

TEST REPORT

Test Report No. : UL-RPT-RP15124648-616A

Manufacturer : SECO S.p.A.
Model No. / HVIN : SYS-D90-ITE
PMN : SYS-D90-ITE
FCC ID : 2ALZB-7150PN
ISED Certification No. : IC: 22688-7150PN
Test Standard(s) : FCC Parts 15.209(a) & 15.225
ISED Canada RSS-Gen Issue 5 February 2021 &
RSS-210 Issue 10 April 2020

Test Laboratory : UL International (UK) Ltd, Basingstoke, Hampshire, RG24 8AH,
United Kingdom

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2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 5.0 supersedes all previous versions.

Date of Issue: 16 September 2024

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1. Customer Information

Company Name:	SECO S.p.A.
Address:	Via Achille Grandi, 20 - 52100 Arezzo, Italy

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.225
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Radio Frequency Devices) - Section 15.225
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.209
Specification Reference:	RSS-Gen Issue 5 February 2021
Specification Title:	General Requirements for Compliance of Radio Apparatus
Specification Reference:	RSS-210 Issue 10 April 2020
Specification Title:	Licence-exempt Radio Apparatus: Category I Equipment.
Site Registration:	FCC: 685609, ISEDC: 20903
FCC Lab. Designation No.:	UK2011
ISEDC CABID:	UK0001
Location of Testing:	Unit 3 & 4 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	14 March 2024 to 05 September 2024

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.225(a)(b)(c)(d)	RSS-Gen 6.12 RSS-210 B.6(a)	Transmitter Fundamental Field Strength	
Part 15.209(a)/ 15.225(d)	RSS-Gen 6.13 RSS-210 B.6(a)	Transmitter Radiated Emissions	
Part 15.209(a)/ 15.225(c)(d)	RSS-Gen 6.13 RSS-210 B.6(a)	Transmitter Band Edge Radiated Emissions	
Part 15.215(c)	N/A	Transmitter 20 dB Bandwidth	
N/A	RSS-Gen 6.7	Transmitter 99% Occupied Bandwidth	
Part 15.225(e)	RSS-Gen 6.11 RSS-210 B.6(b)	Transmitter Frequency Stability (Temperature & Voltage Variation)	
Key to Results  = Complied  = Did not comply			

2.3 Facilities and Accreditation

The test site and measurement facilities used to collect data are located at Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom. The following table identifies which facilities were utilised for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

Site 1	X
Site 2	-
Site 17	-
Site 32	-
Site 33	-

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2.4. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	Notice 2020 - DRS0023
Title:	Guidance on magnetic field strength radiated emission measurements (9 kHz - 30 MHz)

2.5. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	itema
Model Number / HVIN:	SYS-D90-ITE
PMN:	SYS-D90-ITE
Test Sample Serial Number:	230202056 (Radiated sample)
Hardware Version:	System: SYS-D90-ITE-00-C0 Main Board: CD90-1532-0886-C0
Software Version:	U-Boot 2020.04 Linux seco-imx8mm-c61 5.4.70
FCC ID:	2ALZB-7150PN
ISED Certification Number:	IC: 22688-7150PN

3.2. Description of EUT

The equipment under test was a HMI touchscreen containing an NFC reader and a 2.4 GHz WLAN / Bluetooth module.

3.3. Modifications Incorporated in the EUT

The sample with serial number 230202056 was modified on 21 March 2024 to allow the supply voltage to be varied using an external DC power supply. No other modifications were applied to the EUT during testing. The modification was reversed following the test.

3.4. Additional Information Related to Testing

Tested Technology:	NFC	
Category of Equipment:	Transceiver	
Channel Spacing:	Single channel device	
Transmit Frequency Range:	13.56 MHz	
Power Supply Requirement:	Nominal	24 VDC
	Minimum	21.6 VDC
	Maximum	26.4 VDC
Tested Temperature Range:	Minimum	0°C
	Maximum	50°C

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	AC/DC Power Adaptor
Brand Name:	MEAN WELL
Model Name or Number:	GSM90B24-P1M
Serial Number:	ECO6435803

Description:	USB Docking Station
Brand Name:	Think Pad
Model Name or Number:	USB-C Dock/40A9
Serial Number:	ZAF0LGYW

Description:	USB Hub
Brand Name:	Lemorele
Model Name or Number:	TC19
Serial Number:	None Stated

Description:	Ethernet Cable x2
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	USB Cable x2
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Micro USB Cable
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Keyboard
Brand Name:	Dell
Model Name or Number:	RT7D50
Serial Number:	Not marked or stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Constantly transmitting at full power with a modulated carrier in NFC test mode.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The NFC test mode was enabled by a software application provided by the customer. The software application was run from the EUT user interface.
- For fundamental field strength, radiated spurious emissions and band edge radiated emissions tests, the EUT was powered from a 120 VAC mains supply via the supplied AC/DC power adaptor. Tests were performed with the EUT in the worst-case orientation for each respective test.
- Testing at voltage extremes was performed with the EUT powered by an external DC power supply.
- Test instructions were provided by the customer in the document "SYS-D90-ITE_RF_TEST_GUIDE_20240116.pdf" dated 28 February 2024.
- The EUT is powered by CANbus in normal installation. An AC/DC adaptor was supplied by the customer for test purposes.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6: Measurement Uncertainties* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Fundamental Field Strength

