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DATE: 18 February 2021

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

For

Augmedics Ltd.

Equipment under test:

Radio Module

Jeston TX2 assembly PN YELC0050

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

ISRAEL TESTING LABORATORIES
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Measurement/Technical Report for

Augmedics Ltd.

Radio Module

Jeston TX2 assembly PN YELC0050

FCC ID: 2AR2O-VOB-P3310

This report concerns:	Original Grant:
	Class I Change:
	Class II Change: X
Equipment type:	FCC: (NII) Unlicensed National Information Infrastructure TX
Limits used:	47CFR15, Part 15, Subpart E, Section 15.407

Measurement procedure used is KDB 789033 D02 v02, ANSI C63.10:2013 and

Application for Certification
prepared by:
R. Pinchuck
ITL (Product Testing) Ltd.
1 Bat Sheva Street
Lod 7116002
Israel
e-mail Rpinchuck@itlglobal.org

Applicant for this device:
(different from "prepared by")
Stuart Wolf
1 Ha-Tsmikha St., P.O.B 345
Yoqneam, 2069205, Israel
Tel: +972-4-3730800
Email: stuart@augmedics.com

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1. General Information

1.1 *Administrative Information*

Manufacturer:	Augmedics Ltd.
Manufacturer's Address:	1 Ha-Tsmikha St. P.O.B. 345 Yoqneam, 2069205, Israel Tel: +972-4-3730880
Manufacturer's Representative:	Stuart Wolf
Equipment Under Test (E.U.T):	Radio Module
Equipment Model No.:	Jeston TX2 assembly PN YELC0050 (*See Note below)
Equipment Serial No.:	1420120028510
Date of Receipt of E.U.T:	January 31, 2021
Start of Test:	January 31, 2021
End of Test:	February 02, 2021
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	47CFR15, Part 15, Subpart E, Section 15.407

Note:

1. The Jetson module assembly was tested as part of the XVS headset YHMD6xxWLx, serial number D00151, with the final configuration and assembly of the antenna.

1.2 *List of Accreditations*

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 *Product Description*

Radio module.

1.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in KDB 789003 D02 v02 and ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 *Test Facility*

Emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is IL1005.

1.6 *Measurement Uncertainty*

Conducted Emission
Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 3.44 dB

Radiated Emission
Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site:

30-1000MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 4.96 dB

1 GHz to 6 GHz
Expanded Uncertainty (95% Confidence, K=2):
±5.19 dB

>6 GHz
Expanded Uncertainty (95% Confidence, K=2):
±5.51 dB

2. System Test Configuration

2.1 *Justification*

2.1.1 On 04/16/2019, a Grant for single modular approval was issued for FCC ID: 2AR2O-VOB-P3310. Approval was limited to OEM installation only and for use in the portable Host (headset of the xvision-spine (XVS)).

2.1.2. Subsequently, C1PC changes were made to the headset (see ITL report no. E207760.01).

2.1.3 Additional, C1PC changes were made again to the headset. (see ITL report no. E216220.00).

2.1.4 Currently, the manufacturer has replaced the dipole antenna with a monopole type with a lower antenna gain. See manufacturer C2PC Declaration of Change on following page.

2.1.5 As agreed upon between the manufacturer and the TCB, only partial radiated spurious emission regarding the “worst case” band edge and harmonic spurious emission radiation needed to be performed.

2.1.6 Pursuant to TCB instructions, tests were done for spurious emission (1 channel) and band edge (2 channels: high &low) for only 1 “worst case” combination of mode/BW/data-rate.

2.1.7 After reviewing the original module test report the “worst case” was as follows:

Band	UNII 1&2	UNII3
Low Band Edge	HT80 MCSO MIMO	HT80 MCSO MIMO
High Band Edge	HT80 MCSO MIMO	HT20 MCSO MIMO
Spurious Emission	HT20 MCSO MIMO(5260.0MHz)	HT20 MCSO MIMO(5500.0MHz)

2.1.8 The results meet the requirements of a C2PC.

2.2 *EUT Exercise Software*

No special exercise software was used.

