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# Report On

RF Exposure Assessment of the  
Nokia Solutions and Networks  
AirScale and Flexi Multiradio Base Station Multiband Products  
(Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71)

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**REPORT ON**

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1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71)

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12 December 2017



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## **SECTION 1**

### **REPORT SUMMARY**

RF Exposure Assessment of the  
Nokia Solutions and Networks AirScale Base Station Products  
and Flexi Multiradio Station Products  
(Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71)



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## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Exposure Assessment of the Nokia Solutions and Networks AirScale and Flexi Multiradio Base Station Multiband Products (Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71) to the requirements of the applied test specifications.

Objective	To perform RF Exposure Assessment to determine the Equipment Under Test's (EUT's) compliance of the applied rules.
Applicant	Nokia Solutions and Networks
Manufacturer	Nokia Solutions and Networks Oy
Manufacturing Description	AirScale Base Station Products and Flexi Multiradio Base Station Products (Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71)
Model Number(s)	AirScale and Flexi Multiradio Base Station Multiband Products
Test Specification/Issue/Date	EN 62311:2008 CFR 47 Pt1.1310 (2016) Health Canada Safety Code 6 ARPANSA Radiation Protection Series No.3
Related Documents	EN 50385: 2017



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## 1.2 REGIONAL REQUIREMENTS

The table below shows the regional requirements that are referenced in this test report. A full list of the requirements is shown in Annex A.

Report Reference	Regional Requirement
EU	EN 62311:2008
FCC	CFR 47 Pt1.1310 (2016)
IC	Health Canada Safety Code 6
AUS	ARPANSA Radiation Protection Series No.3



### 1.3 PRODUCT INFORMATION

#### 1.3.1 Technical Description

The Equipment under test was a Nokia Solutions and Networks AirScale and Flexi Multiradio Base Station Multiband Products (Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71). A full technical description can be found in the manufacturer’s documentation.

All reported calculations were carried out on the relevant information supplied for the AirScale and Flexi Multiradio Base Station Multiband Products (Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71) to demonstrate compliance with the applied test specification(s). The sample assessed was found to comply with the requirements of the applied rules.

#### 1.3.2 Supported Features

The following radio access technologies and frequency bands are supported by the equipment under test.

Radio Access Technology	LTE (120W)
	LTE (160W)
	LTE (200W)
	LTE (240W)
	LTE (320W)

Frequency Band	Band 8 + Band 20 + Band 28 (758-960)
	Band 1 + Band 3 (1805-2170)
	Band 66 + Band 25 (1930-2200)
	Band 66a + Band 25 (1930-2180)
	Band 5 + Band 13 (746-894)
	Band 12 + Band 14 (729-768)
	Band 12 + Band 71 (617-746)
	Band 2 + Band 66a (1930-2180)
	Band 28 (758-803)
	Band 66a (2110-2180)
	Band 1+ Band 3 (1805-2170)
	Band 28+Band 20 (758-821)
	Band 29 + Band 70 (717-2020)

#### 1.3.3 Antennas

The following antennas are supported by the equipment under test.

No.	Model	Gain(dB)
1	Not Supplied	16.4



### 1.3.4 EUT Configurations

In order to make the overall calculation for each Configuration we have used the declared maximum power that will be produced by each combination of Bands and TX Antennas as supplied by Nokia and described in the following table.

