# DOCUMENT CHANGE REQUEST

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| DCR number 694 | Changes required for: General | Originator: Steve Thacker |
| Date: 2015/12/08 | Date sent: 2011/12/22 | Organisation: ESCC Executive Secretariat |
| Status: IMPLEMENTED | | |

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|---|---|---|---|
| Title: | Generic Specification for Capacitors Fixed Ceramic Dielectric Types I and II | | |
| Number: | 3001 | Issue: | 1 |

Other documents affected:

Page:

Total reformat/re-write of ESCC Generic Specification 3001 issue 1 as part of the ongoing conversion of legacy ESA/SCC specifications to the ESCC format.

Paragraph:

all

Original wording:

The Generic Specification is proposed to be extensively amended to incorporate various policy, technical & editorial amendments & corrections in order to bring it in line with other ESCC Generic Specifications that have already been converted to the new ESCC format.

The layout, format and general structure, and editorial content of ESCC 3001 issue 2 draft C are based closely on ESCC 5000 issue 6 per DCRs 149, 236, 286, 313 & 399 (all approved).
The proposed technical content of ESCC 3001 draft 2C is based on the current content of ESCC 3001 issue 1.

This DCR summarises all the amendments to ESCC 3001 issue 1, plus identifies the additional editorial & technical changes to ESCC 3001 issue 1 not already generally detailed and justified by DCRs 149/236/286/313/399.

For full details of the proposed contents of ESCC 3001 issue 2 see the attached draft Generic specification ESCC 3001 issue 2 draft C.

Note - the content of ESCC 3001 draft 2C per this DCR is very similar to the content of ESCC 3009 draft 2C.

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Change Details:

A) Main General Changes (similar to those already incorporated into ESCC5000 issue 6):

1) The SCC testing levels B and C have been deleted; there is now only a single ESCC testing level, equivalent to old SCC level C, but it is not given a specific designation. All requirements applicable to ESCC level B are deleted (e.g. Parameter Drift Value measurements, Radiographic Inspection and serialisation during screening, documentation requirements)

2) Qualification and Lot Acceptance Testing charts have been incorporated, with some modifications, into a single Chart F4,

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Qualification and Periodic Tests. Modifications include:
- Periodic testing is mandatory for ESCC qualified components with a defined testing schedule.
- Lot Acceptance Testing has been deleted but an Orderer option for similar Lot Validation Testing, for procurement, has been added. Lot Validation Testing is not mandatory and will only be done if specifically stipulated by the Orderer in the PO. The requirement for LAT level 3 as a minimum for non-qualified component procurement is removed.
- Operating Life is always 2000hours (previously was 2000hours for Qual / 1000hours for LAT2)
- No failures are allowed during Chart F4 testing.

3) Introduction of Technology Flow Qualification per ESCC No. 25400 to the Generic spec.

4) Introduction of ESCC 23100 (ESCC Recommendations on the use of the ESCC Specification System for the Evaluation and Procurement of Unqualified Components) to the generic spec.

5) The Generic Specification has been made applicable and fully usable for procurement of unqualified components as well as for ESCC Qualified components.

6) Clarification that the term PID is specific to ESCC qualified components.

7) The minimum required delivered documentation to the customer for procurement is a Certificate of Conformity & a Cover sheet.

8) The maximum allowed delay for Lot failure notification (provided by the Manufacturer) is now 5 working days (was 2).

9) Check for lot failure during Screening (PDA), only includes Electrical Parameter limit failures (excluding the mechanical, handling, lost and visual failures counting towards PDA in ESCC 3001 issue 1)

10) The General Flow Chart I is replaced by Chart F1; It clarifies the flow of components for Procurement.

11) Para 5 & Chart F2, Production Control/Special In-Process Controls, replaces Paras 5 & 6 and Chart II.

12) Chart III Burn-in and Electrical Measurements, has been replaced by Chart F3, Screening Tests.

13) When using the ESCC System to procure components from an unqualified source and marking the parts with the ESCC component number, the Manufacturer should possess a manufacturing and quality assurance system that is compatible with space application. As such, the user expectation should be that parts would be compatible with passing the testing requirements of Chart F4. Accordingly the requirement placed on qualified sources to not knowingly supply components that cannot meet the Chart F4 testing is extended to unqualified sources.

