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ENAC ENSAYOS Nº 51/LE147

Test report No:
NIE: 60085RRF.001

Test report
USA FCC Part 15.225, 15.209
CANADA RSS-210, RSS-Gen

(*) Identification of item tested	Industrial HMI controller for weaving machine
(*) Trademark	PICANOL
(*) Model and /or type reference	PD15
Other identification of the product	Hardware version: BE322130.04 Software version: 19083.0.0.2 FCC ID: 2ATV5-PD15 IC: 25229-PD15
(*) Features	Wifi; Bluetooth 4.0, NFC
Applicant	PICANOL N.V. Steverlyncklaan 15 8900 Ieper, Belgium
Test method requested, standard	USA FCC Part 15.225 (10–1–18 Edition): Operation within the band 13.110 -14.010. USA FCC Part 15.209 (10–1–18 Edition): Radiated emission limits, general requirements. CANADA RSS-210 Issue 9 (August 2016). CANADA RSS-Gen Issue 5 (April 2018). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Jose Carlos Luque RF Lab. Supervisor 74841983Y JOSE CARLOS LUQUE (C:A29507456) Firmado digitalmente por 74841983Y JOSE CARLOS LUQUE (C:A29507456) Fecha: 2020.01.07 12:44:37 +01'00'
Date of issue	2020-01-07
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of an industrial HMI for Picanol weaving machinery, contains:

   - Wifi + BT combo module (Redpine RS9113-NB0-S1N; RF module and antenna integrated)
   - NFC: SOC with antenna glued on PD15 housing
   - 2 internal USB's for future dongles
   - 2 external USB's for data sticks
   - Communication cable based on ethernet for single communication with the machine
   - 26Vdc SELV supply

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
60085B/011	Industrial HMI controller for weaving machine	PD15	PS1912 980785	2019/06/06

Auxiliary elements used with sample S/01:

Control Nº	Description	Model	Serial Nº	Date of reception
60085B/006	NFC card	---	---	2019/06/06
60085B/020	Industrial HMI controller for weaving machine	PD15	PS1917 980392	2019/06/06

Sample S/01 has undergone the following test(s): All RADIATED tests indicated in Appendix A.

- Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
60085B/024	Industrial HMI controller for weaving machine	PD15	PS1917 980392	2019/10/07

Auxiliary elements used with sample S/02:

Control Nº	Description	Model	Serial Nº	Date of reception
60085B/030	NFC card	---	---	2019/10/07
60085B/025	Industrial HMI controller for weaving machine	PD15	PS1911 980471	2019/10/07

Sample S/02 has undergone the following test(s): All CONDUCTED tests indicated in Appendix A.

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)
	Supply 26Vdc	testsetup 5m application 12m	☒	☐	☐
	Ethernet Communication *point to point*	testsetup 5m application 12m	☒	☐	☐
Supplementary information to the ports…… :	-				

Rated power supply ……:	Voltage and Frequency	Reference poles				
		L1	L2	L3	N	PE
	☒ DC: 26Vdc from SELV					

Rated Power ……:	26V; 1A max, 26W max
Clock frequencies ……:	• Main switcher: 500kHz • Display backlight: 20kHz • Display LVDS: +/- 80Mhz • iMX6 Core: 1.0GHz • iMX6 DDR3: 533Mhz • BT/Wifi: 2.4Ghz • NFC: 13.56Mhz
Other parameters……:	
Software version ……:	19083.0.0.2
Hardware version……:	PD15-2V1 – AXAA1388.02
Dimensions in cm (W x H x D)….:	43cm x 28cm x 5cm
Mounting position……:	☒ Other: mounted on standard

Modules/parts ……:	Module/parts of test item	Type	Manufacturer
	BOM	PD15	PICANOL
Accessories (not part of the test item) ……:	Description	Type	Manufacturer
	Master Control Unit	PD15	PICANOL
Documents as provided by the applicant……:	Description	File name	Issue date
	--		

Identification of the client

PSICONTROL
Steverlyncklaan 15
8900 Ieper, Belgium

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2019-06-13
Date (finish)	2019-11-12

Document history

Report number	Date	Description
60085RRF.001	2020-01-07	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 35 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Nicolas Salguero and Miguel Angel Torres.

Used instrumentation:

Conducted measurements:

		Last Calibration	Due Calibration
1.	Chamber VÖTSCH VCS 7018-5	2019/07	2020/07
2.	EMI Test Receiver 20Hz – 40GHz RODHE AND SCHWARZ ESU40	2019/09	2021/09
3.	DC Power Supply 40V/40A GW INSTEK GPS-3030D	N/A	N/A
4.	Digital multimeter FLUKE 179	2019/06	2020/06

Radiated measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A	N/A
2.	EMI Test Receiver 9kHz – 7GHz ROHDE AND SCHWARZ ESR7	2018/10	2020/10
3.	Active Loop Antenna HEWLETT PACKARD 11966A	2018/06	2020/06
4	RF Pre-amplifier, 40 dB, 10 MHz-6 GHz BONN ELEKTRONIK BLNA 0160-01N	2019/02	2020/02
5.	Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2017/09	2020/09
6.	DC Power Supply Keysight Technologies U8002A	N/A	N/A
7.	Digital multimeter FLUKE 179	2019/06	2020/06

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

FCC Part 15.225, 15.209 CANADA RSS-210, RSS-Gen Requirement – Test case	Verdict	Remark
15.225 Subclause (a) / RSS-210 Clause B.6 (a). Field strength of emissions within the band 13.553 - 13.567 MHz	P	
15.225 Subclause (b) / RSS-210 Clause B.6 (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 – 13.710 MHz	P	
15.225 Subclause (c) / RSS-210 Clause B.6 (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 – 14.010 MHz	P	
15.225 Subclause (d) / RSS-210 Clause B.6 (d). Field strength of emissions outside of the band 13.110 MHz -14.010 MHz	P	
15.225 Subclause (e) / RSS-210 Clause B.6. Frequency tolerance of the carrier signal	P	
Supplementary information and remarks: None		

Appendix A: Test results.

