DOCUMENT CHANGE REQUEST

DCR number 855	Changes required for: General	Originator: Steve Thacker	
Date: 2015/09/08	Date sent: 2014/04/08	Organisation: ESCC Executive Secretariat	
Status: IMPLEMENTED			

Title:	Generic Specification for Integrated Circuits Monolithic		
Number:	9000	Issue:	6

Other documents affected:

Page:

See below

Paragraph:

See below

Original wording:

See ESCC 9000 issue 6 (& attached Draft Specification)

Proposed wording:

The following changes apply:
See attached mark-up MSWORD draft specification 9000 draft 7C for details (changes are highlighted in blue text).

1) Title:
Amend title to be as follows:

“INTEGRATED CIRCUITS (MONOLITHIC AND MULTICHIP MICROCIRCUITS), HERMETICALLY SEALED”

2) Para 1.1, SCOPE
Amend 1st sentence to be as follows:

“This specification defines the general requirements for the qualification, qualification maintenance, procurement, and delivery of hermetically sealed integrated circuit components (monolithic and multichip microcircuits) for space applications.”

3) Para 2.1, 6.2.1, 8.22, 9.7, Chart F2 & Chart F2 Note 5
Radiographic Inspection (per ESCC No. 20900) has been added to Screening Tests (similar to ESCC No. 5000).

Note - See justification below for proposal how to handle the impact of this change on all published ESCC 9xxx/xxx Detail Specifications.

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4) Para 3, TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS
Add the following:

“In addition, the following shall apply:

• Integrated Circuit (Microcircuit): A small circuit having a high equivalent circuit element density, which is considered as a single part composed of interconnected elements on or within a single substrate to perform an electronic circuit function.

• Monolithic Microcircuit: An integrated circuit or microcircuit consisting exclusively of elements formed in situ on or within a single semiconductor substrate with at least one of the elements formed within the substrate.

• Multichip Microcircuit: An integrated circuit or microcircuit consisting of elements formed on or within two or more semiconductor dice which are separately attached to a substrate or package.”

5) Para 5.2.1, 5.2.2, 5.2.3
Amend the 1st sentence to be as follows:

“For both monolithic and multichip microcircuits, process monitoring review shall be done in compliance with the Manufacturer’s SPC rules described in the PID (for qualification, qualification maintenance or procurement of qualified components).”

6) Para 5.2.2, Scanning Electron Microscope (SEM) Inspection
Amend the 1st sentence to be as follows:

“For both monolithic and multichip microcircuits, semiconductor dice incorporated into components supplied to this specification shall originate from a wafer lot that has been subjected to, and successfully met, the Scanning Electron Microscope Inspection requirements in accordance with Para. 8.3.”

7) Para 5.2.3: Total Dose Radiation Testing
Amend to be as follows:

“For qualification or qualification maintenance of both monolithic and multichip microcircuits:
• If specified in the Detail Specification, semiconductor dice incorporated into components shall originate from a wafer lot which has been subjected to and successfully completed Total Dose Radiation Testing in accordance with Para. 8.4 to the specified total dose level.

During procurement of both monolithic and multichip microcircuits:
• If specified in the Detail Specification and stipulated in the Purchase Order, semiconductor dice incorporated into components shall originate from a wafer lot which has been subjected to and successfully completed Total Dose Radiation Testing in accordance with Para. 8.4 to the stipulated total dose level.”

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8) Para 8.2.1, Bond Strength
Add the following after the bond wire sampling subpara:

“For multichip microcircuits, the above internal bond wire sampling shall apply to each semiconductor die incorporated into the component.”

9) Para 8.2.2, Die Shear or Substrate Attach Strength
Add the following:

“For multichip microcircuits, testing shall be performed on each semiconductor die incorporated into the component.”

10) Para 8.4, TOTAL DOSE RADIATION TESTING
Add the following:

For both monolithic and multichip microcircuits, testing shall be performed on each semiconductor die type incorporated into the component, in accordance with the Detail Specification.

11) This specification has been migrated from Framemaker to MSWORD publishing software; accordingly some additional minor editorial changes in terms of presentation, apply.

Justification:

Item 1, 2, 4, 5, 6, 7, 8, 9, 10:
To add the option for the specification of “multichip microcircuits” under ESCC 9000.

Justifications for specific items are as follows:

3: Radiographic Inspection is added to check package seal, die attach integrity etc., for both types (monolithic & multichip microcircuits)

Note – for all currently published ESCC Detail specifications, 9xxx/xxx, where Radiographic Inspection is by definition currently not required, a deviation to make this new Radiographic Inspection not applicable will be added to each appropriate Manufacturer’s Appendix. It is proposed that this change will be implemented, in due course, in to each Detail Specification at the same time as the ongoing publishing software migration activity (i.e. Framemaker to MSWORD).

4: The definitions are taken from MIL-PRF-38535

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7 & 10: Testing the radiation performance for each individual die is considered sufficient to be able to verify the performance at component level (specifically for multichip microcircuits). Accordingly, radiation testing for both monolithic and multichip microcircuits is only performed at die/wafer level.
Note - this means that for multichip microcircuits, there is no option to have a test at component level (i.e. after assembly/encapsulation).

For monlithic microcircuits, the radiation test requirements shall be as specified in the ESCC Detail Specification (i.e. no change from the current system where bias conditions and electrical measurements are specified in the Detail Specification).

For multichip microcircuits, the radiation test requirements for each individual die type used shall also be as specified in the ESCC Detail Specification; but exactly how they will be specified will vary from Detail specification to Detail specification, depending on the details of the semiconductor dice used.

Attachments:

9000_issue_7_draft_e_(2015_09_08).docx, 9000_issue_7_draft_d_(2015_03_25).docx, 9000_issue_7_draft_c_(dcr_attachment_2014_04_08).docx

Modifications:

The original content of this DCR is modified as follows based on the contents of the final revision of ESCC 9000 (Draft 7E; see attached) as effectively approved by the PSWG during meeting #69 on 24/06/2015:

Note: 9000 draft 7E is the same as draft 7D (as reviewed and approved by the PSWG) with one addition per item 12) below as agreed with the PSWG during meeting #69.

Note: the item numbers given below refer to the same item numbers in the original DCR855

3) This Item and all changes to add Radiographic Inspection to Screening Tests are removed from the DCR

4) The new definitions are amended to be as follows (based on definitions in MIL-PRF-38535 as modified by the PSWG):

- Integrated Circuit (Microcircuit): A small circuit having a high equivalent circuit element density, which is considered as a single part composed of interconnected elements on or within a single substrate to perform an electronic circuit function. Monolithic Microcircuits and Multichip Microcircuits are considered as Integrated Circuits.

- Monolithic Microcircuit: A microcircuit consisting exclusively of elements formed in situ on or within a single semiconductor substrate with at least one of the elements formed within the substrate (with a single semiconductor die).

- Multichip Microcircuit: A microcircuit consisting of two or more semiconductor dice coming from the same manufacturer, from one or more foundries, individually attached to a single package cavity.

The following new items are added to DCR855:

12) Para 5.3, 6.1, 7.1.1; Add the following clarification subpara:

For Monolithic Microcircuits, tests and inspections shall be performed at Monolithic Microcircuit level. For Multichip Microcircuits, tests and inspections shall be performed at Multichip Microcircuit level.

13) Para 5.3.2; Add the following subpara:

For Multichip Microcircuits, testing shall be performed on each semiconductor die incorporated into the component.

Approval signature:

Date signed:

2015-09-08