



ANNEXE 3

**English version of the document:
Carte CLB-V6_CCTP_CNRS DR016_A06**

PARIS-NORMANDIE DELEGATION

SPECIAL TECHNICAL SPECIFICATIONS

(In french : CCTP = Cahier des Clauses Techniques Particulières)

PUBLIC SUPPLY CONTRACTS

SUBJECT:

**Purchase of Electronic cards “CLB-V6”
for new detection lines for the KM3NeT-ORCA project as part of
NEPTUNE funding by the Normandy region.**

Lot n°06

BUYER :

CNRS-Délégation Paris-Normandie
3 rue Michel Ange
75794 PARIS Cedex 16

CONTRACTUAL FORM:

Single-award framework agreement based on unit prices following a formal open tender procedure in accordance with Articles L. 2124-2, R. 2124-2 and R. 2161-2 to R. 2161-5 of the Public Procurement Code.

This is a supply contract subject to the provisions of the General Administrative Clauses for Public Supply Contracts (CCAG/FCS) issued by the decree of 31 March 2021.

This document comprises 21 pages, including the cover page.



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LIST OF ABBREVIATIONS

CCAG	Cahier des Clauses Administratives Générale = General Administrative Terms and Conditions
CCTP	Cahier des Clauses Techniques Particulières = Special Technical Specifications
CCAP	Cahier des Clauses Administratives Particulières = Special Administrative Terms and Conditions
EPST	Etablissement public à caractère scientifique et technologique = Public scientific and technological institution
FCS	Fournitures courantes ou services = Routine supplies or services
HT	Hors taxes = Excluding taxes
RC	Règlement de la consultation = Consultation rules
RGPD	Règlement général sur la protection des données personnelles = General Data Protection Regulation
PEPR	Programmes et équipements prioritaires de recherche = Priority research programmes and equipment
SCTD	Service centralisé de traitement de la dépense = Centralised expenditure processing service
CNRS	Centre national de la recherche scientifique = National Centre for Scientific Research
LPCC	Laboratoire de Physique Corpusculaire de Caen = Caen Particle Physics Laboratory
LNS	Laboratori Nazionali del Sud (Catane -Italie)
KM3NeT	Kilomètre cube Neutrino Telescope
ORCA	Oscillation Research with Cosmics in the Abyss
ARCA	Astroparticle Research with Cosmics in the Abyss
NEPTUNE	Neutrino Physics with Telescope Underwater
DU	Detection Unit
CLB	Central Logic Board
BOM	Bill Of Materials (= liste des composants)
CMD ou CMS	Surface Mount Device ou Composant Monté en Surface
THT	Through Hole Technology (ou Composant à Technologie traversante)
AABUS	As Agreed Between User and Supplier/Manufactured « Comme convenu entre l'utilisateur et le fournisseur/fabricant »
HASS	Highly Accelerated Stress Screen « Test de stress hautement accéléré » = test de déverminage
DfM	Design for Manufacturing – “Conception pour la fabrication”

ANNEXES AU PRESENT CCTP

Annexe 1	Tests HALT&HASS_KM3NeT
Annexe 2	BOM CLB-V6
Annexe 3	English translation of these Special Conditions of Contract
Annexe 4	English translation of: Tests HALT&HASS_KM3NeT

In these Special Conditions of Contract:

- The terms "equipment", "supplies" and "materials" refer interchangeably to the materials to be supplied for each lot;
- The term "Contractor", "holder", "supplier" "successful tenderer" refers to the company that is awarded one or more lots of the contract;
- The term "Contract" refers to the agreement concluded between the CNRS and the Holder of each lot.



1 Preamble

The provision of the services defined in this document constitutes a contract with a public institution with an obligation of means and results.

The Contractor undertakes that it is able to perform this contract in strict compliance with the obligations set out in the contract documents, in particular with regard to confidentiality, qualification and insurance clauses.

The Contractor shall be deemed, under its responsibility and regardless of any justifications provided, to have received the legal authorisations to perform and to possess the professional qualifications corresponding to the nature and importance of the service covered by this contract. The Contractor shall be solely liable for any consequences that may arise from the fact that these qualifications do not comply with regulations or are incorrect and, in particular, for the consequences of any termination that the CNRS may rightly decide to implement as a result.

In addition to the documents constituting the consultation file, the Contract Holder is required to comply with the specifications and requirements of the decrees, orders, regulations, standards and texts in force on the date of submission of its tender.

