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RADIO TEST REPORT – 466497-1APFWL

Type of assessment:

MPE Exemption report

Manufacturer:

Maximus Systems (4458664 Canada Inc)

Product description:

RFID Card Reader

Product Marketing Name (PMN):

Card Reader

Hardware Version Identification Number (HVIN):

7000-0024

FCC ID:

2A7II-RFID115

IC certification number:

28688-RFID115

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 5 Amendment 1, (February 2021)
- RSS-102, Issue 5, Supplementary Procedure SPR-002, Issue 1

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: September 28, 2022

Nimish Kapoor, EMC/RF Specialist

Prepared by

Signature

Lab locations

Company name	Nemko Canada Inc.			
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Test site identifier	**Organization**	**Ottawa/Almonte**	**Montreal**	**Cambridge**
	FCC:	CA2040	CA2041	CA0101
	ISED:	2040A-4	2040G-5	24676
Website	www.nemko.com			

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.

Copyright notification

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Section 1 Evaluation summary

1.1 MPE exemption for standalone transmission

1.1.1 References, definitions and limits

FCC §2.1091(c)

(1) Mobile devices that operate in the Commercial Mobile Radio Services pursuant to part 20 of this chapter; the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Services pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible Use Service pursuant to part 30 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the 76-81 GHz Band Radar Service pursuant to part 95 of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if:

(i) They operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more, or

(ii) They operate at frequencies above 1.5 GHz and their ERP is 3 watts or more.

(2) Unlicensed personal communications service devices, unlicensed millimeter-wave devices, and unlicensed NII devices authorized under §§15.255(f), 15.257(g), 15.319(i), and 15.407(f) of this chapter are also subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if their ERP is 3 watts or more or if they meet the definition of a portable device as specified in §2.1093(b) requiring evaluation under the provisions of that section.

(3) All other mobile and unlicensed transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in §§1.1307(c) and 1.1307(d) of this chapter.

RSS-102, Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where ƒ is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $0.0131\ f^{0.6834}$ W (adjusted for tune-up tolerance), where ƒ is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

1.1.2 EUT technical information

Operational frequency	0.12315 MHz
Antenna type	Coil
Antenna gain	0 dBi
Number of antennas	1
Maximum transmitter conducted power	N/A
Maximum EIRP	-16.08 dBm (0.024 mW)

1.1.3 MPE exemption calculation

Fundamental transmit (prediction) frequency:	0.12315	MHz
Field Strength at 3m	79.142	dBµV/m
EIRP	-16.08	dBm
Cable and/or jumper loss:	0	dB
Maximum peak power at antenna input terminal:	-16.08	dBm
Tx On time:	1.000	ms
Tx period time:	1.000	ms
Average factor:	100	%
ɹm calculated average power at antenna input terminal:	0.02466	mW

	ISED limit		FCC limit	
MPE exemption limit:	**1.000000**	**W**	**1.000000**	**W**
Average EIRP at prediction frequency:	**0.025**	**mW**	**0.025**	**mW**
	0.000	W	0.000	W
Margin of Compliance:	**46.08**	**dB**	**46.08**	**dB**

1.1.4 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 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
SPR-002, Issue 1	Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits

2.2 Test methods

RSS 102, Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
SPR-002, Issue 1	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: ☒ General Public Use		☐ Controlled Use
	Measurement distance:	0.2 m	
	Field Strength:	1.3644	☒ V/m (electric) ☐ A/m (magnetic) ☒ Measured ☐ Computed ☐ Calculated
	Field Strength:	0.1250	☐ V/m (electric) ☒ A/m (magnetic) ☒ Measured ☐ Computed ☐ Calculated
	Exposure condition:	☒ Whole body/Torso/Head ☒ Arm	☐ Leg ☐ 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/m²)	Reference Period (minutes)
0.003-10[21]	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 x 10^{-4} $f^{0.5}$	6.67 x 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

Start date	September 20, 2022

2.5.3 Observations, settings and special notes

The testing was performed as per SPR-002, Issue 1.

