

Product Assembly Document

Antenna Processing Subrack Power Unit
(APSPU)

PCB nr.: 03117

| | Organisatie / Organization | Datum / Date |
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1 Introduction

1.1 Document Scope

This document is intended for PCB assembly manufacturers and test facilities. It describes the assembly of a LOFAR2.0 APSPU. More information about the production of the APSPU can be found in [AD-1]. In section 2 an overview of the most important applicable standards are given and special requirements/treatments if needed. Section 4 describes the assembly steps to complete the module.

1.2 List of Terms and acronyms

| | |
|-------|--|
| APSPU | Antenna Processing Subrack Power Unit |
| BOM | Bill Of Material |
| IPC | Association Connecting Electronics Industries |
| PCB | Printed Circuit Board |
| PCBA | Printed Circuit Board Assembly |
| EMS | Electronics Manufacturing Services, Assembly company |

1.3 Applicable documents (AD)

| Ref.nr. | Doc. number | Title | Author |
|---------|-------------|--|--------------------|
| AD-1 | PMS00046 | APSPU Product Manufacturing Specifications | Gijs Schoonderbeek |

1.4 Reference documents (RD)

| Ref.nr. | Doc. number | Title | Author |
|---------|-------------|------------------------------------|--------------------|
| RD-1 | TPR00020 | APSPU Test plan | Gijs Schoonderbeek |
| RD-2 | 014983-01 | Mechanical drawing of APSPU module | Jeroen Herrewijnen |

1.5 Label information

A small readable label has to be placed onto the designated area of the assembled board and a label on the front panel, see section 4.7. The labels shall be equal and must contain the items:

Product name → APSPU (5-digits)
 Batch number → YY (last 2 digits year) WW (week nr.) D (day)
 Serial number → 5-digits, starting with 00000

Basic; APSPU -YYWWD-YYYYY
 Example: APSPU-22091-00100

The information has to be printed in readable text at least 5mm high together with a QR-code pointing to the ASTRON database.

Example:



APSPU -YYWWD-YYYYY

2 IPC Quality standards

2.1 Design

The IPC standards that have been used during the design are:

| IPC requirement | Comment |
|-----------------|---|
| IPC 2221B | Class 2 Dedicated Service Electronic Products |
| IPC 2222B | Type 3, Multilayer Printed Board without blind and buried via's |

2.2 Assembly

| IPC requirement | Comment |
|-----------------|---|
| IPC-A-610 | Class 2 Dedicated Service Electronic Products |

Production tests are described in RD-1

3 Description

A functional description for the LOFAR2.0 APSPU can be found in the "Product Manufacturing Specification" document (AD-1).

4 Items to assemble

| Item nr. | Amount | Description | Remarks |
|----------|--------|--|-----------------|
| #1 | 1 | APSPU board assembly | SMD components |
| #2 | ~70 | Non SMD components (connectors, inductors) | |
| #3 | 3 | Light-pipes | See section 4.3 |
| #4 | 1 | Front panel | See section 4.5 |
| #5 | 3 | Set switches | |
| #6 | 2 | Place ASTRON serial number (QR-code) | See section 4.7 |

The following instructions are required for the APSPU assembly. The assembly order may be changed for efficiency and/or quality reason for the working flow. Any change in the assembly order must be discussed and agreed with the design engineer.

Assembly order:

1. Place Manufacturer Serial Number, see section 4.1.
2. SMD component reflow assembly, see section 4.2.
3. Verify assembly (AOI, AXI), see [RD-1] for more details.
4. Solder Through hole components (jumpers, connectors).
5. Place Light pipes, see section 4.3.
6. Place heatsinks, see section 4.4.
7. Mount front panel, see section 4.5.
8. Place QR label on PCB and front panel, see section 4.4.
9. Functional testing, see [RD-1].



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Class.:

A 3D drawing of the assembled board is shown in Figure 1. The assembly drawing are shown in Section 7.1. On request a STEP-model of the assembly can be supplied by ASTRON.