Test Summary:

Test Engineers:	Lenny Hantz & Andrew Edwards	Test Date:	14 March 2024
Test Sample Serial Number:	230202056		

FCC Reference:	Part 15.225(a)(b)(c)(d)
ISED Canada Reference:	RSS-Gen 6.12 / RSS-210 B.6(a)
Test Method Used:	ANSI C63.10 Section 6.4

Environmental Conditions:

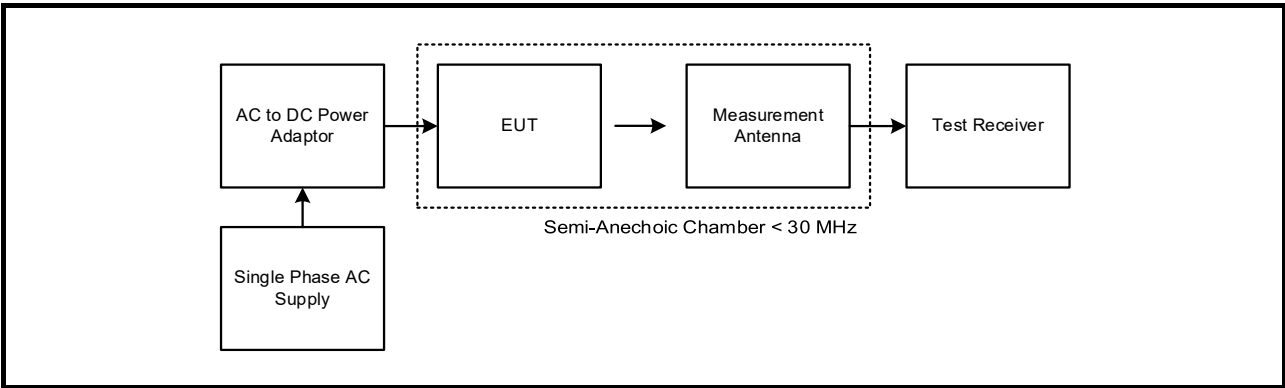
Temperature (°C):	23
Relative Humidity (%):	43

Note(s):

- Measurements below 30 MHz were performed in a semi-anechoic chamber (Asset Number K0001) at 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. As allowed by ANSI C63.10 clause 5.2; an alternative test site that can demonstrate equivalence to an open area test site may be used for measurements below 30 MHz. Therefore, measurements were performed in a semi-anechoic chamber. The correlation data between semi-anechoic chamber and an open field test site is available upon request.
- Pre-scan measurements were performed using a spectrum analyser with a peak detector and measurement bandwidth of 10 kHz. The fundamental field strength was maximized by rotating the measurement antenna and EUT.
- The spectrum analyser was then switched to test receiver mode and the final measurement on the maximised level was performed. In accordance with ANSI C63.10 Clause 4.1.4.2.1 and CISPR 16-1-1, a quasi-peak detector was used in conjunction with a measurement bandwidth of 9 kHz and 15 second sweep time. Quasi-peak levels were recorded at a 3 metre measurement distance.
- The measured value at 3 metres was extrapolated to the required measurement distance of 30 metres and compared to the specified limit at that distance:
 - 490 kHz to 30 MHz: measured value extrapolated from 3 metres to 30 metres by subtracting 40 dB at 40 dB / decade.

The result table shows both the measured level at 3 metres and the same measured value extrapolated to the actual measurement distance specified in the limits.

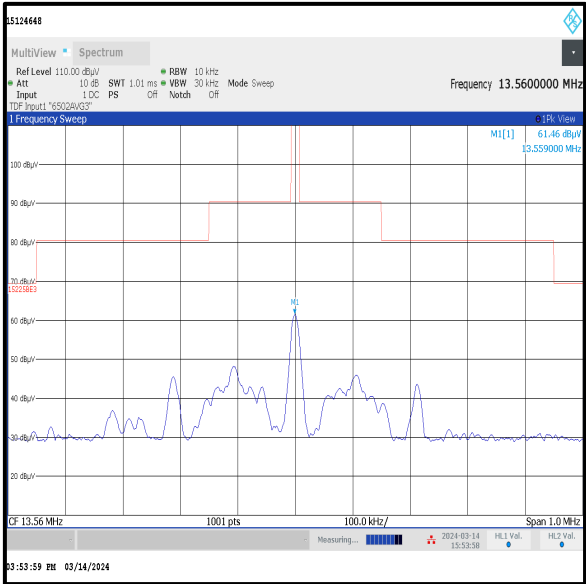
Test Setup:



