

RF Exposure Lab

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CERTIFICATE OF COMPLIANCE MPE EVALUATION

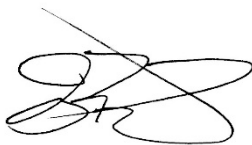
Industrial Scientific
One Life Way
Pittsburgh, PA 15205

Dates of Test: February 15, 2023
Test Report Number: MPE.20230201
Revision B

Contains FCC ID:	U9O-SM220, RI7ME910G1WW, Z64-CC3120MOD, SQGBL652, PHH-RGX
Contains IC Certificate:	7084A-SM220, 5131A-ME910G1WW, 451I-CC3120MOD, 3147A-BL652, 20727-RGX
Model(s):	RGX Gateway Version RGX-4G
Test Sample:	Engineering Unit Same as Production
Equipment Type:	Wireless Monitoring
Classification:	Mobile Transmitter
TX Frequency Range:	13.56 MHz; 2405 – 2480 MHz; 2412 – 2462 MHz; 2402 – 2480 MHz; 699 – 716 MHz; 777 – 787 MHz; 788 – 798 MHz; 814 – 849 MHz; 1710 – 1755 MHz; 1850 – 1915 MHz 2500 – 2570 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	13.56 MHz – -35.0 dBm, 2450 MHz (Mesh) – 20.0 dBm; 2450 MHz (WiFi) – 17.0 dBm; 700 MHz (LTE) – 23.5 dBm, 850 MHz (GPRS) – 33.0 dBm; 850 MHz (UMTS) – 24.0 dBm; 850 MHz (LTE) – 23.5 dBm; 1750 MHz (UMTS) – 24.0 dBm; 1750 MHz (LTE) – 23.5 dBm; 1900 MHz (GPRS) – 30.0 dBm; 1900 MHz (UMTS) – 24.0 dBm; 1900 MHz (LTE) – 23.5 dBm; 2550 MHz (LTE) – 23.5 dBm Conducted
Signal Modulation:	ASK, O-QPSK, DSSS, OFDM, GMSK, WCDMA, QPSK, 16QAM
Antenna Type:	Internal
Application Type:	Certification
FCC Rule Parts:	Part 1, 2, 15C, 22, 24, 27
KDB Test Methodology:	KDB 447498 D01 v06
Industry Canada:	RSS-102 Issue 5, Safety Code 6
Maximum MPE Value:	0.13 mW/cm ² (FCC); 1.34 W/m ² (IC)
Maximum E-Field Value:	0.02 V/m (FCC); 22.51 V/m (IC)
Maximum H-Field Value:	<<0.01 A/m (FCC); 0.06 A/m (IC)
Max. Simultaneous MPE Ratio:	29.1% (FCC); 9.1% (IC)
Max. Simultaneous E-Field Ratio:	N/A (FCC); 43.3% (IC)
Max. Simultaneous H-Field Ratio:	N/A (FCC); 43.5% (IC)
Separation Distance:	20 cm for Body

This wireless mobile and/or portable device has been shown to be compliant for RF exposure requirements for uncontrolled environment/general exposure limits specified in 47 CFR 1.1310, 47 CFR 2.1091 and RSS-102 (See test report).

I attest to the accuracy of the data. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



Jay M. Moulton
Vice President



Certificate # 2387.01

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Comment/Revision	Date
Original Release	February 15, 2023
Revision A – Correct Model Number in Section B.2.2	February 16, 2023
Revision B – Add version to Model	March 7, 2023

Note: The latest version supersedes all previous versions listed in the above table. The latest version shall be used.

1. Introduction

This measurement report shows compliance of the Industrial Scientific Model RGX Gateway Version RGX-4G Wireless Monitoring with 47 CFR 1.1310, 47 CFR 2.1091 and RSS-102 Issue 5.

2. Characteristics of the Evaluation

2.1 Requirements and Methods

RF exposure assessment of the Industrial Scientific Model RGX Gateway Version RGX-4G Wireless Monitoring.

