Price Enquiry

Technical Specification
for the Supply of
ACME_1 (EDA-02063) boards

Abstract

This technical specification concerns the supply of 100 assembled and tested ACME_1 printed circuit boards, also known as EDA-02063 boards.

The delivery of the pre-series of 20 boards is required to be within 15 weeks following placement of the contract, while the remaining 80 boards are required to be delivered within 8 weeks after ACME’s acceptance of the pre-series.

Colours:
- Yellow: marked: to be completed
- Blue: options to consider on a case by case basis
- Green: examples
- [Red]: comments and guidelines to be removed before the document is released

January 2016
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## Terms and definitions

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<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>BGA</td>
<td>Ball Grid Array, a type of surface-mount package</td>
</tr>
<tr>
<td>BOM</td>
<td>Bill of Material (component list)</td>
</tr>
<tr>
<td>EDMS</td>
<td>Engineering Data Management System</td>
</tr>
<tr>
<td>FMC</td>
<td>FPGA Mezzanine Card standard VITA 57.1</td>
</tr>
<tr>
<td>FPGA</td>
<td>Field Programmable Gate Array</td>
</tr>
<tr>
<td>HPC</td>
<td>High Pin Count (400-pin FMC connector)</td>
</tr>
<tr>
<td>IPC</td>
<td>IPC — Association Connecting Electronics Industries (website <a href="http://www.ipc.org">http://www.ipc.org</a>)</td>
</tr>
<tr>
<td>OHL</td>
<td>Open Hardware Licence (website <a href="http://ohwr.org/cernohl">http://ohwr.org/cernohl</a>)</td>
</tr>
<tr>
<td>OHR</td>
<td>Open Hardware Repository (website <a href="http://ohwr.org">http://ohwr.org</a>)</td>
</tr>
<tr>
<td>PCB</td>
<td>Printed Circuit Board</td>
</tr>
<tr>
<td>PTH</td>
<td>Pin Through Hole</td>
</tr>
<tr>
<td>RoHS</td>
<td>Restriction of Hazardous Substances, EU Directives 2002/96/EC and 2002/95/EC</td>
</tr>
<tr>
<td>SMD</td>
<td>Surface Mount Device</td>
</tr>
</tbody>
</table>
1. **INTRODUCTION**

1.1 **Introduction to ACME**

The Acme Corporation is a fictional corporation that features prominently in the Road Runner/Wile E. Coyote cartoons as a running gag featuring outlandish products that fail or backfire catastrophically at the worst possible times. The name is also used as a generic title in many cartoons, films, TV series and comic strips.

Further information is available on the website: [https://en.wikipedia.org/wiki/Acme_Corporation](https://en.wikipedia.org/wiki/Acme_Corporation)

1.2 **Introduction to the Open Hardware projects**

CERN has made the Open Hardware Repository (OHR, [http://ohwr.org](http://ohwr.org)), which is a place on the web for electronics designers to collaborate on open hardware designs, much in the philosophy of the free software movement.

Anyone may reuse and produce the designs that are licenced under the CERN Open Hardware Licence (CERN OHL) conditions that can be found at [http://www.ohwr.org/cernohl](http://www.ohwr.org/cernohl). The CERN OHL is also applicable to this hardware development.

The designs on OHR may be used by other companies or institutes for their own specific purposes. The CERN OHL allows any company, including the successful bidder, to produce boards for use by themselves or for sale to third companies.

*The successful bidder is encouraged to sell the OHR designs as products much in the way as other products in their catalogue.*
2. SPECIFICATION OF THE SUPPLY

This technical specification concerns the supply to ACME of assembled and tested ACME_1 printed circuit boards. The successful bidder (hereinafter referred to as the “contractor”) shall deliver the boards (hereinafter also referred to, in whole or in part, as the “supply”) as defined in this technical specification.

2.1 General Description of the Board

The ACME_1 (EDA-02063) board’s function is to convert analogue signals into digital values on an FMC mezzanine card. It will not be used in radioactive environments.

