

INQUIRY FCC SC2324

**< KDB 484596 DATA
REFERENCE >**



DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía
C/ Severo Ochoa, 2 & 6
29590 Málaga - Spain
☎. +34 952 61 91 00
Fax. +34 952 61 91 13

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1 INTRODUCTION

This document briefly describes the testing approach followed by our customer (SEPURA LIMITED) for the FCC certification process for model name SC2324.

This document will describe an inquiry to confirm the testing approach, according to the KDB 484596, we need permission from FCC to re-use the test report for TETRA, SAR and RF Exposure (re-use of test report of a similar SEPURA Limited equipment).

2 EQUIPMENT UNDER CERTIFICATION DETAILS

Manufacturer

Sepura Limited

Model Name

SC2324

FCC IDENTIFICATION

FCC ID: XX6SC2324X

3 TESTING APPROACH

The product under certification is SC2324, with FCC ID: XX6SC2324X. This is a device with TETRA transmitter.

SEPURA Limited has a very similar product, model SC2024 certified under the FCC ID: XX6SC2024M (exactly same main PCB but the model SC2024 integrate a module that supports BT/Wi-Fi. This module PCB is independent and it is plugged on the main board by a specific connector). The same hardware, same antennas, same frequency and software are used to generate the TETRA signal.

Based on, the testing approach followed for model SC2324 has been:

3.1 FCC TESTING APPROACH

3.1.1 RADIO FREQUENCY

TETRA

- Full testing on model SC2024 performing the following test cases:

Section	Specification Clause				Test Description	Result
	Part 2	Part 90	RSS-119	RSS-GEN		
Configuration and Mode: TETRA - 450-470 MHz						
2.1	2.1046	90.205	5.4	6.12	Maximum Conducted Output Power	Pass
2.2	2.1047	90.207	5.2	-	Types of Emissions	Satisfactory
2.3	2.1049	90.209	5.5	6.7	Bandwidth Limitations	Pass
2.4	2.1051	90.210	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass
2.5	2.1053	90.210	5.8	6.13	Radiated Spurious Emissions	Pass
2.6	-	90.221	5.8.9.1	-	Adjacent Channel Power	Pass
2.7	-	90.214	5.9	-	Transient Frequency Behaviour	Pass
2.8	2.1055	90.213	5.3	6.11	Frequency Stability	Pass
Configuration and Mode: TETRA - 403-430 MHz						
2.1	2.1046	90.205	5.4	6.12	Maximum Conducted Output Power	Pass
2.2	2.1047	90.207	5.2	-	Types of Emissions	Satisfactory

Section	Specification Clause				Test Description	Result
	Part 2	Part 90	RSS-119	RSS-GEN		
2.3	2.1049	90.209	5.5	6.7	Bandwidth Limitations	Pass
2.4	2.1051	90.210	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass
2.5	2.1053	90.210	5.8	6.13	Radiated Spurious Emissions	Pass
2.7	-	90.214	5.9	-	Transient Frequency Behaviour	Pass
2.8	2.1055	90.213	5.3	6.11	Frequency Stability	Pass

- Partial testing on model SC2324 performing the following test cases:

Section	Specification Clause				Test Description	Result
	Part 2	Part 90	RSS-119	RSS-GEN		
Configuration and Mode: Tetra - 450-470 MHz						
2.1	2.1046	90.205	5.4	6.12	Maximum Conducted Output Power	Pass
2.2	2.1051	90.210	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass
2.3	2.1053	90.210	5.8	6.13	Radiated Spurious Emissions	Pass
Configuration and Mode: Tetra - 406.1-430 MHz						
2.1	-	-	5.4	6.12	Maximum Conducted Output Power	Pass
2.2	-	-	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass
2.3	-	-	5.8	6.13	Radiated Spurious Emissions	Pass

Comparing the test results in terms of power, the difference is less than 3 dBm. So we are in compliance with the KDB criteria. Bellow you can find the test results for both models.

Tetra - 450-470 MHz

Parameter	450.025 MHz	460.025 MHz	469.975 MHz
Conducted Output Power (dBm)	34.41	34.46	34.52
Manufacturer Declared Power (dBm)	35.00	35.00	35.00
Δ from manufacturer Power (dB)	-0.59	-0.54	-0.48
Antenna Gain (dBi)	7.00	7.00	7.00
ERP (dBm)	39.26	39.31	39.37

Table 16 - ISED RSS-119 ERP

Figure 1 SC2324 Maximum output power

TETRA 450 MHz to 470 MHz

Parameter	450.025 MHz	460.025 MHz	469.975 MHz
Conducted Output Power (dBm)	35.24	35.28	35.25
Manufacturer Declared Power (dBm)	35.0	35.0	35.0
Δ from manufacturer Power (dB)	0.24	0.28	0.25
Antenna Gain (dBd)	-1.55	-1.55	-1.55
ERP (dBm)	33.69	33.73	33.70

Table 17 - ERP

Figure 2 SC2024 Maximum output power

Difference= 0.76dBm

Tetra - 406.1-430 MHz

Parameter	406.125 MHz	418.000 MHz	429.975 MHz
Conducted Output Power (dBm)	34.56	34.32	34.37
Manufacturer Declared Power (dBm)	35.00	35.00	35.00
Δ from manufacturer Power (dB)	-0.44	-0.68	-0.63
Antenna Gain (dBi)	7.00	7.00	7.00
ERP (dBm)	39.41	39.17	39.22

