

# RADIO TEST REPORT – 451191-1APFWL

Type of assessment:

**Final product testing**

Applicant:

**Barrett Communications Pty Ltd**

Model:

**PRC-4090 System Docking Station**

Product name (type):

**SDR Transceiver**

FCC ID:

**OWA-PRC4090MB**

ISED certification number:

**6468A-4090MB**

Specification:

- ◆ FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310
- ◆ FCC 47 CFR Part 2 Subpart J, §2.1091
- ◆ FCC KDB 447498 D01 General RF Exposure Guidance v06
- ◆ ISED Canada RSS-102 Issue 6, December 15, 2023
- ◆ RSS-102, Issue 6, Supplementary Procedure SPR-002, 2<sup>nd</sup> edition

Declaration of RF exposure compliance for exemption from routine evaluation limits

## **RSS-102 Annex C - Attestation:**

I attest that the radiocommunication apparatus meets the exemption from the routine evaluation limits in Section 2.5 of RSS-102 standard; that the Technical Brief was prepared, and the information contained therein is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed; and that the device meets the SAR and/or RF field strength limits of RSS-102.

Date of issue: July 11, 2025

**Kevin Rose, EMC/RF Specialist**

Prepared by



Signature

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SCC File Number: 15064 (Ottawa/Almonte); 151100 (Montreal); 151097 (Cambridge)

FCC and RSS-102 Annex C – MPE Exemption; Date: May 2021

## Lab locations

Company name	Nemko Canada Inc.			
Facilities	<i>Ottawa site:</i> 303 River Road Ottawa, Ontario Canada K1V 1H2  Tel: +1 613 737 9680 Fax: +1 613 737 9691	<i>Montréal site:</i> 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8  Tel: +1 514 694 2684 Fax: +1 514 694 3528	<i>Cambridge site:</i> 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2  Tel: +1 519 650 4811	<i>Almonte site:</i> 1500 Peter Robinson Road West Carleton, Ontario Canada K0A 1L0  Tel: +1 613 256-9117
Test site identifier	<b>Organization</b>	<b>Ottawa/Almonte</b>	<b>Montreal</b>	<b>Cambridge</b>
	FCC:	CA2040	CA2041	CA0101
	ISED:	2040A-4	2040G-5	24676
Website	<a href="http://www.nemko.com">www.nemko.com</a>			

## Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 1 Evaluation summary

### 1.1 MPE calculation for standalone transmission

#### 1.1.1 References, definitions and limits

##### FCC §2.1091(d)

- (2) For operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in Table 1 in paragraph (e)(1) of this section, may be used instead of whole-body SAR limits as set forth in paragraphs (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b) of this part, except for portable devices as defined in §2.1093 of this chapter as these evaluations shall be performed according to the SAR provisions in §2.1093.

**Table 1.1-1:** Table 1 to §1.1310(e)(1)—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(i) Limits for Occupational/Controlled Exposure</b>				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842 / f	4.89 / f	*(900 / f <sup>2</sup> )	<6
30–300	61.4	0.163	1.0	<6
300–1500			f / 300	<6
1500–100000			5	<6
<b>(ii) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34	614	1.63	*(100)	<30
1.34–30	824 / f	2.19 / f	*(180 / f <sup>2</sup> )	<30
30–300	27.5	0.073	0.2	<30
300–1500			f / 1500	<30
1500–100000			1.0	<30

Notes: f = frequency in MHz. \* = Plane-wave equivalent power density.

References, definitions and limits, continued

RSS-102, Section 5.3.2

The electric and magnetic field strength reference levels, power density reference levels, and associated reference period for devices employed by the general public (uncontrolled environment) and controlled-use devices (controlled environment) are specified in table below. Note that the power density limits specified in these tables apply to whole body exposure conditions.

