FCC PART 15 SUBPART B & SUBPART C SECTION 15.225 RSS GEN, RSS 210
TEST REPORT

For

HALO SELECT PLUS
MODEL: 9801
FCC ID: NUL-HAL3SP
IC: 3022A-HAL3SP

Prepared for

ASSA ABLOY AMERICAS RESIDENTIAL
19701 DA VINCI
LAKE FOREST, CA 62610

Prepared by: _____

TOM SZYNAL

Approved by: _____

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DATE: JUNE 09, 2025

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NVLAP® TESTING
NVLAP LAB CODE 200527-0

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GENERAL REPORT SUMMARY

This electromagnetic emission report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form except in full, without the written permission of Compatible Electronics.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Device Tested:	Halo Select Plus Model: 9801 FCC ID: NUL-HAL3SP, IC: 3022A-HAL3SP
Product Description:	The EUT is Halo Select Plus. The NFC Tag Reader contains a 13.56MHz RF Transceiver that transmits for 2 seconds at full power and 3 seconds at low power. The lock is always installed on a residential building's entry door. Highest Clock Frequency: 13.56 MHz Dimensions (LxWxH): 1.35” x 2.85” x 5.40”
Modifications:	The EUT was not modified during the testing in order to comply with the specifications.
Manufacturer:	ASSA ABLOY Americas Residential 19701 Da Vinci Lake Forest, CA 92610
Test Date:	April 24, 25 and 28, 2025

Test Specifications Covered by Accreditation:

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Test Specifications: EMI requirements
FCC CFR Title 47, Part 15 Subpart B, Subpart C Section 15.225
RSS GEN, RSS 210, KDB 447498
Test Procedure: ANSI C63.4 & C63.10.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz.	The EUT is battery powered, therefore this test was deemed unnecessary and thus was not performed.
2	Spurious RF Emissions, 9 kHz – 1 GHz.	Complies with the limits of RSS-210, RSS-GEN, CFR Title 47 Part 15 Subpart B Section 15.109 & Subpart C Section 15.205, 15.209, and 15.225
3	Transmission Timeout	Complies with the limits of CFR Title 47 Part 15 Subpart C Sections 15.205, 15.209, RSS-102, and 15.225, RSS-210, RSS-GEN

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Halo Select Plus Model: 9801. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 and C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the specification limits defined by RSS 210 Issue 11, RSS Gen Issue 5 Amendment 1 and 2, and the Code of Federal Regulations Title 47, Part 15 Subpart B, Part 15 Subpart C Sections 15.205, 15.209, 15.225, RSS-102, RSS-210 and RSS-GEN

1.1 Decision Rule & Risk

If a measured value exceeds a specification limit it implies non-compliance. If the value is below a specification limit it implies compliance. Measurement uncertainty of the laboratory is reported with all measurement results but generally not taken into consideration unless a standard, rule or law requires it to be considered.

Qualification test reports are only produced for products that are in compliance with the test requirements, therefore results are always in conformity. Otherwise, an engineering report or just the data is provided to the customer.

When performing a measurement and making a statement of conformity, in or out-of-specification to manufacturer's specifications or Pass/Fail against a requirement, there are two possible outcomes:

- The result is reported as conforming with the specification
- The result is reported as not conforming with the specification

The decision rule is defined below.

When the test result is found to be below the limit but within our measurement uncertainty of the limit, it is our policy that the final acceptance decision is left to the customer, after discussing the implications and potential risks of the decision.

When the test result is found to be exactly on the specification, it is our policy, in the case of unwanted emissions measurements to consider the result non-compliant, however, the final decision is left to the customer, after discussing the implications and potential risks of the decision.

When the test result is found to be over the specification limit under any condition, it is our policy to consider the result non-compliant.

In terms of uncertainty of measurement, the laboratory is a calibrated and tightly controlled environment and generally exceptionally stable, the measurement uncertainties are evaluated without the consideration of the test sample. When it comes to the test sample however, as most testing is performed on a single sample rather than a sample population, and that sample is often a pre-production representation of the final product, that test sample represents a significantly higher source of measurement uncertainty. We advise our customers of this and that when in doubt (small test to limit margins), they may wish to perform statistical sampling on a population to gain a higher confidence in the results. All lab reported results are that of a single sample in any event.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way, Lake Forest, California 92630.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

ASSA ABLOY Americas Residential

Thuan Nguyen Assc. Electronic Engineer

Compatible Electronics, Inc.

Tom Szynal Test Engineer
Joey Manglangbayan Special Services Engineer

2.4 Date Test Sample was Received

The test sample was received on April 24, 2025. Received as described in product description.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics as of the date of this report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
NVLAP	National Voluntary Laboratory Accreditation Program
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
NCR	No Calibration Required
RX	Receive
TX	Transmit
PCB	Printed Circuit Board
NFC	Near Field Communication

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

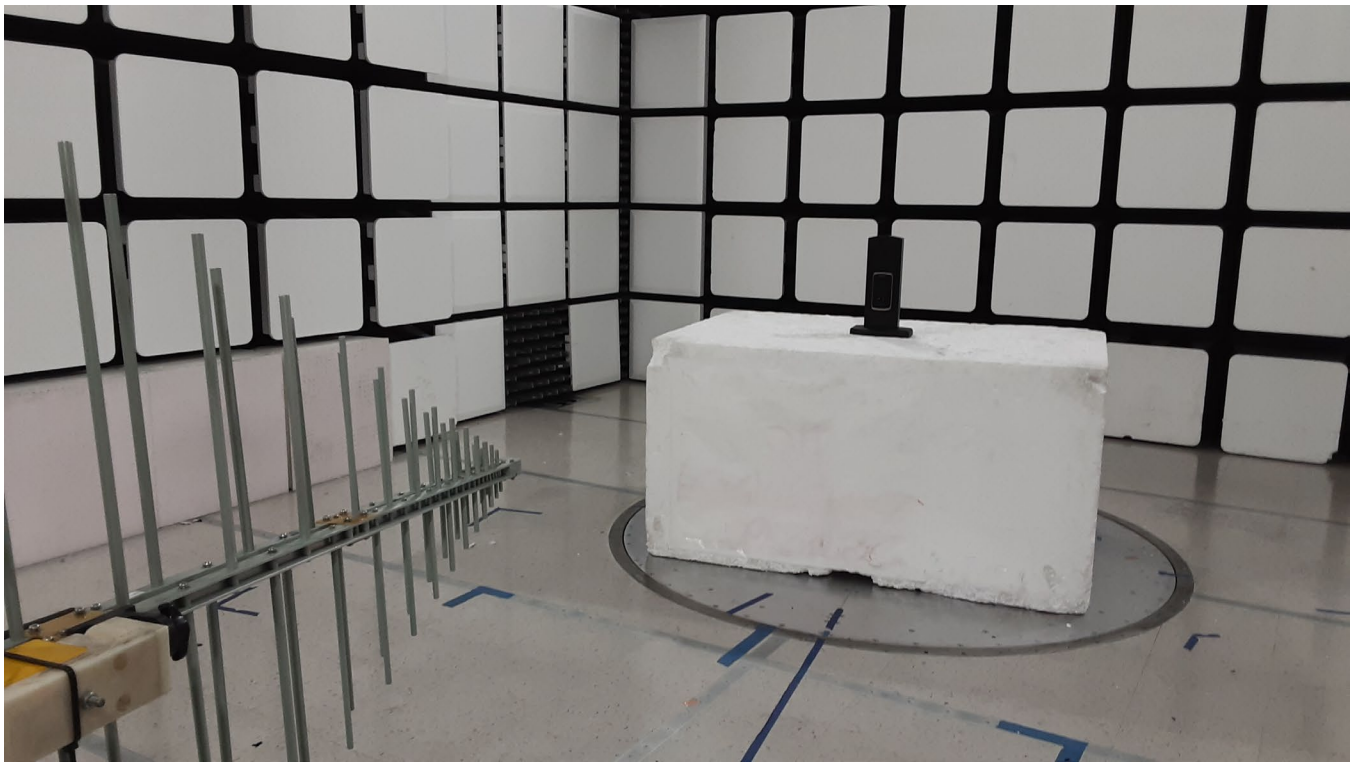
SPEC	TITLE
FCC CFR Title 47, Part 15, Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
FCC CFR Title 47, Part 15, Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
KDB 447498 D01	General FR Exposure Guidance v06
ANSI C63.10: 2013	American National Standard for Testing Unlicensed Wireless Devices
ANSI C63.4 2014	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
RSS GEN, Issue 5 Amendment 1 (March 2019) Amendment 2 (February 2021)	General Requirements for Compliance of Radio Apparatus
RSS 102 Issue 6 (December 2023)	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
RSS 210 Issue 11: (June 2024)	License-Exempt Radio Apparatus: Category I Equipment

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The Halo Select Plus, Model: 9801 (EUT) was set up in a standalone table-top configuration. Upon detection of a NFC tag close by, the EUT wakes up for 2 seconds during which it tries to read and validate the credential from the NFC tag via its RF transceiver which operates at 13.56 MHz. Once the EUT has validated the NFC tag's credential, it goes into ultra low power state for 3 seconds then goes back to NFC tag detection mode again. The worst-case orientation was deemed to be the Y-axis.

4.1.1 Photograph of Test Configuration – EMI



4.1.1.1 Photograph of Test Configuration (Continued)

X Axis

Y Axis

Z Axis

4.1.2 Cable Construction and Termination

The EUT had no external cables.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	P/N
EUT	HALO SELECT PLUS FCC ID: NUL-HAL3SP, IC: 3022A-HAL3SP	ASSA ABLOY AMERICAS RESIDENTIAL	9801	FCC01

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Thermometer & Hygrometer	Control Company	4088	581508	01/23/2023	01/23/2026
Computer	Compatible Electronics	NONE	NONE	NCR	NCR
EMI Receiver	Keysight Technologies	N9038A	MY56400077	07/17/2024	07/17/2025
Antenna, Active Loop	Com-Power	AL-130R	10160093	04/23/2025	04/23/2026
Antenna, CombiLog	Com-Power	AC-220	10030023	10/23/2023	10/23/2025
Preamplifier 1-1000 MHz	Com-Power	PAM-103	441188	11/08/2024	11/08/2025
Below 1 GHz cable	Pasternack	RG-214	Asset: 5020	04/02/2025	04/02/2026
Below 1 GHz cable	Pasternack	RG-214	Asset: 5566	04/02/2025	04/02/2026
Mast, Antenna Positioner	Sunol Science Corporation	SC104V	081309-1	NCR	NCR
Antenna Mast	Sunol Science Corporation	TWR 95.4	081309-3	NCR	NCR
Turntable	Sunol Science Corporation	FM2011VS	NONE	NCR	NCR

5.3 Test Software

LAB(S)	SOFTWARE TITLE	MANUFACTURER	VERSION
P, R	Measurement and Automation Software	TDK TestLab	12.12

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

All the radiated emissions measurements were performed in a semi-anechoic chamber.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 0.6 by 1.2-meter by 0.8 meters high non-conductive table for below 1 GHz which was placed on the ground plane. For above 1 GHz, the EUT was mounted 1.5 meters above the ground plane.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature and barometric pressure.

6.4 Measurement Uncertainty

"Compatible Electronics" U_{lab} value is less than U_{cispr}, thus based on this − compliance is deemed to occur if no measured disturbance exceeds the disturbance limit

$$u_c(y) = \sqrt{\sum_i c_i^2 \; u^2(x_i)}$$

Measurement		U_{cispr}	U_{lab} = 2 uc (y)
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	3.6 dB	2.72 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	5.2 dB	3.39 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(1 GHz – 18 GHz)	5.2 dB	3.67dB

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

The Wireless Door Lock, Halo Select Plus, NFC tag operates at 13.56 MHz.