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TEST CONDITIONS

POWER SUPPLY (V):

Vn: 26 Vdc (*)
Vmin: 24.7 Vdc (*)
Vmax: 27.3 Vdc (*)

Type of Power Supply: External power supply.

The subscripts 'n', 'min' and 'max' mean nominal, minimum and maximum respectively.

(*): Declared by applicant.

ANTENNA:

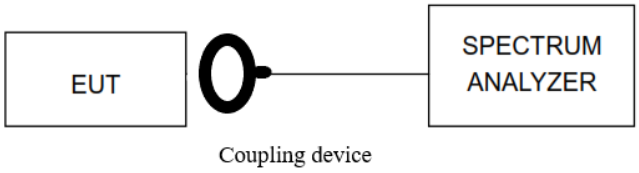
Type of Antenna: Flex PCB antenna

TEST FREQUENCY:

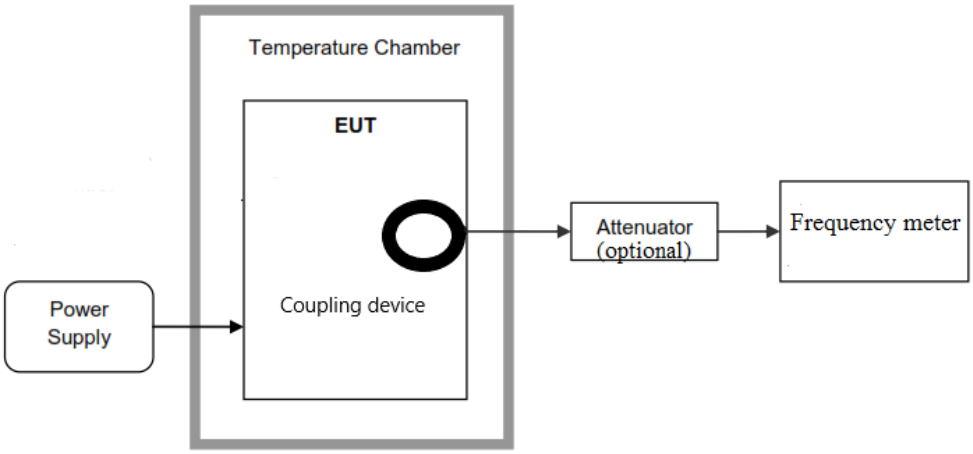
Nominal Operating Frequency: 13.56 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is directly connected to the spectrum analyzer through a coupling device.



For frequency stability test the EUT was placed inside a climatic chamber and connected to a frequency meter using a low loss cable and a coupling device. An external DC power supply was connected to the EUT for voltage variation test.



RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for the range between 30 MHz to 240 MHz) is situated at a distance of 3 m.

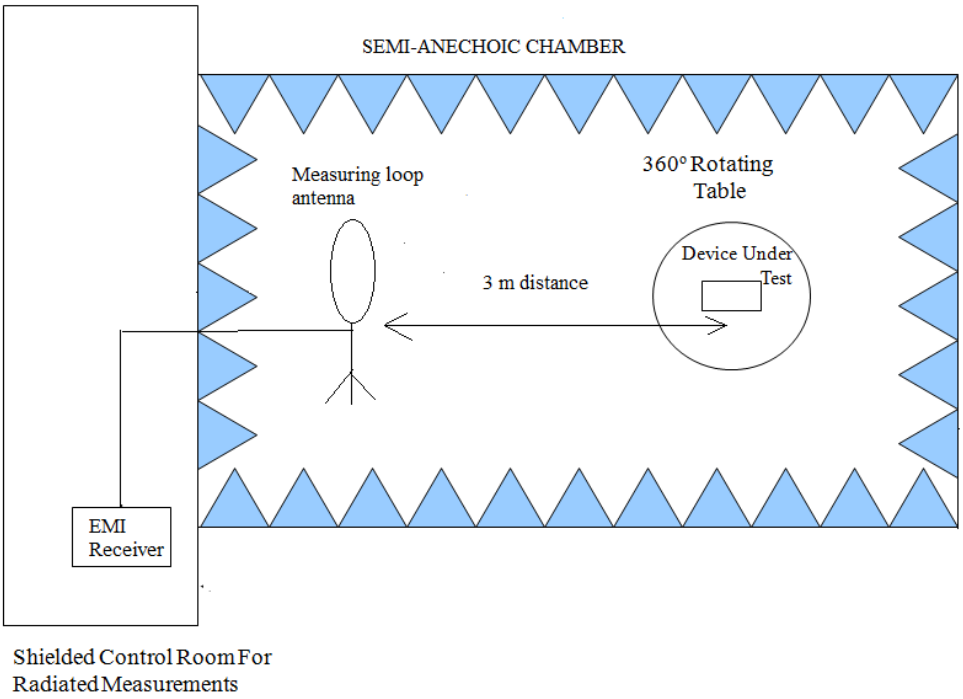
For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and in the range between 30 MHz and 200 MHz the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