Requirements	Frequency Bands
47 CFR 1.1310 Radio frequency radiation exposure limits and 47 CFR 2.1091 Radio frequency radiation exposure evaluation: mobile devices.	13.56 MHz; 2405 – 2480 MHz; 2412 – 2462 MHz, 2402 –2480 MHz; 699 – 716 MHz; 777 – 787 MHz; 788 – 798 MHz; 814 – 849 MHz; 1710 – 1755 MHz; 1850 – 1915 MHz; 2500 – 2570 MHz
RSS-102 Issue 5 Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)	13.56 MHz; 2405 – 2480 MHz; 2412 – 2462 MHz, 2402 –2480 MHz; 699 – 716 MHz; 777 – 787 MHz; 788 – 798 MHz; 814 – 849 MHz; 1710 – 1755 MHz; 1850 – 1915 MHz; 2500 – 2570 MHz

3. Data Supplied by the Applicant

3.1 Applicant

Name/Company: Industrial Scientific
Address: One Life Way, Pittsburgh, PA 15205
Country: United States

3.2 Representative

Name: Bob Kuzmich
Address: One Life Way, Pittsburgh, PA 15205
Country: United States

3.3 Identification of Item Evaluated

Product: Wireless Monitoring
Model: RGX Gateway Version RGX-4G
Manufacturer: Industrial Scientific

4. Evaluation Results

Abbreviations used in the RESULTS column of the following tables are:

C	Compliant with requirements
NC	Not Compliant with requirements
NA	Not Applicable
NE	Not Evaluated

Document/Standard	Results
47 CFR 1.1310 Radio frequency radiation exposure limits and 47 CFR 2.1091 Radio frequency radiation exposure evaluation: mobile devices.	C
RSS-102 Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)	C

5. Summary

Considering the results of the performed analysis and evaluation, stated in Appendix A and B, the item under evaluation is **IN COMPLIANCE** with the specifications listed in Section 2.1 “Requirements and Methods”.

Appendix A

Host Analysis

A.1. Device

The device is in a mobile exposure condition (antenna-to-user distance > 20 cm).

Transmitters:

Type of Equipment : Wireless Monitoring
Model : RGX Gateway Version RGX-4G
Maximum antenna gain : See table below
Output power : See table below

Frequency Band	Mode	Frequency Range (MHz)	Maximum Conducted output power (dBm)	Maximum Conducted output power (mW)	Duty Cycle	Equivalent conducted output power (mW)	Maximum antenna gain (dBi)	Maximum antenna gain (numerical)	EIRP (mW)
13.56 MHz	NFC	13.56	-35.0	0.0003	100%	0.0003	3.0	2.0	0.0006
2450 MHz	802.11b	2412-2462	17.0	50.1	100%	50.1	1.9	1.5	75.2
2450 MHz	BLE	2402-2480	4.0	2.5	100%	2.5	0.5	1.1	2.8
2450 MHz	Mesh	2405-2480	20.0	100.0	100%	100.0	0.0	1.0	100.0
750 MHz	LTE	699-716	23.5	223.9	100%	223.9	4.3	2.7	604.5
750 MHz	LTE	777-787	23.5	223.9	100%	223.9	4.3	2.7	604.5
750 MHz	LTE	788-798	23.5	223.9	100%	223.9	4.3	2.7	604.5
850 MHz	GPRS	824-849	33.0	249.4	100%	249.4	4.3	2.7	673.4
850 MHz	UMTS	824-849	24.0	251.2	100%	251.2	4.3	2.7	678.2
850 MHz	LTE	814-849	23.5	223.9	100%	223.9	4.3	2.7	604.5
1750 MHz	UMTS	1710-1755	24.0	251.2	100%	251.2	4.1	2.6	653.1
1750 MHz	LTE	1710-1755	23.5	223.9	100%	223.9	4.1	2.6	582.1
1900 MHz	GPRS	1850-1910	30.0	125.0	100%	125.0	4.1	2.6	325.0
1900 MHz	UMTS	1850-1910	24.0	251.2	100%	251.2	4.1	2.6	653.1
1900 MHz	LTE	1850-1915	23.5	223.9	100%	223.9	4.1	2.6	582.1
2550 MHz	LTE	2500-2570	23.5	223.9	100%	223.9	4.1	2.6	582.1

Worst Case Considerations:

- Antenna-to-user distance: 20 cm
 - o Any antenna-to-user distance > 20 cm would be covered by the analysis included in this report as far as it would provide better exposure conditions.
- Antenna gains: 2450 MHz band WiFi: 1.9 dBi
 - o Any antenna gains below the specified would be covered by the analysis included in this report as far as it would provide better exposure conditions.
- Antenna gains: 2450 MHz band BLE: 0.5 dBi
 - o Any antenna gains below the specified would be covered by the analysis included in this report as far as it would provide better exposure conditions.
- Antenna gains: 2450 MHz band Mesh: 0.0 dBi
 - o Any antenna gains below the specified would be covered by the analysis included in this report as far as it would provide better exposure conditions.
- Antenna gains: 13.56 MHz band: 3.0 dBi
 - o Any antenna gains below the specified would be covered by the analysis included in this report as far as it would provide better exposure conditions.
- Antenna gains: 750 MHz and 850 MHz bands: 4.3 dBi
 - o Any antenna gains below the specified would be covered by the analysis included in this report as far as it would provide better exposure conditions.
- Antenna gains: 1750 MHz, 1900 MHz and 2550 MHz bands: 4.1 dBi
 - o Any antenna gains below the specified would be covered by the analysis included in this report as far as it would provide better exposure conditions.

Appendix B

RF Exposure Assessment

B.1 Maximum Permissible Exposure (MPE) Limits

B.1.1 FCC MPE Limits

Normative document:

- 47 CFR 1.1310 Radio frequency radiation exposure limits
- 47 CFR 2.1091 Radio frequency radiation exposure evaluation: mobile devices

Reference levels:

The table below is excerpted from 47 CFR 1.1310, Radio frequency radiation exposure limits:

Frequency Range (MHz)	E-field strength (V/m)	H-field strength (A/m)	Power Density (S) (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	(100)	30
1.34-30	824/f	2.19/f	(180/f)	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

MPE limits:

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (MHz)	MPE limit S _{eq} (mW/cm ²)	E-Field Strength (V/m)	H-Field Strength (A/m)
13.56 MHz	NFC	13.56	13.56	13.3	60.77	0.16
2450 MHz	802.11b	2412-2462	2412	1.0	N/A	N/A
2450 MHz	BLE	2402-2480	2402	1.0	N/A	N/A
2450 MHz	Mesh	2405-2480	2405	1.0	N/A	N/A
750 MHz	LTE	699-716	699	0.47	N/A	N/A
750 MHz	LTE	777-787	777	0.52	N/A	N/A
750 MHz	LTE	788-798	788	0.53	N/A	N/A
850 MHz	GPRS	824-849	824	0.55	N/A	N/A
850 MHz	UMTS	824-849	824	0.55	N/A	N/A
850 MHz	LTE	814-849	814	0.54	N/A	N/A
1750 MHz	UMTS	1710-1755	1710	1.0	N/A	N/A
1750 MHz	LTE	1710-1755	1710	1.0	N/A	N/A
1900 MHz	GPRS	1850-1910	1850	1.0	N/A	N/A
1900 MHz	UMTS	1850-1910	1850	1.0	N/A	N/A
1900 MHz	LTE	1850-1915	1850	1.0	N/A	N/A
2550 MHz	LTE	2500-2570	2500	1.0	N/A	N/A

B.1.2 IC MPE Limits

Normative document:

- RSS-102 Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

Reference levels:

The table below is excerpted from Table 4 of RSS-102 Issue 5 Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands):

Frequency Range (MHz)	E-field strength (V/m)	H-field strength (A/m)	Power Density (S) (W/m ²)	Averaging Time (minutes)
0.003-10 ²³	170	180	--	Instantaneous
0.1-10	--	1.6/f	--	6
1.29-10	193/f ^{0.5}	--	--	6
10-20	61.4	0.163	10	6
20-48	129.8/f ^{0.25}	0.344/f ^{0.25}	44.72/f ^{0.5}	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60/f ^{0.25}	0.04138/f ^{0.25}	0.6455/f ^{0.5}	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/f ^{1.2}
150000-300000	0.354/f ^{0.5}	9.40 x 10 ⁻⁴ f ^{0.5}	3.33 x 10 ⁻⁴ f	616000/f ^{1.2}

MPE limits:

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (MHz)	MPE limit S _{eq} (W/m ²)	E-Field Strength (V/m)	H-Field Strength (A/m)
13.56 MHz	NFC	13.56	13.56	10	61.4	0.163
2450 MHz	802.11b	2412-2462	2412	31.70	109.32	0.29
2450 MHz	BLE	2402-2480	2402	31.64	109.21	0.29
2450 MHz	Mesh	2405-2480	2405	31.66	109.25	0.29
750 MHz	LTE	699-716	699	17.07	80.21	0.21
750 MHz	LTE	777-787	777	18.00	82.36	0.22
750 MHz	LTE	788-798	788	18.12	82.65	0.22
850 MHz	GPRS	824-849	824	18.53	83.58	0.22
850 MHz	UMTS	824-849	824	18.53	83.58	0.22
850 MHz	LTE	814-849	814	18.42	83.33	0.22
1750 MHz	UMTS	1710-1755	1710	26.69	100.32	0.27
1750 MHz	LTE	1710-1755	1710	26.69	100.32	0.27
1900 MHz	GPRS	1850-1910	1850	27.76	102.31	0.27
1900 MHz	UMTS	1850-1910	1850	27.76	102.31	0.27
1900 MHz	LTE	1850-1915	1850	27.76	102.31	0.27
2550 MHz	LTE	2500-2570	2500	32.28	110.31	0.29

B.2 RF Exposure Assessment – Individual Transmitters

B.2.1 Introduction

Calculations to predict power density levels in the far-field of the antenna are made by use of the following equation:

$$S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g. mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (in appropriate units, e.g. cm)

B.2.2 RF Exposure Assessment for RGX Gateway Version RGX-4G

FCC Requirements

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	Power Density (S _{eq}) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ (mW/cm ²)	MPE limit (S _{lim}) (mW/cm ²)	Compliance (S _{eq} < S _{lim}) (mW/cm ²)
13.56 MHz	NFC	13.56	0.0006	20	0.0000001	13.3	COMPLIANT
2450 MHz	802.11b	2412-2462	75.2	20	0.0154	1.0	COMPLIANT
2450 MHz	BLE	2402-2480	2.8	20	0.0007	1.0	COMPLIANT
2450 MHz	Mesh	2405-2480	100.0	20	0.0199	1.0	COMPLIANT
750 MHz	LTE	699-716	604.5	20	0.1199	0.47	COMPLIANT
750 MHz	LTE	777-787	604.5	20	0.1199	0.52	COMPLIANT
750 MHz	LTE	788-798	604.5	20	0.1199	0.53	COMPLIANT
850 MHz	GPRS	824-849	673.4	20	0.1344	0.55	COMPLIANT
850 MHz	UMTS	824-849	678.2	20	0.1344	0.55	COMPLIANT
850 MHz	LTE	814-849	604.5	20	0.1199	0.55	COMPLIANT
1750 MHz	UMTS	1710-1755	653.1	20	0.1284	1.0	COMPLIANT
1750 MHz	LTE	1710-1755	582.1	20	0.1145	1.0	COMPLIANT
1900 MHz	GPRS	1850-1910	325.0	20	0.0644	1.0	COMPLIANT
1900 MHz	UMTS	1850-1910	653.1	20	0.1284	1.0	COMPLIANT
1900 MHz	LTE	1850-1915	582.1	20	0.1145	1.0	COMPLIANT
2550 MHz	LTE	2500-2570	582.1	20	0.1145	1.0	COMPLIANT

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	E-Field Strength (V/m)	MPE limit	Compliance
13.56 MHz	NFC	13.56	0.0006	20	0.02175	0.16	COMPLIANT

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	H-Field Strength (A/m)	MPE limit	Compliance
13.56	NFC	13.56	0.0006	20	0.000001255	0.16	COMPLIANT

