

Exposure Calculation Report

Apple Inc
Model: A2439

In accordance with EU EN 62311, FCC CFR 47
Part 1.1310, Health Canada Safety Code 6,
Australia ARPANSA RPS No.3
& New Zealand NZS 2772.1

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NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
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EXECUTIVE SUMMARY

The calculation of exposure for this product was found to be compliant at a minimum distance of 20 cm with EU EN 62311, FCC CFR 47 Part 1.1310, Health Canada Safety Code 6, Australia ARPANSA RPS No.3, New Zealand NZS 2772.1 assuming continuous exposure of 6 minutes or more. If alternative antennas are used with greater gains, the distance must be recalculated.

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	25 March 2021

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A2439
Hardware Version(s)	REV 1.0
Software Version(s)	20W430340t
Specification/Issue/Date	<ul style="list-style-type: none">• EN 62311:2008 Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)• FCC 47 CFR Part 1.1310: 2018• ISED Canada: Health Canada Safety Code 6:2015• Australia: ARPANSA Radiation Protection Series No.3:2002• NZS 2772.1:1999 Radiofrequency fields, Maximum exposure levels, 3 kHz to 300 GHz
Order Number	0540205414
Date	07 July 2020



Related Document(s)

- Directive 2013/35/EU on minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).
- European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), Official Journal, L199, of 1999-7-30, p.59-70.
- OET65:97 Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
- IEEE C95.3:2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz–300 GHz
- RSS-102 Issue 5 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
- AS/NZS 2772.2:2016 Radiofrequency fields, Part 2: principles and methods of measurement and computation, 3 kHz to 300 GHz



1.3 Brief Summary of Results

The wireless device described within this report was compliant with the restrictions related to human exposure to electromagnetic fields for both general public and worker/occupational exposures at the minimum compliance distances calculated.

The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).

1.3.1 Compliance Boundary

Regional Requirement	Configuration	Calculated minimum compliance boundary (m) (rounded up to nearest 0.1 m)	
		Worker/Occupational	General Public
EU	5.0 GHz WLAN + 2.4GHz WLAN	0.2	0.2
	5.0 GHz WLAN + Bluetooth	0.2	0.2
	5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth	0.2	0.2
FCC	5.0 GHz WLAN + 2.4GHz WLAN	0.2	0.2
	5.0 GHz WLAN + Bluetooth	0.2	0.2
	5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth	0.2	0.2
CANADA	5.0 GHz WLAN + 2.4GHz WLAN	0.2	0.2
	5.0 GHz WLAN + Bluetooth	0.2	0.2
	5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth	0.2	0.2
AUSTRALIA	5.0 GHz WLAN + 2.4GHz WLAN	0.2	0.2
	5.0 GHz WLAN + Bluetooth	0.2	0.2
	5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth	0.2	0.2
NEW ZEALAND	5.0 GHz WLAN + 2.4GHz WLAN	0.2	0.2
	5.0 GHz WLAN + Bluetooth	0.2	0.2
	5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth	0.2	0.2

Table 2 – Compliance Boundary Calculation Results

Note: The calculated minimum compliance distances were less than that stated in Table 2, however the assessment method of RF exposure calculation described in Section 2 is applicable only to separation distances of 0.2 m or more, therefore a minimum separation distance of 0.2 m is required.



1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) was a desktop computer with Bluetooth, Bluetooth Low Energy and 802.11 a/b/g/n/ac/ax WLAN capabilities in the 2.4GHz and 5GHz bands.

1.4.2 Transmitter Description

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

Radio Access Technology	Antenna Port	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
Bluetooth	WF1, WF2, WF3	2402-2480	2402	14.5	100
WLAN	WF1, WF2	2412-2472	2412	15.5	100
WLAN	WF1, WF2	5180-5825	5180	17.5	100

Table 3 – Transmitter Description (EU, AUS, NZ)

Radio Access Technology	Antenna Port	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
Bluetooth	WF1, WF2, WF3	2402-2480	2402	18	100
WLAN	WF1, WF2	2412-2472	2412	22	100
WLAN	WF1, WF2	5180-5825	5180	20	100

Table 4 – Transmitter Description (FCC, CANADA)

Note: Transmitter power includes upper bounds of uncertainty therefore maximum values are used in accordance with Section 2.8.

