

INQUIRY FCC STP8X040
WITHOUT BLUETOOTH
**< 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

VERSION CONTROL

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|---------|------------|-----------------|
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1 INTRODUCTION

The product under certification (variant device) is STP8X040 without Bluetooth, with FCC ID: XX6STP8X040X. This is a device with TETRA transmitter.

SEPURA Limited has a very similar product, model STP8X040 with Bluetooth (REFERENCE device) certified under the FCC ID: XX6STP8X040B (exactly same main PCB but the model STP8X040 with Bluetooth integrate a module that supports BT. 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.

We, SEPURA LIMITED, take full responsibility for the fact that the test data as referenced represents valid data for demonstrating compliance for the variants listed in the application.

2 JUSTIFICATIONS

STP8X040 with Bluetooth (reference device) is certified for TETRA bands and Bluetooth 2.4GHz bands (Part 90, Part 15C).

STP8X040 without Bluetooth (variant device) has identical components as the reference device, and only support TETRA technology (Part 90). The reduced band functionality for a variant is obtained by removing the BT module.

Both variants have the same main PCB, same hardware, same antennas, same frequency and same software is used to generate the TETRA signal.

For all these reasons, we consider that the variant device can leverage the test results (Part 90) from the reference device just performing the spot checking explained below.

3 ILLUSTRATIONS SIDE BY SIDE

Please refers to document “Illustrations side by side”.

4 SPOT CHECK TEST PLAN

4.1 RADIO FREQUENCY

TETRA

- Full testing on model STP8X040 with Bluetooth performing the following test cases:

| Section | Specification Clause | | | | Test Description | Result | Comments/Base Standard |
|---|----------------------|---------|---------|---------|---|--------|------------------------|
| | Part 2 | Part 90 | RSS-119 | RSS-GEN | | | |
| Configuration and Mode: TETRA - 407 - 430 MHz | | | | | | | |
| 2.1 | - | - | 5.4 | 6.12 | Maximum Conducted Output Power | Pass | ANSI C63.26: 2015 |
| 2.2 | - | - | 5.5 | 6.7 | Bandwidth Limitations | Pass | ANSI C63.26: 2015 |
| 2.3 | - | - | 5.8 | 6.13 | Spurious Emissions at Antenna Terminals | Pass | |
| 2.4 | - | - | 5.8 | 6.13 | Radiated Spurious Emissions | Pass | ANSI C63.26: 2015 |
| 2.5 | - | - | 5.3 | 6.11 | Frequency Stability | Pass | ANSI C63.26: 2015 |
| 2.6 | - | - | 5.9 | - | Transient Frequency Behaviour | Pass | |
| 2.8 | - | - | 5.2 | - | Types of Emissions | Pass | |
| Configuration and Mode: TETRA - 450 - 470 MHz | | | | | | | |
| 2.1 | 2.1046 | 90.205 | 5.4 | 6.12 | Maximum Conducted Output Power | Pass | ANSI C63.26: 2015 |
| 2.2 | 2.1049 | 90.209 | 5.8 | 6.7 | Bandwidth Limitations | Pass | ANSI C63.26: 2015 |
| 2.3 | 2.1051 | 90.210 | 5.8 | 6.13 | Spurious Emissions at Antenna Terminals | Pass | |
| 2.4 | 2.1053 | 90.210 | 5.8 | 6.13 | Radiated Spurious Emissions | Pass | ANSI C63.26: 2015 |
| 2.5 | 2.1055 | 90.213 | 5.3 | 6.11 | Frequency Stability | Pass | ANSI C63.26: 2015 |
| 2.6 | - | 90.214 | 5.9 | - | Transient Frequency Behaviour | Pass | |
| 2.7 | - | 90.221 | 5.8.9.1 | - | Adjacent Channel Power | Pass | |
| 2.8 | 2.1047 | 90.207 | 5.2 | - | Types of Emissions | Pass | |