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

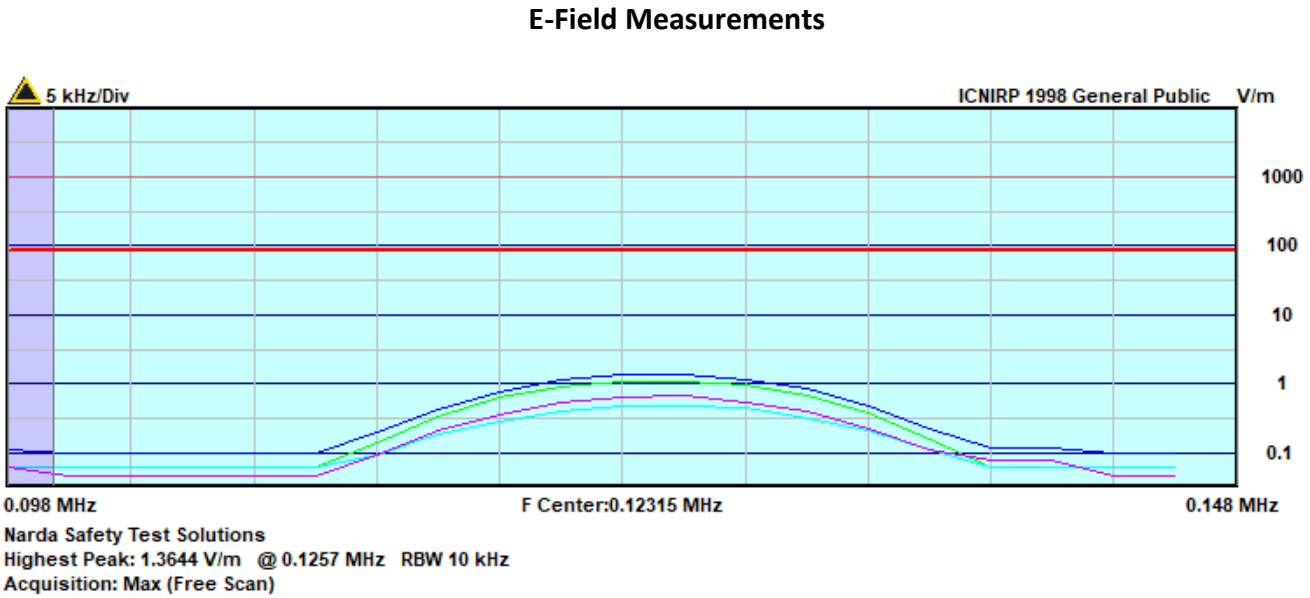


Figure 1 – E-Field scan on 0.12315 MHz, H3E modulation, transmitter emission - 20 cm separation distance

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
0.12315	20	20	1.36	83.00	81.64

Notes: Limit taken from RSS 210, Issue 5, Table 4 for Uncontrolled Exposure, Maximum E-Field emission measured at 20 cm