Transmitter Fundamental Field Strength (continued)

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level at 3m (dBμV/m)	Extrapolated Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)	Result
13.56	90° to EUT	61.1	21.1	84.0	62.9	Complied



Fundamental field strength and spectrum mask / measured at 3 metres in a semi-anechoic chamber

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	06 Sep 2024	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	21 Apr 2024	12
A3165	Magnetic Loop Antenna	ETS-Lindgren	6502	00224383	13 Apr 2024	12

5.2.2. Transmitter Radiated Spurious Emissions

Test Summary:

Test Engineers:	Lenny Hantz & Andrew Harding	Test Dates:	14 March 2024 to 20 March 2024
Test Sample Serial Number:	230202056		

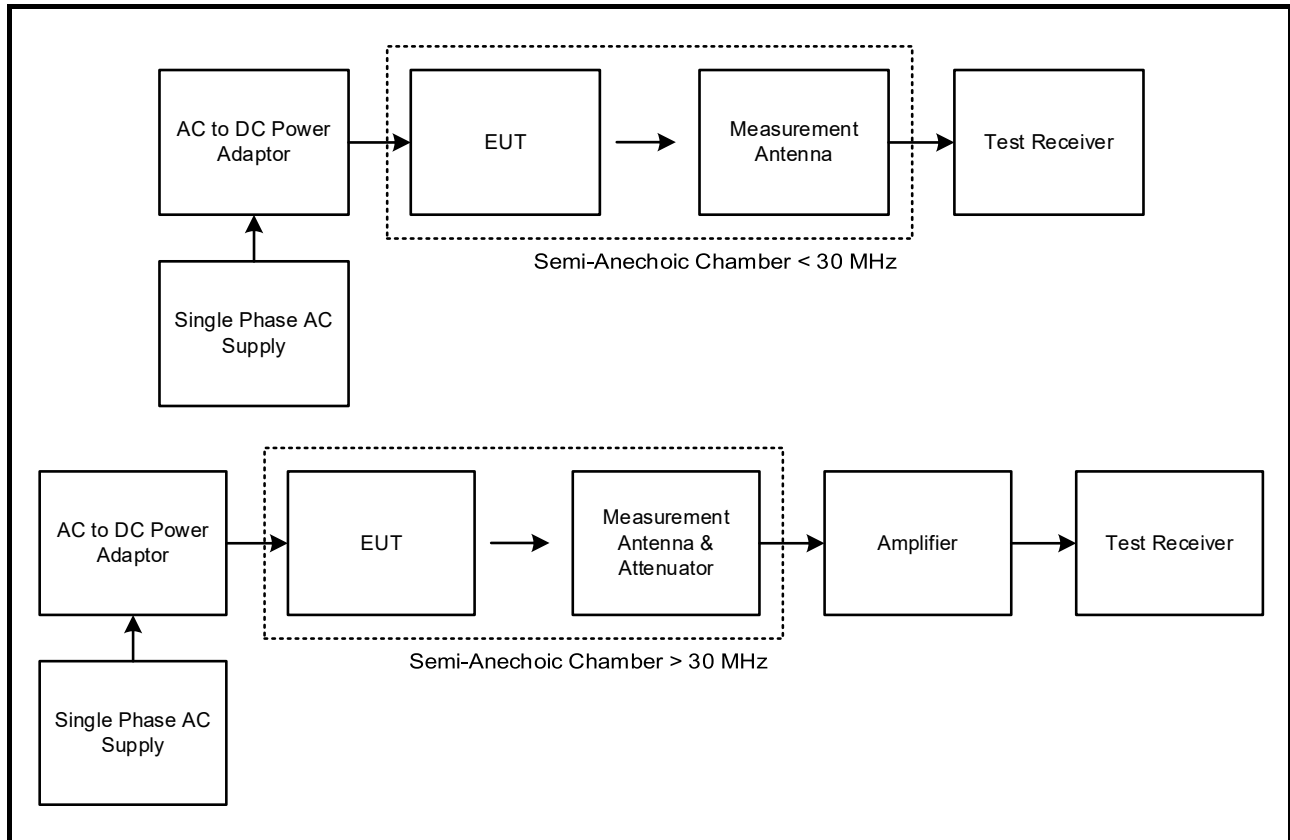
FCC Reference:	Parts 15.225(d) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 / RSS-210 B.6(a)(iv)
Test Method Used:	ANSI C63.10 Sections 6.3, 6.4 and 6.5 and notes below
Frequency Range:	9 kHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	21 to 23
Relative Humidity (%):	43 to 46