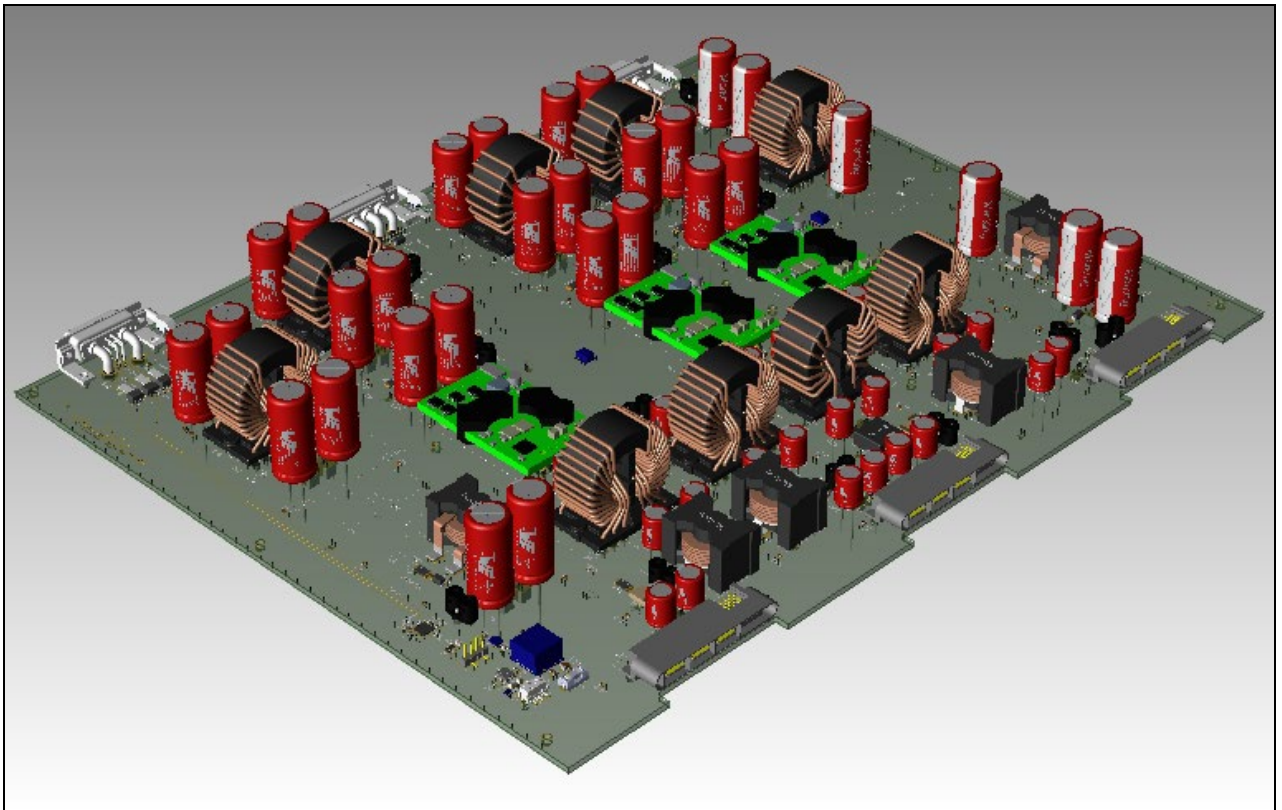


Figure 1 3D-drawing of APSPU PCBA

4.1 PCB Manufacturer and EMS serial/lot number

Both the PCB manufacturer and the EMS have to place a serial and or lot number on the PCB in order to track issues during the warranty period of the PCBA. In the ODB++ and in the PSF of the APSPU the locations are shown, see Figure 2.