1.4.3 Antenna Description

The following antennas are supported by the equipment under test.

Antenna No	Radio Access Technology	Antenna Model	Gain (dBi)	Antenna length (cm)
1	Bluetooth/WLAN 2.4 GHz	WF1	3.33	5.17
1	WLAN 5.0 GHz	WF1	6.20	5.17
2	Bluetooth/WLAN 2.4 GHz	WF2	3.33	3.63
2	WLAN 5.0 GHz	WF2	6.20	3.63
3	Bluetooth	WF3	3.33	4.82

Table 5 – Antenna description

In the case of more than one type of antenna being supported by the equipment, the calculation is based on the maximum of the antenna gains. If other antennas can be used that have greater gains, the minimum separation distances will need to be recalculated.



Note: Antenna gain includes upper bounds of uncertainty therefore maximum values are used in accordance with Section 2.8.

1.4.4 Equipment Configuration

Scenario 1 - 5.0 GHz WLAN + 2.4GHz WLAN

Scenario 2 - 5.0 GHz WLAN + Bluetooth

Scenario 3 - 5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth



2 Assessment Details

2.1 Assessment Method

The assessment method is by calculation of the power density S , electric field strength E , magnetic field strength H or magnetic flux density B .

The calculation uses the spherical model applicable under far field conditions.

$$S = E \times H = \frac{E^2}{\eta} = H^2 \times \eta = \frac{P \times G_i}{4 \times \pi \times r^2}$$

Where:

η - Impedance of free space (377 ohm in far field)

P – Average transmitter power W ($P_{av} = P_{max} \times \text{Duty Cycle}$)

G_i – Antenna gain ratio relative to isotropic

r – Separation distance m

The magnetic flux density is related to the magnetic field strength by a constant:

$$B = \mu_o \times H$$

Where:

μ_o – Permeability of free space $4 \times \pi \times 10^{-7}$ H/m

This assessment assumes that exposure is continuous for 6 minutes or more in accordance with the averaging time required by the exposure standards at the stated minimum compliance boundary separation distance. Exposures of less than 6 minutes at other separation distances are not addressed by this report.

This assessment method of RF exposure is applicable to separation distances of 20 cm or more. Separation distances of less than 20 cm require a Specific Absorption Rate (SAR) assessment.

The far field region boundary depends on the frequency and wavelength and also on the antenna dimension. The boundary of the far field region is calculated below to demonstrate the validity of using the spherical model.

The result is compared to the limits in Annex A to determine compliance or to calculate the required compliance distance. The calculation is based on the lowest frequency in each band as the most onerous requirement as the limits increase with frequency for frequencies above 10-50 MHz (dependent on region).



2.2 Individual Antenna Port Exposure Results

2.2.1 Calculation of Compliance Distance

The frequencies shown in the tables below have been chosen based on the lowest possible frequency that the EUT can transmit. A full list of the regional requirements is shown in Annex A.

Regional Requirement	Antenna Port	RAT	Frequency (MHz)	Minimum Calculated Compliance Boundary (m) at Limit for:			
				S Power Density	E Field	H Field	B Field
EU	1, 2, 3	Bluetooth	2402	N/A	0.0096	N/A	0.0100
	1, 2, 3	WLAN	2412	N/A	0.0108	N/A	0.0112
	1, 2	WLAN	5180	N/A	0.0189	N/A	0.0196
FCC	1, 2, 3	Bluetooth	2402	0.0147	N/A	N/A	N/A
	1, 2, 3	WLAN	2412	0.0233	N/A	N/A	N/A
	1, 2	WLAN	5180	0.0258	N/A	N/A	N/A
CANADA	1, 2, 3	Bluetooth	2402	0.0185	0.0185	0.0185	N/A
	1, 2, 3	WLAN	2412	0.0293	0.0293	0.0293	N/A
	1, 2	WLAN	5180	0.0267	0.0267	0.0267	N/A
AUSTRALIA	1, 2, 3	Bluetooth	2402	0.0098	0.0098	0.0098	N/A
	1, 2, 3	WLAN	2412	0.0110	0.0110	0.0110	N/A
	1, 2	WLAN	5180	0.0193	0.0194	0.0193	N/A
NEW ZEALAND	1, 2, 3	Bluetooth	2402	0.0098	0.0098	0.0099	N/A
	1, 2, 3	WLAN	2412	0.0110	0.0110	0.0112	N/A
	1, 2	WLAN	5180	0.0193	0.0194	0.0195	N/A