IC Requirements

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	Power Density (S_{eq}) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ (W/m ²)	MPE limit (S_{lim}) (mW/cm ²)	Compliance ($S_{eq} < S_{lim}$) (mW/cm ²)
13.56 MHz	NFC	13.56	0.0006	20	0.0000001	10	COMPLIANT
2450 MHz	802.11b	2412-2462	75.2	20	0.154	31.70	COMPLIANT
2450 MHz	BLE	2402-2480	2.8	20	0.007	31.64	COMPLIANT
2450 MHz	Mesh	2405-2480	100.0	20	0.199	31.66	COMPLIANT
750 MHz	LTE	699-716	604.5	20	1.199	17.07	COMPLIANT
750 MHz	LTE	777-787	604.5	20	1.199	18.00	COMPLIANT
750 MHz	LTE	788-798	604.5	20	1.199	18.12	COMPLIANT
850 MHz	GPRS	824-849	673.4	20	1.344	18.53	COMPLIANT
850 MHz	UMTS	824-849	678.2	20	1.344	18.53	COMPLIANT
850 MHz	LTE	814-849	604.5	20	1.199	18.42	COMPLIANT
1750 MHz	UMTS	1710-1755	653.1	20	1.284	26.69	COMPLIANT
1750 MHz	LTE	1710-1755	582.1	20	1.145	26.69	COMPLIANT
1900 MHz	GPRS	1850-1910	325.0	20	0.644	27.76	COMPLIANT
1900 MHz	UMTS	1850-1910	653.1	20	1.284	27.76	COMPLIANT
1900 MHz	LTE	1850-1915	582.1	20	1.145	27.76	COMPLIANT
2550 MHz	LTE	2500-2570	582.1	20	1.145	32.28	COMPLIANT

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	E-Field Strength (V/m)	MPE limit	Compliance
13.56 MHz	NFC	13.56	0.0006	20	0.007	61.4	COMPLIANT
2450 MHz	802.11b	2412-2462	75.2	20	7.62	109.32	COMPLIANT
2450 MHz	BLE	2402-2480	2.8	20	1.62	109.21	COMPLIANT
2450 MHz	Mesh	2405-2480	100.0	20	8.66	109.25	COMPLIANT
750 MHz	LTE	699-716	604.5	20	21.26	80.21	COMPLIANT
750 MHz	LTE	777-787	604.5	20	21.26	82.36	COMPLIANT
750 MHz	LTE	788-798	604.5	20	21.26	82.65	COMPLIANT
850 MHz	GPRS	824-849	673.4	20	22.51	83.58	COMPLIANT
850 MHz	UMTS	824-849	678.2	20	22.51	83.58	COMPLIANT
850 MHz	LTE	814-849	604.5	20	21.26	83.33	COMPLIANT
1750 MHz	UMTS	1710-1755	653.1	20	22.00	100.32	COMPLIANT
1750 MHz	LTE	1710-1755	582.1	20	20.78	100.32	COMPLIANT
1900 MHz	GPRS	1850-1910	325.0	20	15.58	102.31	COMPLIANT
1900 MHz	UMTS	1850-1910	653.1	20	22.00	102.31	COMPLIANT
1900 MHz	LTE	1850-1915	582.1	20	20.78	102.31	COMPLIANT
2550 MHz	LTE	2500-2570	582.1	20	20.78	110.31	COMPLIANT

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	H-Field Strength (A/m)	MPE limit	Compliance
13.56 MHz	NFC	13.56	0.0006	20	0.00002	0.163	COMPLIANT
2450 MHz	802.11b	2412-2462	75.2	20	0.02021	0.29	COMPLIANT
2450 MHz	BLE	2402-2480	2.8	20	0.00431	0.29	COMPLIANT
2450 MHz	Mesh	2405-2480	100.0	20	0.02298	0.29	COMPLIANT
750 MHz	LTE	699-716	604.5	20	0.05639	0.21	COMPLIANT
750 MHz	LTE	777-787	604.5	20	0.05639	0.22	COMPLIANT
750 MHz	LTE	788-798	604.5	20	0.05639	0.22	COMPLIANT
850 MHz	GPRS	824-849	673.4	20	0.05971	0.22	COMPLIANT
850 MHz	UMTS	824-849	678.2	20	0.05971	0.22	COMPLIANT
850 MHz	LTE	814-849	604.5	20	0.05639	0.22	COMPLIANT
1750 MHz	UMTS	1710-1755	653.1	20	0.05836	0.27	COMPLIANT
1750 MHz	LTE	1710-1755	582.1	20	0.05511	0.27	COMPLIANT
1900 MHz	GPRS	1850-1910	325.0	20	0.04133	0.27	COMPLIANT
1900 MHz	UMTS	1850-1910	653.1	20	0.05836	0.27	COMPLIANT
1900 MHz	LTE	1850-1915	582.1	20	0.05511	0.27	COMPLIANT
2550 MHz	LTE	2500-2570	582.1	20	0.05511	0.29	COMPLIANT