2 Presentation

The national centre for scientific research (hereinafter « CNRS » - Centre National de la Recherche Scientifique) is a public research organisation (a public scientific and technological institution, EPST, under the supervision of the Ministry of Higher Education, Research and Innovation). It produces knowledge and puts this knowledge at the service of society.

Its governance is ensured by a chief executive officer, assisted by deputy chief executives.

With over 33,000 employees, a budget of €3.5 billion and a presence throughout France, the CNRS is active in all fields of knowledge, drawing on more than 1,100 laboratories.

Present in all fields of knowledge

As France's leading multidisciplinary research organisation, the CNRS conducts research in all scientific, technological and societal fields. It covers the entire spectrum of scientific disciplines.

The CNRS is active in all major disciplines, grouped into 10 institutes, and focuses on developing collaborations between specialists from different disciplines, particularly with universities, opening up new fields of research that meet the needs of the economy and society.

Present throughout the country

17 regional delegations ensure direct, local management of laboratories and maintain links with local partners and local authorities.



2.1 General context of the project

The NEPTUNE project, funded by the Normandy Region, aims to continue the construction of underwater infrastructure to establish a KM3NeT ORCA underwater observatory for neutrino research, which will ultimately consist of around 115 detection lines and instrumentation for marine and environmental science. It is located approximately 40 km south of Toulon at a depth of 2,500 m.

2.2 Background to the purchase

The purpose of this consultation is to supply electronic cards known as CLB-V6. Integrated into the 18 optical modules of each detection line, the central logic board (CLB) is the main electronic card of the KM3NeT acquisition system.

These technical specifications describe all of the contractor's technical obligations. These constitute a performance obligation for the contractor.

2.3 Subject matter of the contract

Purchase of CLB-V6 electronic cards for new detection lines for the KM3NeT-ORCA project as part of NEPTUNE funding by the Normandy region.

Quantity : 169 Cards (Estimated quantity in relation to the budget allocation).

2.4 Allotment

This contract is a supply contract.

The contract is divided into 08 separate lots. Each lot is the subject of a separate contract.

Lots	Lot names
01	Cable vertical Opto-Electrique (VEOC)
02	Buoy support structure
03	Electronic card BPS (Base Power System)
04	Penetrator VEOC in Base Module
05	Cylindrical container of the Base Module
06	Electronic card CLB (Central Logic Board)
07	TSFP optical Transceiver
08	Hydrophone

3 Description of expected equipment and general and technical specifications

3.1 Purpose of this document

The purpose of this document is to describe the (minimum) specifications for the following activities:

- 1) Production of 169 electronic boards called CLBs (Central Logic Boards) described in this section 3.
- 2) Highly Accelerated Stress Screening – HASS: Procedure for debugging products (to eliminate teething problems) and functional testing – documentation attached (Appendix 1; or 4 in english).

3.2 Request for quotation

The offer must include:

- A preseries of 5 boards, including PCBs
- A series of 164 boards

The quotation must detail the costs, differentiating between non-recurring and recurrent, as follows:

- Cost of the components (BOM and ancillary components as described in this documentation)
- Engineering Services: Preparation of the manufacturing file, Design for Manufacturing (DfM) study, drafting of manufacturing instructions (manufacturing flowchart), production management, quality monitoring, documentation, and delivery of inspection, test, and compliance reports
- Printed Circuit Board (PCB) Manufacturing
- PCB microsection analysis
- PCBA: assembly of electronic boards
- X-rays
- Programming and implementation of the automated optical inspection (AOI)
- Programming and implementation of the boundary scan
- Tests: functional tests and Highly Accelerated Stress Screening (HASS)

Additionally, the quotation must include the total.

For each activity, the quotation must include a minimum:

- A statement of acceptance of all relevant criteria described in this document, together with a list of the proposed improvements (if any).
- The economic offer.
- The expected time and delivery plan. The intended number of batches and their sizes must be provided, along with the planned delivery timeline.
- Non-recurrent costs must be indicated separately from recurrent costs. A unitary price, including only recurrent costs, must be provided.
- The different quality standards that the applying company will follow must be specified. They will be considered a plus, except for the ISO-9001, which is mandatory.
- The manufacturing flow, facilities, and the test flow must be described in the quotation.
- The intended third-party laboratory for the cross-section analysis, if known.