**Table 1.1-2: RSS-102— RF field strength and power density limits**

Frequency range (MHz)	Electric field strength (V/m rms)	Magnetic field strength (A/m rms)	Power density (W/m <sup>2</sup> )	Reference Period (minutes)
<b>Limits for Controlled Environment</b>				
10–20	61.4	0.163	10	6
20–48	$129.8 / f^{0.25}$	$0.3444 / f^{0.25}$	$44.72 / f^{0.5}$	6
48–100	49.33	0.1309	6.455	6
100–6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
6000–15000	137	0.364	50	$616000 / f^{1.2}$
15000–30000	$0.354 f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	$616000 / f^{1.2}$
<b>Limits for Uncontrolled Environment</b>				
10–20	27.46	0.0728	2	6
20–48	$58.07 / f^{0.25}$	$0.1540 / f^{0.25}$	$8.944 / f^{0.5}$	6
48–300	22.06	0.05852	1.291	6
300–6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000–15000	61.4	0.163	10	$616000 / f^{1.2}$
15000–30000	$0.158 / f^{0.5}$	$4.21 \times 10^{-4} / f^{0.5}$	$6.67 \times 10^{-5} / f$	$616000 / f^{1.2}$

Notes: f = frequency in MHz.

The above table refers to Health Canada's Safety Code 6 for relevant notes and additional information.

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm<sup>2</sup> or W/m<sup>2</sup>)  
P = power input to the antenna (mW or W)  
G = power gain of the antenna in the direction of interest relative to an isotropic radiator  
R = distance to the center of radiation of the antenna (cm or m)

1.1.2 EUT technical information

Operational frequency	16.1 MHz
Antenna gain (max)	5 dBi
Number of antennas	1
Maximum transmitter conducted power	51.66 dBm (for FCC), 45.20 dBm (for ISSED)

### 1.1.3 MPE calculation (for FCC)

Fundamental transmit (prediction) frequency: 16.1 MHz  
 Maximum measured conducted peak output power: 51.66 dBm  
 Cable and/or jumper loss: 0 dB  
 Maximum peak power at antenna input terminal: 51.66 dBm  
 Duty cycle: 100 %  
 Maximum calculated average power at antenna input terminal: 146554.78 mW  
 Single Antenna gain (typical): 5 dBi  
 Number of antennae: 1  
 Total system gain: 5.00 dBi

#### FCC calculations

##### Uncontrolled environment

Declared distance: 230 cm  
 Average power density at declared distance: 0.694418 mW/cm<sup>2</sup>  
 6.944177 W/m<sup>2</sup>  
 MPE limit at prediction frequency: 0.694418 mW/cm<sup>2</sup>  
 6.944177 W/m<sup>2</sup>  
 Minimum calculated prediction distance for compliance: 230 cm  
 Margin of Compliance: 0.00 dB  
 with Maximum permitted antenna gain: 5.00 dBi

##### Controlled environment

Declared distance: 103 cm  
 Average power density at declared distance: 3.472088 mW/cm<sup>2</sup>  
 34.720883 W/m<sup>2</sup>  
 MPE limit at prediction frequency: 3.472088 mW/cm<sup>2</sup>  
 34.720883 W/m<sup>2</sup>  
 Minimum calculated prediction distance for compliance: 103 cm  
 Margin of Compliance: 0.00 dB  
 with Maximum permitted antenna gain: 5.00 dBi

#### 1.1.4 MPE calculation (for ISED)

Fundamental transmit (prediction) frequency:	16.1 MHz
Maximum measured conducted peak output power:	45.20 dBm
Cable and/or jumper loss:	0 dB
Maximum peak power at antenna input terminal:	45.20 dBm
Duty cycle:	100 %
Maximum calculated average power at antenna input terminal:	33113.11 mW
Single Antenna gain (typical):	5 dBi
Number of antennae:	1
Total system gain:	5.00 dBi