2.3 *Special Accessories*

No special accessories were used

2.4 *Equipment Modifications*

No modifications were necessary in order to achieve compliance.

2.5 *Configuration of Tested System*

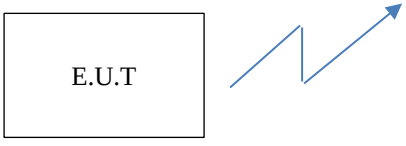


Figure 1. Configuration of Tested System Radiated

Augmedics	**DOCUMENT CODE:** DOC00009	**PAGE:** 1 of 2
TITLE: Declaration of Change C2PC		**REV. :** 1

Declaration of Change

1. On 04/16/19, a Grant of single modular approval was issued for FCC ID :2AR2O-VOB-P3310. Approval was limited to OEM installation only and for use in portable Host (headset of the xvision spine (XVS)).

2. Subsequently, on 02/2020 the following C1PC changes were made:
   The -2dB RF attenuator from in-line coax type attenuator with SMA connector PN ATT000002 Rev 1 in the Headset was changed to a custom PCB containing an AT0603T02ECATB surface mount attenuator PN PCB000012. See ITL Report No. E207760.01.

3. Additionally, on 7/2020 further C1PC changes were made:
   Replacing attenuator MNF PN AT0603T02ECATB (ATC) which was approved in pervious ITL Test Report No. E207760.01 with new attenuator MNF PN PAT1220-C-2DB-T5 (SUSUMO).
   As a result from that the PCB PCB00012 modified to PCB00012-2 due to the changes of the footprint AT1(-2db attenuator). For further information see ITL Test Report no. E216220.00. See Figure 1

4. Currently, the following C2PC changes have been made:
   Removing the PCB00012-2. As a result of that no -2dB Attenuator MNF PN PAT1220-C-2DB-T5 and replacing the cable form 415-0085-150 TO Hirose U. FL to SMA PN CB.720 (See Figure 2).

   The antennas are permanently attached with Loctite 493 to prevent removal by end user.

5. All other modules regarding to the Wi-Fi module remain the same as follows:

Previous Configuration According to ITL Report no: E216220.00- see figure 1			New Configuration according to ITL Report no: E224970.00- see figure 2		
Designator	Manufacturer	Manufacturer PN	Designator	Manufacturer	Manufacturer PN
PCB (2)	H.A Micro	PCB00012-2	No PCB		
Cable (1)	Cinch	415-0085-150 U. FL TO U. FL	Cable	TAOGLAS	CB.720 U. FL to SMA (1)
Antenna (3)	Linx	ANT-2.4-CW-RH	Antenna	Linx Technologies Inc.	ANT-2.4-CW-RHb (3)
AT1	American Technical Ceramics	AT0603T02ECATB	No Attenuator		

Augmedics	**DOCUMENT CODE:** DOC00009	**PAGE:** 2 of 2
TITLE: Declaration of Change C2PC		**REV. :** 1

Previous configuration - According to ITL Test Report no E216220.00 testing.

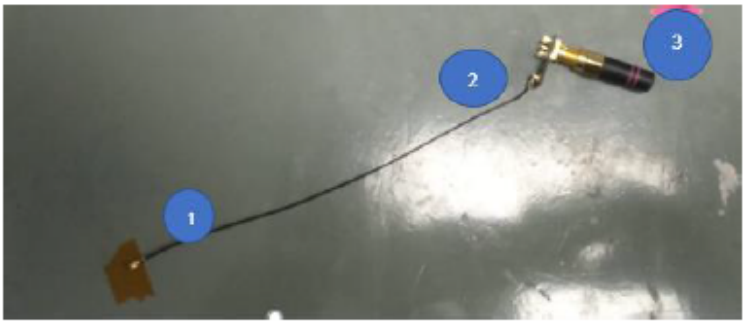


Figure 1

New current configuration - According to ITL Test Report no. E224970.00 testing.

