



Micross Components Technical Paper

NOTES FOR CHECK LIST FOR DESIGN REVIEW 1.

Design Review 1 is intended to ensure that the requirements of the proposed programme of work are well understood particularly with regard to specification, resources, costs and timescales. Approval of this stage is an acceptance by all attendees that the details of the specification are acceptable and that the required timescales and costs are likely to be met.

The points in the checklist are not expected to be a complete list of every possible thing which may require to be discussed and agreed. They are intended to promote discussion and to attempt to ensure that problems which have occurred before do not recur. Any significant new problem area which arises in the future should be added in the form of a new check list point. The following notes outline the areas of discussion relevant to each point on the list.

1.0 Overview.

This is simply an introduction and should be presented by the designer assisted where necessary by the customer. It is intended to familiarise the other attendees, most of whom will be meeting the design for the first time, with the requirement and application.

1.1 The designer should cover the design requirement in sufficient detail to form a basis for the rest of the meeting. The application area and environment should be described and any key or particularly difficult areas brought out for discussion.

2.0 Documentation.

It is important that sufficient documentation exists at this point to enable the project to begin but it is accepted that some documentation will be available in only outline or preliminary form. Actions should be agreed as necessary to ensure where shortcomings in the requirements are found that they are addressed. In general these actions should be completed before the review is approved to ensure that the project is not subsequently held up or derailed when disagreements arise.

2.1 There should be a target specification provided by the customer and it should have been thoroughly reviewed prior to this meeting by all participants. Any conflicts must be resolved and it is a necessary outcome that an agreed specification is in place before the review is passed. It is acceptable that non-critical areas of the specification can be left to be defined during the detail design phase but only provided any associated risks and or costs are well understood and agreed.

2.2 There should be a functional, block diagram, detail diagram or existing implementation either provided by the customer or drafted by the designer to assist in the discussions but it is not a requirement. It does not take the place of the specification but helps in its comprehension and can be used to demonstrate a possible implementation.

2.3 There may be a written description of the design particularly if the project replaces an existing discrete implementation. It is not a requirement. It should be noted that if available 2.2 and 2.3 make the requirement considerably more comprehensible especially to those attendees who have not been involved in detailed discussions prior to this meeting.

2.4 The job specification must define who is responsible for what. It should make it clear what work is to be done, whether the customer or contractor will carry out any particular job and who will underwrite it i.e. sign it off. This is a mandatory item.

2.5 The development plan should take the form of a Gantt chart with as a minimum the following milestones:

- design reviews DR2, DR3
- tape release and mask procurement
- silicon delivery and prototype delivery
- test program availability

and any other milestones as agreed with the customer. It must be agreed before passing the review and is to be used to monitor progress and keep all participants aware of reschedules. Where there are dependencies on external activities (e.g. sample approval etc.) these should be clearly shown.

3.0 Design Route.

The design route check points are intended to agree and document the proposed technology and to ensure that the necessary information, tools and resources are available to meet the required timescales. All of these points must be agreed before the review is passed.

3.1 The technology and vendor will normally have been selected at this point for a costing to have been done. Any information or concerns that anyone has regarding the stability or reliability of the vendor or technology should be discussed. The relative advantages over alternates should be discussed.

3.2 The design rules and relevant libraries should be available. The vendor should be contacted to ensure that the latest releases are available and are frozen for the anticipated period of the development. It should be confirmed that the toolset to be used supports the technology for all phases of the project. The situation regarding process availability and/or changes during the anticipated production period should be established.

3.3 Exactly who will do the work? Are they available in the required time frame? Are there any latent issues which may make the required staff unavailable at short notice and what are the fallbacks?

3.4 Is the development plan (2.5) realistic, will it be met and what contingency is there? At what points will feeds be available for test, assembly etc?

3.5 What are the major identified risks and what steps are proposed to minimise them? Examples of perceived risks are:

- Lack of familiarity with vendor, process, libraries or tools.

- Novel design techniques required.

- Tools support (e.g. DRC runset etc.) required.

- Perceived marginality to process capability on e.g. speed, noise, power, voltage

- Difficulties in establishing or agreeing specifications.

- Priority clashes with other jobs.

or any other perceived risk either to the timescales, costs or achievability of the project.