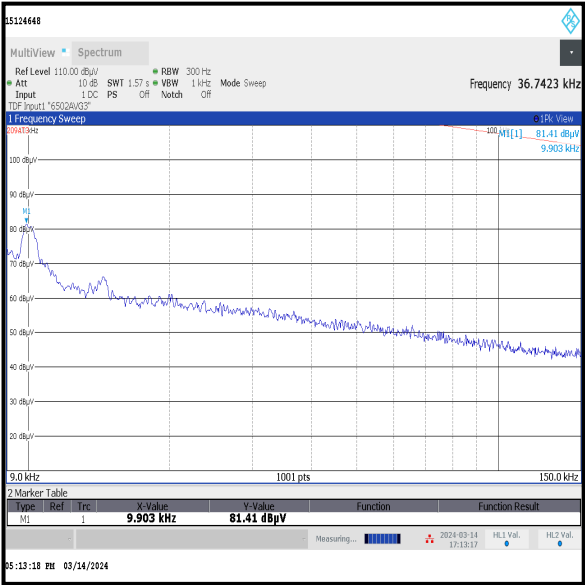
Transmitter Radiated Spurious Emissions (continued)**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions were greater than 20 dB below the applicable limit, below the noise floor of the measurement system or ambient.
3. Measurements from 9 kHz to 30 MHz were performed in a semi-anechoic chamber (UL Asset Number K0001) at a distance of 3 metres. The EUT loop was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. As allowed by ANSI C63.10 clause 5.2; an alternative test site that can demonstrate equivalence to an open area test site may be used for measurements below 30 MHz. Therefore, measurements were performed in a semi-anechoic chamber. The correlation data between semi-anechoic chamber and an open field test site is available upon request.
4. The measured values at 3 metres were extrapolated to the required measurement distances of 300 metres and 30 metres and compared to the specified limits at those distances:
 - 9 kHz to 490 kHz: measured value extrapolated from 3 metres to 300 metres by subtracting 80 dB at 40 dB / decade
 - 490 kHz to 30 MHz: measured value extrapolated from 3 metres to 30 metres by subtracting 40 dB at 40 dB / decade
5. Measurements from 30 MHz to 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
6. Pre-scans were performed, and markers placed on the highest measured levels. The test receiver was configured as follows: During 9 kHz to 150 kHz measurements, the resolution bandwidth was set to 300 Hz and video bandwidth 1 kHz. A peak detector was used and trace mode was Max Hold. For 150 kHz to 30 MHz, the resolution bandwidth was set to 10 kHz and video bandwidth 30 kHz, trace mode was Max Hold. During 30 MHz to 1 GHz measurements, the resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. Final measurements were performed using a CISPR Quasi-Peak detector and measurement time set to 15 seconds.
7. Pre-scans were performed in each EUT orientation. The worst-case plots are presented below. Final measurements were performed in the worst-case orientation identified from the pre-scans.
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-Gen Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency X kHz resulted in a level of Y dB μ V/m, which is equivalent to $Y - 51.5 = Z$ dB μ A/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to the 15.209(a) limit.

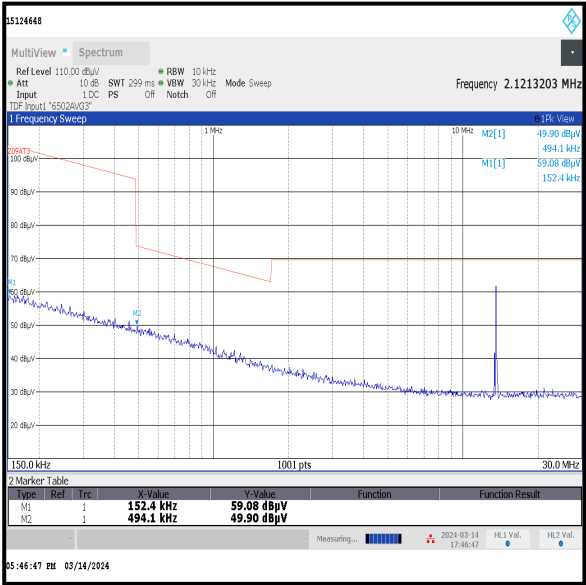
Transmitter Radiated Spurious Emissions (continued)**Test setup:****Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
31.756	Horizontal	26.9	40.0	13.1	Complied
40.680	Vertical	33.9	40.0	6.1	Complied
48.006	Vertical	23.6	40.0	16.4	Complied
83.993	Vertical	25.1	40.0	14.9	Complied
90.005	Vertical	24.3	43.5	19.2	Complied
107.996	Vertical	26.1	43.5	17.4	Complied
199.999	Vertical	36.5	43.5	7.0	Complied
257.602	Vertical	34.4	46.0	11.6	Complied
399.977	Vertical	37.2	46.0	8.8	Complied
599.988	Vertical	43.8	46.0	2.2	Complied
779.980	Vertical	42.0	46.0	4.0	Complied
999.978	Horizontal	52.5	54.0	1.5	Complied

Transmitter Radiated Spurious Emissions (continued)



9 kHz to 150 kHz / peak detector / measured at 3 metres extrapolated to 30 metres / measured in a semi-anechoic chamber / X Orientation (Screen Horizontal) / Combined Antenna Polarisation