Configuration Number	Configuration Name	Detailed Description
1	3 bands, 4 Tx Antenna Connectors (B8/B20/B28)	B28/B20/B8; Power Output: 2x2x60W (240W max); up to 2x120W if only one band in use; 2TX B20/B28+2TX B8
2	2 bands, 2 TX antenna connectors (B1/B3)	B3/B1; Power Output: 2x2x80W (240W max); 2TX B3+2TX B1
3	2 bands, 4 TX antenna connectors (B66/B25)	B66/B25: Power Output: 2x4x40W (320W max); 4TX B66+4TX B25
4	2 bands, 4 TX antenna connectors (B66a/B25)	B66a/B25: Power Output: 2x4x40W (160W max); 4TX B66a+4TX B25
5	2 bands, 4 TX antenna connectors (B5/B13)	B5/B13: Power Output: 2x4x40W (320W max); 4TX B5+4TX B13
6	2 bands, 4 TX antenna connectors (B1/B3)	B3/B1: Power Output: 2x4x40W (320W max); 4TX B3+4TX B1
7	2 bands, 4 TX antenna connectors (B12/B14)	B12/B14: Power Output: 2x4x40W (320W max); 4TX B12+4TX B14
8	2 bands, 4 TX antenna connectors (B12/B71)	B71/B12: Power Output: 2x4x30W (240W max); 4TX B71+4TX B12
9	2 bands, 4 TX antenna connectors (B5/B13)	B5/B13: Power Output: 2x4x20W (160W max); 4TX B5+4TX B13
10	2 bands, 8 TX antenna connectors (four connectors per band) (B2/B66a)	B66a/B2: Power Output: 4x60W B66a + 4x40W B2 (320W max) (SW limit 80W per B66a/B2 antenna pair); 4TX B66a+4TX B2
11	1 band, 4 TX antenna connectors (B28)	B28, Single Band: Power Output: 4x80W (320W max); 4TX B28
12	2 bands, 4TX antenna connectors (two dedicated connectors per band) (B29/B70)	B29/B70: Power Output: 2x40W B29 + 2x60W B70 (RRH 200W max); 2TX B29+2TX B70





#### 1.4 BRIEF SUMMARY OF RESULTS

The wireless device described within this report has been shown to be capable of compliance with the basic restrictions related to human exposure to electromagnetic fields for both General Public and Occupational. The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).

Configuration	Required Compliance Boundary (m)	
	Occupational	General Population
3 bands, 4 Tx Antenna Connectors (B8/B20/B28)	6.85	18.51
2 bands, 2 TX antenna connectors (B1/B3)	5.52	13.76
2 bands, 4 TX antenna connectors (B66/B25)	6.26	15.54
2 bands, 4 TX antenna connectors (B66a/B25)	4.43	10.99
2 bands, 4 TX antenna connectors (B5/B13)	7.94	21.49
2 bands, 4 TX antenna connectors (B1/B3)	6.37	15.89
2 bands, 4 TX antenna connectors (B12/B14)	7.99	21.66
2 bands, 4 TX antenna connectors (B12/B71)	7.52	19.85
2 bands, 4 TX antenna connectors (B5/B13)	5.62	15.20
2 bands, 8 TX antenna connectors (B2/B66a)	6.26	15.53
1 band, 4 TX antenna connectors (B28)	7.91	21.37
2 band, 4 TX antenna connectors (B29/B70)	6.37	17.22

**Table 1 – Compliance Boundary Results**



**1.4.1 Configuration 1 - 3 bands, 4 Tx Antenna Connectors (B8/B20/B28)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 6.85 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	17.7586	18.9675	81.8220	82.6335	0.2170	0.2204
FCC*	1.7759	2.5290	N/A	N/A	N/A	N/A
IC	17.7586	17.7800	81.8220	81.8733	0.2170	0.2172
AUS	17.7586	18.9675	81.8220	84.5616	0.2170	0.2242

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 2 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 6.85 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 18.51 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.4321	3.7935	30.2799	37.8737	0.0803	0.1019
FCC*	0.2432	0.5058	N/A	N/A	N/A	N/A
IC	2.4321	2.4343	30.2799	30.2919	0.0803	0.0804
AUS	2.4321	3.7935	30.2799	37.7360	0.0803	0.1003

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 3 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 18.51 m.