The main characteristics are:

- 4 input channels;
- Maximum sample rate of 105 MS/s;
- 14 bits per sample;
- FMC format with high pin count (HPC) connector;
- 6-layer PCB;
- Component package types: SMD (0603, QFN52, DFN8, etc.) and through-hole. No BGA packages are used on the board.

The top side of a prototype of the EDA-02063 board is shown in Figure 1. The bottom side contains only passive components. The size is approximately 77 mm x 69 mm. The final design may differ.

Figure 1 – Image of a prototype of the top side of EDA-02530 board and front-panel
2.2  **Deliverables Included in the Supply**

The boards to be manufactured are fully described in the Manufacturing File provided by ACME (see § 4.3). This file, downloadable from ACME’s Engineering Data Management System (EDMS), contains Printed Circuit Board (PCB) information, parts lists, component placement drawings, mechanical drawings and circuit diagrams.

The supply of the boards shall include:

- The purchase of the components and materials according to the BOM;
- The manufacturing and assembly of the PCBs followed by testing;
- The manufacturing of mechanical parts;
- The assembly of the different parts;
- The final functional testing of the boards;
- The test results;
- The delivery to ACME (where included).

2.3  **Free-issued Items Supplied by ACME**

- Barcode stickers

2.4  **Items Loaned by ACME**

ACME will loan to the contractor until twelve weeks after the supply of the boards:

- A test bench to perform the functional tests of the assembled boards;
- One reference production model of the assembled board.

If the contractor needs these items for a longer period, for example for purposes of guarantee or for other productions, he will have the possibility to purchase them from ACME.

If during the loan any of the loaned items breaks, the contractor should bear the cost of the repair.

2.5  **Functional Test**

ACME will supply test equipment to the contractor for the functional testing of the board. The duration for the functional test for each board is estimated at 10 minutes. This time includes the unpacking, identifying with a barcode sticker, connecting the board to the test system, performing the actual test, disconnecting and the final repacking. The test covers around 90% of the total functionality of the board.

2.6  **Pre-series and Series Manufacturing**

The fabrication of a pre-series is requested by ACME to verify that the supplied items are produced according this technical specification. Experience has shown that a pre-series production often brings up issues that should be corrected before the series production could be started. For example, it has happened that ACME had to reject the pre-series production batch as the quality of the PCB silkscreen or the quality of assembly were not as specified or that the wrong version of production files was used.
For this reason the contractor is strongly encouraged to produce only the necessary PCBs and front-panels required for fabricating the pre-series and await ACME’s approval prior to fabricating the series.

The following quantities are required:

- Pre-series: 20;
- Series: 80.

2.7 Repairs Beyond Initial Warranty Period

Beyond the initial warranty period, ACME requests the contractor to provide a repair service for the boards. The contractor shall ensure that the repair time will not exceed ten weeks. The repair service will not be located at the ACME site.

2.8 Options

ACME reserves the right to purchase different options.

2.8.1 Warranty Extension

- One year warranty extension beyond the initial warranty period (three year warranty in total);
- Three years warranty extension beyond the initial warranty period (five years warranty in total).

2.8.2 Additional Supplies

After the delivery of the quantity of the supply as specified in § 2.6, ACME reserves the right to purchase the following additional supplies:

- Series: 10-30;
- Series: 31-50;
- Series: 51-100.
3. TECHNICAL REQUIREMENTS

3.1 Manufacturing of Printed Circuit Boards
The PCB shall be manufactured according to ACME’s PCB manufacturing files and the PCB fabrication specification (see § 4.3).
ACME requires an electrical test of each manufactured bare PCB. A written record of these test results is required for each batch of PCBs. The PCBs shall bear the manufacturer’s identification and the date of manufacturing (year and week). Any PCBs held in stock for more than one month shall be dried out and sealed in appropriate moisture barrier bags with a small bag of desiccant inserted.