150 kHz to 30 MHz / peak detector (worst case) / EUT operating / measured at 3 metres extrapolated to 30 metres / measured in a semi-anechoic chamber / X Orientation (Screen Horizontal) / Combined Antenna Polarisation



30 MHz to 1 GHz / peak detector (worst case) / measured at 3 metres in a semi-anechoic chamber / X Orientation (Screen Horizontal) / Combined Antenna Polarisation

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

Transmitter Radiated Spurious Emissions (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	06 Sep 2024	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	21 Apr 2024	12
A3154	Pre-Amplifier	Com Power	PAM-103	18020012	21 Aug 2024	12
A3165	Magnetic Loop Antenna	ETS-Lindgren	6502	00224383	13 Apr 2024	12
A231925	Antenna	Teseq	CBL6111D	63584	27 Apr 2024	12
A3010	Attenuator	AtlanTecRF	AN18-06	208801#5	27 Apr 2024	12

5.2.3. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineers:	Lenny Hantz & Andrew Edwards	Test Date:	14 March 2024
Test Sample Serial Number:	230202056		

FCC Reference:	Parts 15.225(c)(d) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 / RSS-210 B.6(a)(iv)
Test Method Used:	ANSI C63.10 Section 6.10.5.2 and Notes below

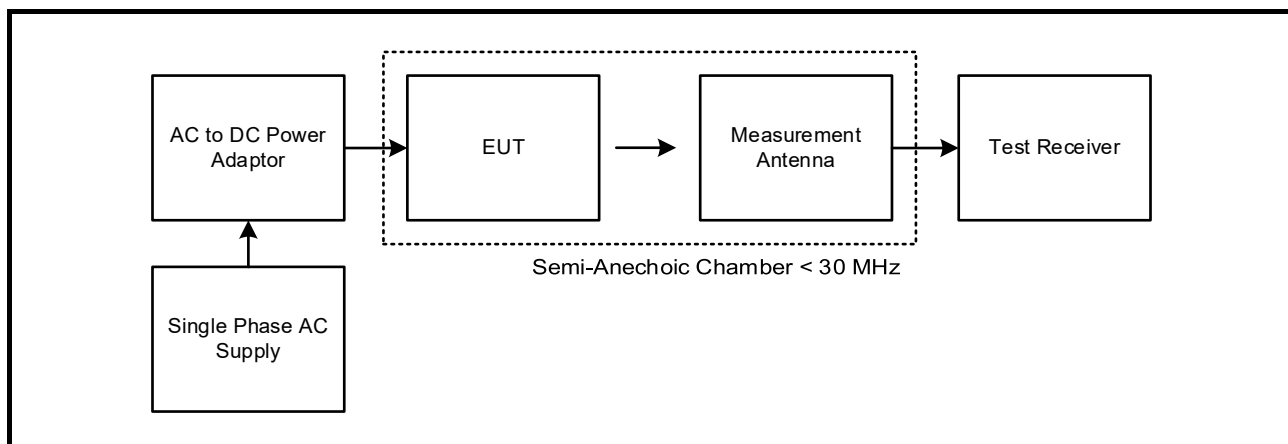
Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	43

Note(s):

- Measurements below 30 MHz were performed in a semi-anechoic chamber (Asset Number K0001) at 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. As allowed by ANSI C63.10 clause 5.2; an alternative test site that can demonstrate equivalence to an open area test site may be used for measurements below 30 MHz. Therefore, measurements were performed in a semi-anechoic chamber. The correlation data between semi-anechoic chamber and an open field test site is available upon request.
- *Field strength measurements performed at 3 metres in a semi-anechoic chamber were extrapolated to a distance of 30 metres by subtracting 40 dB (using a linear distance extrapolation factor of 40 dB/decade).
- The test receiver resolution bandwidth was set to 10 kHz and video bandwidth 30 kHz. A peak detector was used, sweep time was set to auto trace mode was Max Hold. The span was set to 1 MHz, with frequency lines were placed on the lower and upper band edges. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher level emission was present). Marker frequencies and levels were recorded.

Test setup:



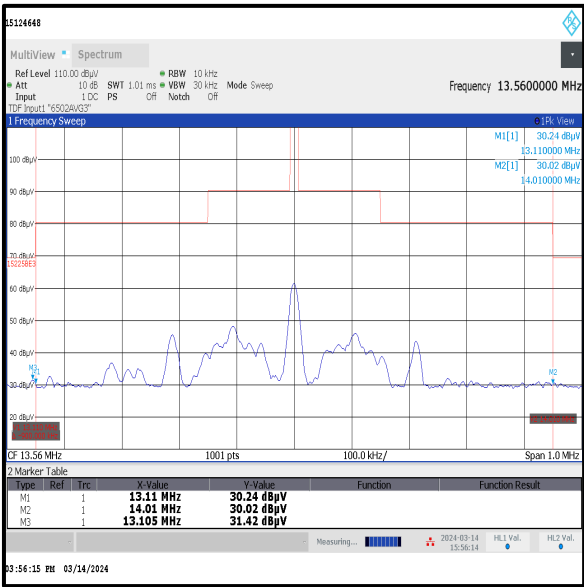
Transmitter Band Edge Radiated Emissions (continued)