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### 1.4.2 Configuration 2 - 2 bands, 2 TX antenna connectors (B1/B3)

Regional Requirement	Calculated RF exposure level at compliance boundary of 5.52 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	27.3471	45.1425	101.5363	127.4806	0.2693	0.3399
FCC*	2.7347	5.0000	N/A	N/A	N/A	N/A
IC	27.3471	27.4296	101.5363	101.6918	0.2693	0.2697
AUS	27.3471	45.1425	101.5363	130.4551	0.2693	0.3459

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 4 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 5.52 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 13.76 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	4.4010	9.0285	40.7326	58.4286	0.1080	0.1572
FCC*	0.4401	1.0000	N/A	N/A	N/A	N/A
IC	4.4010	4.4028	40.7326	40.7382	0.1080	0.1081
AUS	4.4010	9.0285	40.7326	58.2161	0.1080	0.1547

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 5 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 13.76 m.



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### 1.4.3 Configuration 3 - 2 bands, 4 TX antenna connectors (B66/B25)

Regional Requirement	Calculated RF exposure level at compliance boundary of 6.26 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	28.3558	48.2500	103.3918	131.7953	0.2742	0.3515
FCC*	2.8356	5.0000	N/A	N/A	N/A	N/A
IC	28.3558	28.3580	103.3918	103.3984	0.2742	0.2743
AUS	28.3558	48.2500	103.3918	134.8705	0.2742	0.3576

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 6 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 6.26 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 15.54 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	4.6014	9.6500	41.6495	60.4062	0.1105	0.1625
FCC*	0.4601	1.0000	N/A	N/A	N/A	N/A
IC	4.6014	4.6077	41.6495	41.6755	0.1105	0.1106
AUS	4.6014	9.6500	41.6495	60.1865	0.1105	0.1599

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 7 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 15.54 m.



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**1.4.4 Configuration 4 - 2 bands, 4 TX antenna connectors (B66a/B25)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 4.43 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	28.3128	48.2675	103.3135	131.8192	0.2740	0.3515
FCC*	2.8313	5.0000	N/A	N/A	N/A	N/A
IC	28.3128	28.3631	103.3135	103.4078	0.2740	0.2743
AUS	28.3128	48.2675	103.3135	134.8950	0.2740	0.3577

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 8 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 4.43 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 10.99 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	4.6004	9.6535	41.6450	60.4171	0.1105	0.1626
FCC*	0.4600	1.0000	N/A	N/A	N/A	N/A
IC	4.6004	4.6089	41.6450	41.6807	0.1105	0.1106
AUS	4.6004	9.6535	41.6450	60.1974	0.1105	0.1599

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 9 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 10.99 m.



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**1.4.5 Configuration 5 - 2 bands, 4 TX antenna connectors (B5/B13)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 7.94 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	17.6258	18.6675	81.5155	81.9774	0.2162	0.2186
FCC*	1.7626	2.4890	N/A	N/A	N/A	N/A
IC	17.6258	17.6388	81.5155	81.5476	0.2162	0.2163
AUS	17.6258	18.6675	81.5155	83.8902	0.2162	0.2224

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 10 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 7.94 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 21.49 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.4061	3.7335	30.1179	37.5730	0.0799	0.1011
FCC*	0.2406	0.4978	N/A	N/A	N/A	N/A
IC	2.4061	2.4079	30.1179	30.1273	0.0799	0.0799
AUS	2.4061	3.7335	30.1179	37.4364	0.0799	0.0995

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 11 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 21.49 m.



**1.4.6 Configuration 6 - 2 bands, 4 TX antenna connectors (B1/B3)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 6.37 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	27.3849	45.1425	101.6064	127.4806	0.2695	0.3399
FCC*	2.7385	5.0000	N/A	N/A	N/A	N/A
IC	27.3849	27.4296	101.6064	101.6918	0.2695	0.2697
AUS	27.3849	45.1425	101.6064	130.4551	0.2695	0.3459

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 12 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 6.37 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 15.89 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	4.4009	9.0285	40.7321	58.4286	0.1080	0.1572
FCC*	0.4401	1.0000	N/A	N/A	N/A	N/A
IC	4.4009	4.4028	40.7321	40.7382	0.1080	0.1081
AUS	4.4009	9.0285	40.7321	58.2161	0.1080	0.1547

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 13 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 15.89 m.