#### ISED calculations

##### Uncontrolled environment

Declared distance:	204 cm
Average power density at declared distance:	0.200000 mW/cm <sup>2</sup> 2.000000 W/m <sup>2</sup>
MPE limit at prediction frequency:	0.200000 mW/cm <sup>2</sup> 2.000000 W/m <sup>2</sup>
Minimum calculated prediction distance for compliance:	204 cm
Margin of Compliance:	0.00 dB
with Maximum permitted antenna gain:	5.00 dBi

##### Controlled environment

Declared distance:	91 cm
Average power density at declared distance:	1.000000 mW/cm <sup>2</sup> 10.000000 W/m <sup>2</sup>
MPE limit at prediction frequency:	1.000000 mW/cm <sup>2</sup> 10.000000 W/m <sup>2</sup>
Minimum calculated prediction distance for compliance:	91 cm
Margin of Compliance:	0.00 dB
with Maximum permitted antenna gain:	5.00 dBi

#### 1.1.5 Verdict

The calculation of EIRP is below the exemption limit; therefore, the product is passing the RF Exposure exemption requirements.

## Section 2 RSS-102 Nerve Stimulation

### 2.1 Test specifications

RSS 102, Issue 6	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
SPR-002, 2 <sup>nd</sup> edition	Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits

### 2.2 Test methods

RSS 102, Issue 6	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
SPR-002, 2 <sup>nd</sup> edition	Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits

### 2.3 RSS-102 Nerve Stimulation test results

**Table 2.3-1: FCC general requirements results**

Part	Test description	Verdict
	Nerve Stimulation - Instantaneous	Pass

Notes: EUT is an AC powered device.

Type of evaluation	Nerve Stimulation Exposure Evaluation (SPR-002)			
Nerve Stimulation Evaluation (SPR-002)	Evaluated against exposure limits: <input checked="" type="checkbox"/> General Public Use <input type="checkbox"/> Controlled Use			
	Measurement distance:	0.6	m	
	Field Strength:	12.816	<input checked="" type="checkbox"/> V/m (electric) <input type="checkbox"/> A/m (magnetic) <input checked="" type="checkbox"/> Measured <input type="checkbox"/> Computed <input type="checkbox"/> Calculated	
	Field Strength:	0.0221	<input type="checkbox"/> V/m (electric) <input checked="" type="checkbox"/> A/m (magnetic) <input checked="" type="checkbox"/> Measured <input type="checkbox"/> Computed <input type="checkbox"/> Calculated	
	Exposure condition:	<input checked="" type="checkbox"/> Whole body/Torso/Head <input type="checkbox"/> Arm	<input type="checkbox"/> Leg <input type="checkbox"/> Hand/Foot	

### 2.4 Test equipment list

**Table 2.4-1: Equipment list**

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Isotropic probe	Narda	EHP200-TS	FA003103	2 years	July 14, 2023



## 2.5 Nerve Stimulation 3 kHz – 10 MHz

### 2.5.1 Definitions and limits

This evaluation of the instantaneous requirements for Radio Frequency (RF) field strengths (reference levels) based on the effects of internal electric fields was done in accordance with SPR-002, Issue 1. The limits for Uncontrolled Environment are found in RSS 102, Issue 5, Table 4 (Instantaneous).

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-10 <sup>21</sup>	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note:  $f$  is frequency in MHz.  
\* Based on nerve stimulation (NS).  
\*\* Based on specific absorption rate (SAR).

Exposure Condition	Relaxation Factor	Electric Field (V/m r.m.s.)	Magnetic Field (A/m r.m.s.)
Whole Body / Torso / Head	1.0	83	90
Leg	1.5	124.5	135
Arm	2.5	207.5	225
Hand/Foot	5.0	415	450

**Note:** The values of the electric field and the magnetic field in Table 2 are for indication purposes only and do not supersede the levels specified in RSS-102.

#### SPR-002 Limb Exposure Limit Relaxation

No relaxation was applied to the measurements.

### 2.5.2 Test date

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Start date	September 20, 2022
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### 2.5.3 Observations, settings and special notes

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The testing was performed as per SPR-002, 2<sup>nd</sup> edition.