3.2 Material

3.2.1 Material and Components Purchasing
Except for the free-issued items supplied by ACME (see § 2.3), the contractor shall purchase all materials and components exactly as specified in the Bills of Materials (BOMs) listed in the Manufacturing File. The selected components are RoHS compliant (see § 3.9.2).
No alternative components shall be used without ACME’s written approval.
The components are:
• Surface Mount Devices (SMD) or Pin Through Hole (PTH) components;
• Discrete devices such as resistors, capacitors, diodes, transistors, ferrites;
• Connectors;
• Mechanical front-panel according to Manufacturing File drawings;
• Printed Circuit Boards.
The testing of standard components is not required. However, the contractor shall verify the identification of the components and ensure that the references comply with the BOM.

3.2.2 Traceability of Components
The contractor is not requested to perform a complete traceability of components mounted in the modules. However, the contractor shall at the end of the production period provide in a spreadsheet file the date code and specific reference (manufacturer) of each reference used for the execution of the production. This allows, upon discovery of a component default, knowing whether the whole production is affected or not.

3.2.3 Storage
ACME requires a strict discipline to be applied to protect all components in the goods inwards and stores areas. This is particularly important for surface mounted devices. The components shall be stored in conditions that minimize the growth of oxides on surfaces to be soldered and held in sealed bags or boxes containing dry desiccant (e.g. Silica Gel).
All items supplied by ACME (free-issued and those on loan) shall be stored with a clear marking “ACME property” and be separated from any other components.
3.3 Assembly Work

3.3.1 Assembly of Printed Circuit Boards
The assembly of the equipped PCBs will consist of mounting and soldering through-hole components and surface mounted components, on both sides of the boards. The application of the IPC Standards Class 2 (see § 3.9.3) shall be fully respected, especially for the following points:

- Handling Electronic Assemblies;
- Component Installation Location/Orientation;
- Soldering Acceptability Requirements;
- Cleanliness Acceptability Requirements;
- Marking Acceptability Requirements;
- Surface Mount Assemblies Acceptance Requirements.

The boards must be soldered using lead-free solder and must be RoHS compliant. Both sides of the assembly need to be cleaned. On 10% of the boards produced a test for ionic residues is required (IPC/EIA J-STD-001, Cleanliness Designator C-22 & section 8.3.6). Also after rework or repair assemblies shall be cleaned to meet the Cleanliness Designator C-22.

3.3.2 Assembly of Mechanical Parts
All screws shall be tightened so as to withstand multimodal transport from the manufacturing site to the ACME site. Items shall be aligned during the mechanical assembly without applying any force.

3.3.3 Identification
Before performing the functional test, each board shall be individually identified using a barcode sticker provided by ACME. This specific sticker will include an individual ID (serial number). The contractor may add additional identifications to the board.

3.4 Tests to be Carried Out at the Contractor's Premises
ACME reserves the right to be present, or to be represented by an organization of its choice, to witness any tests carried out at the contractor's or his subcontractors' premises. The contractor shall give at least two weeks in advance notice of the proposed date of any such tests.

3.4.1 Assembled Printed Circuit Boards
The contractor shall individually inspect all parts according to the applicable standards (see § 3.9.3). All component defects and assembly errors shall be eliminated.

3.4.2 Mechanical Parts
The dimensions of the mechanical parts shall be checked to ensure conformity, i.e. the dimensions shall be within the specified tolerances. Items which are outside tolerance for straightness, hole position or other reasons shall be rejected.
3.4.3 Functional Test
ACME requests a functional test for each assembled PCB via the existing connectors. For these tests, ACME will supply test equipment to the contractor. This equipment will be delivered at the start of the production. ACME will provide written instructions that explain the use of it. All items requiring component changes, re-soldering etc., shall be treated as untested items and shall be passed through the entire inspection and test procedures again.

3.5 Packaging
Each assembled and tested board shall be individually packaged in a metallised ESD protective bag that is closed with an ESD Sensitive Product warning label. The use of pink polyethylene ESD protective bags is not acceptable.

Each single board in its ESD bag shall be placed in an individual cardboard box with appropriate shock absorbing material. Each box shall be individually identified using a barcode label provided by ACME. This label will include an ID that corresponds to the barcode label on the board.