H-Field Measurements

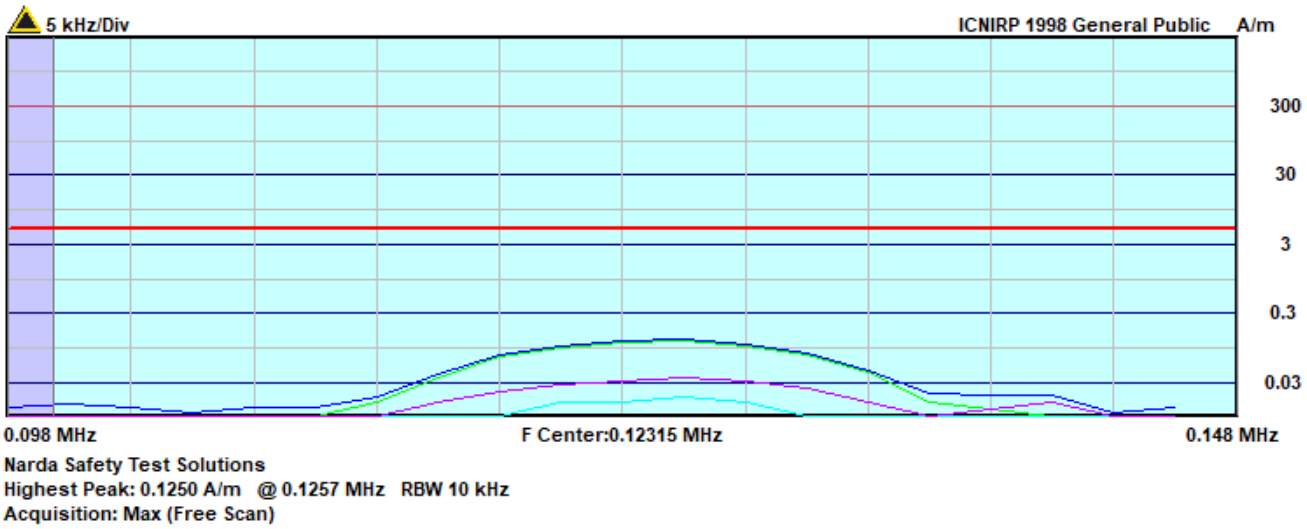


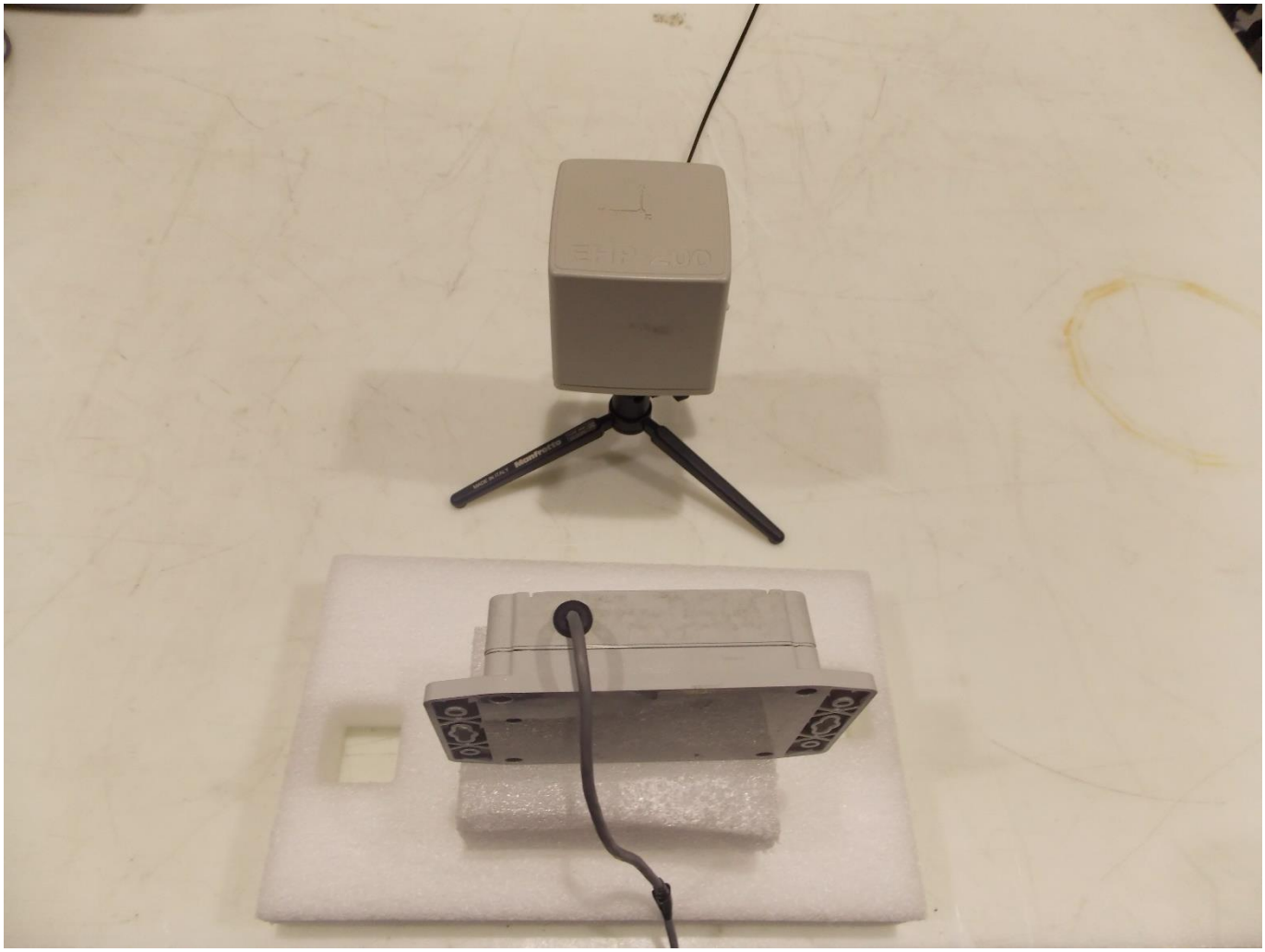
Figure 2 - Zoom scan on 0.12315 MHz transmitter emission, H3E modulation - 20 cm separation distance