Table 6 – Calculation of Compliance Distance Worker/Occupational

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0293 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Regional Requirement	Antenna Port	RAT	Frequency (MHz)	Minimum Calculated Compliance Boundary (m) at Limit for:			
				S Power Density	E Field	H Field	B Field
EU	1, 2, 3	Bluetooth	2402	0.0220	0.0221	0.0224	0.0225
	1, 2, 3	WLAN	2412	0.0247	0.0248	0.0251	0.0252
	1, 2	WLAN	5180	0.0432	0.0435	0.0440	0.0442
FCC	1, 2, 3	Bluetooth	2402	0.0329	N/A	N/A	N/A
	1, 2, 3	WLAN	2412	0.0521	N/A	N/A	N/A
	1, 2	WLAN	5180	0.0576	N/A	N/A	N/A
CANADA	1, 2, 3	Bluetooth	2402	0.0449	0.0449	0.0449	N/A
	1, 2, 3	WLAN	2412	0.0711	0.0711	0.0711	N/A



Regional Requirement	Antenna Port	RAT	Frequency (MHz)	Minimum Calculated Compliance Boundary (m) at Limit for:			
				S Power Density	E Field	H Field	B Field
	1, 2	WLAN	5180	0.0606	0.0606	0.0606	N/A
AUSTRALIA	1, 2, 3	Bluetooth	2402	0.0220	0.0220	0.0220	N/A
	1, 2, 3	WLAN	2412	0.0247	0.0247	0.0246	N/A
	1, 2	WLAN	5180	0.0432	0.0432	0.0432	N/A
NEW ZEALAND	1, 2, 3	Bluetooth	2402	0.0220	0.0221	0.0224	N/A
	1, 2, 3	WLAN	2412	0.0247	0.0248	0.0251	N/A
	1, 2	WLAN	5180	0.0432	0.0435	0.0440	N/A

Table 7 – Calculation of Compliance Distance General Public

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0711 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

The following table shows the regional requirements for the frequencies used in the RF exposure calculation. A full list of the requirements is shown in Annex A.

Regional Requirement	Frequency (MHz)	Worker/Occupational Limit				General Public Limit			
		S Power Density (W/m ²)	E Field (V/m)	H Field (A/m)	B Field (μT)	S Power Density (W/m ²)	E Field (V/m)	H Field (A/m)	B Field (μT)
EU	2402	N/A	140.00	N/A	0.4500	10.00	61.00	0.1600	0.2000
	2412	N/A	140.00	N/A	0.4500	10.00	61.00	0.1600	0.2000
	5180	N/A	140.00	N/A	0.4500	10.00	61.00	0.1600	0.2000
FCC	2402	50.00	N/A	N/A	N/A	10.00	N/A	N/A	N/A
	2412	50.00	N/A	N/A	N/A	10.00	N/A	N/A	N/A
	5180	50.00	N/A	N/A	N/A	10.00	N/A	N/A	N/A
CANADA	2402	31.64	109.21	0.2897	N/A	5.35	44.91	0.1191	N/A
	2412	31.70	109.32	0.2900	N/A	5.37	44.97	0.1193	N/A
	5180	46.46	132.34	0.3511	N/A	9.05	58.40	0.1549	N/A
AUSTRALIA	2402	50.00	137.00	0.3640	N/A	10.00	61.40	0.1630	N/A
	2412	50.00	137.00	0.3640	N/A	10.00	61.40	0.1630	N/A
	5180	50.00	137.00	0.3640	N/A	10.00	61.40	0.1630	N/A
NEW ZEALAND	2402	50.00	137.00	0.3600	N/A	10.00	61.00	0.1600	N/A
	2412	50.00	137.00	0.3600	N/A	10.00	61.00	0.1600	N/A
	5180	50.00	137.00	0.3600	N/A	10.00	61.00	0.1600	N/A