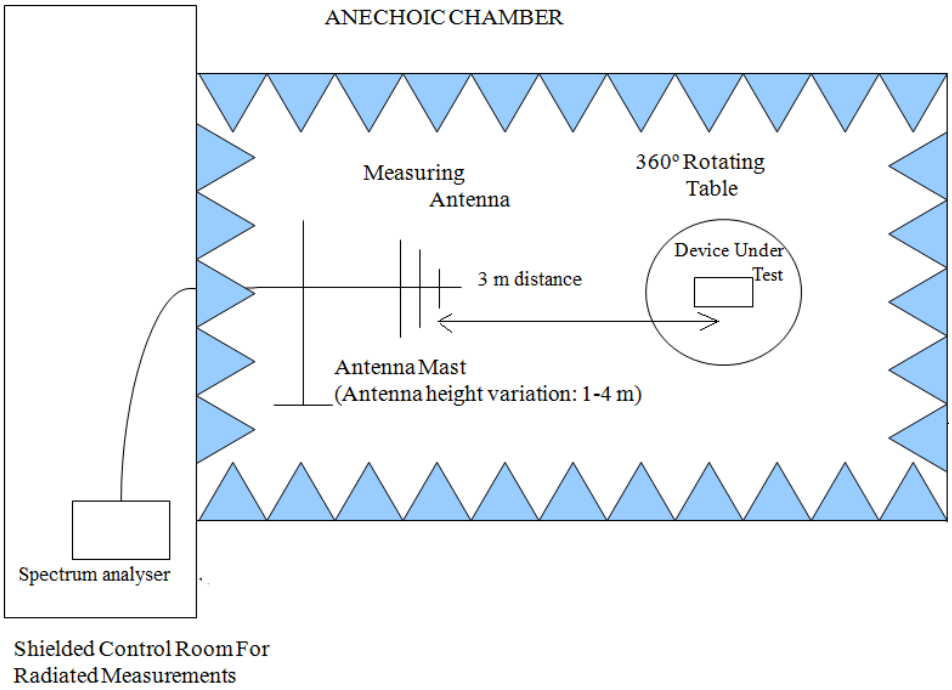
In the range between 9 kHz and 30 MHz the measurements were made in the three different orientation planes of the loop antenna to determine the maximum received field.

In the range between 30 MHz and 200 MHz the measurements were made in both horizontal and vertical planes of polarization.

Radiated measurements setup 9 kHz to 30 MHz:



Radiated measurements setup 30 MHz to 200 MHz:

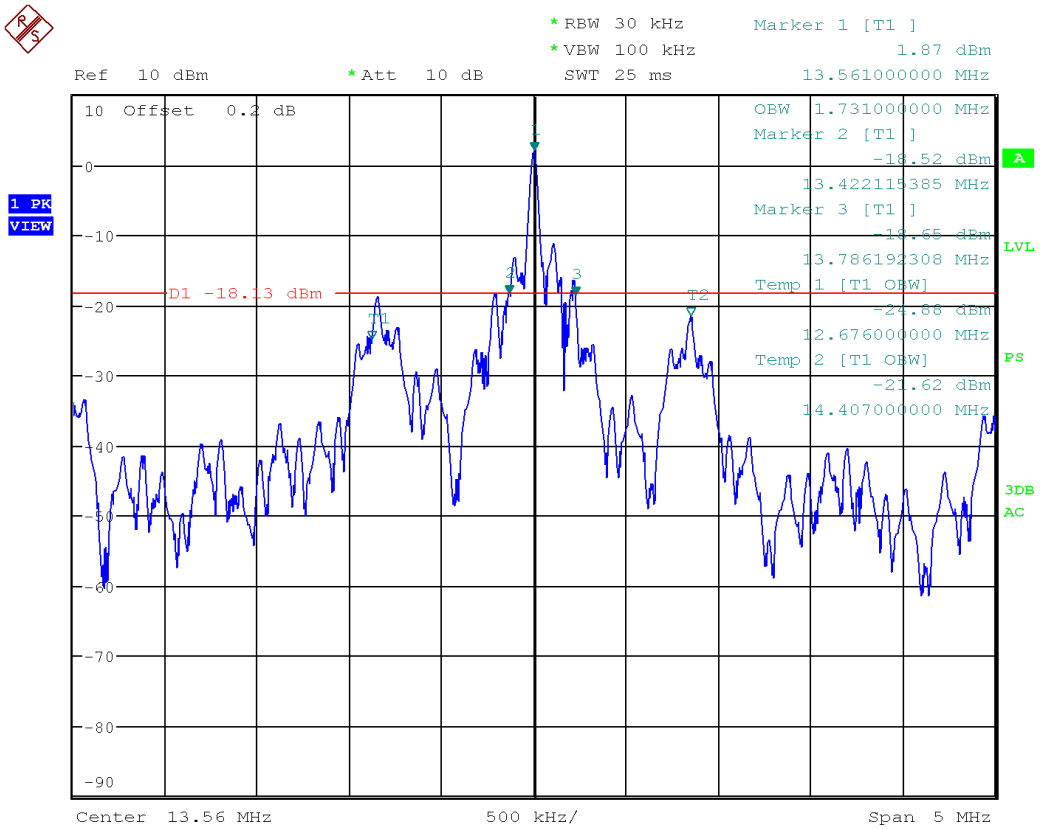


Occupied Bandwidth

RESULTS:

99 % Occupied Bandwidth and 20 dB Bandwidth.