Results: Lower Band Edge

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
13.11	-9.8*	29.5	39.3	Complied

Results: Upper Band Edge

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
14.01	-10.0*	29.5	39.5	Complied



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	06 Sep 2024	12
A3165	Magnetic Loop Antenna	ETS-Lindgren	6502	00224383	13 Apr 2024	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	21 Apr 2024	12

5.2.4. Transmitter 20 dB Bandwidth

Test Summary:

Test Engineers:	Lenny Hantz & Andrew Edwards	Test Date:	03 April 2024
Test Sample Serial Number:	230202056		

FCC Reference:	Part 2.1049
ISED Canada Reference:	N/A
Test Method Used:	ANSI C63.10 Section 6.9.2

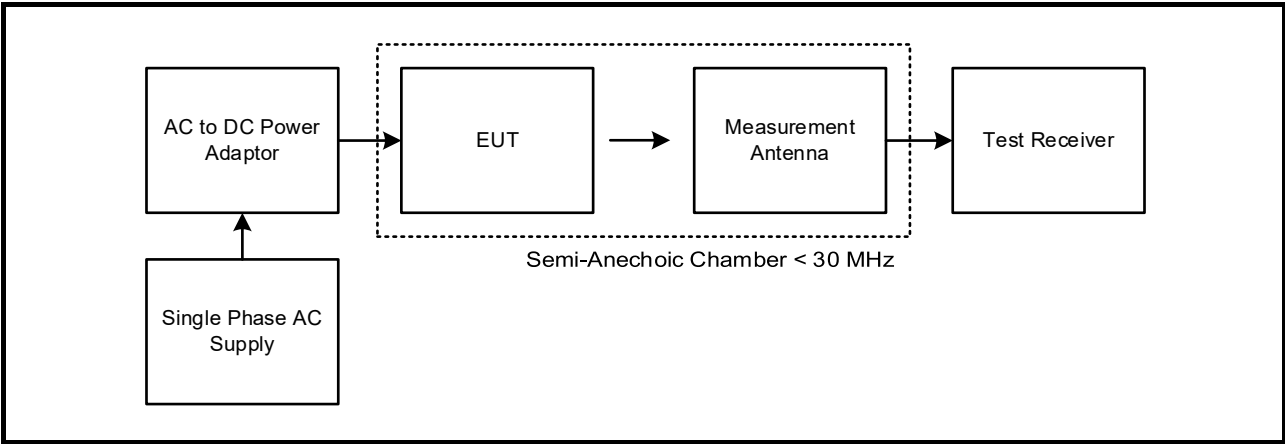
Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	46

Note(s):

1. The signal analyser resolution bandwidth was set to 5 kHz and video bandwidth 20 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 1.5 MHz. Normal and delta markers were placed 20 dB down from the peak of the carrier. The delta value was recorded in the tables below.

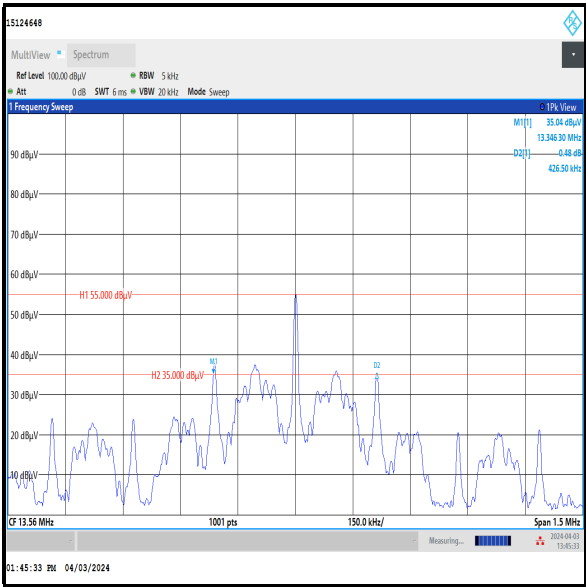
Test setup:



Transmitter 20 dB Bandwidth (continued)

Results:

20 dB Bandwidth (kHz)
426.5



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2037	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
M225863	Signal Analyser	Rohde & Schwarz	FSV3030	102009	02 Nov 2024	12
A209728	Passive Loop Antenna	Schwarzbeck	HFRAE 5163	00207	Calibrated before use	-

5.2.5. Transmitter 99% Occupied Bandwidth

Test Summary:

Test Engineers:	Lenny Hantz & Andrew Edwards	Test Date:	03 April 2024
Test Sample Serial Number:	230202056		

FCC Reference	N/A
ISED Canada Reference:	RSS-Gen 6.7
Test Method Used:	RSS-Gen 6.7