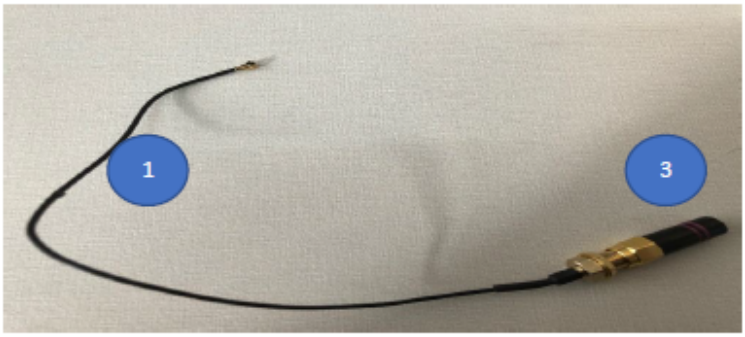


Figure 2

Date: February 16, 2021

Yossi Biton
Practical HW Engineer
Augmedics
1 Ha-Tsmikha St., P.O.B 345
Yokneam, 2069205, Israel
T: +972-4-3730805
C: +972-534296403
www.augmedics.com

3. Conducted & Radiated Measurement Test Set-Up Photos

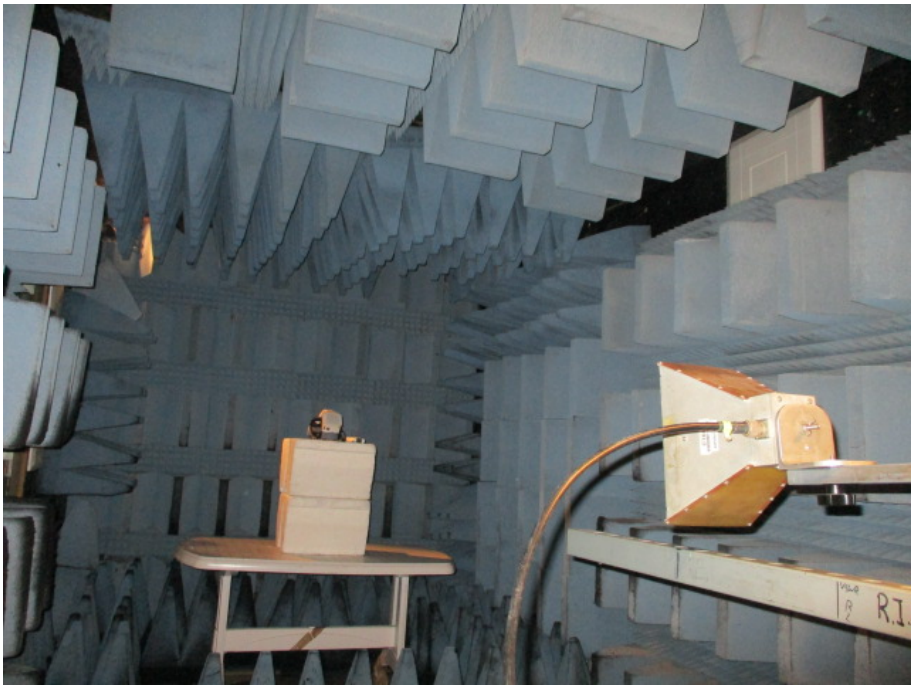


Figure 2. Radiated Emission Test, 1.0-18.0GHz

Figure 3. Radiated Emission Test, 18-26.5GHz

Figure 4. Radiated Emission Test, 26.5-40.0GHz

4. Undesirable/Unwanted Emissions

4.1 *Test Specification*

FCC Part 15, Subpart E, Section 15.407(b)(1-7)

4.2 *Test Procedure*

(Temperature (20°C)/ Humidity (46%RH))

For measurements between 0.009-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.
The frequency range 0.009MHz-30MHz was scanned.

For measurements between 30-1000MHz:
A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30MHz -1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1GHz-40GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.
The frequency range 1GHz -40GHz was scanned.

The highest radiations are described in the tables below.