- Partial testing on model STP8X040 without Bluetooth performing the following test cases:

| Section | Specification Clause | | | | Test Description | Result | Comments/Base Standard |
|---|----------------------|---------|---------|---------|---|--------|------------------------|
| | Part 2 | Part 90 | RSS-119 | RSS-GEN | | | |
| Configuration and Mode: TETRA - 407 - 430 MHz | | | | | | | |
| 2.1 | - | - | 5.4 | 6.12 | Maximum Conducted Output Power | Pass | ANSI C63.26: 2015 |
| 2.2 | - | - | 5.8 | 6.13 | Spurious Emissions at Antenna Terminals | Pass | |
| 2.3 | - | - | 5.8 | 6.13 | Radiated Spurious Emissions | Pass | ANSI C63.26: 2015 |
| Configuration and Mode: TETRA - 450 - 470 MHz | | | | | | | |
| 2.1 | 2.1046 | 90.205 | 5.4 | 6.12 | Maximum Conducted Output Power | Pass | ANSI C63.26: 2015 |
| 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 | ANSI C63.26: 2015 |

Comparing the test results in terms of power:

TETRA - 407 - 430 MHz

| Parameter | 407.0125 MHz | 418.05 MHz | 429.9875 MHz |
|---------------------------------------|--------------|------------|--------------|
| Conducted Output Power (dBm) | 28.67 | 28.39 | 28.81 |
| Manufacturer Declared Power (dBm) | 29 | 29 | 29 |
| Δ from manufacturer Power (dB) | -0.3 | -0.6 | -0.2 |
| Antenna Gain (dBi) | 1.86 | 1.86 | 1.86 |
| ERP (dBm) | 28.38 | 28.10 | 28.52 |

Figure 1 STP8X040 with Bluetooth Maximum output power

TETRA - 407 - 430 MHz

| Parameter | 407.0125 MHz | 418.05 MHz | 429.9875 MHz |
|---------------------------------------|--------------|------------|--------------|
| Conducted Output Power (dBm) | 28.42 | 28.08 | 28.31 |
| Manufacturer Declared Power (dBm) | 29 | 29 | 29 |
| Δ from manufacturer Power (dB) | -0.6 | -0.9 | -0.7 |
| Antenna Gain (dBi) | 1.86 | 1.86 | 1.86 |
| ERP (dBm) | 28.13 | 27.79 | 28.02 |

Figure 2 STP8X040 without Bluetooth Maximum output power

Difference= 0.50dBm

TETRA - 450 - 470 MHz

| Parameter | 450.0125 MHz | 460.025 MHz | 469.9875 MHz |
|---------------------------------------|--------------|-------------|--------------|
| Conducted Output Power (dBm) | 28.68 | 28.81 | 28.90 |
| Manufacturer Declared Power (dBm) | 29 | 29 | 29 |
| Δ from manufacturer Power (dB) | -0.3 | -0.2 | -0.1 |
| Antenna Gain (dBi) | 0.67 | 0.67 | 0.67 |
| ERP (dBm) | 27.20 | 27.33 | 27.42 |

Figure 3 STP8X040 with Bluetooth MAXimum output power

TETRA - 450 - 470 MHz

| Parameter | 450.0125 MHz | 460.025 MHz | 469.9875 MHz |
|---------------------------------------|--------------|-------------|--------------|
| Conducted Output Power (dBm) | 28.39 | 28.35 | 28.54 |
| Manufacturer Declared Power (dBm) | 29 | 29 | 29 |
| Δ from manufacturer Power (dB) | -0.6 | -0.6 | -0.5 |
| Antenna Gain (dBi) | 0.67 | 0.67 | 0.67 |
| ERP (dBm) | 28.91 | 28.87 | 27.06 |

Figure 4 STP8X040 without Bluetooth Maximum output power

Difference= 0.46dBm

, the difference is less than 3 dBm. So we are in compliance with the KDB criteria.

SAR

For SAR, test report is issued against RSS-102 Issue 5 and it states that Notice 2020-DRS0022 is followed. Requirements from RSS-102-SAR.MEAS and Notice 2020-DRS0022 and they are similar. So, reports should be in compliance with RSS-102-SAR.MEAS too. We have performed partial testing on model STP8X040 without Bluetooth 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 1-g (W/kg) | SAR 1-g (W/kg) | Estimated SAR 10-g (W/kg) | SAR 10-g (W/kg) | Power Drift (%) | Plot No. |
|-----------|---------------------|---------------|-----------|-----------------|--------------------------|----------------|---------------------------|-----------------|-----------------|----------|
| 300-00884 | Head | Left Cheek | 0 | 450.00 | 0.482 | 0.493 | N/A | N/A | -2.389 | 1 |
| 300-00884 | Head | Front of Face | 25 | 450.00 | 0.156 | 0.159 | N/A | N/A | 0.231 | 2 |
| 300-00884 | Body | Front Face | 5 | 450.00 | 0.414 | 0.427 | N/A | N/A | 0.231 | 3 |
| 300-00884 | Extremity | Right Edge | 0 | 450.00 | N/A | N/A | 0.475 | 0.453 | -0.230 | 4 |