7.2 Antenna

The Antenna is a loop antenna printed on the PCB.

7.3 Software

The EUT is operated using Firmware Version v17.00_FCC.

8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

8.1 RF Emissions

8.1.1 Conducted Emissions Test

Test Results:

The EUT was battery powered, therefore this test was deemed unnecessary and thus was not performed. Had this test been deemed applicable, it would have been performed as described below.

The EMI Receiver was used as a measuring meter. A 10-dB attenuation pad was used for the protection of the EMI Receiver input stage. All factors associated with attenuator and cables were recorded into the EMI Software Program accordingly to display the actual corrected measured level. The LISN output was connected to the input of the EMI Receiver. The output of the second LISN was terminated with 50-ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT received its power through the LISN, which was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the EMI Receiver at a minimum scan rate of 10 seconds per octave.

8.1.2 Radiated Emissions Test Below 30 MHz

The EMI receiver was used as a measuring meter. The receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps.

For spurious emissions, the quasi-peak detector was used for frequencies below 1GHz and the average detector was used for frequencies above 1 GHz.

For the Harmonic emissions, duty cycle correction was used.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna

The TDK FAC-3 shielded test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4 & ANSI C63.10. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Data was collected in the worst case (highest emission) configuration of the EUT. At the transmit frequency band, the antenna height was 1 meter; the EUT was rotated 360 degrees; and the antenna was positioned in three orthogonal positions and the position with the highest emission level was recorded (for E field radiated field strength).

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart C sections 15.205, 15.209 and 15.225; and RSS-210, RSS-GEN. Please see Appendix E for the data sheets.

8.1.3 Radiated Emissions Test 30-1000 MHz

The EMI Receiver was used as the measuring meter. A built-in, internal preamplifier was used to increase the sensitivity of the instrument. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz for 9 kHz to 150 kHz, 9 kHz for 150 kHz to 30 MHz, 120 kHz for 30 MHz to 1 GHz and 1 MHz for 1 GHz to 25 GHz).

The frequencies above 1 GHz were averaged using the RMS detector function on the EMI Receiver.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 1.0.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
30 MHz to 1 GHz	120 kHz	CombiLog Antenna

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart C sections 15.205, 15.209 and 15.225; and RSS-210, RSS-GEN. The six highest emissions are listed in Table 1.

8.1.4 RF Emissions Test Results

Table 1 SPURIOUS EMISSION RESULTS
HALO SELECT PLUS, MODEL: 9801

Frequency MHz	Corrected Reading* dBuV/m	Specification Limit dBuV/m	Delta (Cor. Reading – Spec. Limit) dB
103.10	28.89	40.00	-11.11
103.10	27.90	40.00	-12.10
95.50	25.05	40.00	-14.95
32.80	24.11	40.00	-15.89
97.90	22.98	40.00	-17.02
46.10	21.93	40.00	-18.07

Notes:

*	The complete emissions data is given in Appendix E of this report.
**	The factors for the antenna are attached in Appendix D of this report.
#	Quasi-Peak Reading
A	Average Reading
V	Vertical Reading
H	Horizontal Reading

8.1.5 Sample Calculations

A correction factor for the antenna, cable and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. This Corrected Meter Reading is then compared to the specification limit in order to determine compliance with the limits.

Conversion to logarithmic terms: Specification limit (μ V/m) log x 20 = Specification Limit in dBuV/m

To correct for distance when measuring at a distance other than the specification

For measurements below 30 MHz: (Specification distance / test distance) log x 40 = distance factor

For measurements above 30 MHz: (Specification distance / test distance) log x 20 = distance factor

Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss.

Corrected Meter Reading = meter reading + F – A + C
where:

F = antenna factor
A= amplifier gain
C = cable loss

The correction factors for the antenna and the amplifier gain are attached in Appendix D of this report. The data sheets are attached in Appendix E.

The distance factor D is 0 when the test is performed at the required specification distance.

8.2 Occupied Bandwidth

The 99% occupied and 20 dB bandwidth was checked using EMI Receiver. The RBW was set to 1-5% of the occupied or 20 dB bandwidth and the VBW was set to approximately three times the RBW. The span was to approximately between 1.5-5 times the occupied or 20 dB bandwidth. The plots of the Occupied and 20 dB Bandwidth are located in Appendix E.

Test Results:

The EUT complies with the relevant requirements as specified in the Summary of Test Results starting on Page 5.

8.3 Duty Cycle Plot

The EUT was tested at a 3-meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E.

$$\delta(\mathrm{dB}) = 20\log\left[\sum\left(nt_1 + mt_2 + \ldots + \xi t_x\right)/T\right]$$

where

n is the number of pulses of duration t1

m is the number of pulses of duration t2

ξ is the number of pulses of duration tx

T is the period of the pulse train or 100 ms if the pulse train length is greater than 100 ms

Pulse Type 1 = 17 * 10.92 ms = 185.64 ms

Total On Time = 185.64 ms

T = 2010 ms

185.64 ms / 2010 ms = 0.0924

20 log (0.0924) = -20.69 dB

Test Results:

The EUT complies with the relevant requirements as specified in the Summary of Test Results starting on Page 5.

8.4 Transmission Timeout

The Transmit Timeout test was performed using the EMI Receiver to make sure the transmission coming from the transmitter would cease within 5 seconds after the activation. A Plot of the transmission duration is located in Appendix E.

Test Results:

The EUT complies with the relevant requirements as specified in the Summary of Test Results starting on Page 5.

8.3 Variation of the Input Power

Test Results:

The EUT was battery powered, therefore this test was deemed unnecessary and thus was not performed. Had this test been deemed applicable, it would have been performed as described below.

The variation of the input power test was performed using the EMI Receiver. The EUT input power was varied between 85 % and 115 % of the nominal rated supply voltage. The carrier frequency was monitored for any change in amplitude.

8.4 Frequency Tolerance of Carrier Signal

The EUT was placed in a temperature chamber and set to +50 degrees Celsius. The EUT was exposed to this temperature for a period of 10 minutes. The temperature was subsequently decreased at 10 degree increments down to -20 degrees Celsius with a 30 minute acclimation period between each temperature. At each temperature, the EUT's fundamental emission was measured with an EMI Receiver to determine whether the carrier signal was within 0.01% of the fundamental frequency at startup, 2 minutes, 5 minutes, and 10 minutes after removal from the temperature chamber.

A data sheet of the Frequency Tolerance testing is located in Appendix E.

Test Results:

The EUT complies with the requirements of FCC Title 47, Part 15, Subpart, C, section 15.225 [e]; RSS-GEN and RSS-210 Clause B.6. Please see Appendix E for the data sheets.

9. TEST PROCEDURE DEVIATIONS

There were no deviations from the test procedures.

10. CONCLUSIONS

The Halo Select Plus Model: 9801 as tested, meets all of the relevant specification requirements defined in the Code of Federal Regulations Title 47, Part 15 Subpart B section, 15.109, & Subpart C sections 15.205, 15.209 and 15.225, RSS 210 Issue 11, and RSS Gen, Issue 5 Amendment 1.

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP TESTING
NVLAP LAB CODE 200527-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025.

For the most up-to-date version of our scopes and certificates please visit

http://celectronics.com/quality/scope/

Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

Innovation, Science and Economic Development Canada Lab Code 2154C

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

There were no modifications made to the EUT.

APPENDIX C

ADDITIONAL MODELS

Used for the Primary Tests	Halo Select Plus Model: 9801 FCC ID: NUL-HAL3SP IC: 3022A-HAL3SP

No additional models.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: LOW FREQUENCY TEST SETUP

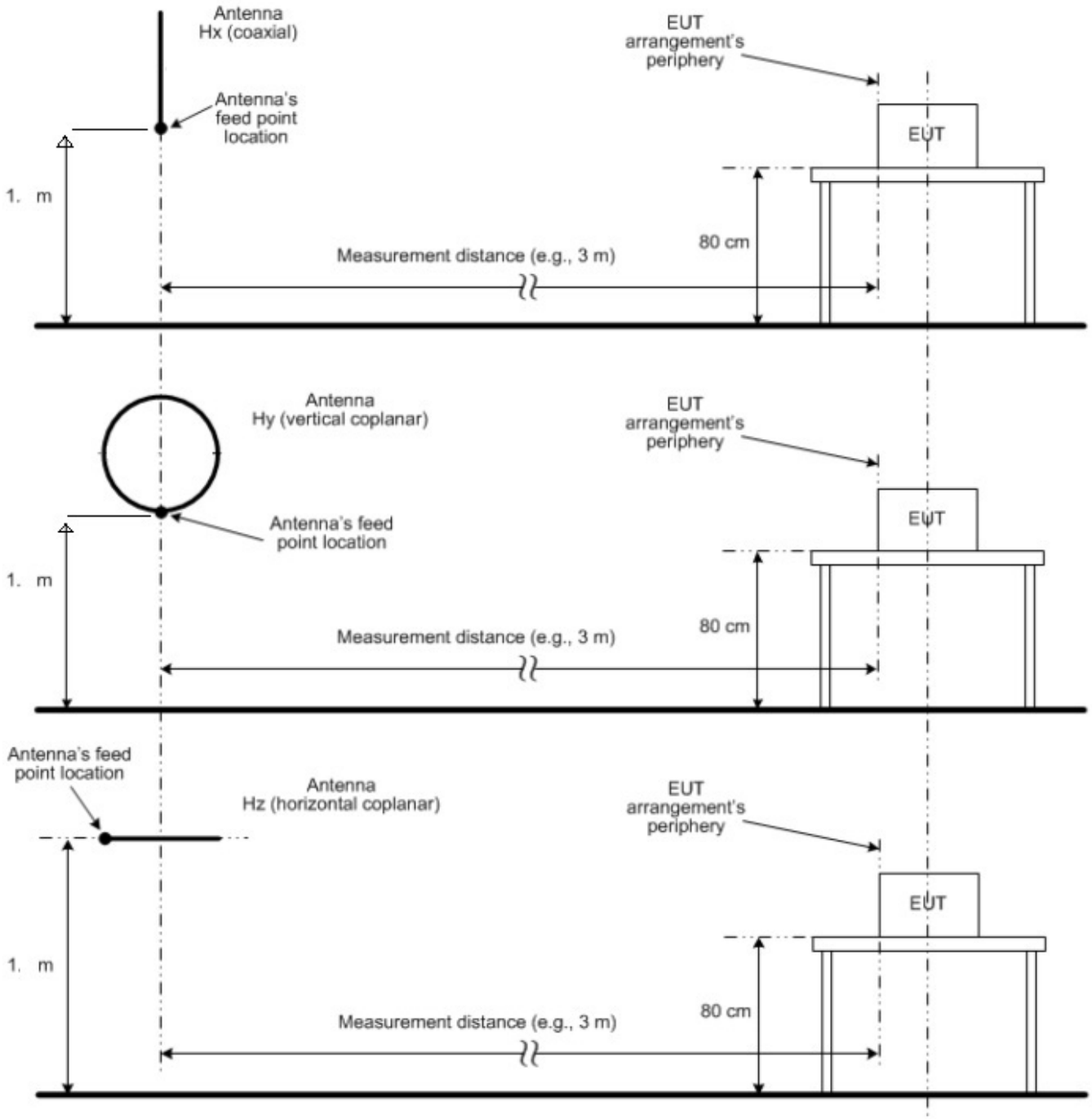
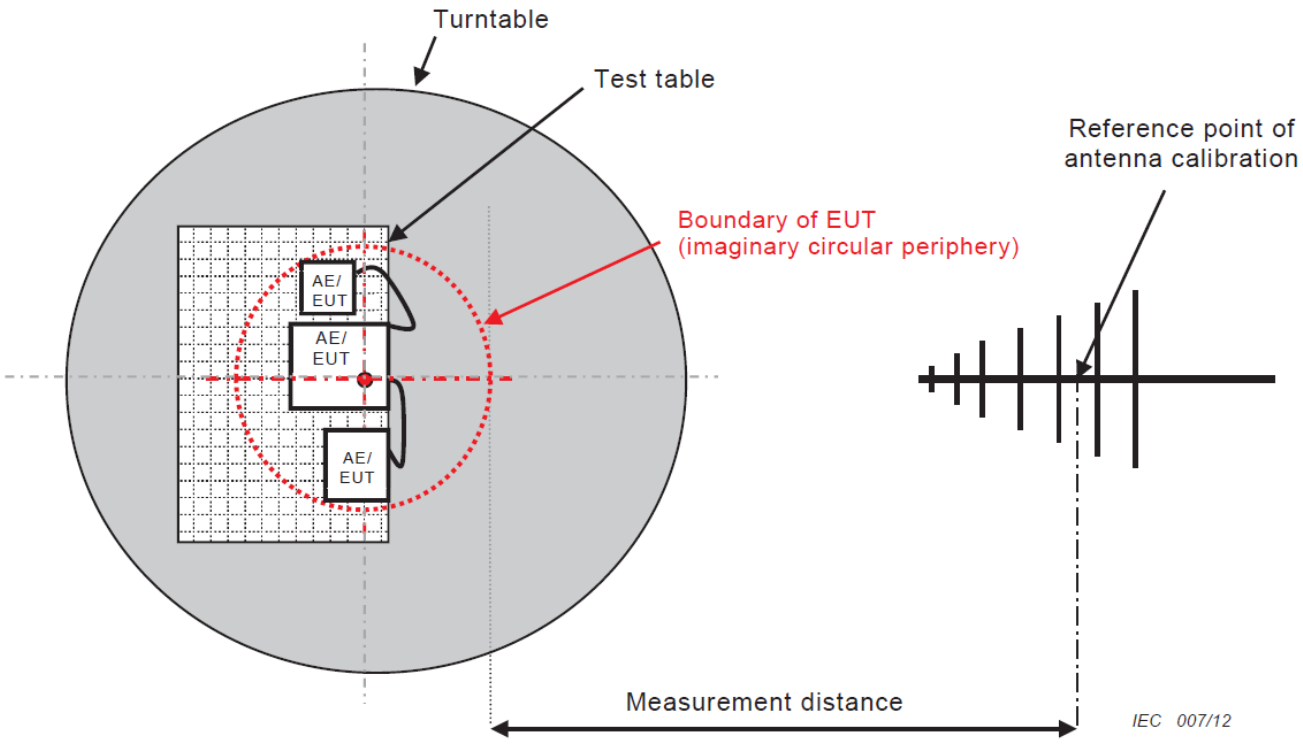