14) Material outgassing reference document is corrected to be ECSS-Q-ST-70-02.

15) Para 9.4, Dimension Check is performed on 3 samples instead of 5.

16) Para 9.5.3, Electrical Measurements at High and Low Temperatures (Para 8.6.3 in ESCC 3009 draft 2C): A default

sample of 5 components with 0 failures (otherwise 100%) is fixed for this test.

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B) Other Editorial and/or Technical Changes (specific to ESCC3001):

17) Para 2.2, (Para 2.2 in ESCC 3001 draft 2C)
Reference documents that are not actually referenced in 3001 are removed,
i.e. ESCC20900, IEC No.410.
Obsolete IEC and ECSS references are corrected.

18) Para 4.1.5 Pre-encapsulation Inspection: requirement for the Orderer to be notified in order to be able to witness the pre-encapsulation Inspection is deleted.

19) Para 5.2.2, Steady State Humidity Test (Para 8.2 in ESCC 3001 draft 2C): It is clarified that Capacitance, Tangent of Loss Angle & Insulation Resistance are all measured at 1.5V during the final measurements.

20) Para 8.1.2, Distribution of the Qualification Test Lot (Para 7.1.2 in ESCC 3001 draft 2C)
The sample distribution of the Qualification Test Lot is amended. The target distribution is detailed without prescribing the actual quantity of ‘test vehicles’ for each subgroup in Chart F4.

21) Para 9.2 & Chart II, Preconditioning (ref. Para 8.6.1.1 in ESCC 3001 draft 2C)
Preconditioning as an individual test is removed and replaced, to be part of the test method for measurement of Capacitance, that is optional at the Manufacturer’s discretion (for type II capacitors only). The exposure temperature is fixed at 150C. A reference age of 1000hours for capacitance measurement meeting the specified tolerance is added to take into account capacitance ageing.

22) Chart II: The optional Electrical Measurements at High and Low Temperatures are deleted.

23) Para 9.5.1.1, 9.5.1.2, 9.5.1.3, 9.5.1.4 Electrical Measurements (Para 8.6 in ESCC 3001 draft 2C)
Test methods for Capacitance, Tangent of Loss Angle, Insulation Resistance and Voltage Proof are made by reference to IEC 60384-1 methods (all are equivalent to the currently specified ESCC methods).

24) Para 9.5.1.3 & 9.5.1.4, Insulation Resistance & Voltage Proof testing of insulated capacitors.
Clarify the sample testing option during Screening Tests.

25) Para 9.5.4 (Para 8.6.2 in ESCC 3001 draft 2C), reference to the option to omit Voltage Proof during Chart II testing is deleted.

26) Para 9.7 Robustness of Terminations (Para 8.3 in ESCC 3001 draft 2C)
Test “Ua” is corrected to be “Ua1” (tensile test)
Test “Ue” is added as applies for surface mount packaged capacitors.

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27) Para 9.8.2 Resistance to Soldering Heat (Para 8.9 in ESCC 3001 draft 2C)
Test details for other capacitors and surface mount capacitors is deleted.

28) Para 9.12 & 9.12.2 Bump
Bump test is deleted (leaving Shock as the required test; Para 8.12 in ESCC 3001 draft 2C)

29) Para 9.13 Climatic Test Sequence (Para 8.10 in ESCC 3001 draft 2C)
The post test recovery period for each test is added as per the applicable IEC method.

30) Para 9.14 Damp Heat Steady State (Para 8.13 in ESCC 3001 draft 2C)
The obsolete IEC method is replaced by the equivalent IEC60068-2-78 details.

31) Para 9.16 & 9.17 Temperature Coefficient & Temperature Characteristic (Para 8.15, 8.6.1.5 & 8.6.1.6 in ESCC 3001 draft 2C)
Redundant test steps are deleted [ 9.16(a), 9.17(a) & 9.17(h) ]
Unnecessary equation is deleted.

32) Para 9.18 Burn-in (Para 8.7 in ESCC 3001 draft 2C)
General test conditions are added (duration, temperature, applied voltage)(similar to Operating life except for duration).

33) Para 9.20 Encapsulation, Coating
Para is deleted.