Operation Mode	99% Occupied Bandwidth (kHz)	20 dB Bandwidth (kHz)
NFC mode ISO 14443A	1731	364.08
Measurement uncertainty (kHz)	<±0.40	



Verdict: PASS

Section 15.225 Subclause (a) / RSS-210 Clause B.6 (a). Field strength of emissions within the band 13.553 - 13.567 MHz

SPECIFICATION:

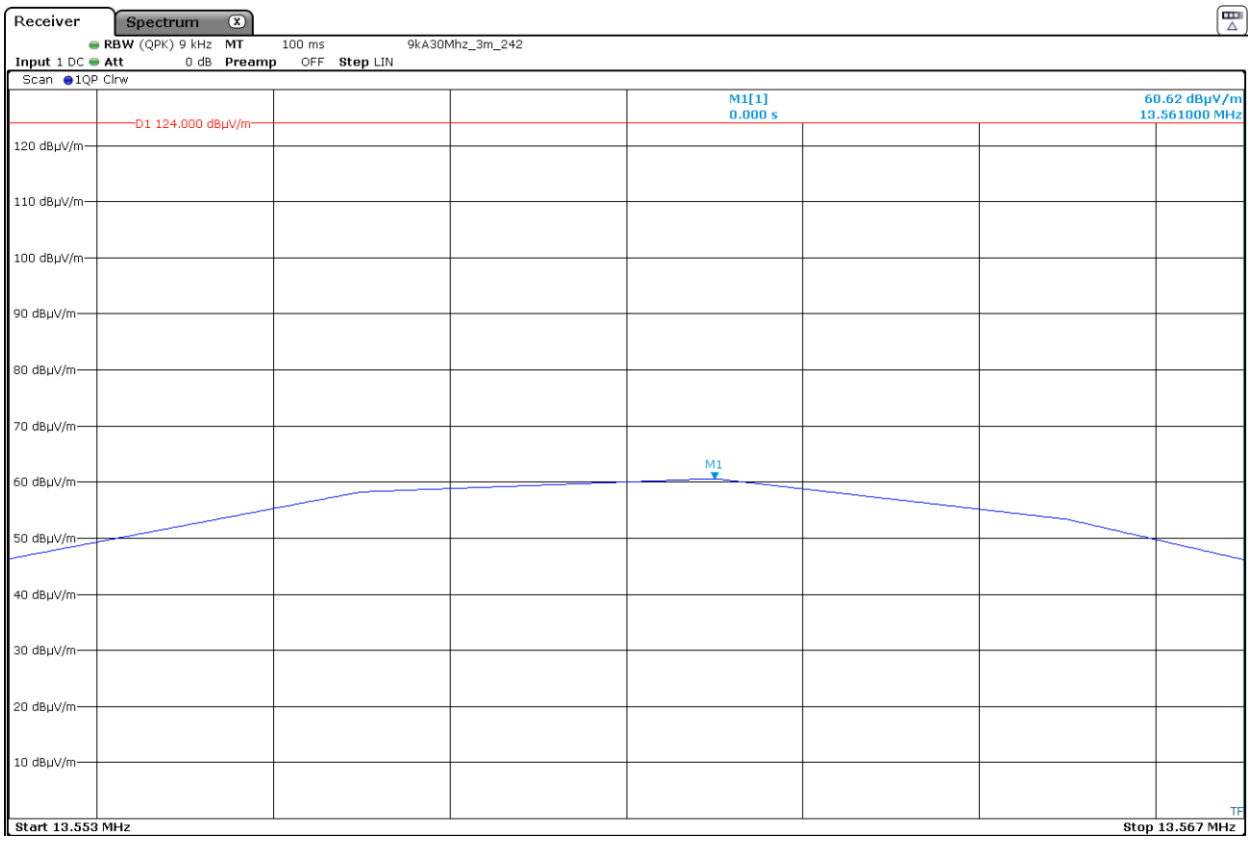
The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter (84 dBµV/m) at 30 meters.

RESULTS:

Measurement distance: 3 meters.

The maximum field strength of fundamental emission:

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.561	60.62	20.62
Measurement uncertainty (dB)	<±3.04	



The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

Section 15.225 Subclause (b) / RSS-210 Clause B.6 (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 - 13.710 MHz

SPECIFICATION:

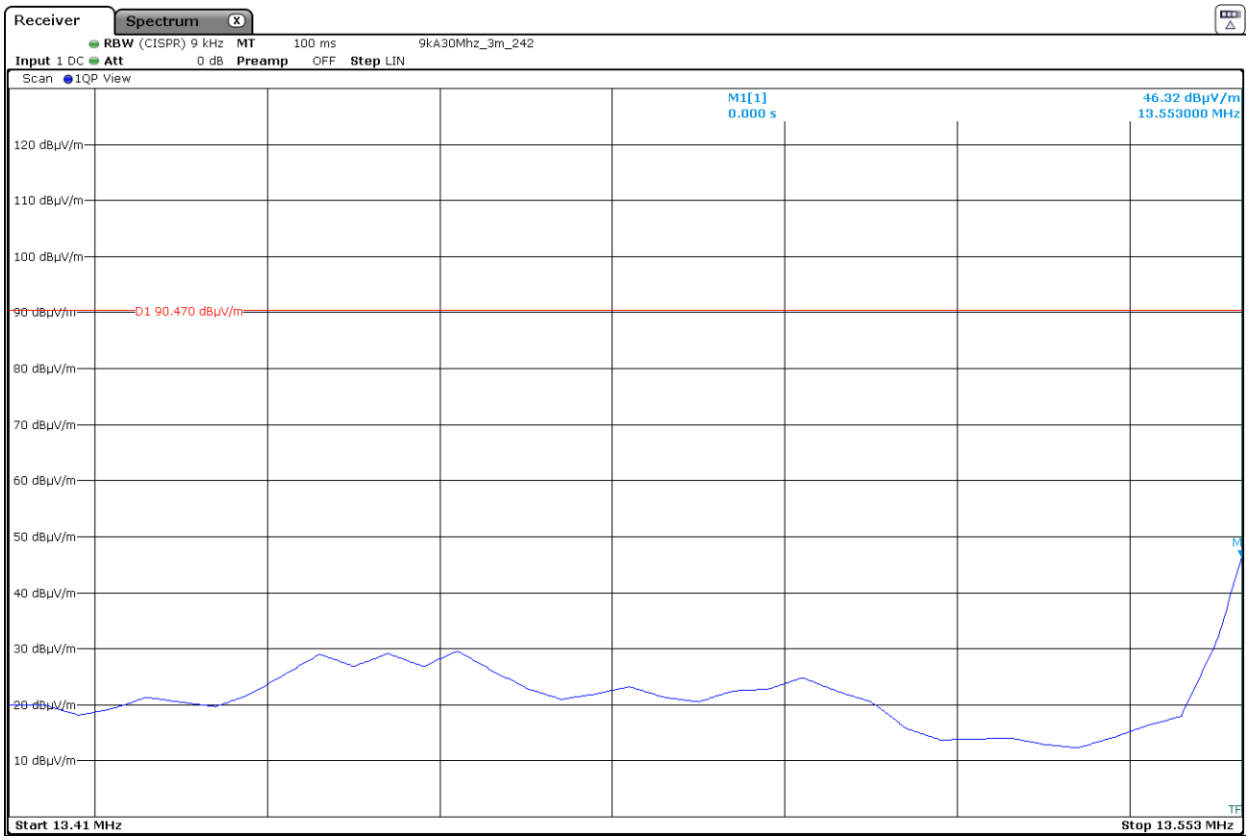
Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50.47 dBµV/m) at 30 meters.

RESULTS:

Measurement distance: 3 meters.

- Band 13.410 - 13.553 MHz

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.553	46.32	6.32
Measurement uncertainty (dB)	<±3.04	

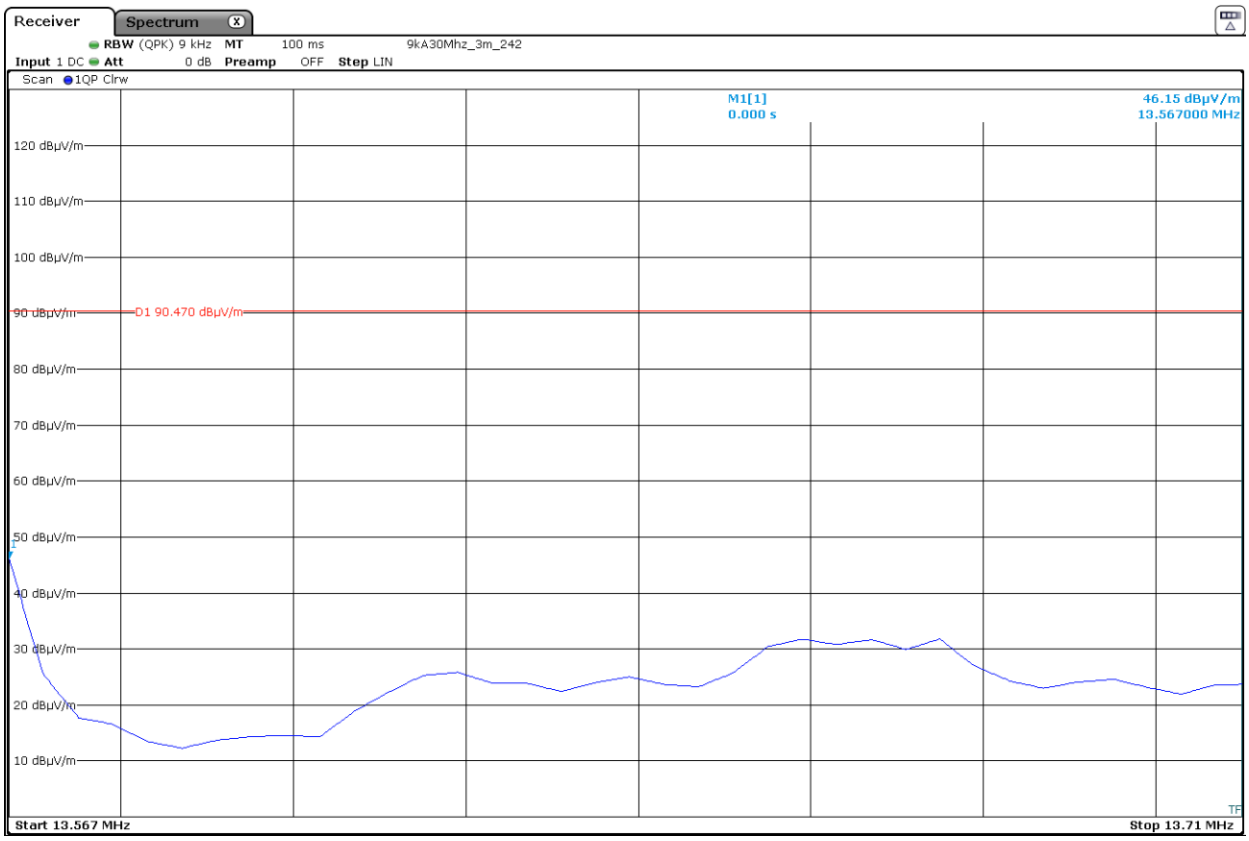


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- Band 13.567-13.710 MHz

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.567	46.15	6.15
Measurement uncertainty (dB)	<±3.04	