FIGURE 2: RADIATED EMISSIONS 3-METER SEMI-ANECHOIC TEST CHAMBER



COM-POWER AL-130R

LOOP ANTENNA

S/N: 10160093

CALIBRATION DUE: APRIL 23, 2026

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)	FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-36.68	14.82	**0.8**	-37.53	13.97
0.01	-36.2	15.3	**0.9**	-37.52	13.98
0.02	-37.37	14.13	**1**	-37.21	14.29
0.03	-36.53	14.97	**2**	-37.07	14.43
0.04	-37.04	14.46	**3**	-37.05	14.45
0.05	-37.6	13.9	**4**	-36.75	14.75
0.06	-37.38	14.12	**5**	-36.78	14.72
0.07	-37.63	13.87	**6**	-36.94	14.56
0.08	-37.51	13.99	**7**	-37.08	14.42
0.09	-37.38	14.12	**8**	-37.23	14.27
0.1	-37.73	13.77	**9**	-37.38	14.12
0.2	-37.7	13.8	**10**	-37.2	14.3
0.3	-37.76	13.74	**15**	-36.78	14.72
0.4	-37.83	13.67	**20**	-37.7	13.8
0.5	-37.63	13.87	**25**	-38.09	13.41
0.6	-37.53	13.97	**30**	-40.11	11.39
0.7	-37.52	13.98	-	-	-

COM-POWER AC-220

LAB R - COMBILOG ANTENNA

S/N: 10030023

CALIBRATION DUE: OCTOBER 23, 2025

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
25	23.60	**275**	18.60
30	22.40	**300**	18.50
35	21.30	**325**	19.20
40	20.60	**350**	19.40
45	19.90	**375**	21.20
50	18.70	**500**	22.10
55	17.00	**425**	22.40
60	15.10	**450**	21.60
65	13.30	**475**	23.00
70	12.00	**500**	22.10
75	11.30	**550**	22.80
80	11.70	**600**	24.30
85	12.70	**650**	24.30
90	13.50	**700**	24.30
95	14.20	**750**	26.00
100	14.70	**800**	26.10
125	16.00	**850**	26.50
150	14.60	**900**	27.40
175	15.30	**950**	28.20
200	15.20	**1000**	27.90
225	15.90	**1050**	29.10
250	17.10	-	-

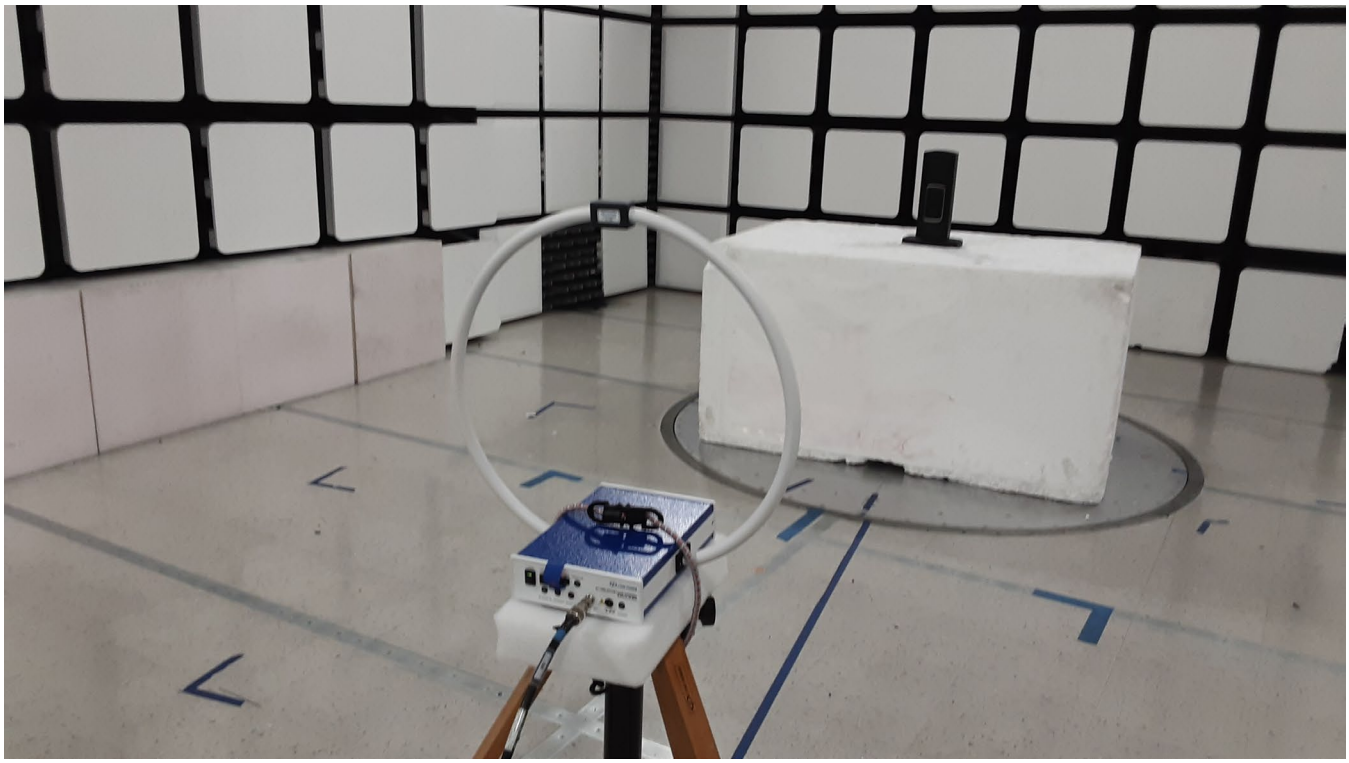
COM-POWER PAM-118A

1-1000MHz – PREAMPLIFIER

S/N: 441188

CALIBRATION DUE: NOVEMBER 08, 2025

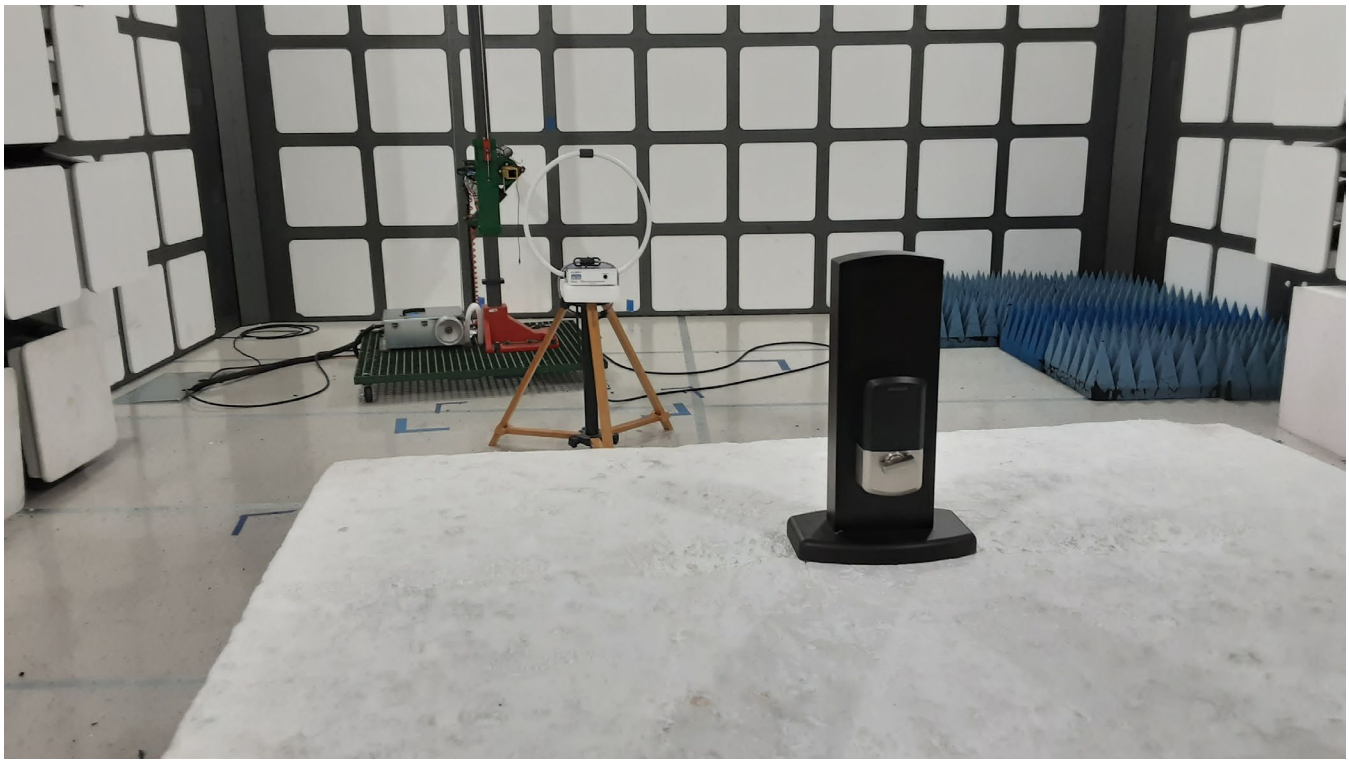
FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1	36.18	**175**	36.12
2	36.25	**200**	36.11
3	36.25	**225**	36.06
4	36.26	**250**	36.05
5	36.27	**275**	35.97
6	36.26	**300**	35.97
7	36.26	**325**	35.81
8	36.27	**350**	35.77
9	36.28	**375**	35.72
10	36.27	**400**	35.72
15	36.27	**425**	35.66
20	36.33	**450**	35.64
25	36.32	**475**	35.57
30	36.26	**500**	35.46
35	36.28	**525**	35.41
40	36.26	**550**	35.42
45	36.29	**575**	35.28
50	36.31	**600**	35.23
55	36.25	**625**	35.18
60	36.25	**650**	35.05
65	36.26	**675**	35.00
70	36.28	**700**	34.99
75	36.27	**725**	34.84
80	36.24	**750**	34.68
85	36.20	**775**	34.78
90	36.23	**800**	34.54
95	36.22	**825**	34.57
100	36.28	**850**	34.49
110	36.23	**875**	34.42
120	36.21	**900**	34.24
130	36.20	**925**	34.39
140	36.17	**950**	34.15
150	36.19	**1000**	34.10