- a) The measurement probe is set a fixed separation distance of 20 cm
- b) The instantaneous E-Field is assessed over the average 180 cm human body height, measuring 5 points in 40 cm intervals, starting 20 cm above the ground. The maximum field was measured at 20 cm height and is used as reference for calculations.
- c) The instantaneous H-Field is assessed by measuring 8 points in an evenly spaced rectangular pattern measuring 60 cm tall by 30 cm wide. The maximum field was measured at 20 cm height and is used as reference for calculations.
- d) The X, Y, and Z axis are measured simultaneously, and summed by the measurement probe software
- e) The maximum emission level is measured using an appropriate resolution bandwidth.

## 2.5.3 Test data

### E-Field Measurements

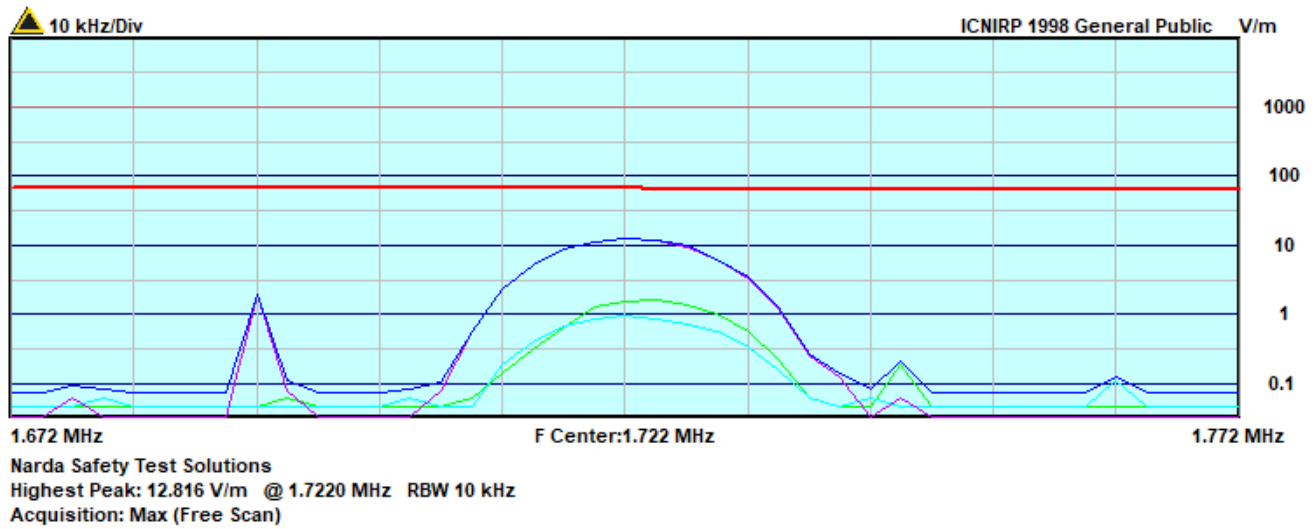


Figure 1 – E-Field scan on 1.722 MHz, H3E modulation, transmitter emission - 60 cm separation distance

Table 2 - Instantaneous E-Field measurements over 180 cm height

Frequency, MHz	Measurement distance cm	Measurement Height cm	Measured Electric Field Strength V/m (r.m.s) instantaneous	RSS-102 Limit Electric Field Strength V/m (r.m.s) instantaneous	Margin, dB
1.722	60	20	12.816	83.00	70.184

Notes: Limit taken from RSS 210, Issue 5, Table 4 for Uncontrolled Exposure, Maximum E-Field emission measured at 60 cm

