

RF Exposure Exemption Report

Sepura Limited
Model: SC2021

In accordance with FCC CFR 47 Pt 1.1307

Prepared for: Sepura Limited
9000 Cambridge Research Park
Beach Drive
Waterbeach
Cambridge, CB25 9TL
United Kingdom



Add value.
Inspire trust.

COMMERCIAL-IN-CONFIDENCE

FCC ID: XX6SC2021M

Document 75961387-10 Issue 01

SIGNATURE			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	22 January 2025

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY
The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307 at a separation distance of 640 mm.

		DISCLAIMER AND COPYRIGHT This non-binding report has been prepared by TÜV SÜD with all reasonable skill and care. The document is confidential to the potential Client and TÜV SÜD. No part of this document may be reproduced without the prior written approval of TÜV SÜD. © 2025 TÜV SÜD. This report relates only to the actual item/items tested. ACCREDITATION Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).
--	--	---

TÜV SÜD
is a trading name of TUV SUD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TUV SUD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuvsud.com/en

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom



Contents

1 Report Summary2

1.1 Report Modification Record.....2

1.2 Introduction.....2

1.3 Brief Summary of Results3

1.4 Application Form3

1.5 Product Information7

2 Assessment Details9

2.1 Single RF Source options for determination of exemption.....9

2.2 Multiple RF Sources options for determination of exemption. 10

2.3 Individual Antenna Port Exposure Results..... 11

2.4 Combined Antenna Port RF Exposure Results FCC 1.1307(b)(3)(ii)(B) 12

Annex A Regional Requirements..... A.1



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	22 January 2025

Table 1

1.2 Introduction

Applicant	Sepura Limited
Manufacturer	Sepura Limited
Model Number(s)	SC2021
Hardware Version(s)	PLX-2V16515-03 (HW Mod State 12, Revision B024)
Software Version(s)	1807 009 07367
Specification/Issue/Date	FCC 47 CFR Part 1.1307: 2022
Order Number	PLC-PO029056
Date	06-May-2024
Related Document(s)	KDB 447498 D04 v01 FCC 47 CFR Part 2.1093: 2023



1.3 Brief Summary of Results

The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.

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

1.4 Application Form

Equipment Description

Technical Description: (Please provide a brief description of the intended use of the equipment)	The SC2021 is a portable TETRA radio with GNSS, Bluetooth and WLAN functionality. It has a TETRA frequency range of 136-174 MHz.
Manufacturer:	Sepura Limited
Model:	SC2021
Part Number:	SC2021

If more than one frequency band is supported, please confirm which combinations of bands are capable of Simultaneous Transmit.	TETRA & Bluetooth TETRA & WLAN Bluetooth and WLAN cannot transmit simultaneously
--	--

Frequency Band 1: TETRA top connector on radio

Antenna Model:	300-02070		
Antenna length:	124 ± 6	mm	
Bottom frequency:	136	MHz	
Middle frequency:	143	MHz	
Top frequency:	150	MHz	
Maximum power (input to the antenna including a tolerance):	35	dBm	
Antenna gain (or maximum gain allowed):	-6.9	dBi	
Separation distance from antenna to the user/bystander	0	cm	
Transmitter Duty Cycle:	< 25	%	

Antenna Model:	300-02071		
Antenna length:	113 ± 6	mm	
Bottom frequency:	149 (136)	MHz	
Middle frequency:	157 (143)	MHz	
Top frequency:	165 (150)	MHz	
Maximum power (input to the antenna including a tolerance):	35	dBm	



Antenna gain (or maximum gain allowed):	-6.24	dBi
Separation distance from antenna to the user/bystander	0	cm
Transmitter Duty Cycle:	< 25	%

Two values are given for the frequency range

The first is for when the radio is used in free space

The second is for when the radio is used near the body or uses a RSM, as the proximity of another device or user down tunes the antenna