The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

Section 15.225 Subclause (c) / RSS-210 Clause B.6 (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 - 14.010 MHz

SPECIFICATION:

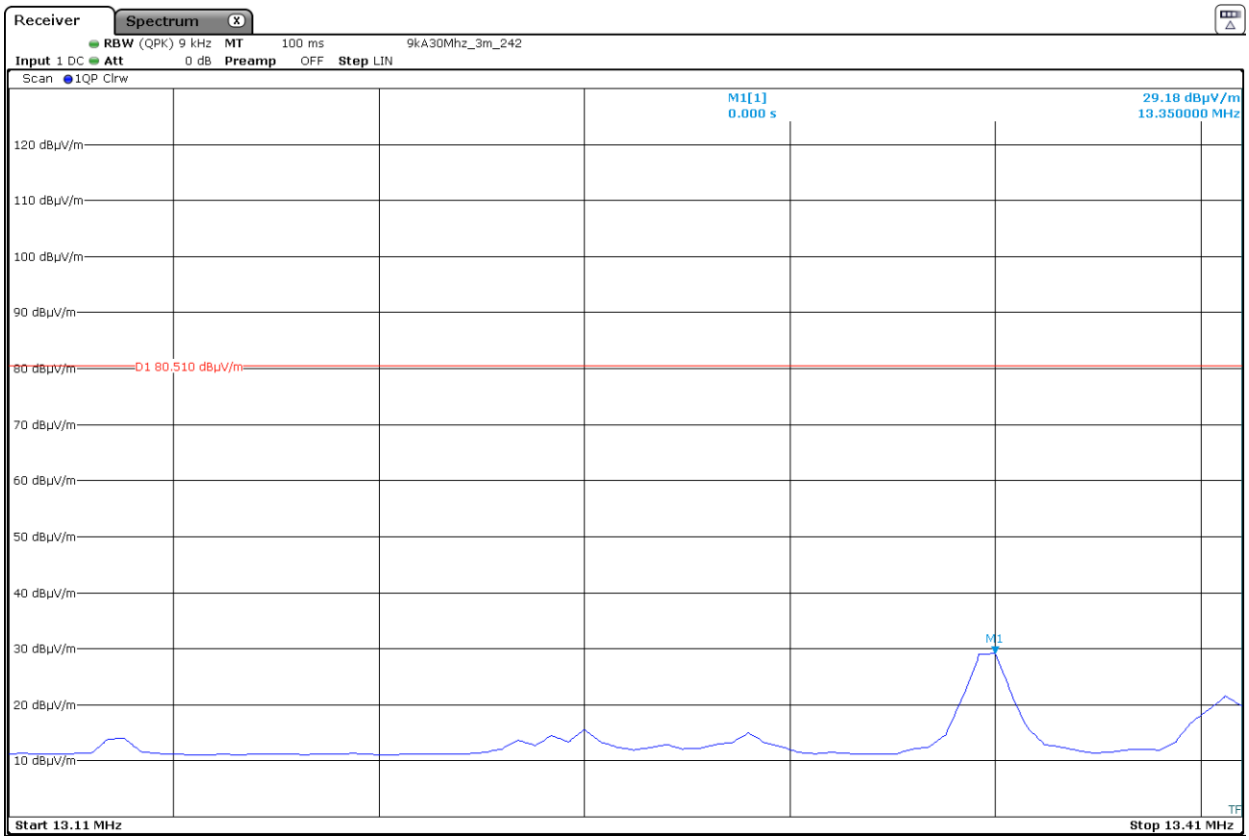
Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter (40.51 dBµV/m) at 30 meters.

RESULTS:

Measurement distance: 3 meters.

- Band 13.110-13.410 MHz

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.350	29.18	-10.82
Measurement uncertainty (dB)	<±3.04	

