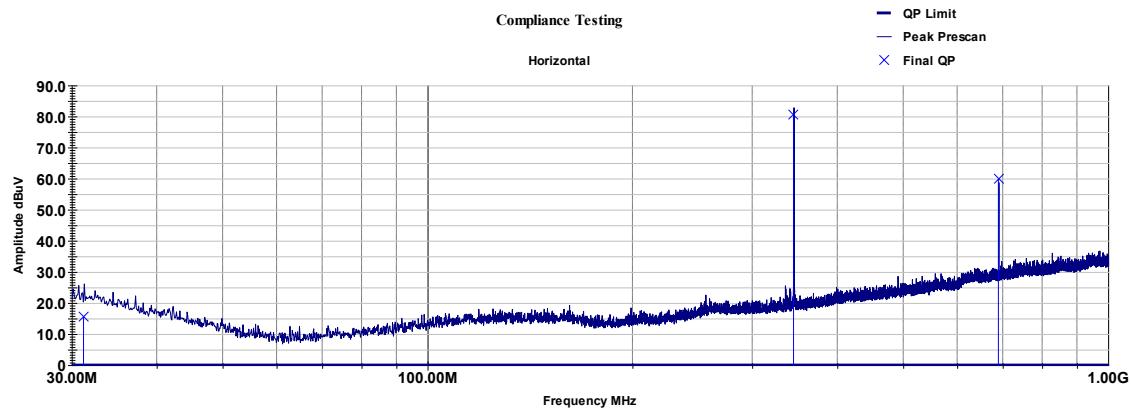
Measured Level includes correction factors that were input to the spectrum analyzer before recording test data

Radiated Emissions 30-1000MHz



The second harmonic was further investigated manually with the raw avg value reflected in the table below

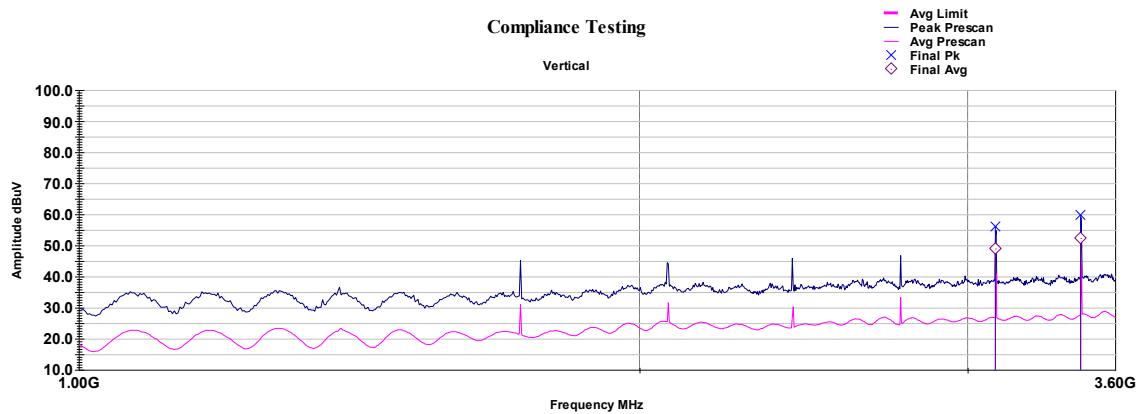
Frequency	Azimuth	Height	Raw Avg	Correction	Final Avg	Limit	Avg Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
131.054	122.00	380.00	27.69	-18.02	9.70	57.26	-47.59
345	355.00	165.00	N/A	N/A	N/A	N/A	N/A
670.002	212.00	106.00	59.15	-6.68	52.47	57.26	-4.80
Final = Raw + Path Loss							
Margin = Final - Limit							



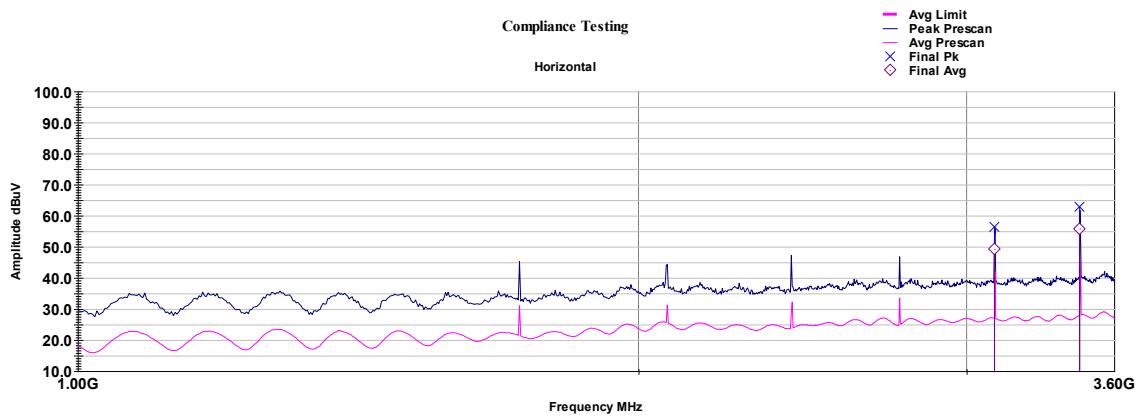
The second harmonic was further investigated manually with the raw avg value reflected in the table below