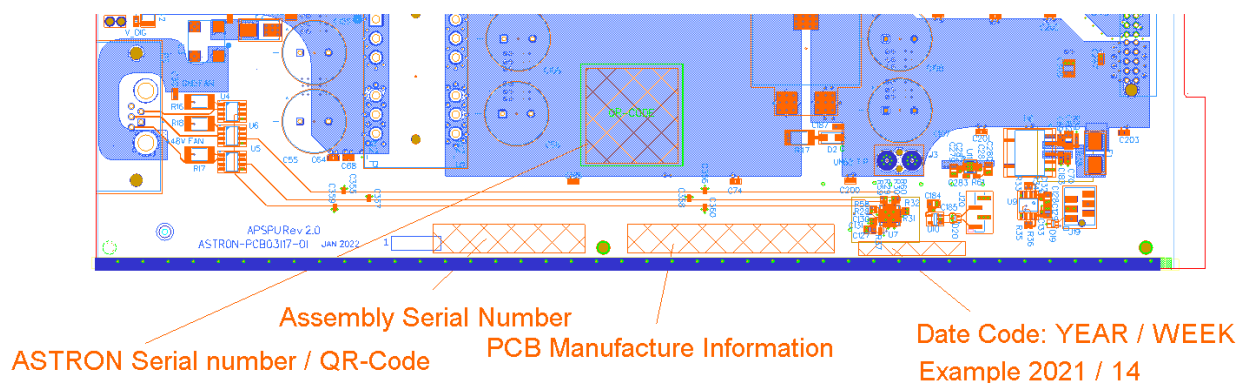


Figure 2 Location for PCB manufacturer and EMS serial or lot numbers.

4.2 SMD Assembly

A component placement file and polarity drawing can be found in section 7.1. All assembly verification steps, like SPI and AOI are described in APSPU Test plan [RD-1].

4.3 Light-pipes

The light-pipes are press-fit stile light pipes which have to be pressed in the holes from the top side of the PCBA, see Figure 3. Make sure that the bottom of the PCBA is supported while pressing the light-pipe into the PCB.

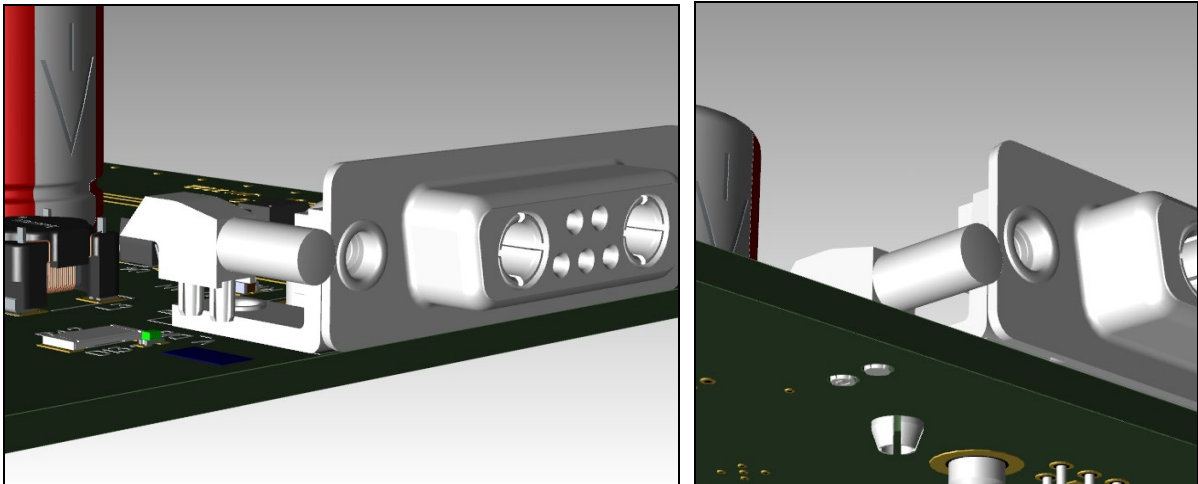


Figure 3 Mounting instruction for light-pipes.

4.4 Mounting of heatsinks

On APSPU heatsinks (Wakefield 547-95AB) have to be mounted on U1, U2 and U3 (Flex BMR456). In Figure 4 is part of the mechanical drawing of the APSPU [RD-2] is shown.