3.6 Transport to ACME
The contractor is responsible for the packing for shipment and, where included, the transport to ACME. He shall ensure that the equipment is delivered to ACME without damage or deterioration in performance due to transport conditions.

3.7 Tests Carried Out at ACME
Acceptance tests will be carried out at ACME to establish that the boards meet the specification and that no damage or changes have occurred during transport. A representative of the contractor is not required for these tests but may be present.

In the event of any errors found during the acceptance test, the contractor shall correct them at his cost at the ACME site. Acceptance of the supply will only be granted after successful tests.

In the event that during the warranty period, as defined in article 25 of the General Conditions of ACME Contracts, the supply does not fully meet this technical specification, ACME reserves the right to repeat the acceptance tests. Any deviations from the specification shall be corrected immediately at ACME at the contractor’s cost.

3.8 Information and Documentation Management
All specified tests and measurements carried out during all stages of production, from material procurement up to delivery shall be recorded. The contractor shall provide these records to ACME at the end of the production period.

ACME requires that all boards to be produced are supported by an approved and formal process designed to monitor and record each phase of the manufacturing, such that complete conformity with the requirements of this specification is achieved.

This process includes individual sub-assembly inspection and test procedures accompanied by written records in electronic format at each stage, and shall allow all faults to be rapidly located, identified and their causes eliminated by the contractor.
3.9 Applicable Regulations and Standards

The following regulations and standards, in order of priority, are applicable for the execution of the Contract.

3.9.1 ACME Regulations


Particular attention should be paid to the base material for the printed circuit boards that should not contain brominated fire retardants (IS 41, section 2.1.4).

3.9.2 EU Regulations

Hazardous material content for substances listed in the RoHS Directive shall be within the limits defined in EU Directives 2002/96/EC and 2002/95/EC and relevant amendments.

3.9.3 International Standards

For the manufacturing of PCBs:

For the assembly of PCBs:
- IPC Standard IPC-A-610 (Class 2);
- IPC Standard IPC/EIA J-STD-001 (Class 2);
  - Cleanliness Designator C-22 (both sides of assembly to be cleaned; test for ionic residues required on 10% of the boards produced).


3.9.4 CERN Open Hardware Licence

- CERN Open Hardware Licence (CERN OHL), [http://www.ohwr.org/cernohl](http://www.ohwr.org/cernohl).
4. PERFORMANCE OF THE CONTRACT

4.1 Delivery Schedule
The delivery schedule is as follows:

<table>
<thead>
<tr>
<th>Items</th>
<th>Date</th>
<th>Relative date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract awarded</td>
<td>Fri 04/04/16</td>
<td>J</td>
</tr>
<tr>
<td>Delivery of the purchasing plan, component delivery schedule, board production and process plan (see § 4.4)</td>
<td>Fri 18/04/16</td>
<td>J + 2 weeks</td>
</tr>
<tr>
<td>Approval by ACME of the purchasing plan, component delivery schedule, board production and process plan (see § 4.4)</td>
<td>Fri 25/04/16</td>
<td>J + 3 weeks</td>
</tr>
<tr>
<td>ACME supplied items delivered to contractor (see § 2.3)</td>
<td>Fri 13/06/16</td>
<td>J + 10 weeks</td>
</tr>
<tr>
<td>ACME delivers items on loan (see § 2.4)</td>
<td>Fri 13/06/16</td>
<td>J + 10 weeks</td>
</tr>
<tr>
<td>Delivery of the pre-series</td>
<td>Fri 18/07/16</td>
<td>J + 15 weeks</td>
</tr>
<tr>
<td>Acceptance by ACME of the pre-series</td>
<td>Fri 25/07/16</td>
<td>J + 16 weeks</td>
</tr>
<tr>
<td>Delivery of the series</td>
<td>Fri 19/09/16</td>
<td>J + 24 weeks</td>
</tr>
<tr>
<td>Delivery of traceability files (see § 3.2.2) and test reports (see § 3.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptance by ACME of the series</td>
<td>Fri 03/10/16</td>
<td>J + 26 weeks</td>
</tr>
<tr>
<td>Return of items loaned by ACME (see § 2.4)</td>
<td>Fri 12/12/16</td>
<td>J + 36 weeks</td>
</tr>
</tbody>
</table>

4.2 Preliminary Manufacturing Schedule
The bidder shall propose a preliminary manufacturing schedule with the offer, based on the specified delivery schedule.