Antenna Model:	300-02072		
Antenna length:	104 ± 6	mm	
Bottom frequency:	162 (149)	MHz	
Middle frequency:	168 (157)	MHz	
Top frequency:	174 (165)	MHz	
Maximum power (input to the antenna including a tolerance):	35	dBm	
Antenna gain (or maximum gain allowed):	-6.93	dBi	
Separation distance from antenna to the user/bystander	0	cm	
Transmitter Duty Cycle:	< 25	%	

Antenna Model:	300-02073		
Antenna length:	91 ± 6	mm	
Bottom frequency:	162	MHz	
Middle frequency:	168	MHz	
Top frequency:	174	MHz	
Maximum power (input to the antenna including a tolerance):	35	dBm	
Antenna gain (or maximum gain allowed):	-14.6	dBi	
Separation distance from antenna to the user/bystander	0	cm	
Transmitter Duty Cycle:	< 25	%	

Antenna Model:	AVGHB-H6
----------------	----------



Antenna length:	123	cm
-----------------	-----	----

Frequency Band 2: TETRA rear connector for external antenna

Antenna Model:	AVGHB-H4	
Antenna length:	136	cm
Bottom frequency:	141	MHz
Middle frequency:	146	MHz
Top frequency:	151	MHz
Maximum power (input to the antenna including a tolerance):	35	dBm
Antenna gain (or maximum gain allowed):	5	dBi
Separation distance from antenna to the user/bystander	20	cm
Transmitter Duty Cycle:	< 25	%

Antenna Model:	AVGHB-H5	
Antenna length:	128	cm
Bottom frequency:	149	MHz
Middle frequency:	154	MHz
Top frequency:	159	MHz
Maximum power (input to the antenna including a tolerance):	35	dBm
Antenna gain (or maximum gain allowed):	5	dBi
Separation distance from antenna to the user/bystander	20	cm
Transmitter Duty Cycle:	< 25	%

Bottom frequency:	156	MHz
Middle frequency:	159	MHz
Top frequency:	162	MHz
Maximum power (input to the antenna including a tolerance):	35	dBm
Antenna gain (or maximum gain allowed):	5	dBi
Separation distance from antenna to the user/bystander	20	cm
Transmitter Duty Cycle:	< 25	%

Antenna Model:	AVGHB-H7	
Antenna length:	115	cm



Bottom frequency:	162	MHz
Middle frequency:	168	MHz
Top frequency:	174	MHz
Maximum power (input to the antenna including a tolerance):	35	dBm
Antenna gain (or maximum gain allowed):	5	dBi
Separation distance from antenna to the user/bystander	20	cm
Transmitter Duty Cycle:	< 25	%

Frequency Band 3: Bluetooth.

Antenna Model:	SPR-07029	
Antenna length:	24.7	mm
Bottom frequency:	2400	MHz
Middle frequency:	2450	MHz
Top frequency:	2500	MHz
Maximum power (input to the antenna including a tolerance):	7.5	dBm
Antenna gain (or maximum gain allowed):	2.5	dBi
Separation distance from antenna to the user/bystander	0	cm
Transmitter Duty Cycle:	69.7	%

Frequency Band 4: WLAN

Antenna Model:	SPR-07029	
Antenna length:	24.7	mm
Bottom frequency:	2400	MHz
Middle frequency:	2450	MHz
Top frequency:	2500	MHz
Maximum power (input to the antenna including a tolerance):	17	dBm
Antenna gain (or maximum gain allowed):	2.5	dBi
Separation distance from antenna to the user/bystander	0	cm
Transmitter Duty Cycle:	100	%

I hereby declare that the information supplied is correct and complete.

Name: Chris Beecham
Position held: Conformance Engineer
Date: 17 July 2024



1.5 Product Information

1.5.1 Technical Description

The SC2021 is a portable TETRA radio with GNSS, Bluetooth and WLAN functionality. It has a TETRA frequency range of 136-174 MHz.

1.5.2 Transmitter Description

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

Radio Access Technology	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
TETRA- Antenna AVGHB-H4	141 to 151	141	35	25
TETRA- Antenna AVGHB-H5	149 to 159	149	35	25
TETRA- Antenna AVGHB-H6	156 to 162	156	35	25
TETRA- Antenna AVGHB-H7	162 to 174	162	35	25
BT - Antenna SPR-07029	2400 to 2483.5	2400	7.5	69.7
WLAN - Antenna SPR-07029	2400 to 2483.5	2400	17	100

Table 2 – Transmitter Description- FCC

Note: Transmitter power includes upper bounds of uncertainty therefore maximum values are used.