The SAR measurements for the STP8X040 without Bluetooth model, using the worst-case SAR measurement on the STP8X040 full model, are lower than those for the STP8X040 full model, and are in the uncertainty range of the laboratory, as shown in the following table:

| Exposure Conditions | Position | Dist (mm) | Frequency (MHz) | STP8X040 without Bluetooth SAR 1-g (W/kg) | STP8X040 full model SAR 1-g (W/kg) | STP8X040 without Bluetooth SAR 10-g (W/kg) | STP8X040 full model SAR 10-g (W/kg) | Δ SAR STP8X040 without Bluetooth and STP8X040 full model (W/kg) | STP8X040 without Bluetooth Plot No. |
|---------------------|---------------|-----------|-----------------|---|------------------------------------|--|-------------------------------------|--|-------------------------------------|
| Head | Left Cheek | 0 | 450.00 | 0.493 | 0.510 | N/A | N/A | -0.017 | 1 |
| Head | Front of Face | 25 | 450.00 | 0.159 | 0.168 | N/A | N/A | -0.009 | 2 |
| Body | Front Face | 5 | 450.00 | 0.427 | 0.433 | N/A | N/A | -0.006 | 3 |
| Extremity | Right Edge | 0 | 450.00 | N/A | N/A | 0.453 | 0.465 | -0.012 | 4 |

Again we got a difference smaller than 3 dB. In this case, 0.017 W/kg is the maximum difference. **So we are in compliance with the KDB criteria.**

4.2 EMC

Full testing has been done for model STP8X040 without Bluetooth 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

| Reference device | Variant device | Key Differences |
|------------------------|------------------------|---|
| FCC ID XX6STP8X040B | FCC ID XX6STP8X040x | Both variants share the same main PCB. The Bluetooth module is a separate module that plugs into the main PCB. The STP8X040 without Bluetooth module is a subset of the STP8X040 with Bluetooth module, with the Bluetooth module removed. 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 | Y | Full testing for model STP8X040 with Bluetooth and spot checking for model STP8X040 without Bluetooth |
| FCC 90.209 | Bandwidth Limitations | Y | Full testing for model STP8X040 with Bluetooth and this test case has not been tested for model STP8X040 without Bluetooth |
| FCC 90.210 | Spurious Emissions at Antenna Terminals | Y | Full testing for model STP8X040 with Bluetooth and spot checking for model STP8X040 without Bluetooth |
| FCC 90.210 | Frequency stability | Y | Full testing for model STP8X040 with Bluetooth and this test case has not been tested for model STP8X040 without Bluetooth |

| | | | |
|------------|-------------------------------|---|--|
| FCC 90.214 | Transient Frequency Behaviour | Y | Full testing for model STP8X040 with Bluetooth and this test case has not been tested for model STP8X040 without Bluetooth |
| FCC 90.221 | Adjacent Channel Power | Y | Full testing for model STP8X040 with Bluetooth and this test case has not been tested for model STP8X040 without Bluetooth |
| FCC 90.207 | Types of Emissions | Y | Full testing for model STP8X040 with Bluetooth and this test case has not been tested for model STP8X040 without Bluetooth |
| FCC 90.210 | Radiated Spurious Emissions | Y | Full testing for model STP8X040 with Bluetooth and spot checking for model STP8X040 without Bluetooth |

| Rule Part | Test item | Data Reference | Comments |
|------------|--|----------------|---|
| FCC 2.1093 | MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE) | Y | Full testing for model STP8X040 with Bluetooth and spot checking for model STP8X040 without Bluetooth |

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 STP8X040 with Bluetooth and for model STP8X040 without Bluetooth |
|---------------|---|----------|---|

| |
|---|
| Acceptance Criteria for all test cases |
|---|

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|--------------------------|
| FCC Part 90 (TNB) |
|--------------------------|

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|--|
| For the same conditions, we have compared the maximum conducted output power measured in both models. And we have verified that the difference is <3 dB. |
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