Table 8 – Limits



2.3 Combined Antenna Port RF Exposure Results

As the frequency of operation for each transmitter is not the same, in order to evaluate compliance with the limit which is dependent on frequency, the fractional exposure value is calculated: The calculated S power density is divided by the limit to get a fractional exposure value. The calculated E and H fields are divided by the limit and squared to get a fractional exposure value. The summation of the fractional RF exposure results for each transmitter provides the combined result. Any values less than one are compliant with the limit. The compliance boundary distance has been calculated to ensure the summation is ≤ 1 .

Calculations are made on an Excel spreadsheet and numbers may not add up exactly due to rounding.

2.4 Configuration 1 - 5.0 GHz WLAN + 2.4GHz WLAN

EN 62311 specifies the method of summation in clause 8.3 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0227 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	N/A	0.2269	N/A	0.2440
1, 2	WLAN	5180	N/A	0.6963	N/A	0.7488
Summation			N/A	0.9232	N/A	0.9928

Table 9 – EU Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0227 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0509 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.2346	0.2377	0.2431	0.2457
1, 2	WLAN	5180	0.7200	0.7295	0.7461	0.7540
Summation			0.9547	0.9672	0.9892	0.9996

Table 10 – EU General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0509 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



FCC OET 65 specifies the method of summation in clause; Multiple-Transmitter Sites and Complex Environments; with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0348 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.4484	N/A	N/A	N/A
1, 2	WLAN	5180	0.5478	N/A	N/A	N/A
Summation			0.9962	N/A	N/A	N/A

Table 11 - FCC Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0348 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0777 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.4497	N/A	N/A	N/A
1, 2	WLAN	5180	0.5495	N/A	N/A	N/A
Summation			0.9992	N/A	N/A	N/A

Table 12 – FCC General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0777 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



CANADA Health Canada Safety Code 6 specifies the method of summation in clause 2.2.1 Note 6 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0397 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.5434	0.5434	0.5434	N/A
1, 2	WLAN	5180	0.4531	0.4530	0.4530	N/A
Summation			0.9965	0.9964	0.9964	N/A

Table 13 – CANADA Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0397 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0935 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.5788	0.5789	0.5788	N/A
1, 2	WLAN	5180	0.4194	0.4195	0.4194	N/A
Summation			0.9982	0.9983	0.9982	N/A

Table 14 – CANADA General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0935 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



AUSTRALIA ARPANSA Radiation Protection Series No.3 specifies the method of summation in clause 3.4 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0223 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.2445	0.2455	0.2447	N/A
1, 2	WLAN	5180	0.7503	0.7535	0.7510	N/A
Summation			0.9947	0.9990	0.9957	N/A

Table 15 – AUSTRALIA Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0223 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0498 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.2451	0.2451	0.2447	N/A
1, 2	WLAN	5180	0.7522	0.7522	0.7510	N/A
Summation			0.9973	0.9973	0.9957	N/A

Table 16 – AUSTRALIA General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0498 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



NEW ZEALAND NZS 2772 Part 1 specifies the method of summation in clause 7 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0225 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.2401	0.2412	0.2457	N/A
1, 2	WLAN	5180	0.7370	0.7401	0.7542	N/A
Summation			0.9771	0.9813	1.0000	N/A

Table 17 – NEW ZEALAND Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0225 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0507 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	WLAN	2412	0.2365	0.2396	0.2450	N/A
1, 2	WLAN	5180	0.7257	0.7353	0.7520	N/A
Summation			0.9622	0.9748	0.9970	N/A