**1.4.7 Configuration 7 - 2 bands, 4 TX antenna connectors (B12/B14)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 7.99 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	17.4059	18.2425	81.0053	81.0389	0.2149	0.2161
FCC*	1.7406	2.4323	N/A	N/A	N/A	N/A
IC	17.4059	17.4369	81.0053	81.0794	0.2149	0.2151
AUS	17.4059	18.2425	81.0053	82.9298	0.2149	0.2199

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 14 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 7.99 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 21.66 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.3685	3.6485	29.8815	37.1428	0.0793	0.0999
FCC*	0.2368	0.4865	N/A	N/A	N/A	N/A
IC	2.3685	2.3703	29.8815	29.8911	0.0793	0.0793
AUS	2.3685	3.6485	29.8815	37.0078	0.0793	0.0983

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 15 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 21.66 m.





**1.4.8 Configuration 8 - 2 bands, 4 TX antenna connectors (B12/B71)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 7.52 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	14.7351	15.4425	74.5320	74.5607	0.1977	0.1988
FCC*	1.4735	2.0590	N/A	N/A	N/A	N/A
IC	14.7351	16.0430	74.5320	77.7712	0.1977	0.2063
AUS	14.7351	15.4425	74.5320	76.3005	0.1977	0.2023

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 16 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 7.52 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 19.85 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.1148	3.0885	28.2358	34.1737	0.0749	0.0920
FCC*	0.2115	0.4118	N/A	N/A	N/A	N/A
IC	2.1148	2.1152	28.2358	28.2368	0.0749	0.0749
AUS	2.1148	3.0885	28.2358	34.0494	0.0749	0.0905

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 17 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 19.85 m.



**1.4.9 Configuration 9 - 2 bands, 4 TX antenna connectors (B5/B13)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 5.62 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	17.5921	18.6675	81.4375	81.9774	0.2160	0.2186
FCC*	1.7592	2.4890	N/A	N/A	N/A	N/A
IC	17.5921	17.6388	81.4375	81.5476	0.2160	0.2163
AUS	17.5921	18.6675	81.4375	83.8902	0.2160	0.2224

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 18 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 5.62 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 15.20 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.4049	3.7335	30.1104	37.5730	0.0799	0.1011
FCC*	0.2405	0.4978	N/A	N/A	N/A	N/A
IC	2.4049	2.4079	30.1104	30.1273	0.0799	0.0799
AUS	2.4049	3.7335	30.1104	37.4364	0.0799	0.0995

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 19 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 15.20 m.



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**1.4.10 Configuration 10 - 2 bands, 8 TX antenna connectors (B2/B66a)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 6.26 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	28.3558	48.2675	103.3918	131.8192	0.2742	0.3515
FCC*	2.8356	5.0000	N/A	N/A	N/A	N/A
IC	28.3558	28.3631	103.3918	103.4078	0.2742	0.2743
AUS	28.3558	48.2675	103.3918	134.8950	0.2742	0.3577

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 20 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 6.26 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 15.53 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	4.6073	9.6535	41.6763	60.4171	0.1105	0.1626
FCC*	0.4607	1.0000	N/A	N/A	N/A	N/A
IC	4.6073	4.6089	41.6763	41.6807	0.1105	0.1106
AUS	4.6073	9.6535	41.6763	60.1974	0.1105	0.1599

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 21 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 15.53 m.



**1.4.11 Configuration 11 - 1 band, 4 TX antenna connectors (B28)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 7.91 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	17.7598	18.9675	81.8246	82.6335	0.2170	0.2204
FCC*	1.7760	2.5290	N/A	N/A	N/A	N/A
IC	17.7598	17.7800	81.8246	81.8733	0.2170	0.2172
AUS	17.7598	18.9675	81.8246	84.5616	0.2170	0.2242

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 22 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 7.91 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 21.37 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.4332	3.7935	30.2870	37.8737	0.0803	0.1019
FCC*	0.2433	0.5058	N/A	N/A	N/A	N/A
IC	2.4332	2.4343	30.2870	30.2919	0.0803	0.0804
AUS	2.4332	3.7935	30.2870	37.7360	0.0803	0.1003

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 23 – General Population Results**

The calculations show that the EUT complies with the general population exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 21.37 m.