FRONT VIEW

ASSA ABLOY AMERICAS RESIDENTIAL
HALO SELECT PLUS
MODEL: 9801
FCC SUBPART C - RADIATED EMISSIONS 0.009-30 MHz

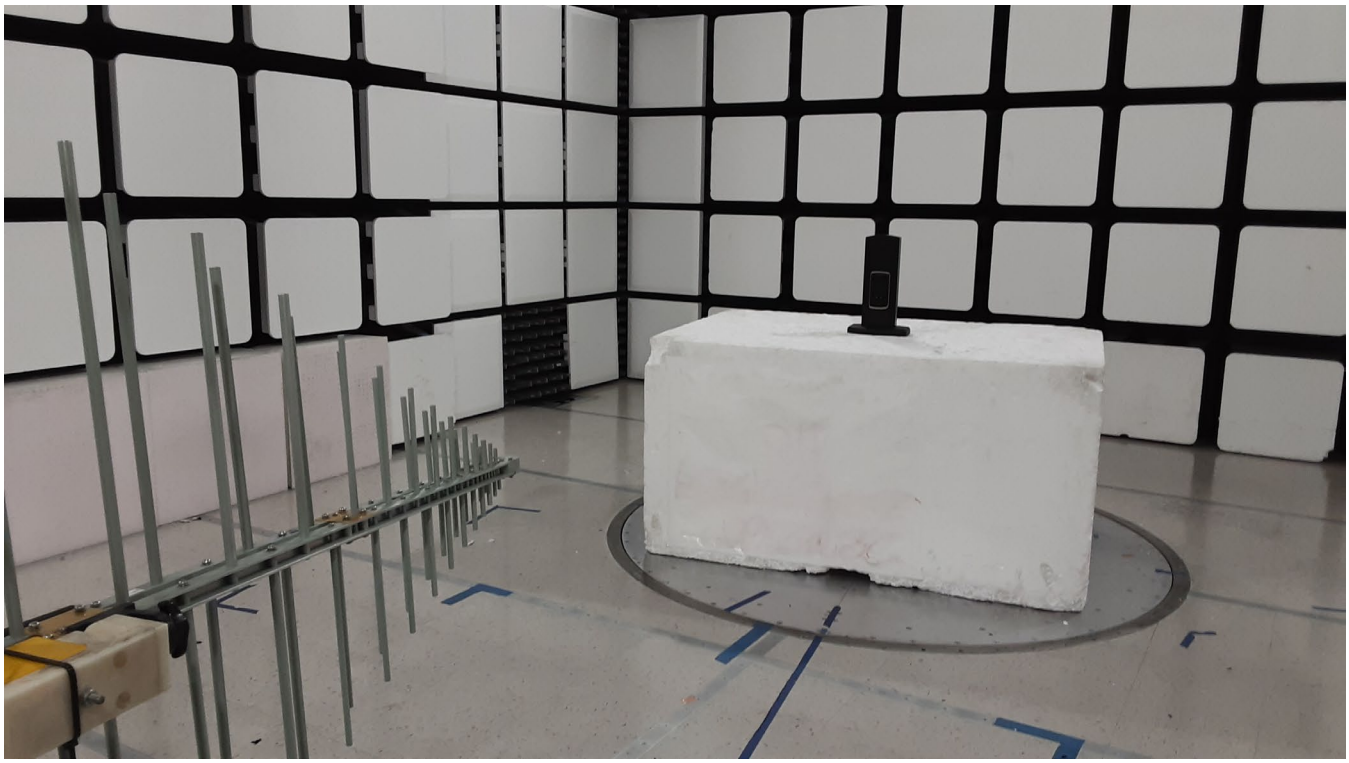
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

ASSA ABLOY AMERICAS RESIDENTIAL
HALO SELECT PLUS
MODEL: 9801
FCC SUBPART C - RADIATED EMISSIONS 0.009-30 MHz

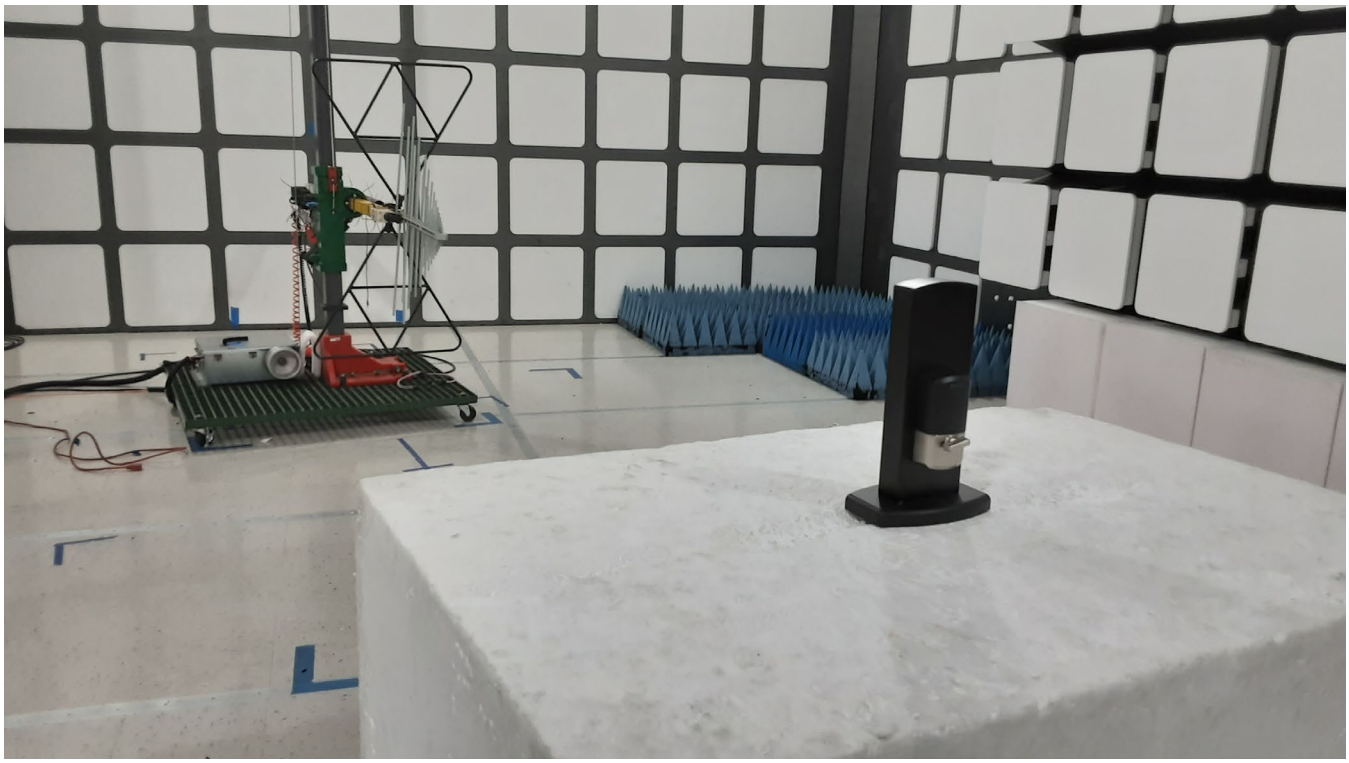
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

ASSA ABLOY AMERICAS RESIDENTIAL
HALO SELECT PLUS
MODEL: 9801
FCC SUBPART C - RADIATED EMISSIONS 30-1000 MHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

ASSA ABLOY AMERICAS RESIDENTIAL
HALO SELECT PLUS
MODEL: 9801
FCC SUBPART C - RADIATED EMISSIONS 30-1000 MHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