Frequency	Azimuth	Height	Raw Avg	Correction	Final Avg	Limit	Avg Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
31.233	117.00	156.00	27.68	-12.13	15.60	57.26	-41.70
345.001	212.00	105.00	N/A	N/A	N/A	N/A	N/A
690.003	165.00	109.00	63.01	-6.48	56.52	57.26	-0.74
Final = Raw + Path Loss							
Margin = Final - Limit							

Radiated Emissions Above 1000MHz



Frequency	Azimuth	Height	Raw Avg	Correction	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
3104885000	61.00	106.00	55.29	-6.30	48.98	57.26	-8.28
3449998000	65.00	100.00	57.72	-5.36	52.36	57.26	-4.90
Final = Raw + Path Loss							
Margin = Final - Limit							



Frequency	Azimuth	Height	Raw Avg	Correction	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
3105037000	293.00	106.00	55.58	-6.30	49.28	57.26	-7.98
3449993000	293.00	100.00	61.17	-5.36	55.81	57.26	-1.45
Final = Raw + Path Loss							
Margin = Final - Limit							

99% and 20db Occupied Bandwidth

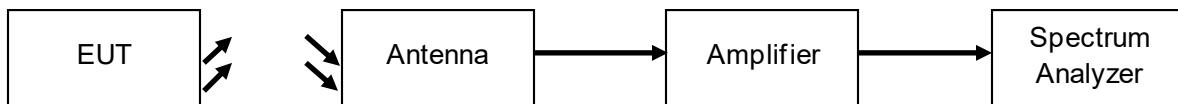
Engineer: Harshith Devarajaz

Test Date: 8/20/25

Test Procedure

The EUT was tested in a semi-anechoic chamber at a distance of 3 meter from the receiving antenna. The Span was set wide enough to capture the entire transmit spectrum and the resolution bandwidth was set to at least 1% of the span. The analyzer was set to max hold while the 99% and 20db bandwidth was measured.

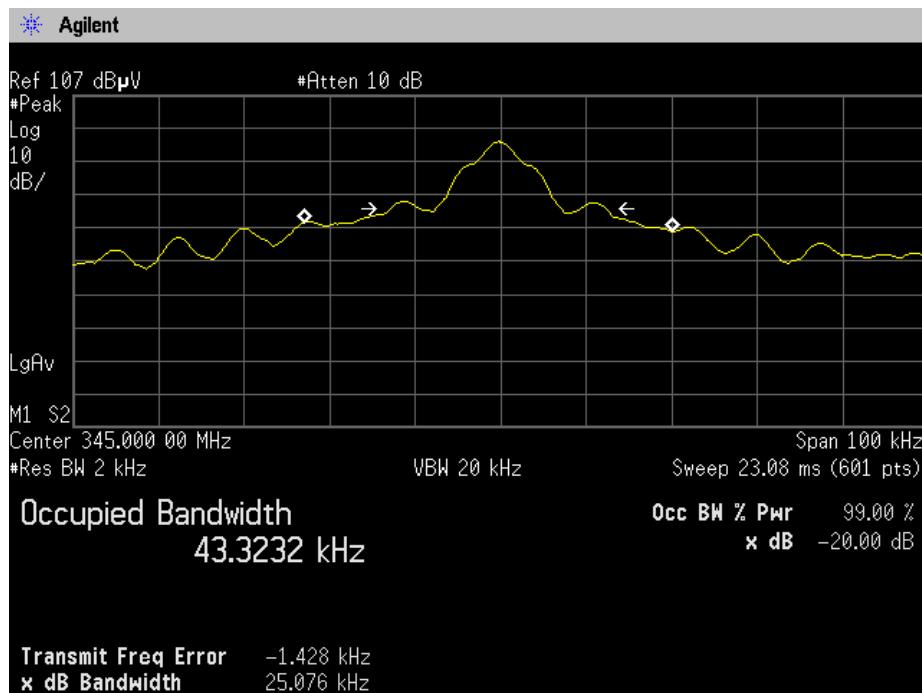
Test Setup



Occupied Bandwidth Summary

Frequency (MHz)	Recorded Measurement (kHz)	Result
345	25.076	Pass

99% and 20db Occupied Bandwidth



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna (1-18GHz)	ARA	DRG-118/A	i00271	8/9/24	8/9/26
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	2/27/25	2/27/27
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/13/23	7/13/26
44GHz EMI receiver	Keysight	N9038A	i00552	3/17/25	3/17/26
PSA Spectrum Analyzer	Agilent	E4448A	i00688	10/26/24	10/26/25
44GHz EMI receiver	Keysight	N9038A	i00552	3/17/25	3/17/26
Temp./humidity/pressure monitor (Main Lab)	Omega Engineering	iBTHX-W-5	i00686	1/25/25	1/25/26

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

Measurement Uncertainty

Measurement Uncertainty (U_{lab}) for Compliance Testing is listed in the table below.

Measurement	U_{lab}
Radio Frequency	$\pm 3.3 \times 10^{-8}$
RF Power, conducted	± 1.5 dB
RF Power Density, conducted	± 1.0 dB
Conducted Emissions	± 1.8 dB
Radiated Emissions	± 4.5 dB
Temperature	± 1.5 deg C
Humidity	± 4.3 %
DC voltage	± 0.20 VDC
AC Voltage	± 1.2 VAC

The reported expanded uncertainty $+/ - U_{lab}$ (dB) has been estimated at a 95% confidence level ($k=2$)

U_{lab} is less than or equal to U_{ETSI} therefore

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance limit

END OF TEST REPORT