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**1.4.12 Configuration 12 - 2 band, 4 TX antenna connectors (B29/B70)**

Regional Requirement	Calculated RF exposure level at compliance boundary of 6.37 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	17.1203	17.9425	80.3380	80.3698	0.2131	0.2143
FCC*	1.7120	2.3923	N/A	N/A	N/A	N/A
IC	17.1203	17.2929	80.3380	80.7440	0.2131	0.2142
AUS	17.1203	17.9425	80.3380	82.2451	0.2131	0.2181

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 24 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 6.37 m.

Regional Requirement	Calculated RF exposure level at compliance boundary of 17.22 m					
	S Field (W/m <sup>2</sup> )		E Field (V/m)		H Field (A/m)	
	Result	Limit	Result	Limit	Result	Limit
EU	2.3427	3.5885	29.7185	36.8361	0.0788	0.0991
FCC*	0.2343	0.4785	N/A	N/A	N/A	N/A
IC	2.3427	2.3436	29.7185	29.7223	0.0788	0.0788
AUS	2.3427	3.5885	29.7185	36.7022	0.0788	0.0975

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 25 – General Population Results**

The calculations show that the EUT complies with the occupational exposure levels described in the EN 62311:2008, CFR 47 Pt1.1310 (2016), Health Canada Safety Code 6 and ARPANSA Radiation Protection Series No.3 at the point of investigation, 17.22 m.



Product Service

## **SECTION 2**

### **TEST DETAILS**



## 2.1 RATIONALE FOR ASSESSMENT OF THE RF EXPOSURE

The aim of the assessment report is to evaluate the compliance boundary for a set of given input power(s) according to the basic restrictions (directly or indirectly via compliance with reference levels) related to human exposure to radio frequency electromagnetic fields.

The chosen assessment method to establish the compliance boundary in the far-field region is the reference method as defined in the relevant specifications.

The RF exposure assessment is based upon the following criteria:

The AirScale and Flexi Multiradio Base Station Multiband Products (Bands 1, 2, 3, 5, 8, 12, 13, 14, 20, 25, 28, 29, 66, 66a, 70 and 71) operates with the following transmitters active on the antenna ports shown in Section 1.3.3. For each transmitter, the Radio Access Technology (RAT), EIRP inclusive of antenna gain and duty cycle, gain of the antenna and lowest frequency of operation are shown as they contribute to the calculation of S Field, E field and H field values according to the following formulas.

The power flux (S Field):

$$S = \frac{PG_{(\theta, \phi)}}{4\pi r^2}$$

The electric field strength (E Field):

$$E = \frac{\sqrt{30PG_{(\theta, \phi)}}}{r}$$

The magnetic field strength (H Field):

$$H = \frac{E}{\eta_0}$$

Where:

P = Average Power (W)

G = Antenna Gain (dBi)

r = Distance (cm) or (m)

$\eta_0 = 377$



## 2.2 TEST RESULT DETAILS

The frequencies shown in the tables below have been chosen based on the lowest possible frequency that the EUT can transmit.