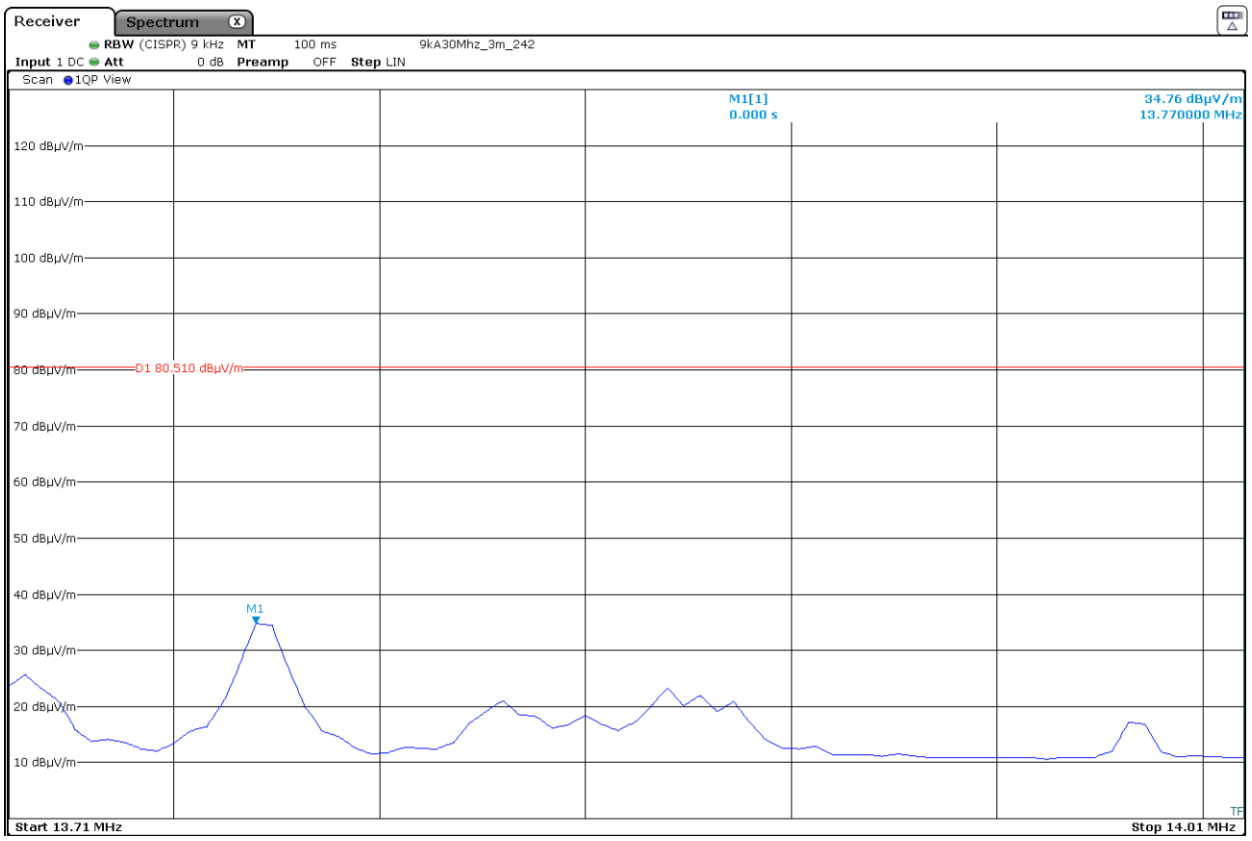


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- Band 13.710-14.010 MHz

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.770	34.76	-5.24
Measurement uncertainty (dB)	±3.04	



The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

Section 15.225 Subclause (d) / RSS-210 Clause B.6 (d). Field strength of emissions outside of the band 13.110 - 14.010 MHz

SPECIFICATION:

Field strength of any emissions appearing outside of the band 13.110 MHz - 14.010 MHz band shall not exceed the general radiated emission limits in 15.209/RSS-Gen:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

RESULTS:

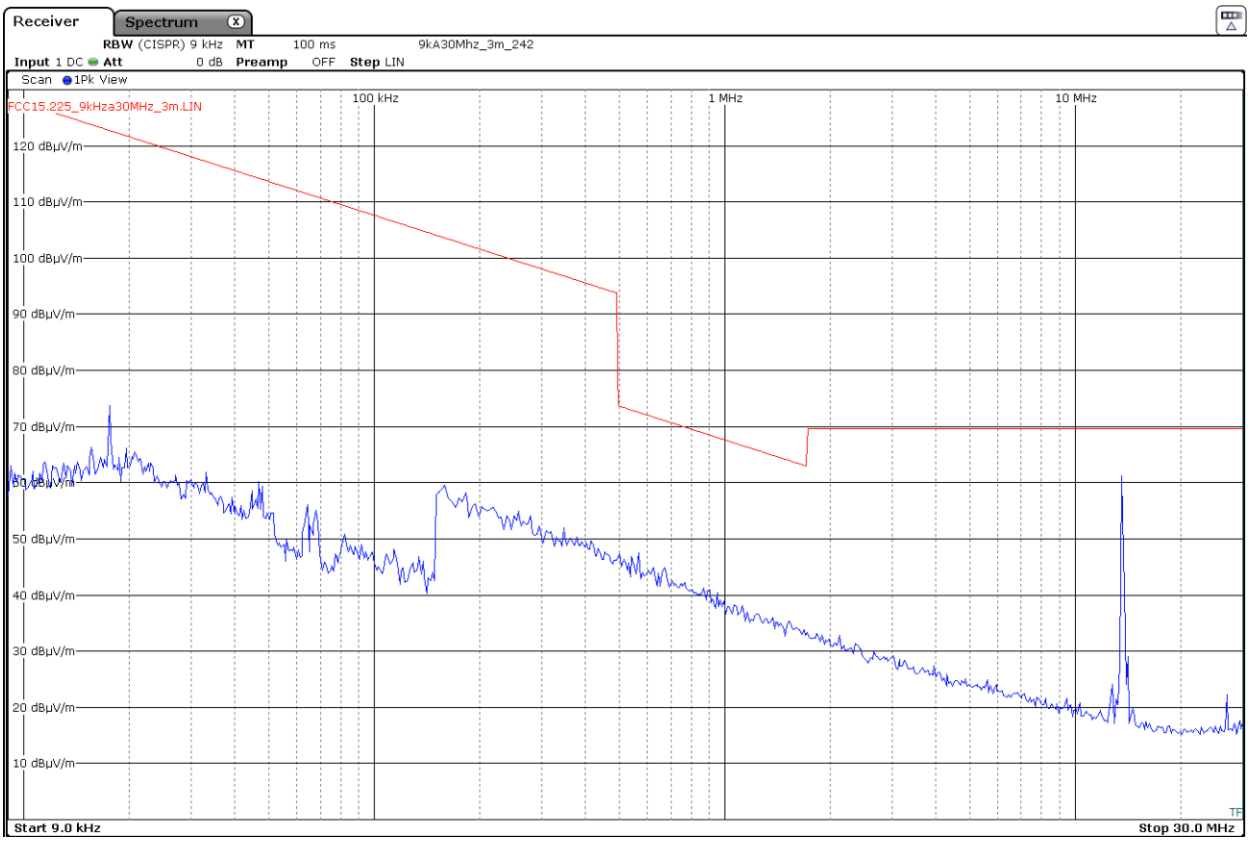
All tests were performed in a semi-anechoic chamber at a distance of 3 m.