KM3NeT provides the production files; the products must be manufactured exactly as described by these files. Proposed modifications, if any, must be accepted by KM3NeT.

3.3 CLB Production

1. The design of the board is identified with the KM3NeT code V6, described in the files of the tender.
2. The PCB production must comply with standard IPC Class 3 (with the limitations the design may have). Any modification concerning the design provided must be agreed upon with the KM3NeT (As Agreed Between User -KM3NeT- and Manufacturer "AABUS").
3. The PCB assembly process must comply with IPC Class 3 (with the limitations the design may have). As in the previous case, any modification concerning the design provided must be agreed upon with the KM3NeT (As Agreed Between User -KM3NeT- and Manufacturer "AABUS").
4. Electronic components are present on both sides of the PCB.
5. The Gerbers files describe the PCB design. The manufactured PCB must comply strictly with the provided Gerbers files.
6. Solder paste masks must be provided and generated by the company starting from the given Gerber files, so the company can choose the pad shrinking factor depending on the solder paste used and mask thickness. Solder paste must be deposited on the PCB using the above-mentioned masks with an automatic machine in order to have a very good uniformity to ensure high quality for component

soldering. Solder paste deposition must be inspected before starting the population of the PCB (with Solder Paste Inspection (SPI) or similar).

7. AOI must be used on all the boards.
8. All the SMD components must be placed using automatic Pick&Place machines. A reflow oven must be used for soldering the components.
9. Boundary scan tests are mandatory.
10. X-Ray Inspection and verification for components with BGA footprint on all boards. Images must be available upon request.
11. The boards must be identified with labels attached to them. The information to print those labels (using QR code) will be provided by KM3NeT. In case the PCBs also bear an individual identifying code defined by the producing company, an electronic file containing the correspondence between the KM3NeT label and the company's label must be provided by the company.
12. The company must provide traceability of all the procured components following IPC-1782 level 3.
13. On all the CLBs, the SFP cage (U13, pressfit) must also be soldered at least on the 4 vertices.
14. A screw must be used for the guiding poles (4 x WT-102-2) to be used with J11, J12, J13, and J14. All the screws and washers must be stainless.
15. A screw with a washer must be used with J11 and J12 to reinforce the connector. The screws must also be stainless.
16. The official tools from Samtec, one for signal connectors and another for power connectors, must be used for the press-fit connectors (J11, J12, J13, and J14). The manufacturer must describe the process and also the facility to perform the press-fit connector assembly. Constraints and insertion forces must be monitored (and reported) according to the instructions defined by Samtec.
17. KM3NeT will appoint a single technical point of contact to liaise exclusively with the company regarding production-related technical issues.
18. The company producing the boards will also provide adequate packaging for shipment. The shipment itself is considered part of this procurement.
19. The company must provide the components listed in the BOM (and those indicated in this section). Each component must match exactly the part number specified in the BOM (unique part numbers must be used in all production: the one specified in the BOM). All the components must be acquired through an official channel. The use of brokers is only acceptable in specific cases and must be explicitly agreed upon in advance with KM3NeT (AABUS). The datacodes (DC) of each part number must be provided.
20. In case a part number is obsolete, the replacement must be agreed upon with KM3NeT (AABUS).
21. In addition to the Bill of Material, the company must also acquire 1 Phoenix terminal block (1792757) and 2 ferrules 18 AWG, 1 mm², and 8 mm per board:

Commenté [1]: Modify if we go for a separate tender for FPGAs

Ferrule, simple cable, 18 AWG, 1 mm ² , 8 mm	Farnell 2817747
Pluggable Terminal Block, 5.08 mm, 2 Positions, 24 AWG – 12 AWG, 2.5 mm ² , Screw Connection	Farnell 1792757

3.4 Debugging

The debugging of CLBv6 will be carried out in accordance with :