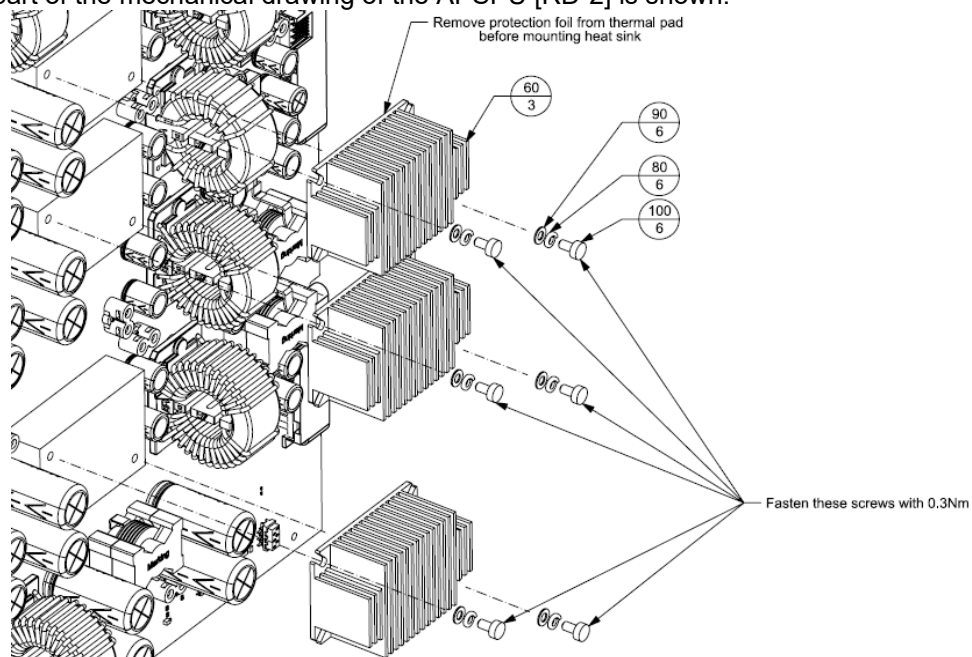


Figure 4 Mounting of heatsinks

For the assembly of the heatsinks the following order has to be taken:

1. Clean top of the BMR456 with alcohol and wait until it's dry
2. Remove the protection foil from the heatsink
3. Place the heatsink on the BMR456 such that the holes in the heatsink match the threaded holes in the BMR456.
4. Place a M3 Spring washer on a M3x6mm bold
5. Place a M3 DIN433 washer on the combination.
6. Hand tight the combination in one of the two holes of the heatsink which is placed on the BMR456
7. Place a M3 Spring washer on a M3x6mm bold
8. Place a M3 DIN433 washer on the combination.
9. Hand tight the combination in the other hole of the heatsink which is placed on the BMR456
10. Tight the M3 bold with a ESD save screw drive at a torque of 0.3 Nm
11. Repeat steps 1 till 10 for the other two heatsinks.

4.5 Mounting of front panel

Before the front panel can be mounted, the Schroff extractor handles 20817-620 (top) and 20817-621 (bottom) have to be mounted on the front panel and the PCB metal Brackets (Schroff 60807181) to the PCB. See mechanical drawing in APSPU_Front panel [RD-2] for more details.

All screws have to be tighten, with an ESD safe screwdriver with a torque as indicated on the mechanical drawing.

4.6 Set switches and place jumpers

The switches S1 and S2 have to be set according the off state before functional test can start, see Figure 5

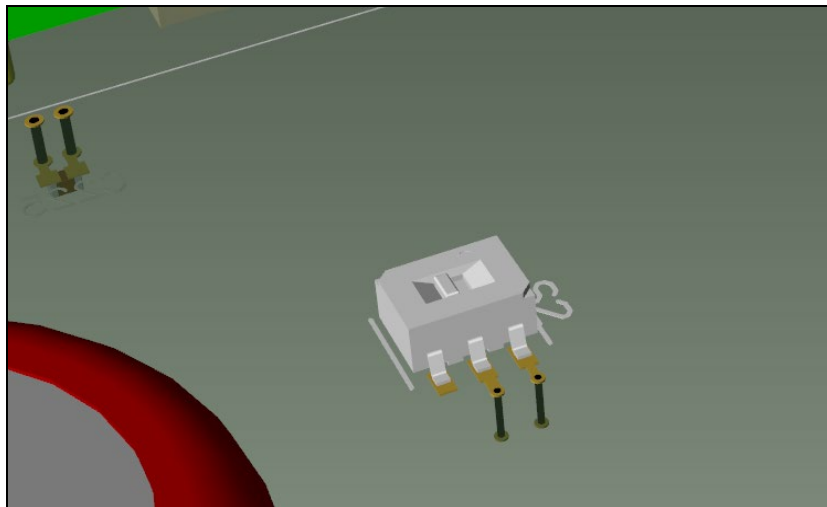


Figure 5 DIP-Switch on APSPU

4.7 Serial Number placement

Two equal serial numbers stickers, including QR-codes, have to be placed on the assembly. One serial number has to be placed on the top side of the PCB as indicated in silkscreen on the PCB by "QR-CODE", see Figure 6.