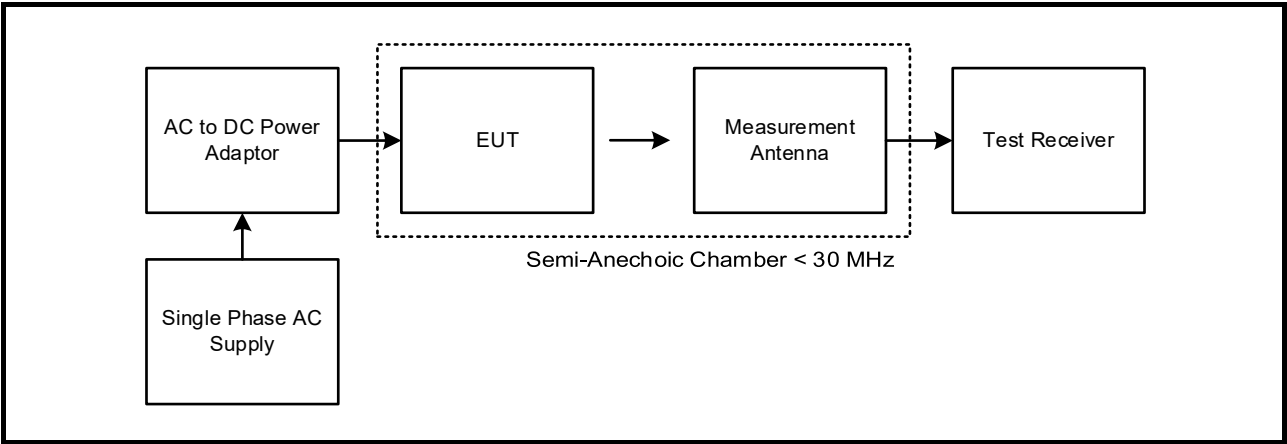
Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	46

Note(s):

- 1. The signal analyser resolution bandwidth was set to 5 kHz and video bandwidth 20 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 1.5 MHz. The signal analyser's 99% Occupied Bandwidth function was enabled and the value was recorded in the table below.

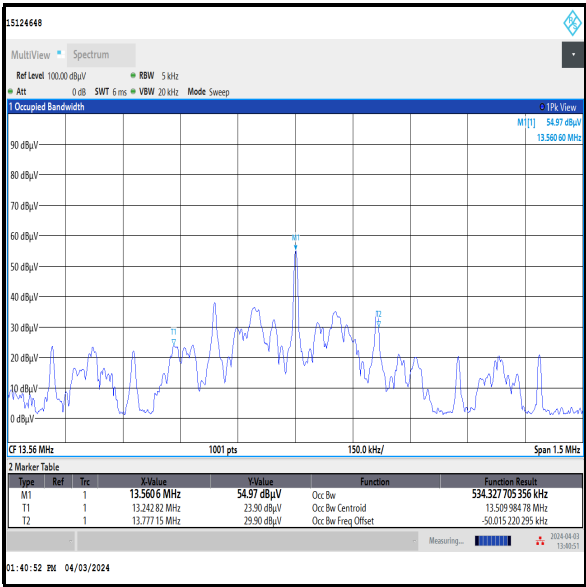
Test Setup:



Transmitter 99% Occupied Bandwidth (continued)

Results:

99% Occupied Bandwidth (kHz)
534.328



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2037	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
M225863	Signal Analyser	Rohde & Schwarz	FSV3030	102009	02 Nov 2024	12
A209728	Passive Loop Antenna	Schwarzbeck	HFRAE 5163	00207	Calibrated before use	-

5.2.6. Transmitter Frequency Stability (Temperature & Voltage Variation)

Test Summary:

Test Engineers:	Lenny Hantz, Jose Bayona & Nick Tye	Test Date:	21 March 2024 to 05 September 2024
Test Sample Serial Number:	230202056		

FCC Reference:	Part 15.225(e)
ISED Canada Reference:	RSS-Gen 6.11 / RSS-210 B.6(b)
Test Method Used:	ANSI C63.10 Section 6.8.1 and 6.8.2