KM3NeT_ELEC_WD_2018_001-HALT&HASS_KM3NeT

3.5 Post-Assembly tests: Functional & HASS test

22. The test workflow, in addition to the X-Ray, AOI, Boundary scan, etc, must foresee a first functional test, a HASS test, and a final functional test.
23. The software for running the functional tests will be provided by KM3NeT, which will assist in the installation and the training for using the test tool. The duration of the test is estimated to last a maximum of 30 minutes (as there are two functional tests, one before the HASS tests and one after, the total duration will have a maximum of one hour). The company must provide the ancillary material for the test, such as a power supply or a computer. Internet connection is required in order to store the result of the testbench in the KM3NeT Database.
24. After the functional tests, a mechanical test must be performed. An octopus board, provided by KM3NeT, must be inserted to test the J11, J12, J13, and J14 connectors. The outcome of the tests must be included in the CoC.
25. The HASS (Highly Accelerated Stress Screening) tests of the CLBv6 will be done according to the attached document KM3NeT_ELEC_WD_2018_001-HALT&HASS_KM3NeT.
26. The maximum temperature limit is 72 degrees Celsius, and the minimum temperature limit of the cycle is - 32 degrees Celsius. The requirements of the temperature cycle are described in the previous document. If possible, a ramping rate greater than the one specified will be appreciated.
27. For the CLBv6 climatic tests, the required number of PB will be provided by KM3NeT.

Commenté [2]: The goal is now to move asap to a full testbench to replace this mechanical test

Commenté [3R2]: OK, when it is ready the document should be updated.

Commenté [4]: To check with Vladimir if a reminder of this has been included in the testbench software. The output of this tests can also be included in the json report (in this case the info can be excluded from the CoC)

Commenté [5]: 90*0.8=72; 40*0.8=32

Commenté [6]: From the HALT (refer to the HALT results)

Commenté [7R6]: Not needed, here. This is only for the company. We can add as a comment: https://git.km3net.de/working_groups/electronics/qa-rams/electronics/-/issues/11

3.6 Certificate of Conformity

28. With the delivery of the boards, a Certificate of Conformity (CoC), common for all the delivered boards, must be included. The CoC must include the KM3NeT board IDs (UPIs), the manufacturer ID, and the MAC address. This information must also be provided in an electronic file (spreadsheet).
29. The CoC must include at least seven check boxes: one for the AOI inspection, Boundary scan, X-Ray, first functional tests, the climatic tests (HASS), and another for the last functional tests. It must also include an additional check box for the outcome of the pressfit connectors (J11, J12, J13, and J14) mechanical tests. For the board that did not pass the tests, a report on the failure must be prepared.
30. Also, the CoC must contain the following information:
 - Company Information:
 - i. Name and address of the Company
 - ii. Contact information
 - Certificate identification & product identification:
 - i. A unique number identifying the certificate of conformity: The code of the board (UPI) provided by KM3NeT
 - Compliance with Standards:
 - i. List of standards and regulations the product complies with (e.g., CE, RoHS, REACH)
 - ii. References to tests (functional, HASS, XRAYs, AOI...) and certifications performed
 - Manufacturing Date and production information:
 - i. Date when the PCB was manufactured and the CLB assembled
 - ii. List of machinery used for the PCB Assembly and testing
 - Component & Traceability Information:
 - i. Date codes
 - ii. Traceability compliance with IPC 1782 level 3
 - iii. Details that allow for the tracing of components and manufacturing processes used.
 - Declaration of Conformity:
 - i. A signed declaration by an authorized representative of the company stating that the product complies with the specified standards and has been manufactured according to the specifications provided.

3.7 Printed circuit board (PCB) manufacturing requirements

3.7.1 General technical requirements for PCB manufacturing

31. Standards required:
 - a. IPC-600 CLASS 3 for the acceptability of printed Circuit Board
 - b. IPC-6012 CLASS 3 compliance (for rigid PCB manufacturing): qualification and performance specifications for rigid printed boards
 - c. IPC-2221: Ensure that the PCB design adheres to IPC-2221 guidelines for generic printed circuit board design
 - d. UL (Underwriters Laboratories) marked to ensure compliance with safety standards
32. Material:
 - a. Laminate: FR4 High TG must be used (IPC-4101B/126)
 - b. Fiber weave: To be required if necessary (example 2216 or 1080) (AABUS)
 - c. ROHS compliance: Lead-free
 - d. UL approval: According to 94-V0
33. The thickness of individual copper clad sheets shall be as defined in the stack-up diagram
34. ENIG finish: plating per the current revision of IPC-4552
35. Vias filled and capped, except for press-fit and through-hole, in compliance with IPC 4761
36. Required Cross-section analysis: Perform cross-sectional analysis to verify the integrity of plating, via filling, and overall structure.
37. FAI-CL3: (First Article Inspection - Class 3): Conduct a detailed inspection of the first article produced to ensure it meets all specified requirements.
38. Metrological Analysis required.
39. Destructive testing:
 - a. An additional micro-section analysis must be requested by the PCB assembler to a third-party laboratory - the selection of the third-party laboratory must be communicated to KM3NeT beforehand for approval, and the third-party laboratory must be located inside the European Union. The micro section must guarantee an IPC-600 class 3 level.
 - b. Before the microsection, it is recommended to perform a thermal stress according to the procedure of IPC-TM-650 2.6.8. Test Condition A. (Bath temperature of +288°C +/- 5°C). Baking of PCBs for 8 hours at +125°C +/- 5°C to be done before shocks. Perform 4 thermal shocks. Samples must return to room temperature between each test. The duration of a shock, that is to say the PCB in contact with the alloy bath (Sn63Pb37 or Sn60Pb40) must be 10 seconds -0/+1s.
 - c. X-out panels may be used for solder samples