Table 18 – NEW ZEALAND General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0507 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



2.5 Configuration 2 - 5.0 GHz WLAN + Bluetooth

EN 62311 specifies the method of summation in clause 8.3 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0221 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	N/A	0.1901	N/A	0.2045
1, 2	WLAN	5180	N/A	0.7347	N/A	0.7900
Summation			N/A	0.9248	N/A	0.9945

Table 19 – EU Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0221 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0496 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1963	0.1988	0.2034	0.2055
1, 2	WLAN	5180	0.7583	0.7682	0.7857	0.7940
Summation			0.9545	0.9671	0.9891	0.9995

Table 20 – EU General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0496 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



FCC OET 65 specifies the method of summation in clause; Multiple-Transmitter Sites and Complex Environments; with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0297 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.2451	N/A	N/A	N/A
1, 2	WLAN	5180	0.7522	N/A	N/A	N/A
Summation			0.9972	N/A	N/A	N/A

Table 21 - FCC Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0297 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0664 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.2452	N/A	N/A	N/A
1, 2	WLAN	5180	0.7524	N/A	N/A	N/A
Summation			0.9976	N/A	N/A	N/A

Table 22 – FCC General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0664 m. However this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



CANADA Health Canada Safety Code 6 specifies the method of summation in clause 2.2.1 Note 6 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0325 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.3235	0.3235	0.3235	N/A
1, 2	WLAN	5180	0.6760	0.6760	0.6760	N/A
Summation			0.9995	0.9994	0.9995	N/A

Table 23 – CANADA Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0325 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0755 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.3544	0.3544	0.3544	N/A
1, 2	WLAN	5180	0.6433	0.6433	0.6433	N/A
Summation			0.9976	0.9978	0.9976	N/A

Table 24 – CANADA General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0755 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



AUSTRALIA ARPANSA Radiation Protection Series No.3 specifies the method of summation in clause 3.4 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0218 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.2032	0.2041	0.2034	N/A
1, 2	WLAN	5180	0.7851	0.7884	0.7859	N/A
Summation			0.9883	0.9925	0.9893	N/A

Table 25 – AUSTRALIA Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0218 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0485 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.2053	0.2053	0.2049	N/A
1, 2	WLAN	5180	0.7931	0.7931	0.7918	N/A
Summation			0.9983	0.9983	0.9967	N/A

Table 26 – AUSTRALIA General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0485 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



NEW ZEALAND NZS 2772 Part 1 specifies the method of summation in clause 7 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0220 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1995	0.2004	0.2042	N/A
1, 2	WLAN	5180	0.7709	0.7742	0.7889	N/A
Summation			0.9704	0.9745	0.9931	N/A

Table 27 – NEW ZEALAND Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0220 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0494 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1979	0.2005	0.2050	N/A
1, 2	WLAN	5180	0.7644	0.7745	0.7921	N/A
Summation			0.9623	0.9749	0.9971	N/A

Table 28 – NEW ZEALAND General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0494 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



2.6 Configuration 3 - 5.0 GHz WLAN + 2.4GHz WLAN + Bluetooth

EN 62311 specifies the method of summation in clause 8.3 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0248 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	N/A	0.1510	N/A	0.1624
1, 2, 3	WLAN	2412	N/A	0.1901	N/A	0.2044
1, 2	WLAN	5180	N/A	0.5834	N/A	0.6274
Summation			N/A	0.9245	N/A	0.9942

Table 29 – EU Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0248 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0557 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1556	0.1577	0.1613	0.1630
1, 2, 3	WLAN	2412	0.1959	0.1985	0.2030	0.2052
1, 2	WLAN	5180	0.6013	0.6092	0.6230	0.6296
Summation			0.9528	0.9654	0.9873	0.9977

Table 30 – EU General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0557 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