## H-Field Measurements

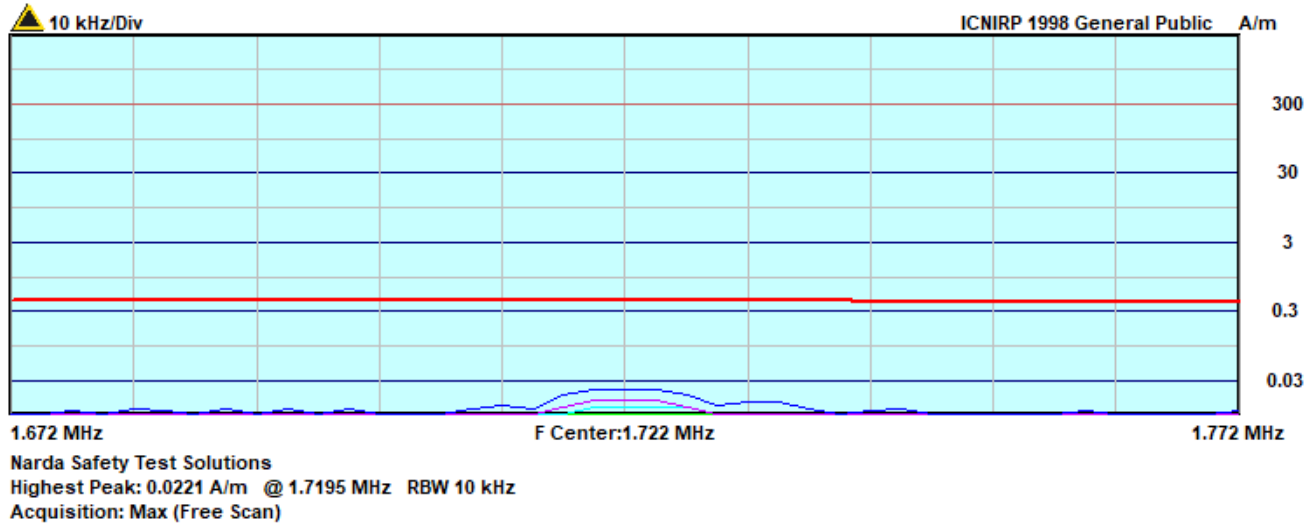


Figure 2 - Zoom scan on 0.12825 MHz transmitter emission, H3E modulation - 20 cm separation distance