B.3 RF Exposure Assessment – Collocation Considerations

B.3.1 Introduction

In situations where simultaneous exposure to fields of different equipment and frequencies occurs, the possibility that these exposure will be additive in their effects must be considered. Calculations base on this activity are performed by the sum of relative exposure for each equipment according to the following compliance criteria:

$$\sum_{n=1}^N \frac{S_{eqn}}{S_{limn}} = \frac{S_{eq1}}{S_{lim1}} + \frac{S_{eq2}}{S_{lim2}} + \dots + \frac{S_{eqN}}{S_{limN}} \leq 1$$

where:

S_{eq} is the power density of the electromagnetic field caused, at a given distance (evaluation distance), by a specific equipment transmitting at a defined frequency.

S_{lim} is the MPE limit for the evaluated transmission frequency.

B.3.2 FCC Requirements

Relative Exposure – Power Density

Frequency Band	Mode	Frequency Range (MHz)	S_{eq}	S_{lim}	$\frac{S_{eq}}{S_{lim}}$
13.56 MHz	NFC	13.56	0.0000001	13.3	0.000000008
2450 MHz	802.11b	2412-2462	0.0154	1.0	0.015
2450 MHz	BLE	2402-2480	0.0007	1.0	0.001
2450 MHz	Mesh	2405-2480	0.0199	1.0	0.020
750 MHz	LTE	699-716	0.1199	0.47	0.255
750 MHz	LTE	777-787	0.1199	0.52	0.231
750 MHz	LTE	788-798	0.1199	0.53	0.226
850 MHz	GPRS	824-849	0.1344	0.55	0.244
850 MHz	UMTS	824-849	0.1344	0.55	0.244
850 MHz	LTE	814-849	0.1199	0.55	0.218
1750 MHz	UMTS	1710-1755	0.1284	1.0	0.128
1750 MHz	LTE	1710-1755	0.1145	1.0	0.115
1900 MHz	GPRS	1850-1910	0.0644	1.0	0.064
1900 MHz	UMTS	1850-1910	0.1284	1.0	0.128
1900 MHz	LTE	1850-1915	0.1145	1.0	0.115
2550 MHz	LTE	2500-2570	0.1145	1.0	0.115

Simultaneous Exposure – Power Density

The highest value for each module was assessed to determine the worst case simultaneous configuration.

Transmitter	Mode	Maximum $\frac{S_{eq}}{S_{lim}}$	Maximum $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$	Compliance $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$
13.56 MHz	NFC	0.000000008	0.291	COMPLIANT
2450 MHz	802.11b	0.015		
2450 MHz	BLE	0.001		
2450 MHz	Mesh	0.020		
750 MHz	LTE	0.255		

B.3.3 IC Requirements

Relative Exposure – Power Density

Frequency Band	Mode	Frequency Range (MHz)	S_{eq}	S_{lim}	$\frac{S_{eq}}{S_{lim}}$
13.56 MHz	NFC	13.56	0.0000001	10	0.0000001
2450 MHz	802.11b	2412-2462	0.154	31.70	0.005
2450 MHz	BLE	2402-2480	0.007	31.64	0.001
2450 MHz	Mesh	2405-2480	0.199	31.66	0.006
750 MHz	LTE	699-716	1.199	17.07	0.070
750 MHz	LTE	777-787	1.199	18.00	0.067
750 MHz	LTE	788-798	1.199	18.12	0.066
850 MHz	GPRS	824-849	1.344	18.53	0.073
850 MHz	UMTS	824-849	1.344	18.53	0.073
850 MHz	LTE	814-849	1.199	18.42	0.065
1750 MHz	UMTS	1710-1755	1.284	26.69	0.048
1750 MHz	LTE	1710-1755	1.145	26.69	0.043
1900 MHz	GPRS	1850-1910	0.644	27.76	0.023
1900 MHz	UMTS	1850-1910	1.284	27.76	0.046
1900 MHz	LTE	1850-1915	1.145	27.76	0.041
2550 MHz	LTE	2500-2570	1.145	32.28	0.035