4.0 Test Requirements

Test requirements need to cover the broad spectrum from evaluation of initial samples (both in-house and with the customer) to qualification and viable production testing. The checklist is intended to ensure that the test requirements are established and that the necessary equipment and resources will be available.

4.1 The test specification defines the level of test which will assure that the product can be supplied against the customer's procurement specification. It will be based on the target specification although certain parameters may be assumed guaranteed by design or by sampling. It may be required to test both at probe and final test and in this case a separate probe test specification will need to be derived which balances the cost and practicality of probe testing against final test yield loss. The test specification does not require to be firm at this review provided that the general test requirements and viability are established.

4.2 Testability issues cover device, equipment and economic considerations. At this review it is only necessary to draw attention to any specification parameters which are impractical to measure and to discuss in general terms the controllability and observability of the various elements.

4.3 The screening level should have been established and it must be agreed before the next review since it may impinge on aspects of the design, layout, packaging considerations etc..

4.4 Qualification requirements should have been established but are not necessarily mandatory for this review provided that the costing takes account of likely expenses. High-reliability or space projects require the qualification to be costed and included in the plan.

4.5 Test timescales need to take into account evaluation requirements for prototypes, any requirements for tested samples and the production ramp-up in terms of probe and final test. Any unusual qualification or characterisation requirements also need to be addressed and the timescale for these established. The availability of man and machine time needs to be considered. Agree whether test requirements can be addressed within the required project timescales.

5.0 Assembly Requirements

The assembly may range from supply of naked die through in- or ex-house packaging of either single or multi-chips. It is not absolutely necessary to have determined the particular package for this review but it is necessary to discuss the topic generally so that it can be established what decisions have to be taken and by when.

5.1 Package type considerations include customer's preference, likely dissipation, application, probable die size, special parasitic requirements etc. For in-house assembly the lead-times need to be established. For ex-house assembly the range of leadframes and assembly rules need to be obtained. If possible the package should be agreed now but it must be agreed before the next review in time for the electrical design to take account of it. Is the die size estimate in line with packaging requirements?

5.2 Package approval status appropriate to the screening level needs to be established. Especially for space and high-rel applications this needs to be confirmed at this review since package qualifications are costly and time-consuming.

5.3 Special tooling requirements include crop and form, socketing and/or carriers for test and/or burn-in, burn-in requirements, centrifuge etc. as well as any actual package assembly requirements. Agree requirements and availability within the project timescales.

5.4 Check that assembly requirements can be addressed within the required timescales and agree when critical decisions have to be taken.

6.0 Commercial Requirements.

These are generally self-explanatory and all require to be agreed for this review. The project will not proceed until commercial considerations are satisfied.

6.1 Can the die cost requirement be met on the proposed process taking into account complexity, design methodology, volumes and projected yield?

6.3 Is the unit cost estimate valid taking into account 6.1, probe, assembly, test, screening and/or other special costs.

6.4 Can the required volumes be handled through assembly and test? Do the projected volumes and asp adequately compensate for the engineering commitments?

6.5 Is any equipment or service hire required for design, qualification or test? If extra capacity is required for production is the capital available in the required timescales? Are any package tooling costs required etc?

7.0 Safety and Reliability.

This section takes account of in-service reliability and liability aspects. It is necessary to satisfy these questions before the project is allowed to proceed.

7.1 Is the product known to be used in life or safety critical applications? Are there any indemnity or insurance implications? Is the contractual position clear? Are the risks to Micross Components acceptable?

7.2 Is the reliability requirement stated? Is it achievable? Are there any special precautions or design techniques required?

7.3 Have any early reliability predictions been made based on e.g. estimated complexity, packaging etc. and are they in line with requirements? Is information and supporting evidence available for the process? Are there any anticipated problems? Is any other information required before allowing the project to proceed?

7.4 Are the ESD requirements stated? Are they achievable on the proposed process and is supporting evidence available? Are there any implications on the design?

8.0 Documentation Status.

It is important that control is maintained over the documentation status. There should be formal mechanisms to ensure that revisions to specifications etc. are properly controlled so that during the design phase any changes are properly reflected in the project. As a check at each review the documentation status is verified and agreed to ensure that everyone is working to the same revisions.

8.1 Is the current revision of the various documentation agreed? Is the project box file contents list up to date?

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