FCC OET 65 specifies the method of summation in clause; Multiple-Transmitter Sites and Complex Environments; with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0378 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1513	N/A	N/A	N/A
1, 2, 3	WLAN	2412	0.3800	N/A	N/A	N/A
1, 2	WLAN	5180	0.4643	N/A	N/A	N/A
Summation			0.9957	N/A	N/A	N/A

Table 31 - FCC Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0378 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0844 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1517	N/A	N/A	N/A
1, 2, 3	WLAN	2412	0.3812	N/A	N/A	N/A
1, 2	WLAN	5180	0.4657	N/A	N/A	N/A
Summation			0.9986	N/A	N/A	N/A

Table 32 – FCC General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0844 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



CANADA Health Canada Safety Code 6 specifies the method of summation in clause 2.2.1 Note 6 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0438 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1781	0.1781	0.1781	N/A
1, 2, 3	WLAN	2412	0.4464	0.4464	0.4464	N/A
1, 2	WLAN	5180	0.3722	0.3722	0.3722	N/A
Summation			0.9967	0.9967	0.9967	N/A

Table 33 – CANADA Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0438 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.1037 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1879	0.1879	0.1878	N/A
1, 2, 3	WLAN	2412	0.4705	0.4706	0.4705	N/A
1, 2	WLAN	5180	0.3410	0.3410	0.3410	N/A
Summation			0.9993	0.9995	0.9993	N/A

Table 34 – CANADA General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.1037 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



AUSTRALIA ARPANSA Radiation Protection Series No.3 specifies the method of summation in clause 3.4 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0244 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1622	0.1629	0.1624	N/A
1, 2, 3	WLAN	2412	0.2042	0.2051	0.2044	N/A
1, 2	WLAN	5180	0.6267	0.6294	0.6273	N/A
Summation			0.9931	0.9973	0.9941	N/A

Table 35 – AUSTRALIA Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0244 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0544 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1632	0.1631	0.1629	N/A
1, 2, 3	WLAN	2412	0.2054	0.2054	0.2051	N/A
1, 2	WLAN	5180	0.6304	0.6304	0.6293	N/A
Summation			0.9989	0.9989	0.9973	N/A

Table 36 – AUSTRALIA General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0544 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



NEW ZEALAND NZS 2772 Part 1 specifies the method of summation in clause 7 with results as follows:

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0246 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1596	0.1603	0.1633	N/A
1, 2, 3	WLAN	2412	0.2009	0.2017	0.2056	N/A
1, 2	WLAN	5180	0.6165	0.6192	0.6309	N/A
Summation			0.9770	0.9812	0.9998	N/A

Table 37 – NEW ZEALAND Worker/Occupational Combined Exposure

The calculations show that the EUT complies with the worker/occupational exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0246 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.

Antenna Port	RAT	Frequency (MHz)	Calculated RF exposure level at minimum compliance boundary of 0.0554 m as a fraction of the limit			
			S Power Density	E Field	H Field	B Field
			Summation for simultaneous exposure; value to be <1			
1, 2, 3	Bluetooth	2402	0.1573	0.1594	0.1630	N/A
1, 2, 3	WLAN	2412	0.1980	0.2007	0.2052	N/A
1, 2	WLAN	5180	0.6078	0.6158	0.6298	N/A
Summation			0.9632	0.9758	0.9980	N/A

Table 38 – NEW ZEALAND General Public Combined Exposure

The calculations show that the EUT complies with the general public exposure levels described in the listed specifications in Annex A at the point of investigation, a minimum distance of 0.0554 m. However, this assessment method of RF exposure is applicable only to separation distances of 0.2 m or more that exceed the calculated value, therefore a minimum separation distance of 0.2 m is required.