40. Solder mask:
- a. Solder mask over bare copper (smobc) on primary and secondary sides using supplied artwork following the current revision of IPC-SM-840 type B.
 - b. Color: black
 - c. Liquid photo-imageable (LPI) IPC-SM-840, halogen-free
 - d. No bleed-out allowed over exposed SMD pads.
 - e. No exposed traces.
 - f. Solder Mask applied with spray
41. Transfer layers by Laser Direct Imaging
42. Electrical tests: All PCBs shall pass 100 % electrical test using the supplied IPC-356 netlist following the current revision of IPC-9252, class 3.
43. European Union producer: the PCB producer must have the factory placed in a country member of the European Union.
44. Silkscreen:
- a. Silkscreen primary and secondary sides with white epoxy, non-conductive, non-nutrient ink.
 - b. Any unspecified stroke width shall be 0.13 mm
 - c. Clip the silkscreen away from any exposed metal.
 - d. Vendor date code, logo, UL, and any additional marking to be located on the secondary side.
 - e. Bag and tag are acceptable for PCBs that are too small for marking.
 - f. PCB RoHS markings must comply with IPC-1066. The preferred location for the marking is on the printed circuit board top layer.
 - g. The method required is an inkjet printer in white, for marking the printed circuit board, and shall be legible to corrected, unmagnified vision.
45. Flatness specification:
- a. Bow and twist of assembly sub-panel or singular PCB shall not exceed 0,75% as required inside IPC-600.
 - b. Test following the current revision of IPC-TM-650 2.4.22.
46. Holes' acceptability level: Shall conform to IPC 600 Class 3.
47. Impedance: conform to IPC 2221 - IPC 6012 (all tolerances +/- 10%) when specified.
48. Packaging and handling:
- a. PCBs are to be packed in an MBB (Moisture Barrier Bag).
 - b. Add a desiccant inside with an HIC (Humidity Indicator Card).
 - c. PCBs shall be packaged in vacuum-sealed inner containers.
 - d. Outer containers shall be sufficient to prevent damage during shipping and handling.

49. Documentation:

- a. Provide detailed documentation, including manufacturing process flowcharts, test reports, and material certifications.
- b. Include traceability information to be linked to each step of the production process to review, if necessary, quality checks and results.
- c. A certificate of conformance shall be supplied with each shipment.
- d. An impedance certificate must be provided when controlled impedance is required.

50. Design for Manufacturing: A Design for Manufacturing (DfM) analysis is requested. The PCB manufacturer is required to send their DfM guide and a report with the result of the DfM. Manufacturers can propose manufacturing file modifications to comply with DfM recommendations or improve reliability. Each change must be tracked, and the customer must be informed. Specifically, manufacturers are allowed to implement “teardrops” when necessary to improve reliability by enhancing the connection and reducing the undesirable breakout of drilling.

51. Communication: Establish clear communication channels between the PCB manufacturer and the assembly company for real-time updates and issue resolution.

52. On-site visits to the PCB producer: The Quality and Production Managers from the PCB-Assembly Company will conduct four on-site visits to the PCB manufacturing facility. Customers must be invited at least two weeks before. The trip cost must be taken into account in the consolidated cost analysis.

- a. Feasibility analysis - PCB Production plan: Initial meeting to discuss production requirements, timelines, and quality standards.
- b. To Kick Off Production: Formal start of production with a detailed plan and initial inspection of materials and processes.
- c. Manufacturing Inspection Point (pre buy off): During PCB Manufacturing, visit to inspect quality, check for any deviations, and ensure compliance with specifications.
- d. FAI review (Post-Production Validation / Final buy off): Final inspection and validation of the completed prototypes before delivery.