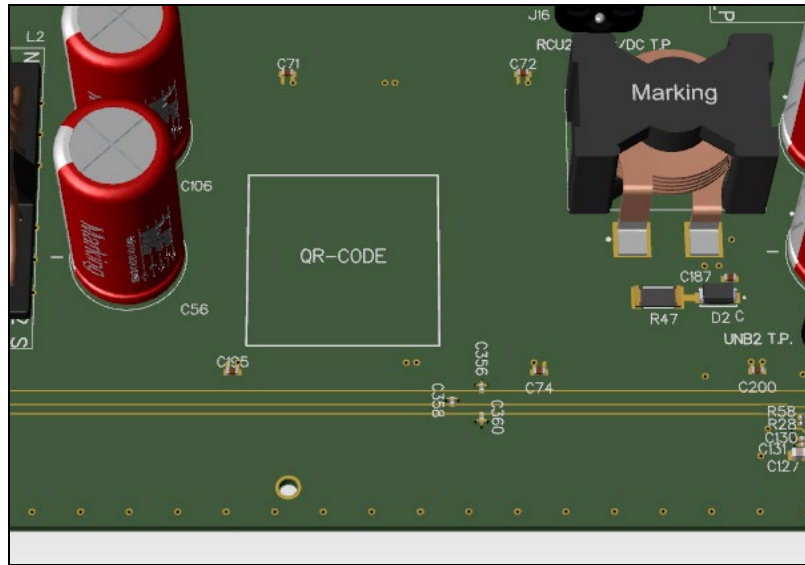


Figure 6 Location of the QR-code on the PCBA.

The second serial number sticker has to be placed on the front panel as shown in Figure 7.

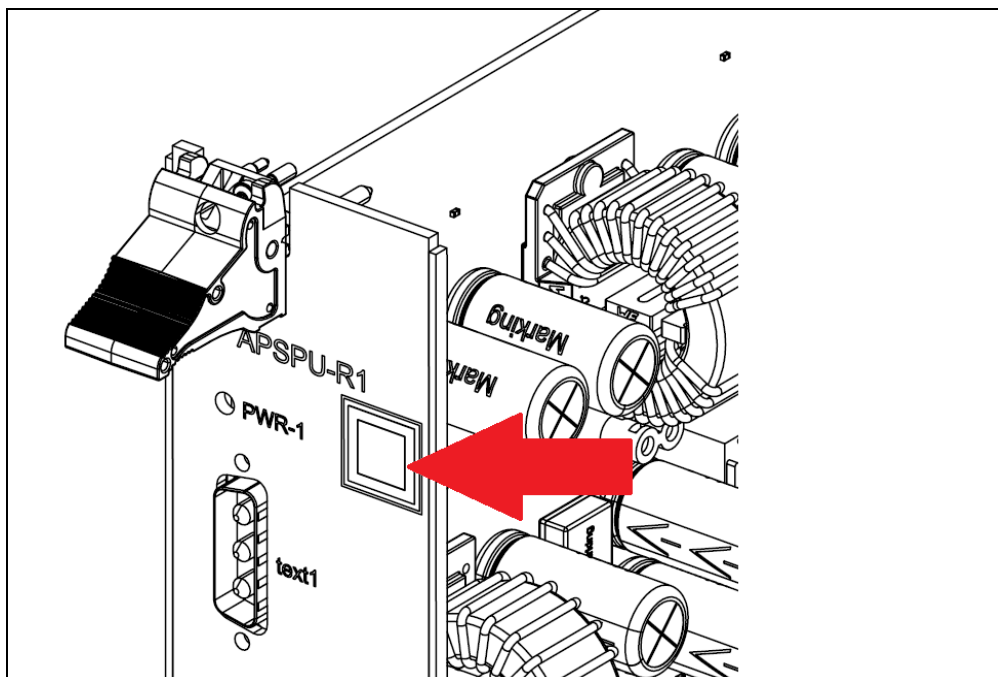


Figure 7 Location of the QR-code on the front panel.

5 Precautions

A list of precautions are given, which are important during production.

