

EMF ASSESSMENT REPORT

No. AR19-0046101-01

performed in accordance with

FCC Rules: Code of Federal Regulations (CFR) no. 47
Part 15 Subpart C § 1.1307(b)(1)

INDUSTRY CANADA

Spectrum Management and Telecommunications Radio Standards Specification

RSS-102:2015

Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus
(All Frequency Bands)

PRODUCT	Augmented reality safety glasses and control unit
MODEL(s) TESTED	VISIONAR and VISIONAR – CONTROL UNIT
TRADE MARK(s)	UNIVET

APPLICANT	UNIVET S.r.l. ~ Via G. Prati, 87 ~ I-25086 Rezzato (BS)
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Assessed by	Robertino Torri <i>[Laboratory technician]</i>	
Approved by	Giovanni Di Turi <i>[Laboratory Manager]</i>	

Revision Sheet

Release No.	Date of Issue	Revision Description
Rev. 0	2020-06-10	First edition Digital signed - AR19-0046101-01_TR_SAR exclusion FCC_UNIVET - Glasses + Control unit

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.
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1. GENERAL DATA

SAMPLE		
Samples received on	/	(Item(s) sampled and sent by applicant)
IMQ reference samples	BEM	/
Samples tested No.	/	
Object under analysis recognition	Not carried out Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
TEST LOCATION		
Testing dates	/	
Testing laboratory.	IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano	
Testing site	Viale Lombardia, 20 – I-20021 Bollate (MI)	
ENVIRONMENTAL CONDITIONING		
Parameter	Measured	
Ambient Temperature	/	
Relative Humidity	/	
Atmospheric Pressure	/	
The laboratory is monitored by a continuous environmental conditions measurements system. Temperature, humidity and pressure data are recorded on a weekly basis and stored in local archive.		
REMARKS		
Throughout this report a point is used as the decimal separator. The ability or reliability of this product to perform its intended function in a particular application has not been investigated. IMQ declines any responsibility derived from missing or wrong information provided aside by the applicant.		

2. REFERENCE DOCUMENT

	DOCUMENT	DATE	TITLE
☒	47 CFR Part 15	2015	Radio Frequency Device
☒	447498 D01 v06	2015	RF exposure procedures and equipment authorization policies for mobile and portable devices
☒	RSS-102	2015	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

3. UNIT UNDER TEST (EUT) DETAILS

GENERAL DATA

MODEL (basic)	Description
VISIONAR and VISIONAR – CONTROL UNIT	Augmented reality safety glasses and control unit
VARIANTS (derived)	Description
/	/

The VISIONAR – CONTROL UNIT contains the radio modules:

Module	FCC ID:	IC code
GSM and GPS	N7NHL8548	2417C-HL8548
Wi-Fi, BT and BLE	Z64-WL18SBMOD	451I-WL18SBMOD

MANUFACTURER	UNIVET S.r.l. ~ Via G. Prati, 87 ~ I-25086 Rezzato (BS)
ASSEMBLY PLANT(s)	

EUT IDENTIFICATION

EUT type	Glasses and control unit		
EUT use	☐ Fixed	☐ Mobile	☒ Portable
EUT single or system	☒ Single	☐ System	

Antenna Type		
Antenna	Model	2450AT45A100E by JOHANSON (for 2.4 GHz module)
	Type:	☒ Integral ☐ Dedicated ☐ External
	Gain	1.5 dBi typ.
Antenna	Model	SRFC025-100 by ANTENOVA (for GSM module)
	Type:	☐ Integral ☒ Dedicated ☐ External
	Gain	-3.31 dBi (@ 824-960 MHz)

4. SUMMARY OF EMF ASSESSMENT RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object meets the requirement	PASS
Test object does not meet the requirement	FAIL
Evaluation of test result submit to customer	C.E.