DATA SHEETS

AND

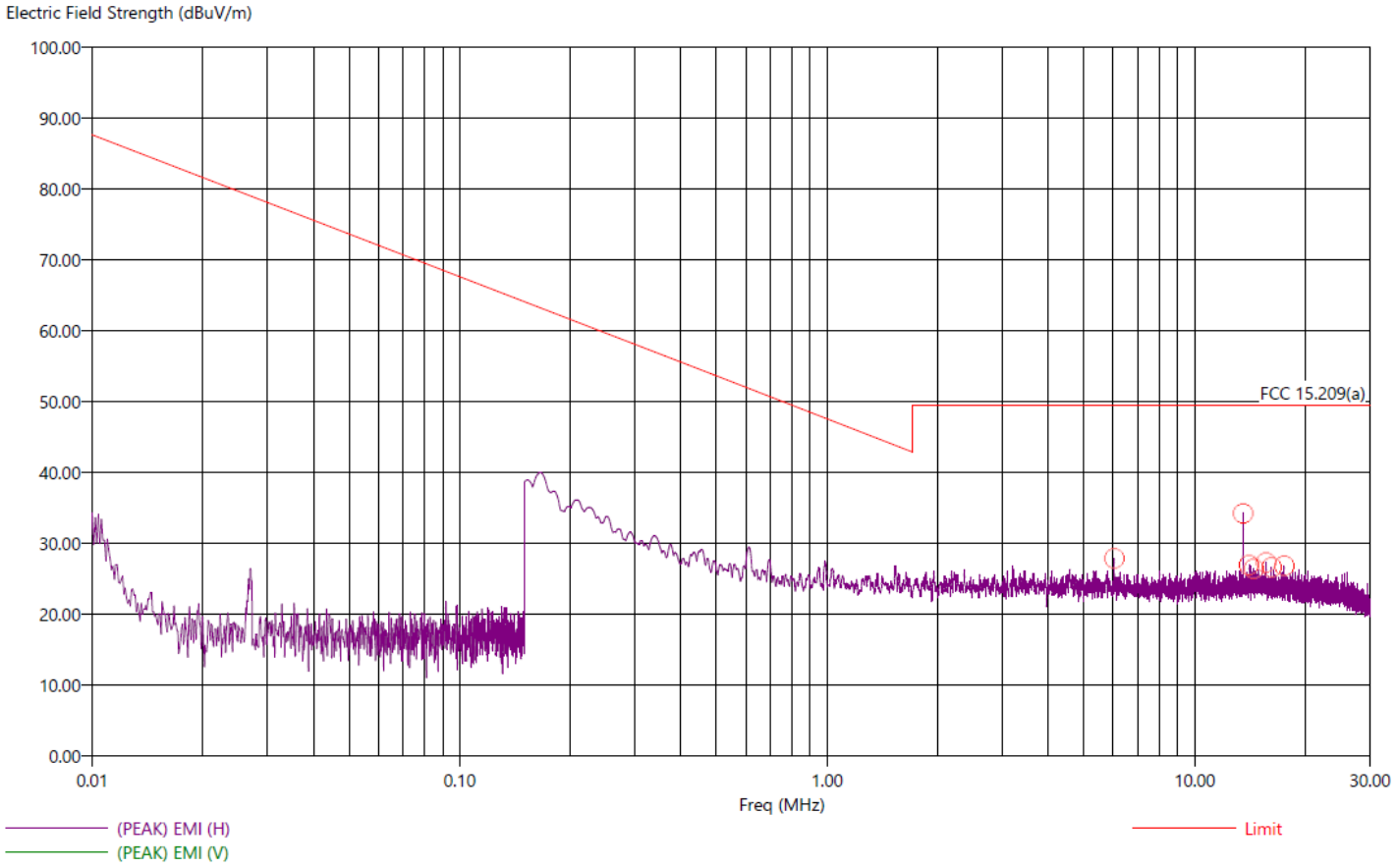
FCC COMPLIANCE INFORMATION STATEMENT

SPURIOUS EMISSIONS
DATA SHEETS

Test title: FCC Class B
File: 02b Hx Pre Scan 9kHz-30MHz.set
Operator name: Tom Szynal
EUT type: Door Lock
EUT condition: NFC Tag Read (EUT in y-axis)
Notes: Company: Assa Abloy
Model: Halo Select Plus
Temp: 20 C
RH: 45 %
Hx (coaxial) polarization
Battery Powered

4/25/2025 3:58:04 PM
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (LAB R)



Test title: FCC Class B
File: 04b Hx Final Scan 9kHz-30MHz ETSI WPT.set
Operator name: Tom Szynal
EUT type: Door Lock
EUT condition: NFC Tag Read (EUT in y-axis)
Notes: Company: Assa Abloy
Model: Halo Select Plus
Temp: 20 C
RH: 45 %
Hx (coaxial) polarization
Battery Powered

4/25/2025 4:47:28 PM
Sequence: Final Measurements

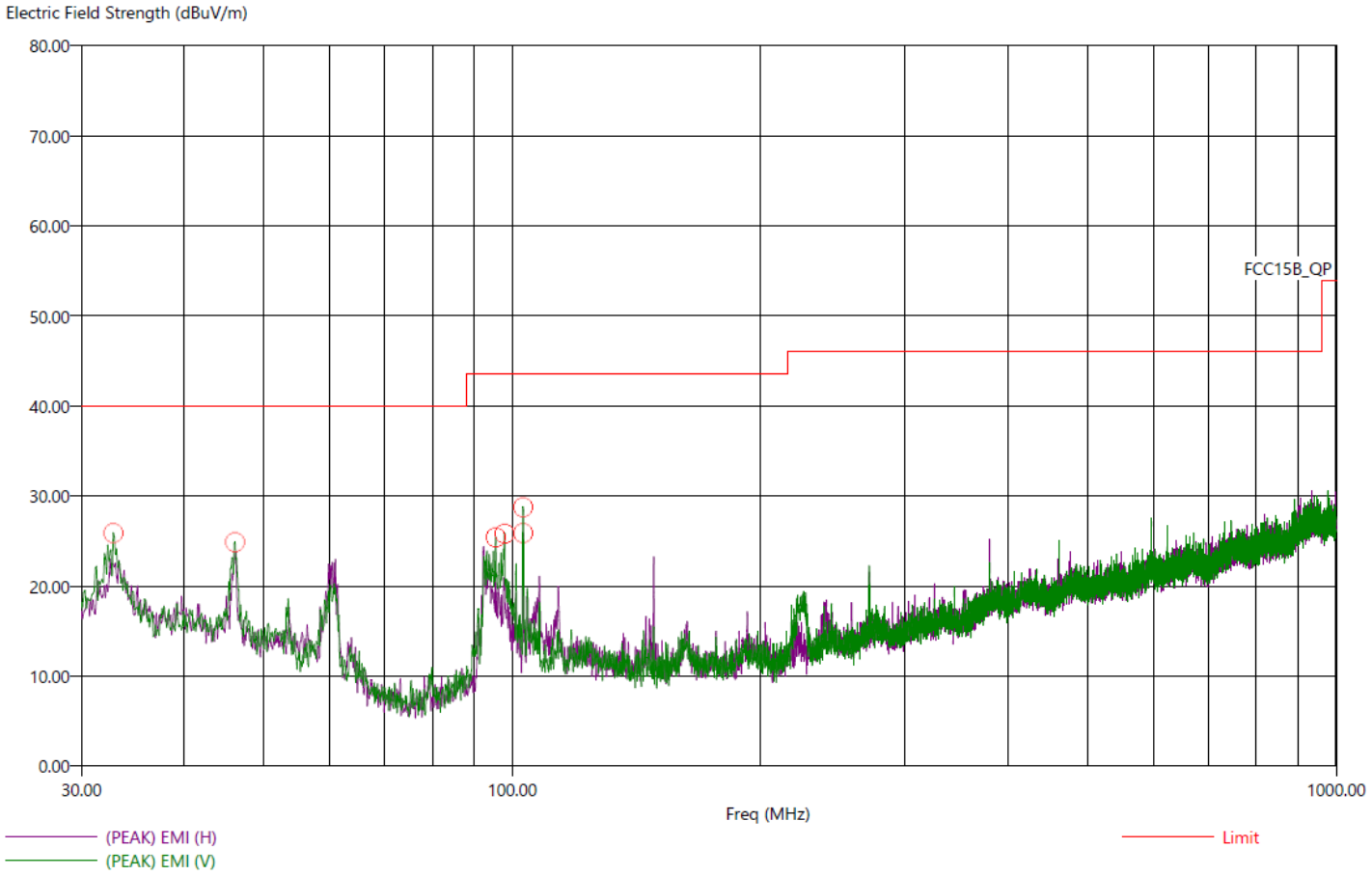
Compatible Electronics, Inc. FAC-3 (LAB R)

Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Ang (deg)	Cable (dB)	Transducer (dB)
6.05	Hx (coaxial)	23.45	19.33	49.50	-30.17	100.00	233.00	0.23	14.55
13.56	Hx (coaxial)	34.15	18.48	49.50	-31.02	100.00	58.75	0.34	14.66
14.07	Hx (coaxial)	22.94	18.53	49.50	-30.97	100.00	141.00	0.33	14.65
14.47	Hx (coaxial)	23.00	18.55	49.50	-30.95	100.00	174.00	0.34	14.68
15.65	Hx (coaxial)	22.41	18.51	49.50	-30.99	100.00	281.00	0.35	14.58
16.21	Hx (coaxial)	21.76	18.39	49.50	-31.11	100.00	163.25	0.36	14.47
17.54	Hx (coaxial)	23.30	18.24	49.50	-31.26	100.00	249.25	0.38	14.22

Test title: FCC Class B
File: 01 Pre-Scan 30-1000MHz.set
Operator name: Tom Szynal
EUT type: Halo Select Plus
EUT condition: NFC Tag Read (EUT in y-axis)
Notes: Company: Assa Abloy
Model: 9801
Temp: 17 C
RH: 50 %
Battery Powered

4/28/2025 9:10:25 AM
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (LAB R)



Test title: FCC Class B
File: 01 Final Scan 30-1000MHz.set
Operator name: Tom Szynal
EUT type: Halo Select Plus
EUT condition: NFC Tag Read (EUT in y-axis)
Notes: Company: Assa Abloy
Model: 9801
Temp: 17 C
RH: 50 %
Battery Powered

4/28/2025 9:22:10 AM
Sequence: Final Measurements

Compatible Electronics, Inc. FAC-3 (LAB R)

Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Ang (deg)	Cable (dB)	Transducer (dB)
32.80	V	27.70	24.11	40.00	-15.89	109.82	42.00	0.60	21.66
46.10	V	27.16	21.93	40.00	-18.07	115.79	42.25	0.71	19.64
95.50	V	28.31	25.05	40.00	-14.95	334.71	352.75	1.02	14.25
97.90	V	28.42	22.98	40.00	-17.02	291.31	197.00	1.03	14.58
103.10	H	30.47	28.89	40.00	-11.11	276.74	254.75	1.06	15.01
103.10	V	28.84	27.90	40.00	-12.10	295.97	134.50	1.06	15.01

FUNDAMENTAL & HARMONICS
DATA SHEETS

FUNDAMENTAL FIELD STRENGTH

FCC 15.225 RSS210
Company: ASSA ABLOY Americas Residential
EUT: Halo Select Plus
Model: 9801
Duty Cycle Correction Factor: -20.00 dB

Date: 04-24-25
Lab:R
Tested By: Tom Szynal

Compatible Electronics, Inc. FAC-3

Freq. (MHz)	Level (dBuV/m) @ 3m	Antenna Polarity (x/y/z)	Spec Limit per FCC 15.225 *	Margin (dB)	Detector	Table (deg)	Tower (cm)	EUT Orientation
13.56	29.967	x	124.00	-94.033	Peak	90	100	X Axis
13.56	25.012	y	124.00	-98.988	Peak	90	100	X Axis
13.56	28.889	z	124.00	-95.111	Peak	94	100	X Axis
13.56	**36.072**	**x**	**124.00**	**-87.928**	**Peak**	**0**	**100**	**Y Axis**
13.56	32.432	y	124.00	-91.568	Peak	90	100	Y Axis
13.56	28.170	z	124.00	-95.83	Peak	183	100	Y Axis
13.56	35.635	x	124.00	-88.365	Peak	0	100	Z Axis
13.56	32.635	y	124.00	-91.365	Peak	61	100	Z Axis
13.56	28.448	z	124.00	-95.552	Peak	348	100	Z Axis

* Corrected limit at 3 meters is based on equation (4) of ANSI C63.10: 2013 section 6.4.4.2

HARMONICS

FCC 15.209
ASSA ABLOY Americas Residential
Halo Select Plus
Model: 9801

Date: 04-24-25
Lab: R
Tested By: Tom Szynal

EUT Orientation: Y axis
Test Distance: 3 Meters

Temp:19 °C
RH: 51%

Freq. (MHz)	Level at 3 Meters (dBuV/m)	Spec Limit per FCC 15.209	Margin	Antenna Axis (x/y/z)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
13.56	**36.072**	**69.50 ***	**-33.43**	**x**	**Peak**	**1.00**	**0.00**	**Worst Case Fundamental**
27.12	23.399	69.50 *	-46.10	x	Peak	1.00	-	Noise Floor
40.68	33.536	40.00	-6.46	x	Peak	1.00	-	Noise Floor
54.24	33.846	40.00	-6.15	x	Peak	1.00	-	Noise Floor
67.80	34.099	40.00	-5.90	x	Peak	1.00	-	Noise Floor
81.36	33.194	40.00	-6.81	x	Peak	1.00	-	Noise Floor
94.92	33.533	43.50	-9.97	x	Peak	1.00	-	Noise Floor
108.48	33.789	43.50	-9.71	x	Peak	1.00	-	Noise Floor
122.04	33.357	43.50	-10.14	x	Peak	1.00	-	Noise Floor
135.60	33.307	43.50	-10.19	x	Peak	1.00	-	Noise Floor