1. The PCBA is ESD sensitive. ESD precautions must be taken at any time during the assembly and handling of the PCBA or individual components (use a wrist strap connected to a ground terminal).
2. The PCBA has bulky inductors which could place stress on the PCBA when not handled with care.

6 Delivery and logistics

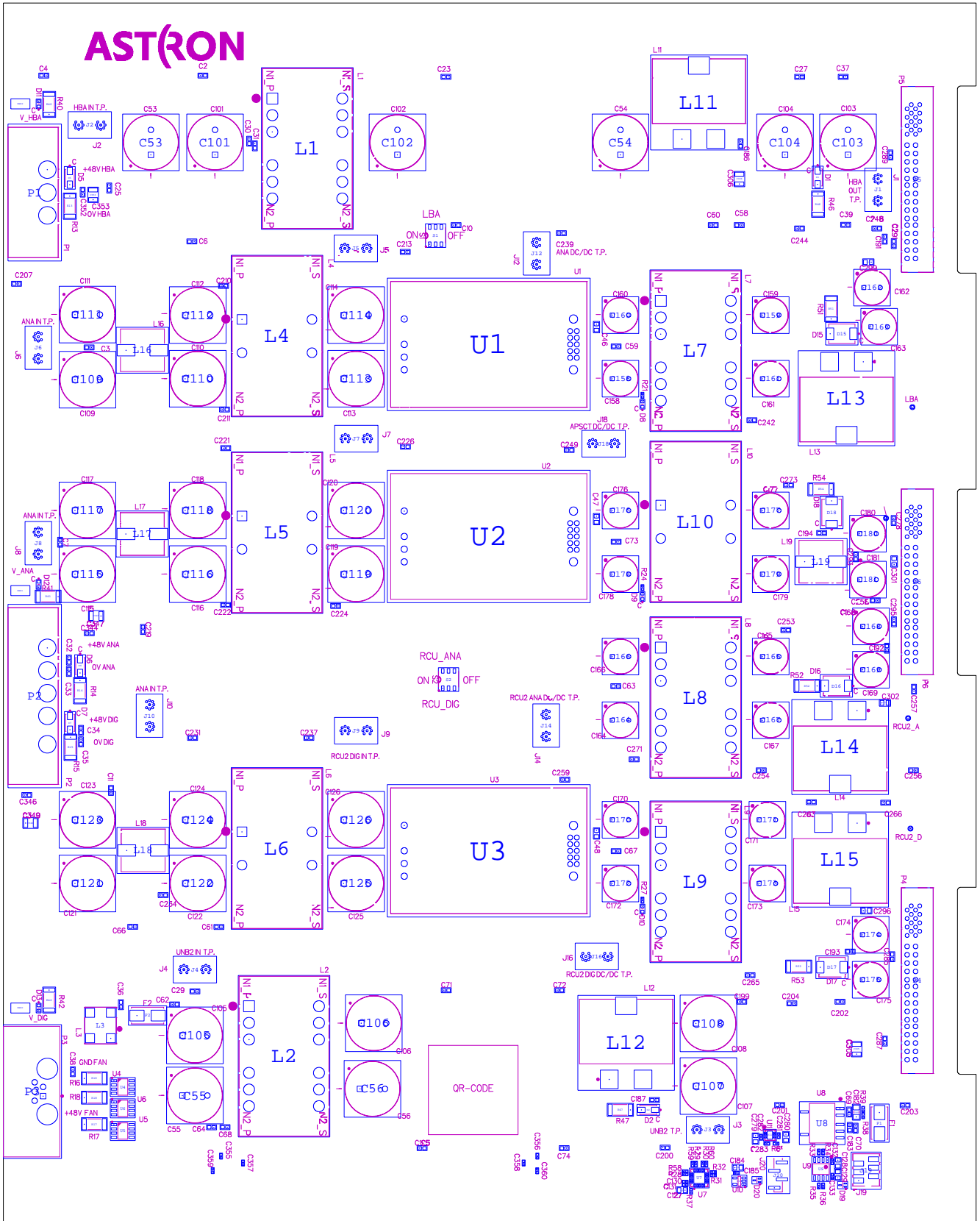
Delivery and logistic information is provided in the procurement documentation.

7 Annexes

7.1 Assembly drawing

An assembly drawing of the top and bottom will be added to the next pages.

Top Components, sst



ssb, Bottom Components