34) Para 10.5 Chart F2 Data (Para 9.5 in ESCC 3001 draft 2C)
Specific references to data for microsection and robustness of terminations is deleted.

Proposed wording:

see above & attached draft specification 3001 Draft 2C

Justification:

All changes have been defined and included to serve the purposes of technical improvement, clarification, accuracy, completeness, simplification, harmonisation and consistency. The aim is to simplify and improve the content and interpretation of the specification and its requirements whilst maintaining an efficient and acceptable technical baseline.

ESCC 3001 issue 2 draft C is written to closely follow the layout, format and content of the latest ESCC 5000 issue 6. The justifications for the related policy and editorial changes given in all other previous DCRs related to ESCC 5000 issue 6 (i.e. DCRs 149, 236, 286, 313, 399) also apply to this DCR.

Item 21): Preconditioning details have been clarified to reflect the details as applied by ESCC qualified Manufacturers (AVX-NI, AVX/TPC, Eurofarad).

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Attachments:

3001_issue_2_draft_e_for_wg_activity.pdf, 3001_issue_2_for_publishing_(s.thacker_2015_12_01).docx

Modifications:

The following amendments and additions are included in this DCR based on the PSWG approval of ESCC 3001 draft 2E (at PSWG #71 on 19/11/2015):

The original DCR attachment is replaced by ESCC 3001 issue 2 (which is a tidied up version of draft 2E as approved by the PSWG)

Item 2) is amended as follows:
Operating Life test duration is clarified to be as follows (previously was 2000hours for Qual / 1000hours for LAT2):
: 2000 ±48 hours; applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.
: 1000 ±24 hours; applicable to Periodic Testing for extension of qualification.

Item 14) is amended as follows:
Para 2.1, 2.2 & 4.5, Material outgassing (& restrictions) reference document is corrected to be ESCC Basic Specification No. 22600 (which in turn refers to ECSS-Q-ST-70-02).

Item 19) is amended as follows:
Para 5.2.2, Steady State Humidity Test is deleted from Special In-Process Controls. It is added to Chart F4 but with the following amendments:
: The sampling is changed: Chart F4 Subgroup 1A samples size = 20 components per test vehicle selected for the Qualification Test Sublot (was 12 components from the highest capacitance value of each chip size for every fired ceramic lot)
: The test is now performed on encapsulated components (whereas previously it was performed on samples that were not coated or encapsulated).
: The initial rapid change of temperature processing is covered by the previous test in Chart F4 Subgroup 1A.
: The test duration is 1000h (was 240h)
: It is clarified that only Insulation Resistance is measured at 1.5V during the final measurements
: Change in Capacitance limits are also applied during the test (whereas previously only an absolute limit was applied)

Item 20) is amended as follows:
Para 8.1.2, Distribution of the Qualification Test Lot (Para 7.1.2 & Chart F4 Note 1 in ESCC 3001 draft 2E): The sample distribution and quantity of components & test vehicles to be used in the Qualification Test Lot for qualification and qualification maintenance is amended.

Item 29) is amended as follows:
Para 9.13 Climatic Test Sequence is deleted (also from Charts IV & V).

Item 30) is amended as follows:
Para 9.14 Damp Heat Steady State is deleted (also from Chart IV).

Item 34) is amended as follows:
Para 10.5 Chart F2 Data (Para 9.5 in ESCC 3001 draft 2E): Data for Microsection is clarified as follows:
" For Microsection Inspection, an examination report that includes photographs shall be prepared."

The following new items are added to this DCR:

35) Para 5.2.3 Robustness of Terminations: rework & retest is now permitted if a single failure occurs. Lot failure only applies if 2 or more failures occur during the first test (previously it was 1 failure).

36) Para 9.5.1.4.1(a) Voltage Proof: The voltage application time is changed to be 5 +/-1 second (was 1 minute)

37) New Chart F4 (that replaces Charts IV & V):
: Robustness of Terminations test is not included in Chart F4.
: Resistance to Soldering Heat test is moved to the Assembly Capability Subgroup
: Climatic Sequence tests are not included in Chart F4 (in 2 subgroups)(See item 29)
: Damp Heat Steady State test is not included in Chart F4 (see Item 30)

Approval signature:

Date signed:

2015-12-08