KM3NeT could waive any or all of these visits after agreement with the Assembly company. (AABUS)

53. Repairing: Not allowed for IPC-6012 CLASS 3

3.7.2 Tender Specific requirements: CLBv6

- 5 bare PCB prototypes to be procured in **10 days** after the order to produce them is communicated to the PCB manufacturer
- Pressfit Connector:

Position on the card:

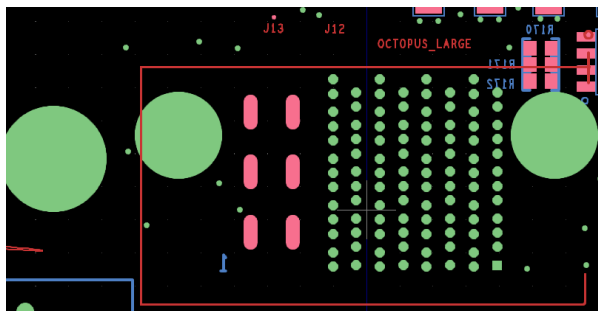


Fig1

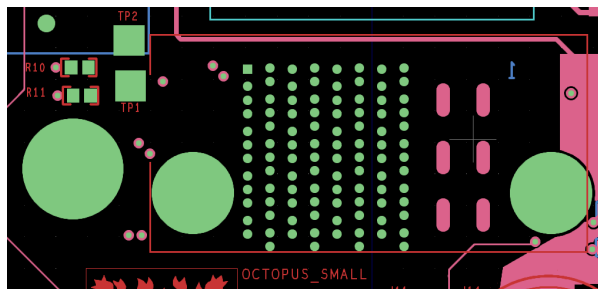


Fig2

Connector specifications:

HDMT-4-08-1-S-VT-0-1 :

Terminal size = 0.017" (0.450 mm), **version -1**. Drilled holes must be 0.450 mm with a tolerance of ± 0.130 mm and a **PTH of 0.36 mm with a tolerance of ± 0.05 mm** (see note 2).

THE THICKNESS OF THE COPPER FINISH MUST NOT VARY BY MORE THAN 0.02 mm [0.001] IN ANY VIA.