Simultaneous Exposure – Power Density

Transmitter	Mode	Maximum $\frac{S_{eq}}{S_{lim}}$	Maximum $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$	Compliance $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$
13.56 MHz	NFC	0.0000001	0.091	COMPLIANT
2450 MHz	802.11b	0.005		
2450 MHz	BLE	0.001		
2450 MHz	Mesh	0.006		
850 MHz	LTE	0.079		

Relative Exposure – E-Field Strength

Frequency Band	Mode	Frequency Range (MHz)	S_{eq}	S_{lim}	$\frac{S_{eq}}{S_{lim}}$
13.56 MHz	NFC	13.56	0.007	61.4	0.0001
2450 MHz	802.11b	2412-2462	7.62	109.32	0.070
2450 MHz	BLE	2402-2480	1.62	109.21	0.015
2450 MHz	Mesh	2405-2480	8.66	109.25	0.079
750 MHz	LTE	699-716	21.26	80.21	0.265
750 MHz	LTE	777-787	21.26	82.36	0.258
750 MHz	LTE	788-798	21.26	82.65	0.257
850 MHz	GPRS	824-849	22.51	83.58	0.269
850 MHz	UMTS	824-849	22.51	83.58	0.269
850 MHz	LTE	814-849	21.26	83.33	0.255
1750 MHz	UMTS	1710-1755	22.00	100.32	0.219
1750 MHz	LTE	1710-1755	20.78	100.32	0.207
1900 MHz	GPRS	1850-1910	15.58	102.31	0.152
1900 MHz	UMTS	1850-1910	22.00	102.31	0.215
1900 MHz	LTE	1850-1915	20.78	102.31	0.203
2550 MHz	LTE	2500-2570	20.78	110.31	0.188

Simultaneous Exposure – E-Field Strength

Transmitter	Mode	Maximum $\frac{S_{eq}}{S_{lim}}$	Maximum $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$	Compliance $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$
13.56 MHz	NFC	0.0001	0.140	COMPLIANT
2450 MHz	802.11b	0.070		
2450 MHz	BLE	0.015		
2450 MHz	Mesh	0.079		
850 MHz	LTE	0.269		

Relative Exposure – H-Field Strength

Frequency Band	Mode	Frequency Range (MHz)	S_{eq}	S_{lim}	$\frac{S_{eq}}{S_{lim}}$
13.56 MHz	NFC	13.56	0.00002	0.163	0.0001
2450 MHz	802.11b	2412-2462	0.02021	0.29	0.070
2450 MHz	BLE	2402-2480	0.00431	0.29	0.015
2450 MHz	Mesh	2405-2480	0.02298	0.29	0.079
750 MHz	LTE	699-716	0.05639	0.21	0.269
750 MHz	LTE	777-787	0.05639	0.22	0.256
750 MHz	LTE	788-798	0.05639	0.22	0.256
850 MHz	GPRS	824-849	0.05971	0.22	0.271
850 MHz	UMTS	824-849	0.05971	0.22	0.271
850 MHz	LTE	814-849	0.05639	0.22	0.256
1750 MHz	UMTS	1710-1755	0.05836	0.27	0.216
1750 MHz	LTE	1710-1755	0.05511	0.27	0.204
1900 MHz	GPRS	1850-1910	0.04133	0.27	0.153
1900 MHz	UMTS	1850-1910	0.05836	0.27	0.216
1900 MHz	LTE	1850-1915	0.05511	0.27	0.204
2550 MHz	LTE	2500-2570	0.05511	0.29	0.190

Simultaneous Exposure – H-Field Strength

Transmitter	Mode	Maximum $\frac{S_{eq}}{S_{lim}}$	Maximum $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$	Compliance $\sum \frac{S_a}{S_{lim_a}} + \frac{S_{BT}}{S_{lim_BT}} < 1$
13.56 MHz	NFC	0.0001	0.435	COMPLIANT
2450 MHz	802.11b	0.070		
2450 MHz	BLE	0.015		
2450 MHz	Mesh	0.079		
850 MHz	LTE	0.271		