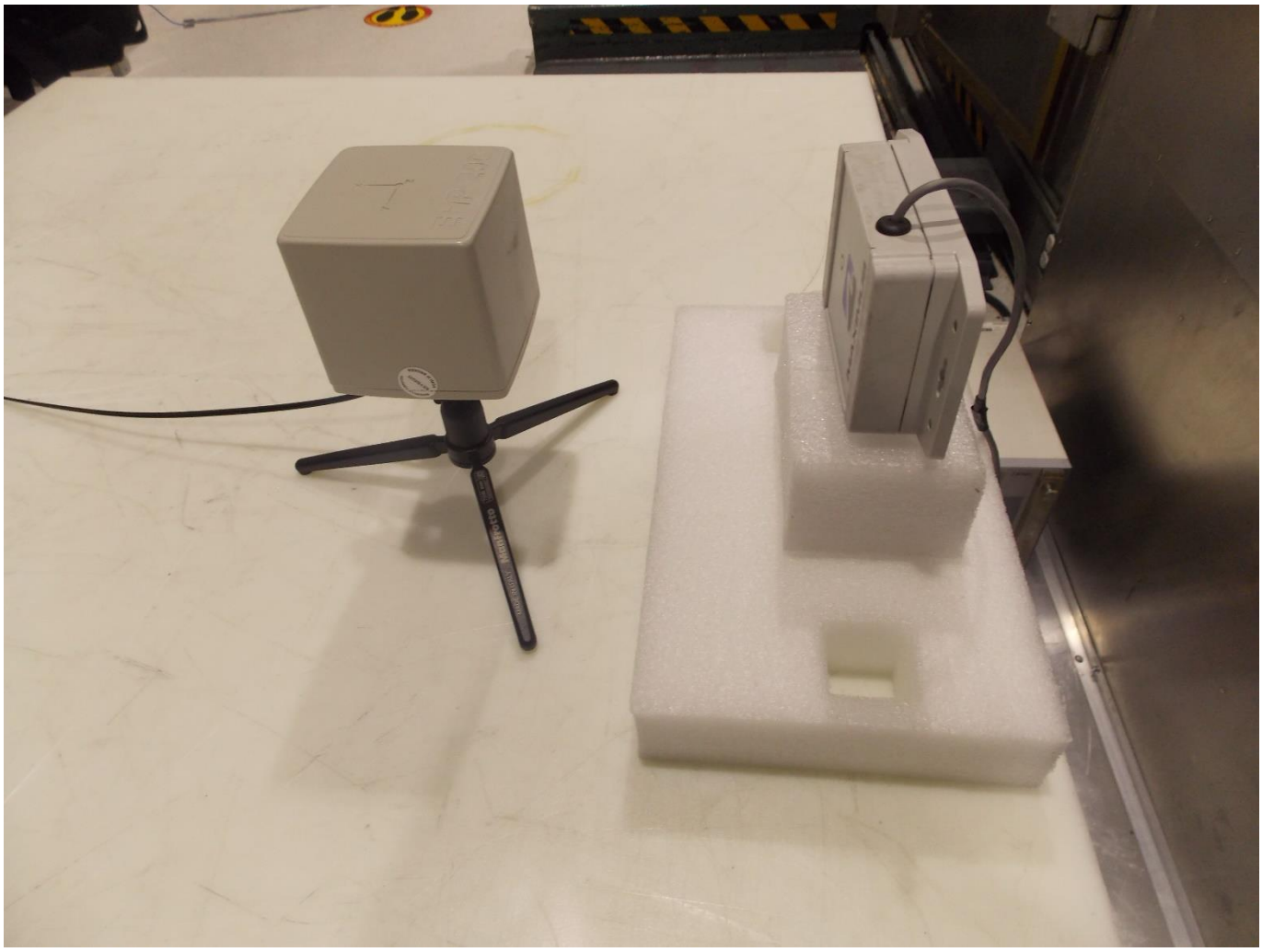
Table 3 - Maximum instantaneous H-Field

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
0.12315	center	20	20	0.13	90.00	89.87

Notes: Limit taken from RSS 210, Issue 5, Table 4 for Uncontrolled Exposure.

Section 3 EUT setup photos





End of the test report