1.5.3 Antenna Description

The following antennas are supported by the equipment under test.

Radio Access Technology	Antenna Model	Gain (dBi)	Antenna length (cm)	Minimum Separation Distance (mm)
TETRA- Antenna AVGHB-H4	AVGHB-H4	5.00	136	640
TETRA- Antenna AVGHB-H5	AVGHB-H5	5.00	128	640
TETRA- Antenna AVGHB-H6	AVGHB-H6	5.00	123	640
TETRA- Antenna AVGHB-H7	AVGHB-H7	5.00	115	640
BT - Antenna SPR-07029	SPR-07029	2.50	2.47	640
WLAN - Antenna SPR-07029	SPR-07029	2.50	2.47	640

Table 3 – 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.

1.5.4 Equipment Configuration

The device supports the following modes:-

- 2.4GHz WLAN
- 2.4GHz Bluetooth
- Tetra 149 MHz to 159 MHz
- Tetra 156 MHz to 162 MHz
- Tetra 162 MHz to 174 MHz
- Simultaneous operation - Wifi or Bluetooth, Tetra

Please note that as per customer specification, either WIFI or Bluetooth can transmit at one time and not simultaneously. Therefore, for Simultaneous transmission testing, the WIFI Mode was configured as the worst-case.



2 Assessment Details

2.1 Single RF Source options for determination of exemption.

Option	Reference	RF Exposure Test Exemptions for Single Source												
A (1-mW Test Exemption)	FCC 1.1307(b)(3)(i)(A)	The available maximum time averaged power is no more than 1 mW, regardless of separation distance.												
B (SAR-Based Exemption)	FCC 1.1307(b)(3)(i)(B)	The available maximum timeaveraged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by: $P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$ Where $x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$ and $ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$ <i>d</i> = the separation distance (cm);												
C (MPE-Based Exemption)	FCC 1.1307(b)(3)(i)(C)	Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value). TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION <table><tr><th>RF Source frequency (MHz)</th><th>Threshold ERP (watts)</th></tr><tr><td>0.3–1.34</td><td>1,920 R².</td></tr><tr><td>1.34–30</td><td>3,450 R²/f².</td></tr><tr><td>30–300</td><td>3.83 R².</td></tr><tr><td>300–1,500</td><td>0.0128 R²f.</td></tr><tr><td>1,500–100,000</td><td>19.2R².</td></tr></table>	RF Source frequency (MHz)	Threshold ERP (watts)	0.3–1.34	1,920 R ² .	1.34–30	3,450 R ² /f ² .	30–300	3.83 R ² .	300–1,500	0.0128 R ² f.	1,500–100,000	19.2R ² .
RF Source frequency (MHz)	Threshold ERP (watts)													
0.3–1.34	1,920 R ² .													
1.34–30	3,450 R ² /f ² .													
30–300	3.83 R ² .													
300–1,500	0.0128 R ² f.													
1,500–100,000	19.2R ² .													



2.2 Multiple RF Sources options for determination of exemption.

Option	Reference	
A 1-mW Test Exemption for Multiple Sources	FCC 1.1307(b)(3)(ii)(A)	The available maximum time averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).
B Simultaneous Transmission with both SAR-based and MPE- Based Test Exemptions	FCC 1.1307(b)(3)(ii)(B)	in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation. $\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$



2.3 Individual Antenna Port Exposure Results

2.3.1 Single Source Calculation of Exposure at Specified Separation Distance FCC 1.1307(b)(3)(i)(C) 'Option C' (MPE Based Exemption)