The spectrum was inspected from 9 kHz to 200 MHz searching for spurious signals.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifier gain.

- Frequency range 9 kHz - 30 MHz:

No spurious frequencies were found at less than 20 dB below the limit.



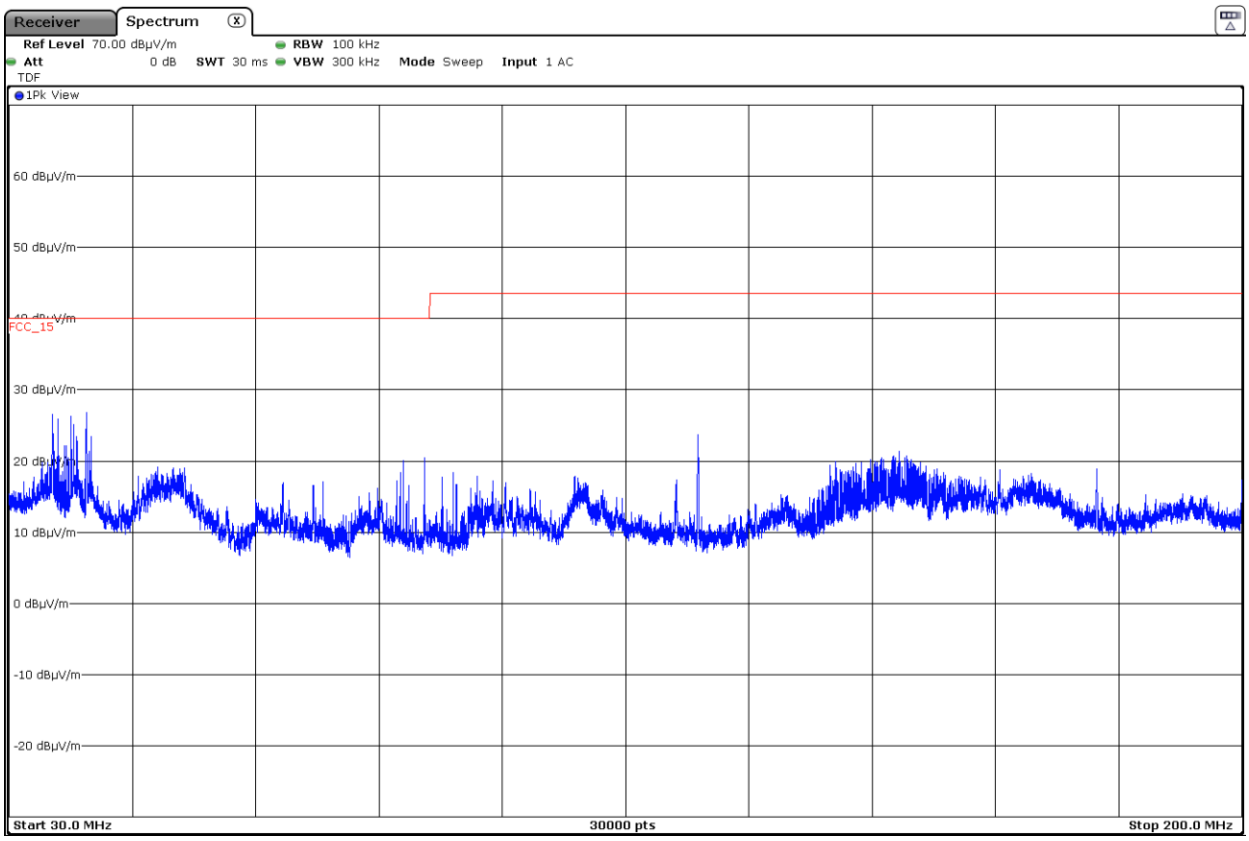
The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.

Resolution bandwidth:
200 Hz for 9 kHz ≤ f ≤ 150 kHz
9 kHz for 150 kHz ≤ f ≤ 30 MHz

- Frequency range 30 - 200 MHz

No spurious frequencies were found at less than 20 dB below the limit.

Measurement uncertainty (dB): <± 2.07



The above plot shows the results of the scan using peak detector.

Verdict: PASS

Section 15.225 Subclause (e) / RSS-210 Clause B.6. Frequency tolerance of the carrier signal

SPECIFICATION:

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

RESULTS:

Nominal Operating Frequency: 13.56 MHz.

- Frequency stability over temperature variations:

Temperature (ºC)	Frequency Error (KHz)	Frequency Error (%)
+50	0.0045	0.000033
+40	0.0045	0.000033
+30	0.0165	0.000122
+20	0.0150	0.000111
+10	-0.0075	-0.000055
0	0.0150	0.000111
-10	0.0105	0.000077
-20	-0.0045	-0.000033

- Frequency stability over voltage variations:

DC Supply	Voltage (V)	Frequency Error (KHz)	Frequency Error (%)
Vmax	27.3	0.0105	0.000077
Vmin	24.7	0.0150	0.000111

Verdict: PASS