CFR47 Part 15	TITLE	RESULT
1.1307(b)(1)	RF humane exposure	PASS

REF. OF RSS 102	TITLE	RESULT
RSS 102 - § 2.5.1	RF humane exposure	PASS

5. RESULTS OF RF EXPOSURE EVALUATION

5.1 FCC

TEST REQUIREMENT	
Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines § 1.1307(b)(1).	
EUT classification (fixed, mobile or portable devices)	Portable according to § 2.1093(b) of this Chapter
LIMITS	According to § 2.1093 of this Chapter, by means of the following guidelines: OET Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies (447498 D01 General RF Exposure Guidance v06)

Limit for maximum permissible Exposure (MPE)				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Average Time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3÷3.0	614	1.63	(100)*	6
3.0÷30	1842/f	4.89/f	(900/f ²)*	6
30÷300	61.4	0.163	1.0	6
300÷1500	--	--	f/300	6
1500÷100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3÷3.0	614	1.63	(100)*	30
3.0÷30	824/f	2.19/f	(180/f ²)*	30
30÷300	27.5	0.073	0.2	30
300÷1500	--	--	f/1500	30
1500÷100,000	--	--	1.0	30
F = Frequency in MHz *Plane-wave equivalent power density				

The distance from the device's transmitting antenna where the exposure level reaches the maximum permitted limit is calculated using the general equation:

$$S = P \cdot G / 4\pi R^2$$

Where:

S = Power Density (mW/cm²)

P = Conducted power (mW)

G = Linear power gain relative to isotropic radiator (numeric gain)

R = Distance (cm)

RF Exposure evaluation

Low threshold limit				
Exposure category	Radio module	Frequency range f_{MHz}	Limit	Limit value (mW/cm ²)
General population	GSM	850	$f_{\text{MHz}}/1500$	0.5667
	Wi-Fi	2462	/	1.0

SINGLE TRASMITTER

MEASUREMENTS RESULTS						
Radio module	Max output power (dBm)	Antenna gain (dBi)	Max. power (dBm)	Max. Power (W)	Power density @ 20 cm (mW/cm ²)	Limits (mW/cm ²)
GSM	33 (*)	-3.31	29.69	0.931	0.185	0.5667
Wi-Fi	20 (*)	0	20	0.100	0.020	1.0

SIMULTANEOUS TRASMITTER

Radio module	Max. power (dBm)	Max. Power (W)	Power density @ 20 cm (mW/cm ²)	Limits (mW/cm ²)	S / Limit
GSM	29.69	0.931	0.185	0.5667	0.327
Wi-Fi	20	0.100	0.020	1.0	0.020
Simultaneous transmission (Σ S/ Limit)					0.347
Limit					1

(*) Max power permitted for radio module type.
For all transmitter assumed duty cycle 100%.

5.2 IC

TEST REQUIREMENT

**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 ²)	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).

RF Exposure evaluation

Low threshold limit				
Exposure category	Radio module	Frequency range f MHz	Limit	Limit value (W/m ²)
General population	GSM	850	0.02619 $f_{\text{MHz}}^{0.6834}$	2.63
	Wi-Fi	2462	0.02619 $f_{\text{MHz}}^{0.6834}$	5.44

SINGLE TRANSMITTER

MEASUREMENTS RESULTS

Radio module	Max output power (dBm)	Antenna gain (dBi)	Max. power (dBm)	Max. Power (W)	Power density @ 20 cm (W/m ²)	Limits (W/m ²)
GSM	33 (*)	-3.31	29.69	0.931	1.85	2.63
Wi-Fi	20 (*)	0	20	0.100	0.20	5.44

SIMULTANEOUS TRANSMITTER

Radio module	Max. power (dBm)	Max. Power (W)	Power density @ 20 cm (W/m ²)	Limits (W/m ²)	S / Limit
GSM	29.69	0.931	1.85	2.63	0.704
Wi-Fi	20	0.100	0.20	5.44	0.037
Simultaneous transmission (Σ S/ Limit)					0.741
Limit					1

(*) Max power permitted for radio module type.
For all transmitter assumed duty cycle 100%.

8. PHOTOGRAPHIC DOCUMENTATION

EUT IDENTIFICATION



END OF ASSESSMENT REPORT