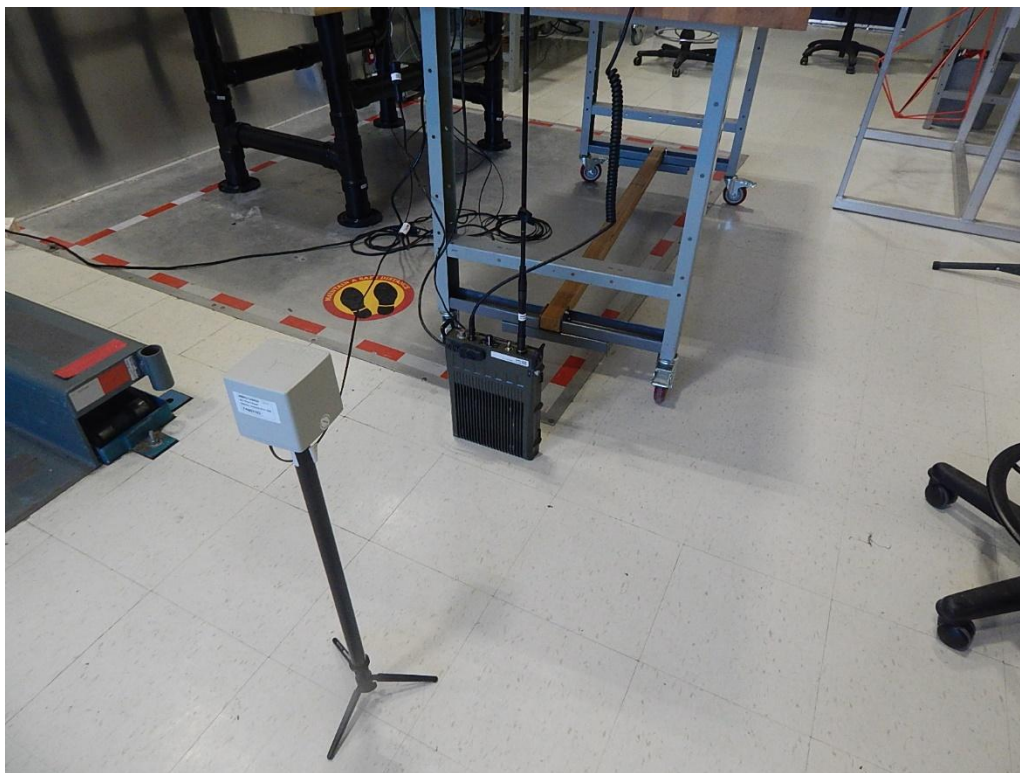
Table 3 - Maximum instantaneous H-Field

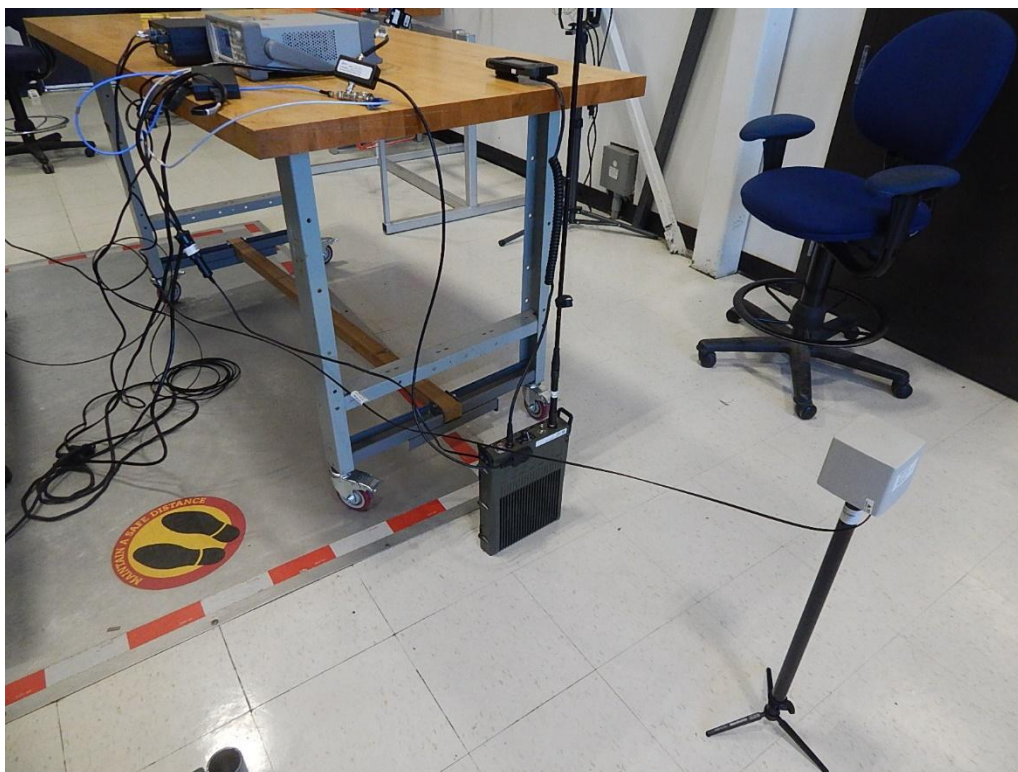
Frequency, MHz	Antenna Position referencing EUT	Measurement distance cm	Measurement Height cm	Measured Magnetic Field Strength A/m (r.m.s) instantaneous	RSS-102 Limit Magnetic Field Strength A/m (r.m.s) instantaneous	Margin, dB
1.722	center	20	20	0.0221	90.00	89.9779

Notes: Limit taken from RSS 102, Issue 6, Table 6 for Uncontrolled Exposure.

## Section 3 EUT setup photos

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End of the test report