Table 18 - ERP

Figure 3 SC2324 Maximum output power

TETRA 403 MHz to 430 MHz

Parameter	406.125 MHz	418.050 MHz	429.975 MHz
Conducted Output Power (dBm)	35.23	35.19	35.27
Manufacturer Declared Power (dBm)	35.0	35.0	35.0
Δ from manufacturer Power (dB)	0.23	0.19	0.27
Antenna Gain (dBd)	-0.85	-0.85	-0.85
ERP (dBm)	34.38	34.34	34.42

Table 16 - ERP

Figure 4 SC2024 Maximum output power

Difference= 0.71dBm

SAR

For SAR, we have performed partial testing on model SC2324 where we got the following results:

5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)

5.1. TETRA SPOT CHECKING

Antenna	Exposure Conditions	Position	Dist (mm)	Frequency (MHz)	Estimated SAR 10-g (W/kg)	SAR 10-g (W/kg)	Power Drift (%)	Plot No.
300-00499	Head	Left Cheek	0	430.00	3.10	3.21	0.07	1
300-00663	Front of Face	Front of face	25	450.00	1.07	1.08	-0.04	2
300-01031	Body	Front face	5	430.00	1.97	1.94	-0.37	3

The SAR measurements for the SC2324 model, using the worst-case SAR measurement on the SC2024, are lower than those for the SC2024, and are in the uncertainty range of the laboratory, as shown in the following table:

Exposure Conditions	Position	Dist (mm)	Frequency (MHz)	SC2324 SAR 1-g (W/kg)	SC2024 SAR 1-g (W/kg)	Δ SAR SC2324 and SC2024 (W/kg)	SC2324 Plot No.
Head	Left Cheek	0	430.00	3.21	3.35	-0.14	1
Front of face	Front of face	25	450.00	1.08	1.15	-0.07	2
Body	Front face	5	430.00	1.94	2.16	-0.22	3

Again we got a difference smaller than 3 dB. In this case, 0.22 W/kg is the maximum difference. So we are in compliance with the KDB criteria.

RF EXPOSURE

And finally, we have leveraged the RF exposure assessment. As I said before, the same hardware, same antennas, same frequency and software are used to generate the TETRA signal. So, in the RF assessment nothing would change between SC2024 and SC2324.

3.1.2 EMC

Full testing has been done for model SC2324 against FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-21 Edition). So we don't need to leverage any test result from other device.

ANNEX 1: CROSS REFERENCE TABLE FOR FCC

Reference device	Variant device	Key Differences
FCC ID XX6SC2024M	FCC ID XX6SC2324X	Both variants share the same main PCB. The Bluetooth / WLAN module is a separate module that plugs into the main PCB. The SC2324 without Bluetooth/WLAN module is a subset of the SC2024 with Bluetooth/WLAN module, with the Bluetooth / WLAN module removed and a reduced key mat and associated bezel. The same hardware, same antennas, same frequency and software are used to generate the TETRA signal.

Rule Part	Test item	Data Reference	Comments
TNB			
FCC 90.205	Maximum Conducted Output Power	N	Full testing for model SC2024 and spot checking for model SC2324
FCC 90.209	Bandwidth Limitations	Y	Full testing for model SC2024 and data reference for model SC2324
FCC 90.210	Spurious Emissions at Antenna Terminals	N	Full testing for model SC2024 and spot checking for model SC2324
FCC 90.210	Frequency stability	Y	Full testing for model SC2024 and data reference for model SC2324
FCC 90.214	Transient Frequency Behaviour	Y	Full testing for model SC2024 and data reference for model SC2324

FCC 90.221	Adjacent Channel Power	Y	Full testing for model SC2024 and data reference for model SC2324
FCC 90.207	Types of Emissions	Y	Full testing for model SC2024 and data reference for model SC2324
FCC 90.210	Radiated Spurious Emissions	N	Full testing for model SC2024 and spot checking for model SC2324

Rule Part	Test item	Data Reference	Comments
FCC 2.1091 FCC 2.1093 FCC 1.1310 FCC 1.1307	RF Exposure Exemption evaluation	Y	Full testing for model SC2024 and data reference for model SC2324 <i>Note: the same hardware, same antennas, same frequency and software are used to generate the TETRA signal. So, in the RF assessment nothing would change between SC2024 and SC2324.</i>
FCC 2.1093	MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)	N	Full testing for model SC2024 and spot checking for model SC2324

Unintentional radiator (EMC) is out of the certification scope.

Rule Part	Test item	Data Reference	Comments
JAB			

FCC 15.107	CE Continuous Conducted emission	N/A	According to the standard, this test is not applicable because EUT is powered in DC (internal battery)
FCC 15.109	RE Radiated emission. Electromagnetic field measure	N	Full testing for model SC2024 and for model SC2324

Acceptance Criteria for all test cases**FCC Part 90 (TNB)**

For the same radiated test conditions, It has been evaluated the value of the carrier, with the difference between the reference and the variant being <3 dB.

ANNEX 2: DOCUMENTS PROVIDED TO THE INQUIRY

Additional to this document, the provided documents to support the current inquiry are listed on the table below.

Typical documents provided to justify the testing approach	Applicable for:	
	ISED	FCC
Declaration of similarities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Photographs of reference device	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Photographs of variant device	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cross reference table for FCC according to KDB ₍₁₎	<input type="checkbox"/>	<input checked="" type="checkbox"/>
FCB011_02 FCC Agent letter	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Applicable Notes: (1) This information is also included in Annex 1 of this document.		