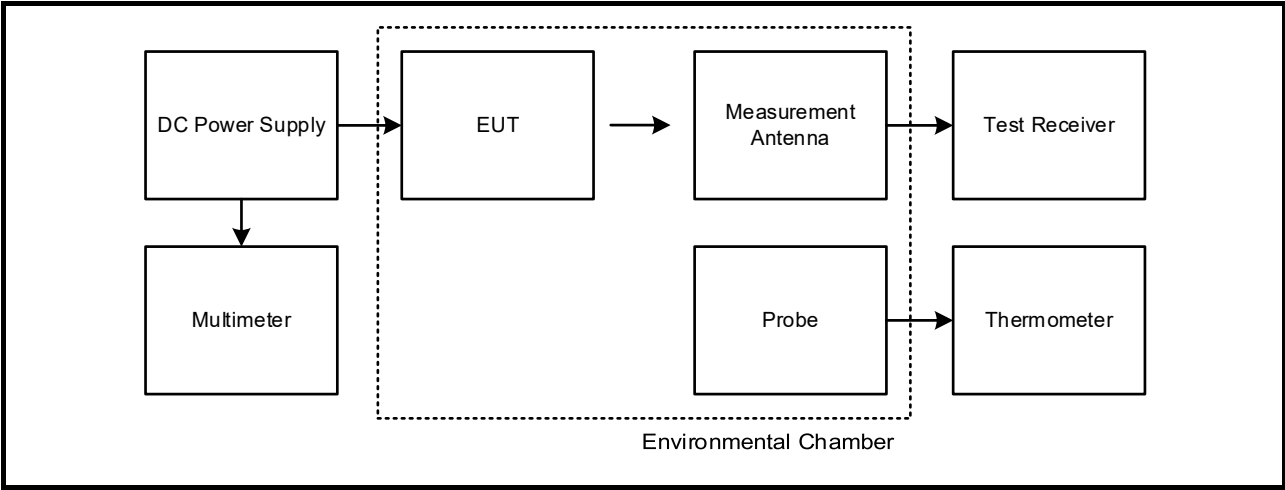
Environmental Conditions:

Ambient Temperature (°C):	21 to 24
Ambient Relative Humidity (%):	45 to 52

Note(s):

1. Testing at voltage extremes was performed with the EUT powered by an external DC power supply. The manufacturer declared the minimum and maximum primary supply voltages as 21.6 and 26.4.
2. Frequency error was measured using a calibrated Rohde & Schwarz spectrum analyser.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.
4. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Test setup:



Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)

Results: Maximum frequency error of the EUT with variations in ambient temperature

Temperature (°C)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
0	13.560675	13.560675	13.560675	13.560675
10	13.560628	13.560628	13.560629	13.560630
20	13.560614	13.560616	13.560617	13.560616
30	13.560601	13.560601	13.560601	13.560600
40	13.560600	13.560600	13.560601	13.560601
50	13.560606	13.560606	13.560609	13.560609

Frequency with Worst Case Deviation (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
13.560675	675	0.005	0.01	0.005	Complied

Results: Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C

Supply Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
21.6	13.56	13.560615	615	0.005	0.01	0.005	Complied
24.0	13.56	13.560615	615	0.005	0.01	0.005	Complied
26.4	13.56	13.560615	615	0.005	0.01	0.005	Complied

Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2037	Thermohygrometer	Testo	608-H1	45124925	27 Dec 2024	12
M2038	Thermohygrometer	Testo	608-H1	45124919	27 Dec 2024	12
E0518	Environmental Chamber	TAS	LTCL 1200	24000107	Calibrated before use	-
M1249	Thermometer	Fluke	52II	88800049	20 Nov 2024	12
M1251	Multimeter	Fluke	175	89170179	06 Jun 2024	12
M225863	Signal Analyser	Rohde & Schwarz	FSV3030	102009	02 Nov 2024	12
M1883	Signal Analyser	Rohde & Schwarz	FSV30	103084	09 Aug 2025	12
A209728	Passive Loop Antenna	Schwarzbeck	HFRAE 5163	00207	Calibrated before use	-
A250419	Passive Loop Antenna	Schwarzbeck	HFRAE 5163	00331	Calibrated before use	-
S0537	Power Supply	Thurlby Thandar	EL302D	249928	Calibrated before use	-

6. Measurement Uncertainty

Measuring Instrument Calibration

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

Measurement Uncertainty & Decision Rule

Overview

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

Decision Rule

Measurement system instrumentation shall be used with an accuracy specification meeting the accuracy specification limits according to IEC/IECEE OD-5014.

As applicable, unless specified otherwise in this quotation, the compliance "Decision Rule" is based on Simple Acceptance. If the measured value is on the limit, the result is defined as a pass. In this case the risk of a false positive is 50%. For further information regarding risk assessment refer to ILAC G8:09/2019.

Measurement Uncertainty

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
20 dB Bandwidth	13 MHz to 14 MHz	95%	±3.92 %
99% Occupied Bandwidth	13 MHz to 14 MHz	95%	±3.92 %
Frequency Stability	13 MHz to 14 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±5.32 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±3.30 dB
Transmitter Fundamental Field Strength	13 MHz to 14 MHz	95%	±5.32 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
2.0	1 & 7	3.1	Model No. / HVIN updated
	17	5.2.2	30 metre extrapolation added to result table
	19 & 21	5.2.3	Reference to EUT orientation and antenna polarisation added
3.0	24	5.2.6	Removed AC Conducted Emissions test, added missing 10 degree step results to Transmitter Frequency Stability test.
4.0	-	-	Removed all references to limit extrapolation.
5.0	1	-	Removed duplicate &
	11	5.2.1	Corrected ANSI reference in note 3 and added note 4
	14	5.2.2	Added note 4

---END OF REPORT---