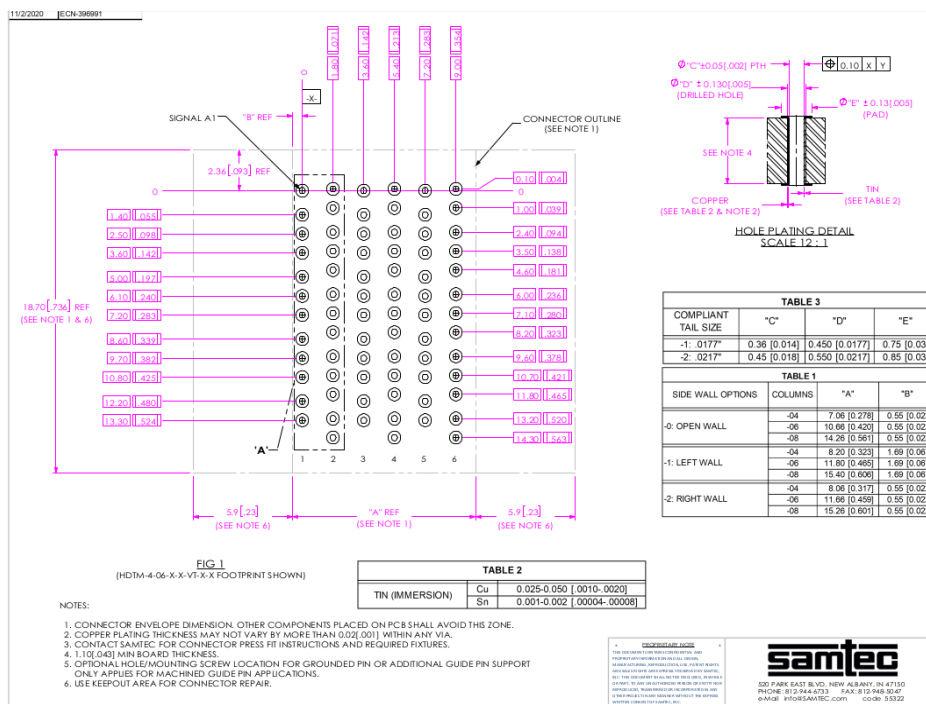


Fig3: PressFit Connector Footprint

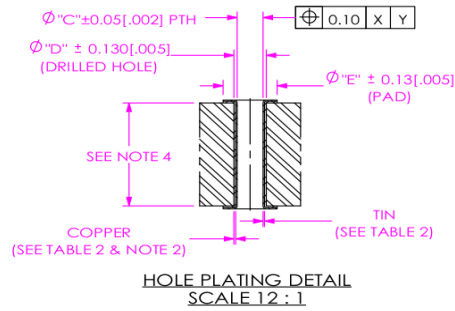


TABLE 3			
COMPLIANT TAIL SIZE	"C"	"D"	"E"
-1: .0177"	0.36 [0.014]	0.450 [0.0177]	0.75 [0.030]
-2: .0217"	0.45 [0.018]	0.550 [0.0217]	0.85 [0.033]

Fig4: Hole Plating Connecteur PressFit

- PCB stacking:

Empilable CLB6-2				
		Épaisseur (µm)		
Signal	Dessus	0.037	Cuivre	
	FR4-TG180	100	FR4-TG180	
GND	GND1	0.017	Cuivre	
	FR4-TG180	180	FR4-TG180	
Signal	SIG1	0.017	Cuivre	Impédance contrôlée
	FR4-TG180	200	FR4-TG180	
GND	GND2	0.017	Cuivre	
	FR4-TG180	180	FR4-TG180	
Signal	SIG2	0.017	Cuivre	Impédance contrôlée
	FR4-TG180	200	FR4-TG180	
Power	ALIM1	0.017	Cuivre	
	FR4-TG180	100	FR4-TG180	
Power	ALIM2	0.017	Cuivre	
	FR4-TG180	200	FR4-TG180	
Signal	Le SIG3	0.017	Cuivre	Impédance contrôlée
	FR4-TG180	180	FR4-TG180	
GND	GND3	0.017	Cuivre	
	FR4-TG180	200	FR4-TG180	
Signal	Le SIG4	0.017	Cuivre	Impédance contrôlée
	FR4-TG180	180	FR4-TG180	
GND	GND4	0.017	Cuivre	
	FR4-TG180	100	FR4-TG180	
Signal	FOND	0.037	Cuivre	

MATERIAL DE BASE Y CONSTRUCCIÓN

Tipo	Espesor inicial nominal	Cu final teórico	Fabricante	Ref.fabricante
Cobre HTE	12 μ	37 μ	CIRCUIT FOIL	TZA
Prepreg 106 FR4>170Tg	2x0,05mm=0,10mm		ISOLA DUEREN	PCL-FRP-370HR 106-73
Core FR4>170Tg	0,18mm-17/17 μ	17/17 μ	ISOLA DUEREN	PCL-FR-370HR
Prepreg 2116 FR4>170Tg	1x0,11mm=0,11mm		ISOLA DUEREN	PCL-FRP-370HR 2116-52
Prepreg 2113 FR4>170Tg	1x0,09mm=0,09mm		ISOLA DUEREN	PCL-FRP-370HR 2113-57
Core FR4>170Tg	0,18mm-17/17 μ	17/17 μ	ISOLA DUEREN	PCL-FR-370HR
Prepreg 2116 FR4>170Tg	1x0,11mm=0,11mm		ISOLA DUEREN	PCL-FRP-370HR 2116-52
Prepreg 2113 FR4>170Tg	1x0,09mm=0,09mm		ISOLA DUEREN	PCL-FRP-370HR 2113-57
Core FR4>170Tg	0,10mm-17/17 μ	17/17 μ	ISOLA DUEREN	PCL-FR-370HR
Prepreg 2113 FR4>170Tg	1x0,09mm=0,09mm		ISOLA DUEREN	PCL-FRP-370HR 2113-57
Prepreg 2116 FR4>170Tg	1x0,11mm=0,11mm		ISOLA DUEREN	PCL-FRP-370HR 2116-52
Core FR4>170Tg	0,18mm-17/17 μ	17/17 μ	ISOLA DUEREN	PCL-FR-370HR
Prepreg 2113 FR4>170Tg	1x0,09mm=0,09mm		ISOLA DUEREN	PCL-FRP-370HR 2113-57
Prepreg 2116 FR4>170Tg	1x0,11mm=0,11mm		ISOLA DUEREN	PCL-FRP-370HR 2116-52
Core FR4>170Tg	0,18mm-17/17 μ	17/17 μ	ISOLA DUEREN	PCL-FR-370HR
Prepreg 106 FR4>170Tg	2x0,05mm=0,10mm		ISOLA DUEREN	PCL-FRP-370HR 106-73
Cobre HTE	12 μ	37 μ	CIRCUIT FOIL	TZA