### 2.2.1 Configuration 1 - 3 bands, 4 Tx Antenna Connectors (B8/B20/B28)

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 6.85 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (240W)	10471.280	100	16.4	758.7	17.7586	81.8220	0.2170

**Table 26 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 18.51 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (240W)	10471.280	100	16.4	758.7	2.4321	30.2799	0.0803

**Table 27 – General Population Transmitter Summary**

### 2.2.2 Configuration 2 - 2 bands, 2 TX antenna connectors (B1/B3)

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 5.52 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (240W)	10471.280	100	16.4	1805.7	27.3471	101.5363	0.2693

**Table 28 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 13.76 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (240W)	10471.280	100	16.4	1805.7	4.4010	40.7326	0.1080

**Table 29 – General Population Transmitter Summary**





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**2.2.3 Configuration 3 - 2 bands, 4 TX antenna connectors (B66/B25)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 6.26 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	1930.7	28.3558	103.3918	0.2742

**Table 30 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 15.54 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	1930.7	4.6014	41.6495	0.1105

**Table 31 – General Population Transmitter Summary**

**2.2.4 Configuration 4 - 2 bands, 4 TX antenna connectors (B66a/B25)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 4.43 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (160W)	6982.328	100	16.4	1930.7	28.3128	103.3135	0.2740

**Table 32 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 10.99 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (160W)	6982.328	100	16.4	1930.7	4.6004	41.6450	0.1105

**Table 33 – General Population Transmitter Summary**



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**2.2.5 Configuration 5 - 2 bands, 4 TX antenna connectors (B5/B13)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 7.94 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	746.7	17.6258	81.5155	0.2162

**Table 34 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 21.49 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	746.7	2.4061	30.1179	0.0799

**Table 35 – General Population Transmitter Summary**

**2.2.6 Configuration 6 - 2 bands, 4 TX antenna connectors (B1/B3)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 6.37 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	1805.7	27.3849	101.6064	0.2695

**Table 36 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 15.89 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	1805.7	4.4009	40.7321	0.1080

**Table 37 – General Population Transmitter Summary**



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**2.2.7 Configuration 7 - 2 bands, 4 TX antenna connectors (B12/B14)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 7.99 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	729.7	17.4059	81.0053	0.2149

**Table 38 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 21.66 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	729.7	2.3685	29.8815	0.0793

**Table 39 – General Population Transmitter Summary**

**2.2.8 Configuration 8 - 2 bands, 4 TX antenna connectors (B12/B71)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 7.52 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (240W)	10471.280	100	16.4	617.7	14.7351	74.5320	0.1977

**Table 40 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 19.85 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (240W)	10471.280	100	16.4	617.7	2.1148	28.2358	0.0749

**Table 41 – General Population Transmitter Summary**



Product Service

**2.2.9 Configuration 9 - 2 bands, 4 TX antenna connectors (B5/B13)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 5.62 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (160W)	6982.328	100	16.4	746.7	17.5921	81.4375	0.2160

**Table 42 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 15.20 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (160W)	6982.328	100	16.4	746.7	2.4049	30.1104	0.0799

**Table 43 – General Population Transmitter Summary**

**2.2.10 Configuration 10 - 2 bands, 8 TX antenna connectors (B2/B66a)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 6.26 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	1930.7	28.3558	103.3918	0.2742

**Table 44 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 15.53 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	1930.7	4.6073	41.6763	0.1105

**Table 45 – General Population Transmitter Summary**



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**2.2.11 Configuration 11 - 1 band, 4 TX antenna connectors (B28)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 7.91 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	758.7	17.7598	81.8246	0.2170

**Table 46 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 21.37 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (320W)	13963.670	100	16.4	758.7	2.4332	30.2870	0.0803

**Table 47 – General Population Transmitter Summary**

**2.2.12 Configuration 12 - 2 band, 4 TX antenna connectors (B29/B70)**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 6.37 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (200W)	8729.706	100	16.4	717.7	17.1203	80.3380	0.2131

**Table 48 – Occupational Transmitter Summary**

Antenna Port	Tx No.	Ant No.	RAT	EIRP (W)	Duty Cycle (%)	Gain (dBi)	Frequency (MHz)	RF Exposure Level at compliance boundary of 17.22 m		
								S Field (W/m <sup>2</sup> )	E Field (V/m)	H Field (A/m)
1	1	1	LTE (200W)	8729.706	100	16.4	717.7	2.3427	29.7185	0.0788