Harmonics for EUT X and Z configuration positions are also at noise floor levels

HARMONICS

FCC 15.209
ASSA ABLOY Americas Residential
Halo Select Plus
Model: 9801

Date: 04-24-25
Lab: R
Tested By: Tom Szynal

EUT Orientation: Y axis
Test Distance: 3 Meters

Temp:19 °C
RH: 51%

Freq. (MHz)	Level at 3 Meters (dBuV/m)	Spec Limit per FCC 15.209	Margin	Antenna Axis (x/y/z)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
13.56	32.432	69.50	-37.07	y	Peak	1.00	90.00	
27.12	23.611	69.50	-45.89	y	Peak	1.00	-	Noise Floor
40.68	33.924	40.00	-6.08	y	Peak	1.00	-	Noise Floor
54.24	33.417	40.00	-6.58	y	Peak	1.00	-	Noise Floor
67.80	34.302	40.00	-5.70	y	Peak	1.00	-	Noise Floor
81.36	32.989	40.00	-7.01	y	Peak	1.00	-	Noise Floor
94.92	34.118	43.50	-9.38	y	Peak	1.00	-	Noise Floor
108.48	34.293	43.50	-9.21	y	Peak	1.00	-	Noise Floor
122.04	33.422	43.50	-10.08	y	Peak	1.00	-	Noise Floor
135.60	34.439	43.50	-9.06	y	Peak	1.00	-	Noise Floor

Harmonics for EUT X and Z configuration positions are also at noise floor levels

HARMONICS

FCC 15.209
ASSA ABLOY Americas Residential
Halo Select Plus
Model: 9801

Date: 04-24-25
Lab: R
Tested By: Tom Szynal

EUT Orientation: Y axis
Test Distance: 3 Meters

Temp:19 °C
RH: 51%

Freq. (MHz)	Level at 3 Meters (dBuV/m)	Spec Limit per FCC 15.209	Margin	Antenna Axis (x/y/z)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
13.56	28.17	69.50	-41.33	z	Peak	1.00	182.75	
27.12	28.681	69.50	-40.82	z	Peak	1.00	-	Noise Floor
40.68	33.548	40.00	-6.45	z	Peak	1.00	-	Noise Floor
54.24	34.631	40.00	-5.37	z	Peak	1.00	-	Noise Floor
67.80	34.478	40.00	-5.52	z	Peak	1.00	-	Noise Floor
81.36	33.533	40.00	-6.47	z	Peak	1.00	-	Noise Floor
94.92	33.192	43.50	-10.31	z	Peak	1.00	-	Noise Floor
108.48	33.354	43.50	-10.15	z	Peak	1.00	-	Noise Floor
122.04	33.102	43.50	-10.40	z	Peak	1.00	-	Noise Floor
135.60	33.56	43.50	-9.94	z	Peak	1.00	-	Noise Floor

Harmonics for EUT X and Z configuration positions are also at noise floor levels

99% OCCUPIED AND 20 dB BANDWIDTH
DATA SHEETS

99% BANDWIDTH

FCC 15.225

Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal

20dB BANDWIDTH

FCC 15.225

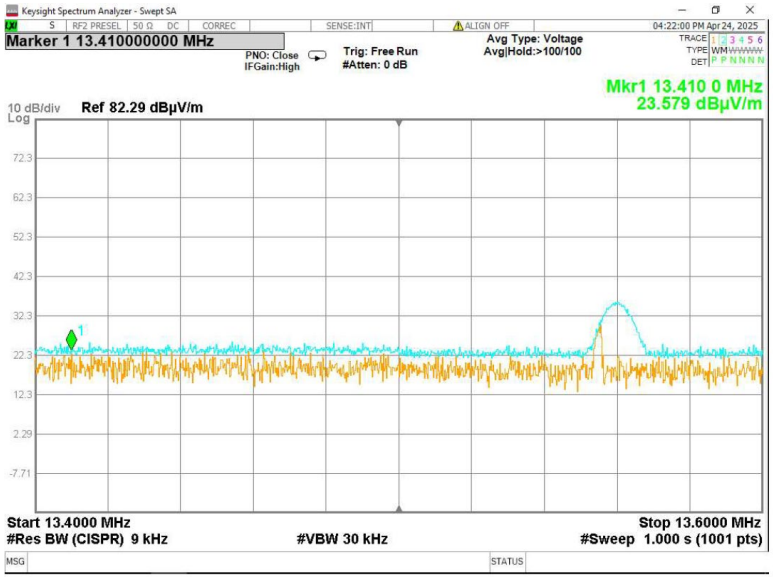
Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal

OUT-OF-BAND EMISSIONS PLOTS
DATA SHEETS

13.410-13.553 MHz PLOTS EUT X-AXIS

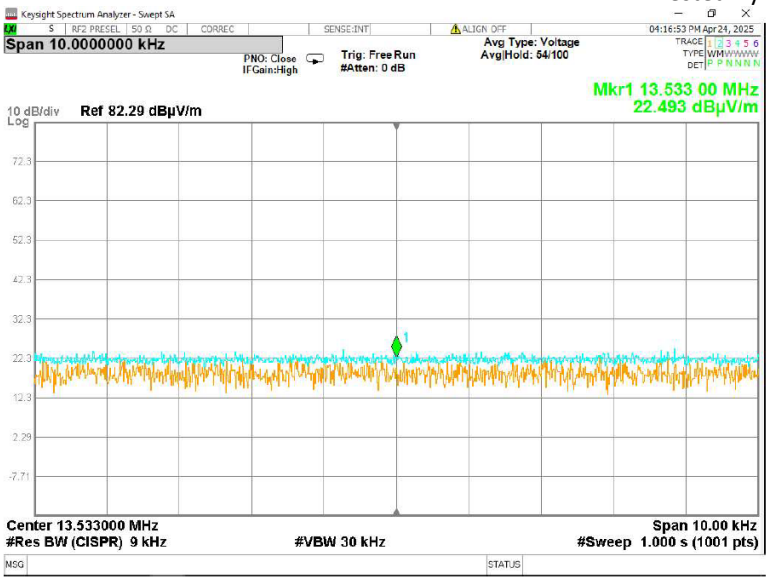
FCC 15.225

Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



FCC 15.225

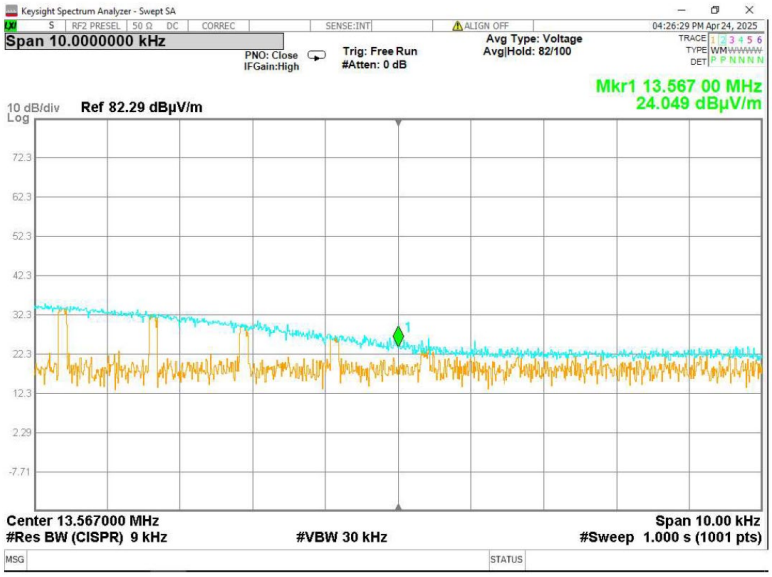
Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



13.567-13.710 MHz EUT X-AXIS

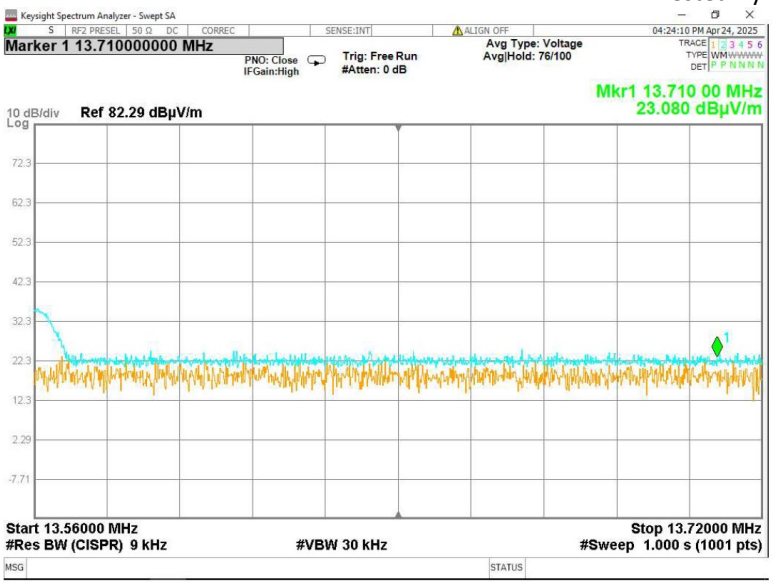
FCC 15.225

Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



FCC 15.225

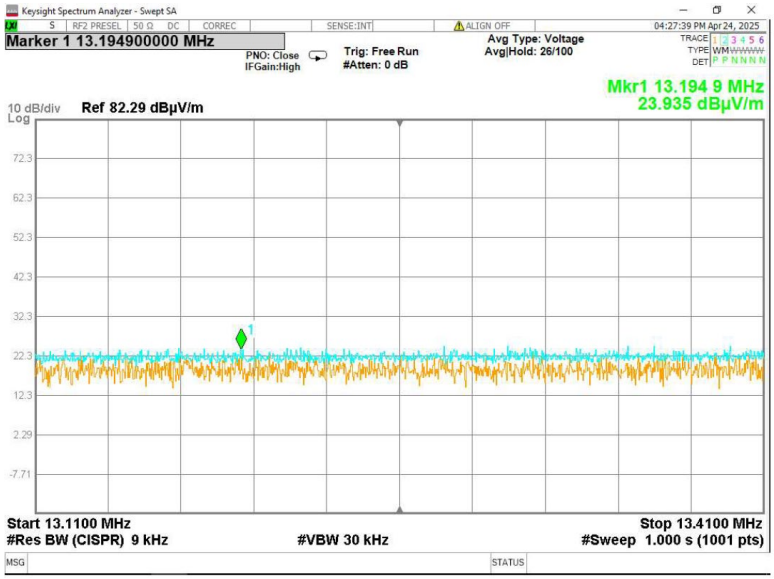
Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



13.110-13.410 MHz PLOT EUT X-AXIS

FCC 15.225

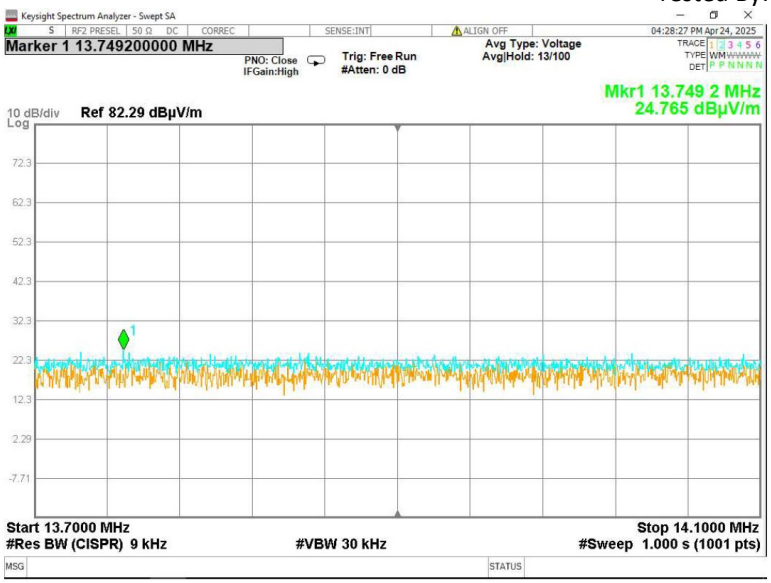
Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal



13.710-14.010 MHz PLOT EUT X-AXIS

FCC 15.225

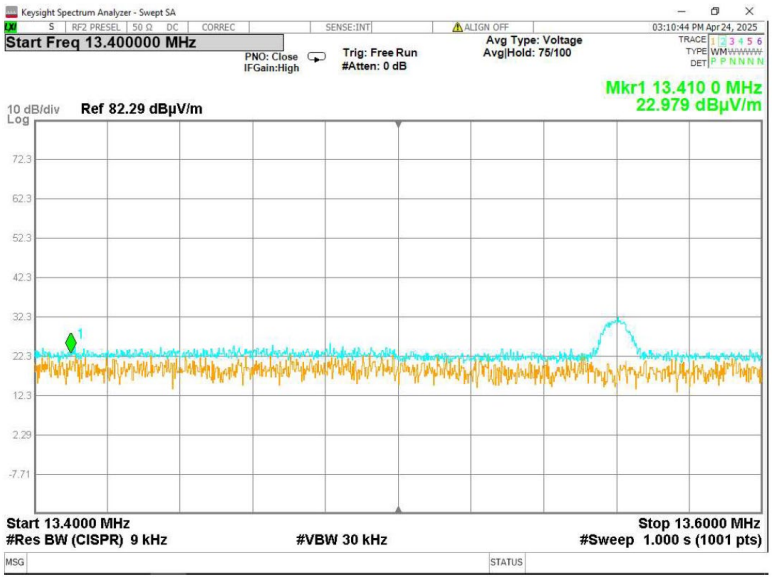
Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal



13.410-13.553 MHz PLOTS EUT Y-AXIS

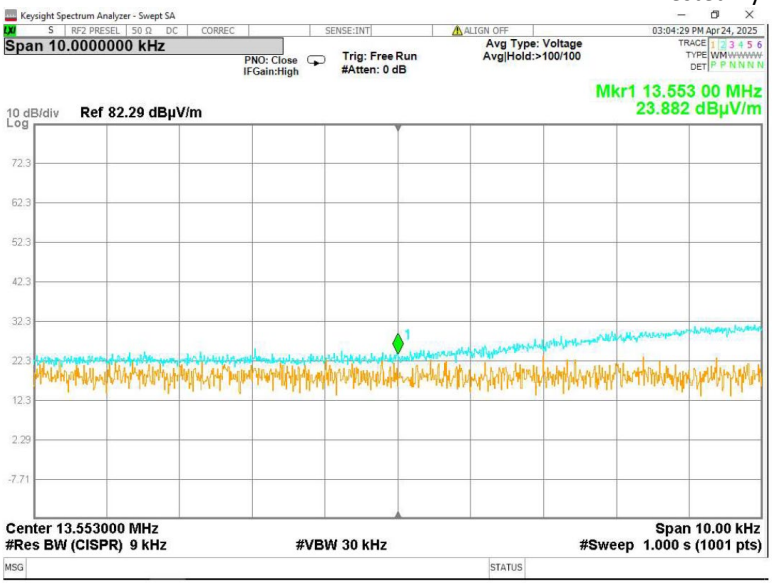
FCC 15.225

Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



FCC 15.225

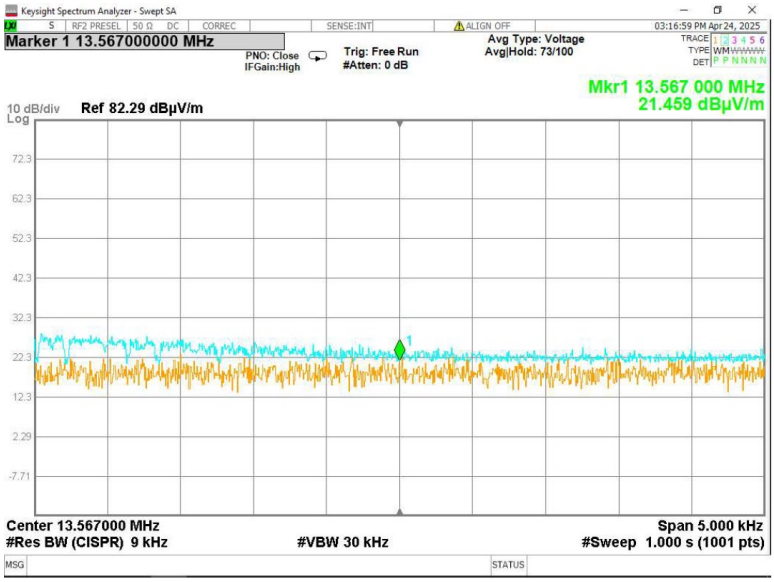
Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



13.567-13.710 MHz PLOTS EUT Y-AXIS

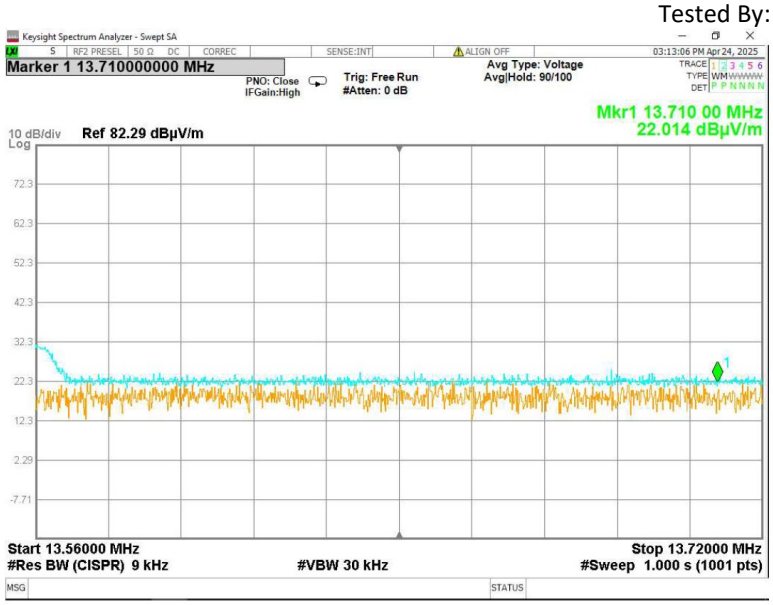
FCC 15.225

Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



FCC 15.225

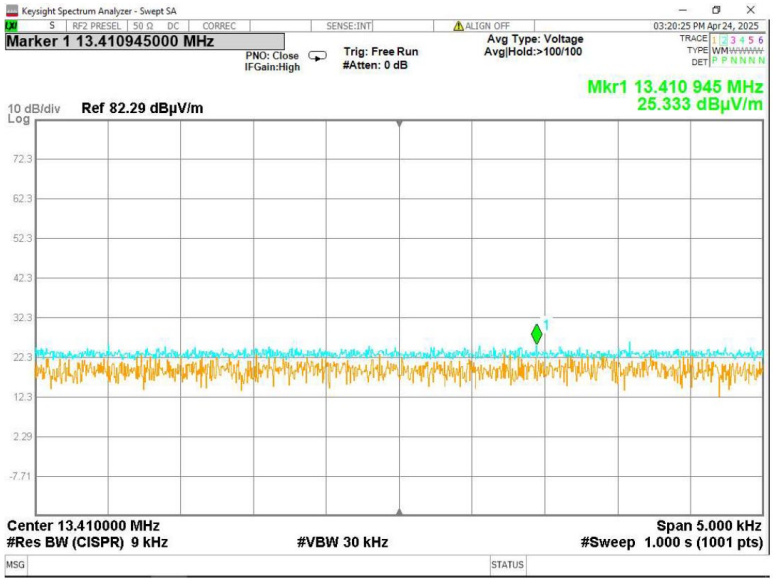
Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



13.110-13.410 MHz PLOT EUT Y-AXIS

FCC 15.225

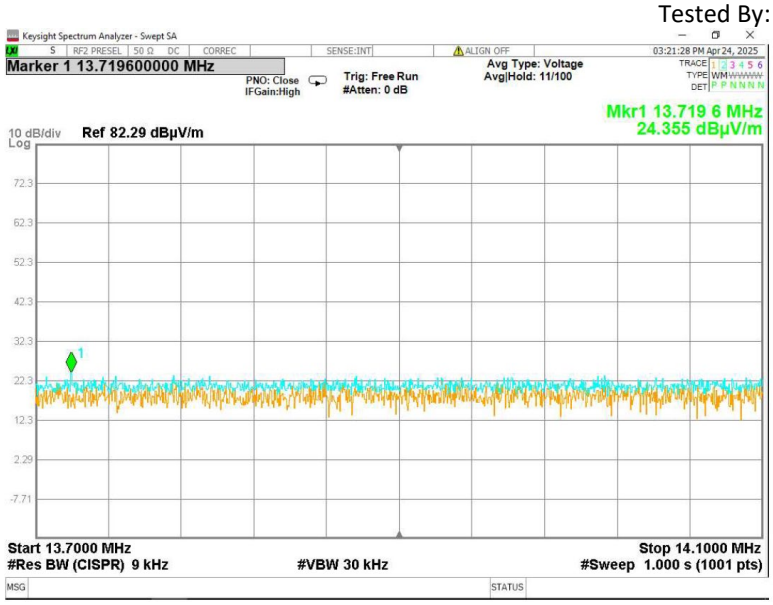
Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal



13.710-14.010 MHz PLOT EUT Y-AXIS

FCC 15.225

Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal

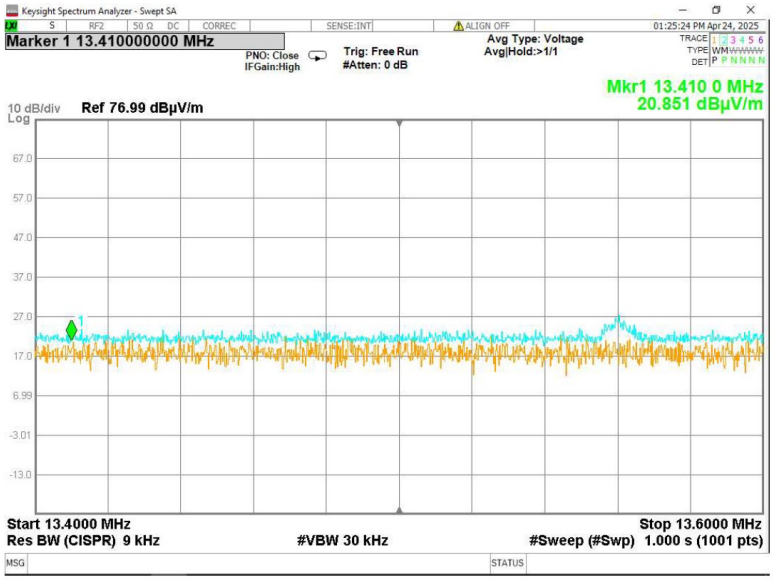


13.410-13.553 MHz PLOTS EUT Z-AXIS

FCC 15.225

Company: ASSA ABLOY Americas Residential
EUT: Halo Select Plus
Model: 9801

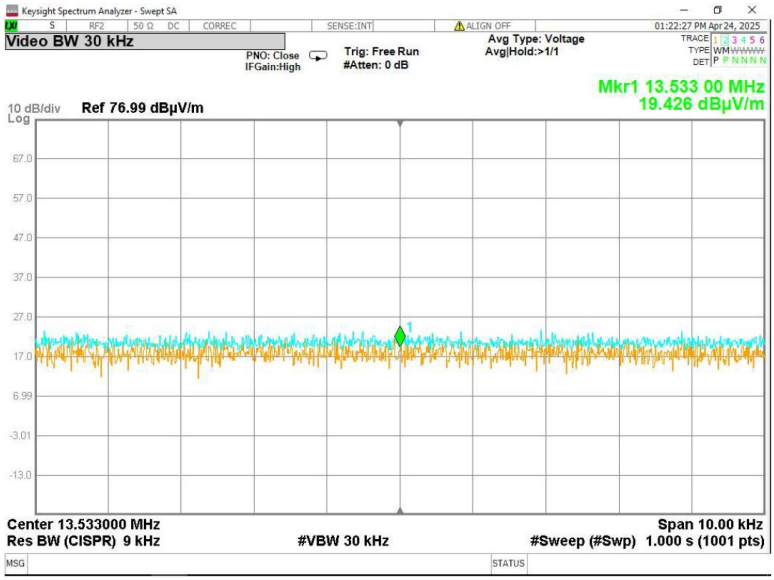
Date: 04-25-25
Lab: R
Tested By: Tom Szynal