• Definition of values and controlled impedance layers:

Controlled Impedance: -	TOP: width = 0.15 mm and clearance = 0.20 mm
Return planes: -	SIG_1; SIG_2 and SIG_3: width = 0.15 mm and clearance = 0.30 mm
	Layers: SIG_1, SIG_2, SIG_3, SIG_4
	SIG_1 & SIG_2 => GND2
	SIG_3 & SIG_4 => GND4
Differential impedance: -	100 Ω
Width: -	0.15 mm
Clearance in differential signals: -	0.30 mm
Clearance to GND: -	0.30 mm
Resin filled and capped: Diameter of vias: -	0.249

4 Delivery times / Terms and conditions of delivery and performance of services

Delivery is at the expense of the holder.

The equipment will be packaged to ensure safe transport.

The delivery time will be determined by the holder, provided that it does not exceed the maximum time limit.

Delivery may be made in several batches, which must be specified in the offer as mentioned in §3.2.

4.1 Maximum delivery time for all products

Maximum time limit: 10 months

4.2 Reviews, audits and milestones

A kick-off meeting will be organised (participants: CNRS/KM3NeT/Contractor) to initiate the service in order to validate the requirements related to the CCTP and the terms and conditions for the provision of the service.

Deliverable Kick Off: 1 signed report and a schedule

An audit may be carried out at the subcontractor's premises in order to verify the means of production, organisational charts and processes.

A Manufacturing Readiness Review (MRR): Organised before each series to validate the manufacturing file provided by KM3NeT, the subcontractor's manufacturing instructions and processes.

MRR deliverables: Approved manufacturing file + DfM report

A MIP (Manufacturing Inspection Point): to carry out key inspection points before and after manufacturing.

MIP deliverables: Inspection report (photos, measurements)



4.3 Delivery terms and premises layout

Deliveries are made on working days from Monday to Friday between 9am and 12pm and between 2pm and 5pm.

Packaging and delivery shall be borne by the contractor.

The contractor is responsible for packaging, packing, loading and stowage operations.

The risks associated with transport to the place of delivery are borne by the contractor.

The exact date of delivery of the services will be agreed upon between the laboratory and the contractor

The services delivered by the contractor or their representative must be accompanied by a delivery note drawn up in duplicate, specifying:

- ✧ The date of dispatch,
- ✧ Tender references,
- ✧ Identification of the contractor,
- ✧ Identification of delivered supplies.

Damage caused by deliveries and installations:

The holder remains liable for any damage of any kind caused by their agents or the carrier to equipment: buildings, land, plantations, installations, etc.....

The CNRS reserves the right to carry out itself or have carried out, on behalf of the holder, the repair of any damage caused.

4.4 CNRS Technical Correspondents

Jérôme PERRONNEL
Laboratoire de Physique Corpusculaire de Caen - LPCC
6 Boulevard Maréchal Juin
F-14050 Caen cedex
France



4.5 KM3NeT Technical Correspondents

David CALVO
Instituto de Física Corpuscular - IFIC
Parque Científico, Catedrático José Beltrán, 2
E-46980 Paterna
España

4.6 Delivery locations / Access

Delivery must be made to the following address:

ECS - Laboratorio CAPACITY
Attn : Guido Schioppa
Viale Carlo III di Borbone 153
81020 San Nicola la Strada (CE) Italie

Delivery hours:
Monday to Thursday, 10:00 a.m. to 2:00 p.m.
Friday: closed
Outside of the hours indicated, it will not be possible to load or unload.

5 Verification operations

Upon delivery, CNRS/KM3NeT performs the following checks and tests:

- Visual inspection
- Documentation check

5.1 Modalités de réception définitive des prestations

Final acceptance shall be declared within a maximum of two weeks after delivery, following verification checks and the provision of the documentation listed in this document.