2.7 Far Field Region Boundary Results

The far field region boundary calculation result is shown in Table 39:

Near Field / Far Field Boundary (Ref: IEEE C95.3 Annex B.2, EN 62311 Annex A, Technical Guide for Interpretation and Compliance Assessment of Health Canada's Radiofrequency Exposure Guidelines 7.1, AS/NZS 2772.2 Appendix B)			
RAT Name	Frequency MHz	Reactive Near Field Boundary (Wave Impedance Dependent)	Far Field Boundary (Antennas on axis)
		$\lambda/4$ (m)	$2D^2/\lambda$ (m)
Bluetooth	2402	0.0312	0.0428
WLAN	2412	0.0311	0.0430
WLAN	5180	0.0145	0.0923

Table 39 – Far Field Boundary

The table below shows the maximum calculated near field / far field region boundaries.

The compliance boundary of 0.2 m is in the far field region and therefore, the approach described in section 2.1 is valid.

Field Region	Reactive Near Field Region	Radiating Near Field Region	Far Field Region
Maximum Boundary	<0.0312 m	0.0312 – 0.0923 m	> 0.0923 m
Validity of Regions	Spherical model potential under-estimate: SAR assessment required	Spherical model over-estimate and conservative	Spherical model valid
Compliance Boundary Location	N/A	N/A	0.2 m

Table 40 – Assessment Method Validity

2.8 Uncertainty

The basic computation formulas presented in section 2.1 are conservative formulas for the estimation of RF field strength or power density.

No uncertainty estimations are required when using these formulas but there is clear guidance on where and when these formulas are applicable. For the estimate of S, E or H to be conservative, the transmitter power P and antenna gain G_i values shall be the upper bounds of uncertainty therefore maximum values are used.

The spherical formula is valid under far field conditions which are established in section 2.7.



ANNEX A

REGIONAL REQUIREMENTS



Frequency Range (MHz)	Power Density (W/m ²)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Magnetic Flux Density (μT)
0.1 - 1	-	610	N/A	2/f
1 - 10	-	610/f	N/A	2/f
10 - 400		61	N/A	0.2
400 - 2000		3*f ^{0.5}	N/A	1E-2*f ^{0.5}
2000 - 6000		140	N/A	0.45
6000 - 300000	50	140	N/A	0.45

Table A.1 – EU: Action levels in Directive 2013/35/EU Annex III Table B1 Worker/Occupational Limits

Frequency Range (MHz)	Power Density (W/m ²)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Magnetic Flux Density (μT)
0.003 - 0.15	-	87	5	6.25
0.15 - 1	-	87	0.73/f	0.92/f
1 - 10	-	87/f ^{0.5}	0.73/f	0.92/f
10 - 400	2	28	0.073	0.092
400 - 2000	f/200	1.375*f ^{0.5}	0.0037*f ^{0.5}	0.0046*f ^{0.5}
2000 - 300000	10	61	0.16	0.2

Table A.2 – EU: Council Recommendation 1999/519/EC Annex II Table 1 General Public Limits

Frequency Range (MHz)	Power Density (mW/cm ²) Note 1	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0 - 0.3	-	-	-
0.3 - 3	100	614	1.63
3 - 30	900/f ²	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 Worker/Occupational Limits

Frequency Range (MHz)	Power Density (mW/cm ²) Note 1	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0 - 0.3	-	-	-
0.3 - 3	100	614	1.63
3 - 30	180/f ²	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 General Public Limits

Note 1: The calculations and limits presented in this report for power density are in units of W/m². The conversion factor is; 1 mW/cm² = 10 W/m².



Frequency Range (MHz)	Power Density (W/m ²)	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 Worker/Occupational Limits

Frequency Range (MHz)	Power Density (W/m ²)	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 Public Limits

Frequency Range (MHz)	Power Density (W/m ²)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0.1 - 1	-	614	$1.63/f$
1 - 10	$1000/f^2$	$614/f$	$1.63/f$
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 Worker/Occupational Limits

Frequency Range (MHz)	Power Density (W/m ²)	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 Public Limits



Frequency Range (MHz)	Power Density (W/m ²)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)
0.1 - 1	-	614	1.63/f
1 - 10	1000/f ²	614/f	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.9 – NZS 2772 Part 1 Worker/Occupational Limits

Frequency Range (MHz)	Power Density (W/m ²)	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.10 – NZS 2772 Part 1 General Public Limits