4.3 Manufacturing File
The Manufacturing file with production documents is available at:
- [https://edms.cern.ch/nav/EDA-02063-V5.0](https://edms.cern.ch/nav/EDA-02063-V5.0) (tab Documents)

The above Manufacturing File is for tendering purposes only.
The final version for manufacturing will be provided by ACME to the contractor with the contract.
4.4 Production Process
The contractor shall build the boards according to the Manufacturing File provided with the contract. Deviation from this final version of the Manufacturing File is not allowed. However, it is possible for the bidder to propose with its bid improvements to the Manufacturing File, mainly on mechanical design and component choice. These modifications can be either accepted or rejected by ACME and, if relevant, shall be added to the final version of the Manufacturing File.

The contractor shall supply, within two weeks after placement of the contract, a written program giving:
- the purchasing plan and component delivery schedule;
- the production and process plan.

4.5 Contract Execution

4.5.1 Responsibility for Design, Components and Performance
The contractor shall be responsible for the correct performance of all items supplied, irrespective of whether they have been chosen by the contractor or defined by ACME.

The contractor shall be responsible for the production quality and the delivery (where included) of all boards that shall have successfully passed all tests made on the provided test bench. ACME assumes responsibility for the performance of items supplied by ACME.

ACME reserves the right to make minor modifications to the specification before placing the contract. These minor changes must not affect the contractual price which shall remain fixed.

4.5.2 Contract Follow-up
The contractor shall assign an engineer responsible for the contract and its follow-up including all contacts with ACME throughout the duration of the contract.

4.5.3 Deviations from this Technical Specification
If, after the contract is placed, the contractor believes that he has misinterpreted this technical specification, this will not be accepted as a justification for deviation and the contractor shall deliver equipment in conformity with this technical specification at no additional cost.

During execution of the contract, all deviations proposed by the contractor from this technical specification, the tender, or any other subsequent contractual agreement, shall be submitted to ACME in writing. ACME reserves the right to reject or accept such proposals without justification.

ACME reserves the right to modify this technical specification during execution of the contract. The consequences of such modifications shall be mutually agreed between ACME and the contractor.

4.6 Factory Access
ACME and its representatives shall have free access during normal working hours to the manufacturing or assembly sites, including any subcontractor’s premises, during the contract period. The place of manufacturing, as stated in the price enquiry documentations, may only be changed after written approval by ACME.
5. **ACME CONTACT PERSONS**

Persons to be contacted for technical matters:

<table>
<thead>
<tr>
<th>Name/Department/Group</th>
<th>Tel-Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr W.E. Coyote</td>
<td>Tel: +1 23 456 789</td>
<td><a href="mailto:W.E.Coyote@ACME.ch">W.E.Coyote@ACME.ch</a></td>
</tr>
<tr>
<td>In case of absence:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mrs E.J. Fudd</td>
<td>Tel: +1 23 456 780</td>
<td><a href="mailto:E.J.Fudd@ACME.ch">E.J.Fudd@ACME.ch</a></td>
</tr>
</tbody>
</table>

Persons to be contacted for commercial matters:

<table>
<thead>
<tr>
<th>Name/Department/Group</th>
<th>Tel-Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mrs T. Avery</td>
<td>Tel: +1 23 456 783</td>
<td><a href="mailto:T.Avery@ACME.ch">T.Avery@ACME.ch</a></td>
</tr>
<tr>
<td>In case of absence:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr E.G. Head</td>
<td>Tel: +1 23 456 784</td>
<td><a href="mailto:E.G.Head@ACME.ch">E.G.Head@ACME.ch</a></td>
</tr>
</tbody>
</table>

ACME wishes to ensure that no doubt exists as to the interpretation of this technical specification. The bidder is therefore encouraged to contact ACME and discuss details of this technical specification before submitting an offer.