4.3 *Test Limits*

Operation band	EIRP Above 1.0GHz	Field strength Above 1.0GHz	Below 1.0GHz
(GHz)	(dBm/MHz)	(dBµV/m)	(dBµV/m)
5.15-5.25	-27.0	68.2	As describe in section 15.209/ RSS Gen

Figure 5 Non-Restricted Band Limits

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	Field strength (dBµV/m)	Field strength* (dBµV/m)@3m
0.009-0.490	2400/F(kHz)	300	48.5-13.8	128.5-73.8
0.490-1.705	24000/F(kHz)	30	33.8-23.0	73.8-63.0
1.705-30.0	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

*The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Figure 6 FCC Restricted Band Limits

4.4 *Test Results*

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart E, Section 15.407(b)(1-7) specification.
Note: All peaks in the following plots are transmission frequencies.

Radiated Emission UNII 1&2

Specifications: FCC, Part 15, Subpart E, Section 15.407(b)(1-7)

Antenna Polarization: Horizontal/Vertical Frequency Range: 9kHz to 40.0 GHz
Protocol Type: WI-FI HT80/20 MCSO MIMO Detector: Peak, Average

Operation Frequency	Freq.	Pol	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
5210.0(HT80)	5150.0	V	55.7	74.0	-18.3	46.9	54.0	-7.1
	5150.0	H	50.3	74.0	-23.7	43.7	54.0	-10.3
5260.0(HT20)	15,780.0	V	56.3	74.0	-17.7	47.7	54.0	-6.3
	15,780.0	H	57.9	74.0	-16.1	46.9	54.0	-7.1
5290.0(HT80)	5350.0	V	53.8	74.0	-20.2	47.0	54.0	-7.0
	5350.0	H	47.9	74.0	-26.1	43.5	54.0	-10.5

Figure 7. Radiated Emission Results

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission UNII3

Specifications: FCC, Part 15, Subpart E, Section 15.407(b)(1-7)

Antenna Polarization: Horizontal/Vertical Frequency Range: 9kHz to 40.0 GHz
Protocol Type: WI-FI HT80/20 MCSO MIMO Detector: Peak, Average

Operation Frequency	Freq.	Pol	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
5530.0(HT80)	5470.0	V	56.9	74.0	-17.1	50.0	54.0	-4.0
	5470.0	H	46.3	74.0	-27.7	40.2	54.0	-13.8
5500.0(HT20)	16,500.0	V	58.6	68.2	-9.6	-	-	-
	16,500.0	H	50.3	68.2	-17.9	-	-	-
5700.0(HT20)	5725.0	V	57.2	68.2	-11.0	-	-	-
	5725.0	H	50.3	68.2	-17.9	-	-	-

Figure 8. Radiated Emission Results

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

4.5 *Test Instrumentation Used, Emissions in Non Restricted Frequency Bands*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	March 9, 2020	March 31, 2021
EMI Receiver	HP	8542E	3906A00276	March 11, 2020	March 31, 2021
RF Filter Section	HP	85420E	3705A00248	March 11, 2020	March 31, 2021
Spectrum Analyzer	HP	8593 EM	3826A00265	March 9, 2020	March 31, 2021
Active Loop Antenna	EMCO	6502	9506-2950	February 5, 2019	February 28, 2021
Biconical Antenna	EMCO	3110B	9912-3337	May 21, 2019	May 31, 2021
Log Periodic Antenna	EMCO	3146	9505-4081	May 31, 2018	May 31, 2021
Horn Antenna	ETS	3115	29845	May 31, 2018	May 31, 2021
Horn Antenna	ARA	SWH-28	1007	December 31, 2017	June 30, 2021
MicroWave System Amplifier	HP	83006A	3104A00589	August 23, 2020	August 31, 2021
RF Cable Chamber	Commscope ORS	0623 WBC-400	G020132	August 23, 2020	August 31, 2021
RF Cable Oats	EIM	RG214-11N(X2)		August 4, 2020	August 31, 2021
Filter Band Pass 4-20 GHz	Meuro	MFL040120H50	902252	November 2, 2020	November 30, 2021
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR
Antenna Mast	ETS	2070-2	9608-1497	NCR	NCR
Turntable	ETS	2087	-	NCR	NCR
Mast & Table Controller	ETS/EMCO	2090	9608-1456	NCR	NCR

Figure 9 Test Equipment Used

4.6 *Field Strength Calculation*

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors", using the following equation:

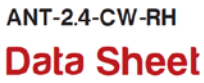
$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

5. Antenna Gain/Information



The antenna peak gain is -0.9dBi@2.45GHz, type: monopole

6. APPENDIX A - CORRECTION FACTORS

6.1 *Correction factors for RF OATS Cable 35m ITL #1911*

Frequency (MHz)	loss (dB)
30.0	1.3
50.0	1.7
100.0	2.6
200.0	3.7
300.0	4.7
400.0	5.5
500.0	6.3
600.0	7.0
700.0	7.6
800.0	8.4
900.0	9.0
1000.0	9.6

6.2 *Correction factor for RF cable for Anechoic Chamber*

ITL #1840

FREQ (MHz)	LOSS (dB)
1000.0	1.5
2000.0	2.1
3000.0	2.7
4000.0	3.1
5000.0	3.5
6000.0	4.1
7000.0	4.6
8000.0	4.9
9000.0	5.7
10000.0	5.7
11000.0	6.1
12000.0	6.1
13000.0	6.2
14000.0	6.7
15000.0	7.4
16000.0	7.5
17000.0	7.9
18000.0	8.1
19000.0	8.8
20000.0	9.1

NOTES:

1. *The cable is manufactured by Commscope*
2. *The cable type is 0623 WBC-400, serial # G020132 and 10m long*

6.3 *Correction factors for Active Loop Antenna*

Model 6502 S/N 9506-2950

ITL # 1075:

F(MHz)	AF(dB/m)
0.01	18.4
0.02	14.3
0.03	13.3
0.05	11.7
0.1	11.4
0.2	11.2
0.3	11.2
0.5	11.2
0.7	11.2
1	11.4
2	11.5
3	11.5
4	11.4
5	11.3
6	11.1
7	11.1
8	11.1
9	11
10	11
20	10
30	8

6.4 *Correction factors for biconical antenna*

ITL #1356
Model: EMCO 3110B
Serial No.: 9912-3337

Frequency [MHz]	AF [dB/m]
30	13.00
35	10.89
40	10.59
45	10.63
50	10.12
60	9.26
70	7.74
80	6.63
90	8.23
100	11.12
120	13.16
140	13.07
160	14.80
180	16.95
200	17.17

6.5 *Correction factors for log periodic antenna*

ITL # 1349
Model:EMCO 3146
Serial No.: 9505-4081

Frequency [MHz]	AF [dB/m]
200	11.58
250	12.04
300	14.76
400	15.55
500	17.85
600	18.66
700	20.87
800	21.15
900	22.32
1000	24.22

6.6 *Correction factors for Double –Ridged Waveguide Horn ANTENNA*

Model: 3115
Serial number:29845
3 meter range; ITL # 1352

FREQUENCY (GHz)	AFE (dB/m)	FREQUENCY (GHz)	AFE (dB/m)
0.75	25	9.5	38
1.0	23.5	10.0	38.5
1.5	26.0	10.5	38.5
2.0	29.0	11.0	38.5
2.5	27.5	11.5	38.5
3.0	30.0	12.0	38.0
3.5	31.5	12.5	38.5
4.0	32.5	13.0	40.0
4.5	32.5	13.5	41.0
5.0	33.0	14.0	40.0
5.5	35.0	14.5	39.0
6.0	36.5	15.0	38.0
6.5	36.5	15.5	37.5
7.0	37.5	16.0	37.5
7.5	37.5	16.5	39.0
8.0	37.5	17.0	40.0
8.5	38.0	17.5	42.0
9.0	37.5	18.0	42.5

6.7 *Correction factors for Horn Antenna Model: SWH-28*

CALIBRATION DATA

3 m distance

Frequency, MHz	Measured antenna factor, dB/m [1]
18000	32.4
18500	32.0
19000	32.3
19500	32.4
20000	32.3
20500	32.8
21000	32.8
21500	32.7
22000	33.1
22500	33.0
23000	33.1
23500	33.8
24000	33.5
24500	33.5
25000	33.8
25500	33.9
26000	34.2
26500	34.7

[1] The antenna factor shall be added to receiver reading in dBµV to obtain field strength in dBµV/m.