FCC 15.225

Company: ASSA ABLOY Americas Residential
EUT: Halo Select Plus
Model: 9801

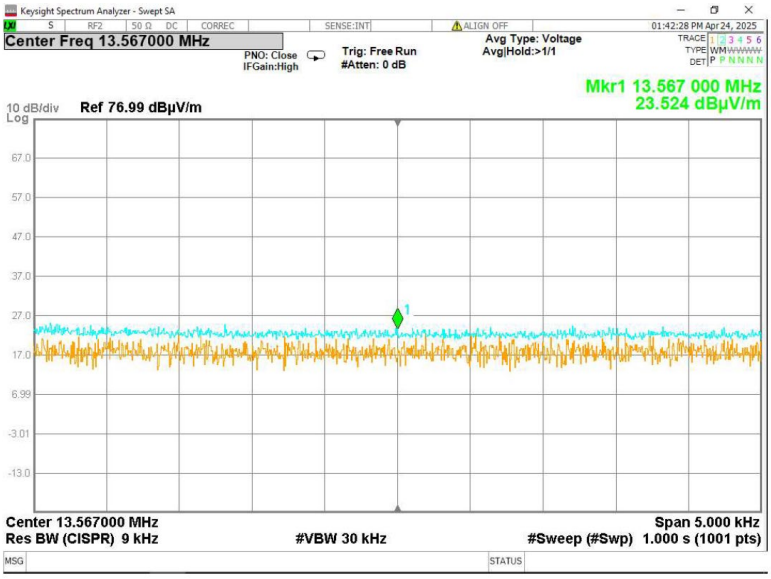
Date: 04-25-25
Lab: R
Tested By: Tom Szynal



13.567-13.710 MHz PLOTS EUT Z-AXIS

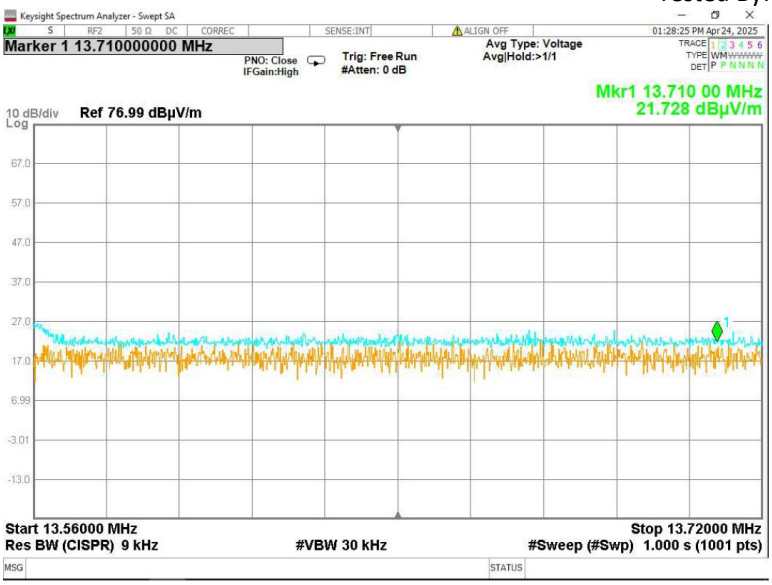
FCC 15.225

Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



FCC 15.225

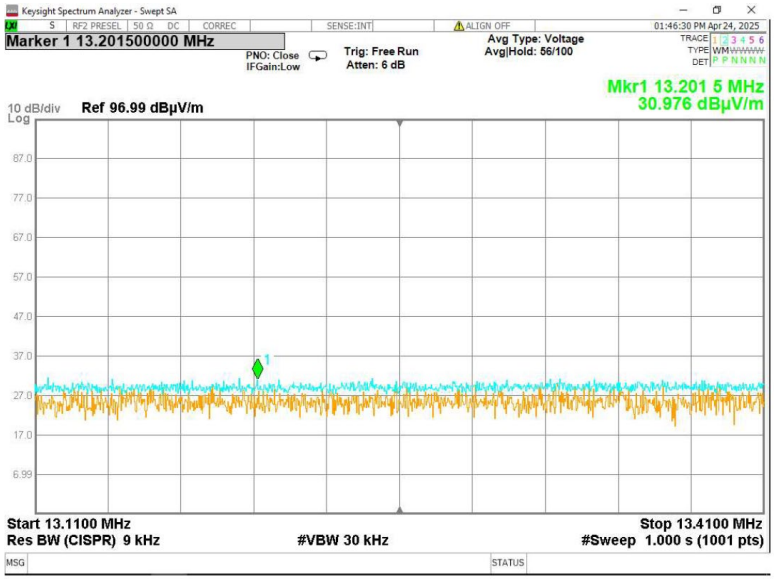
Company: ASSA ABLOY Americas Residential Date: 04-25-25
EUT: Halo Select Plus Lab: R
Model: 9801 Tested By: Tom Szynal



13.110-13.410 MHz PLOT EUT Z-AXIS

FCC 15.225

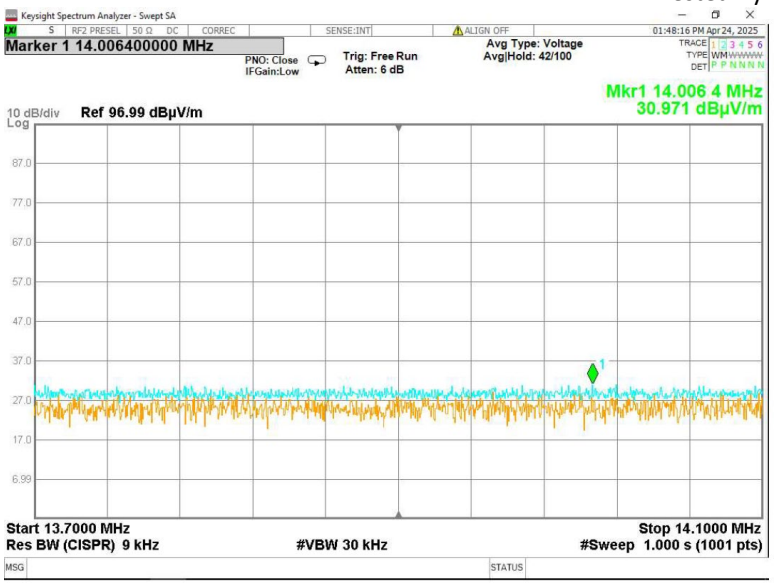
Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal



13.710-14.010 MHz PLOT EUT Z-AXIS

FCC 15.225

Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal



DUTY CYCLE PLOTS
DATA SHEETS

PULSE TIME

FCC 15.225

Company:	ASSA ABLOY Americas Residential	Date:	04-25-25
EUT:	Halo Select Plus	Lab:	R
Model:	9801	Tested By:	Tom Szynal

DUTY CYCLE CORRECTION

FCC 15.225

Company: ASSA ABLOY Americas Residential
EUT: Halo Select Plus
Model: 9801

Date: 04-25-25
Lab: R
Tested By: Tom Szynal

One Period (ms)	Pulse (ms)	Pulse (count)	Total Time (ms)	Duty Cycle	correction
2010	10.92	17		9.24%	-20.69

Temperature Testing **EUT: Halo Select Plus** **Model: 9801**

Test Engineer: Tom Szynal **Date: 04-28-25**

Time	Temperature (°C)	Frequency (MHz)	Measured (MHz)	Deviation (%)
Startup	50	13.56	**13.5608611**	**0.006350295**
2 min	50	13.56	**13.56046969**	**0.003463791**
5 min	50	13.56	**13.56031313**	**0.002309218**
10 min	50	13.56	**13.56007828**	**0.000577286**
Startup	40	13.56	**13.56015656**	**0.001154572**
2 min	40	13.56	**13.56046969**	**0.003463791**
5 min	40	13.56	**13.56031313**	**0.002309218**
10 min	40	13.56	**13.56007828**	**0.000577286**
Startup	30	13.56	**13.56007828**	**0.000577286**
2 min	30	13.56	**13.56039141**	**0.002886504**
5 min	30	13.56	**13.56039141**	**0.002886504**
10 min	30	13.56	**13.56023484**	**0.001731858**
Startup	20	13.56	**13.56015616**	**0.001151622**
2 min	20	13.56	**13.56054797**	**0.004041077**
5 min	20	13.56	**13.56039141**	**0.002886504**
10 min	20	13.56	**13.56015656**	**0.001154572**
Startup	10	13.56	**13.56007828**	**0.000577286**
2 min	10	13.56	**13.56023484**	**0.001731858**
5 min	10	13.56	**13.56046969**	**0.003463791**
10 min	10	13.56	**13.56031313**	**0.002309218**
Startup	0	13.56	**13.56007828**	**0.000577286**
2 min	0	13.56	**13.56054797**	**0.004041077**
5 min	0	13.56	**13.56046969**	**0.003463791**
10 min	0	13.56	**13.56039141**	**0.002886504**
Startup	-10	13.56	**13.56070453**	**0.005195649**
2 min	-10	13.56	**13.56054797**	**0.004041077**
5 min	-10	13.56	**13.56031313**	**0.002309218**
10 min	-10	13.56	**13.56015656**	**0.001154572**
Startup	-20	13.56	**13.56023484**	**0.001731858**
2 min	-20	13.56	**13.56031313**	**0.002309218**
5 min	-20	13.56	**13.56039141**	**0.002886504**
10 min	-20	13.56	**13.56046969**	**0.003463791**
			Maximum =	**0.006350295**
			Minimum =	**0.000577286**

Test Requirements: Limit is 100 ppm or ±0.01% deviation
Note #1: Max % is the maximum percent change from nominal
Note #2: Min % is the minimum percent change from nominal
Note #3: The limit is 13.558644 MHz to 13.561356 MHz

Spectrum Brands | Hand Home

Thuan Nguyen
Assoc. Principal Engineer

19701 DaVinci
Lake Forest, CA 92610
(T) 949.672.4452

Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance Information

Date: August 27, 2025

IDENTIFICATION OF PRODUCT: Halo Select Plus, 9801

RESPONSIBLE PARTY:

NAME: Thuan Nguyen

ADDRESS: 19701 Da Vinci
Lake Forest, CA 92610

TELEPHONE: 949.672.4452

EMAIL: thuan.nguyen1@assaabloy.com

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Thuan Nguyen

Thuan Nguyen

Assoc. Principal Engineer