**Table 49 – General Population Transmitter Summary**



Product Service

## **SECTION 3**

### **DISCLAIMERS AND COPYRIGHT**



Product Service

### 3.1 DISCLAIMERS AND COPYRIGHT

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Product Service

## **ANNEX A**

### **REGIONAL REQUIREMENTS**





Product Service

Frequency Range (MHz)	Power Density (W/m <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0.065 - 1	-	610	1.6/f
1 - 10	-	610/f	1.6/f
10 - 400	10	61	0.162
400 - 2000	f/40	3*f <sup>0.5</sup>	0.008*f <sup>0.5</sup>
2000 - 300000	50	137	0.36

**Table A.1 – EN 62311:2008 Occupational Limits**

Frequency Range (MHz)	Power Density (W/m <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0.003 - 0.15	-	87	5
0.15 - 1	-	87	0.73/f
1 - 10	-	87/f <sup>0.5</sup>	0.73/f
10 - 400	2	28	0.073
400 - 2000	f/200	1.375*f <sup>0.5</sup>	0.0037*f <sup>0.5</sup>
2000 - 300000	10	61	0.16

**Table A.2 – EN 62311:2008 General Population Limits**

Frequency Range (MHz)	Power Density (mW/cm <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0 - 0.3	-	-	-
0.3 - 3	100	614	1.63
3 - 30	900/f <sup>2</sup>	1842/f	4.89/f
30 - 300	1	61.4	0.163
300 - 1500	f/300	-	-
1500 - 100000	5	-	-

**Table A.3 – CFR 47 Pt1.1310 (2016) Occupational Limits**

Frequency Range (MHz)	Power Density (mW/cm <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0 - 0.3	-	-	-
0.3 - 3	100	614	1.63
3 - 30	180/f <sup>2</sup>	824/f	2.19/f
30 - 300	0.2	27.5	0.073
300 - 1500	f/1500	-	-
1500 - 100000	1	-	-

**Table A.4 – CFR 47 Pt1.1310 (2016) General Population Limits**



Product Service

Frequency Range (MHz)	Power Density (W/m <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
10 - 20	10	61.4	0.163
20 - 48	$44.72/f^{0.5}$	$129.8/f^{0.25}$	$0.3444/f^{0.25}$
48 - 100	6.455	49.33	0.1309
100 - 6000	$0.6455*f^{0.5}$	$15.60*f^{0.25}$	$0.04138*f^{0.25}$
6000 - 150000	50	137	0.364

**Table A.5 – Health Canada Safety Code 6 Occupational Limits**

Frequency Range (MHz)	Power Density (W/m <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
10 - 20	2	27.46	0.0728
20 - 48	$8.944/f^{0.5}$	$58.07/f^{0.25}$	$0.1540/f^{0.25}$
48 - 300	1.291	22.06	0.05852
300 - 6000	$0.02619*f^{0.6834}$	$3.142*f^{0.3417}$	$0.008335*f^{0.3417}$
6000 - 15000	10	61.4	0.163

**Table A.6 – Health Canada Safety Code 6 General Population Limits**

Frequency Range (MHz)	Power Density (W/m <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0.1 - 1	-	614	$1.63/f$
1 - 10	$1000/f^2$	614	$1.63/f$
10 - 400	10	61.4	0.163
400 - 2000	$f/40$	$3.07*f^{0.5}$	$0.00814*f^{0.5}$
2000 - 300000	50	137	0.364

**Table A.7 – ARPANSA Radiation Protection Series No.3 Occupational Limits**

Frequency Range (MHz)	Power Density (W/m <sup>2</sup> )	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0.1 - 0.15	-	86.8	4.86
0.15 - 1	-	86.8	$0.729/f$
1 - 10	-	$86.8/f^{0.5}$	$0.729/f$
10 - 400	2	27.4	0.0729
400 - 2000	$f/200$	$1.37*f^{0.5}$	$0.00364*f^{0.5}$
2000 - 300000	10	61.4	0.163

**Table A.8 – ARPANSA Radiation Protection Series No.3 General Population Limits**