RAT	Frequency (MHz)	Conducted Power Output (mW)	Duty Cycle %	Time Average Conducted Power Output (mW)	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	The Calculated $\lambda/2 \pi$ distance (mm)	Threshold ERP (mW)	1.1307(b)(3)(i)(C) Exemption (Yes/No) (300 kHz to 100 GHz)
TETRA- Antenna AVGHB-H4	141	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	1568.8	Yes
TETRA- Antenna AVGHB-H5	149	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	1568.8	Yes
TETRA- Antenna AVGHB-H6	156	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	1568.8	Yes
TETRA- Antenna AVGHB-H7	162	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	1568.8	Yes
BT - Antenna SPR-07029	2400	5.6234	69.7	3.9195	1.77827	6.96995	4.25	640	7864.3	Yes
WLAN - Antenna SPR-07029	2400	50.1187	100	50.1187	1.77827	89.12458	54.34	640	7864.3	Yes

Table 4 –Transmitter Result

The calculations show that the individual transmitters comply with FCC 1.1307(b)(3)(i)(C) MPE-based exception at a minimum distance of 640 mm from the antenna.



2.4 Combined Antenna Port RF Exposure Results FCC 1.1307(b)(3)(ii)(B)

2.4.1 Combination 1 – Option B Summation

RAT	Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance from the Antenna (mm)	ERP _j / ERP _{th,j} <or> P _i / P _{th}	Sum of the fractional contributions to the applicable thresholds is less than or equal to 1. Compliant? (Yes/No)
TETRA- Antenna AVGHB-H4	141	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	0.971691739	-
WLAN - Antenna SPR-07029	2400	50.1187	100	50.1187	1.77827	89.12458	54.34	640	0.006909706	-
Calculated RF exposure level at minimum compliance boundary of 0.64 m as a fraction of the limit									0.978601445	Yes

Table 5 –Transmitter Result

The calculations show that the multiple transmitters comply with FCC 1.1307(b)(3)(ii)(B) summation-based exemption.



2.4.2 Combination 2 - Option B Summation

RAT	Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance from the Antenna (mm)	ERPj / ERPth,j <or> Pi / Pth	Sum of the fractional contributions to the applicable thresholds is less than or equal to 1. Compliant? (Yes/No)
TETRA- Antenna AVGHB-H5	149	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	0.971691739	-
WLAN - Antenna SPR-07029	2400	50.1187	100	50.1187	1.77827	89.12458	54.34	640	0.006909706	-
Calculated RF exposure level at minimum compliance boundary of 0.64 m as a fraction of the limit									0.978601445	Yes

Table 6 –Transmitter Result

The calculations show that the multiple transmitters comply with FCC 1.1307(b)(3)(ii)(B) summation-based exemption



2.4.3 Combination 3 - Option B Summation

RAT	Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance from the Antenna (mm)	ERPj / ERPth,j <or> Pi / Pth	Sum of the fractional contributions to the applicable thresholds is less than or equal to 1. Compliant? (Yes/No)
TETRA- Antenna AVGHB-H6	156	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	0.971691739	-
WLAN - Antenna SPR-07029	2400	50.1187	100	50.1187	1.77827	89.12458	54.34	640	0.006909706	-
Calculated RF exposure level at minimum compliance boundary of 0.64 m as a fraction of the limit									0.978601445	Yes

Table 7 –Transmitter Result

The calculations show that the multiple transmitters comply with FCC 1.1307(b)(3)(ii)(B) summation-based exemption



2.4.4 Combination 4 - Option B Summation

RAT	Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance from the Antenna (mm)	ERPj / ERPth,j <or> Pi / Pth	Sum of the fractional contributions to the applicable thresholds is less than or equal to 1. Compliant? (Yes/No)
TETRA- Antenna AVGHB-H7	162	3162.27766	25	790.56942	3.16227	2499.9939	1524.39	640	0.971691739	-
WLAN - Antenna SPR-07029	2400	50.1187	100	50.1187	1.77827	89.12458	54.34	640	0.006909706	-
Calculated RF exposure level at minimum compliance boundary of 0.64 m as a fraction of the limit									0.978601445	Yes

Table 8 –Transmitter Result

The calculations show that the multiple transmitters comply with FCC 1.1307(b)(3)(ii)(B) summation-based exemption