DOCUMENT CHANGE REQUEST

DCR number 1243	Changes required for: General	Originator: Steve Thacker
Date: 2020/02/14	Date sent: 2019/02/26	Organisation: ESCC Executive Secretariat
Status: IMPLEMENTED		

Title:	Generic Specification for Quartz Crystal Units		
Number:	3501	Issue:	4

Other documents affected:

Page:

All

Paragraph:

Total reformat/re-write of ESCC Generic Specification 3501 issue 4 as part of the ongoing conversion of legacy ESA/SCC specifications to the ESCC format.

Original wording:

See 3501 issue 4

Proposed 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 3501 draft 5 are based on other published, converted ESCC Generic Specifications such as ESCC 5000, 9000, 4001, 3001, etc.

The proposed technical content of ESCC 3501 draft 5 is based on the current content of ESCC 3501 issue 4 plus additional changes proposed for the purposes of general improvement.

This DCR summarises all the amendments to ESCC 3501 issue 4, plus identifies the additional technical changes not already generally detailed and justified by previous, approved DCRs related to conversion of other ESCC Generic Specifications.

For full details of the proposed contents of ESCC 3501 issue 5, see the attached draft Generic specification ESCC 3501 Draft 5 that implements all the proposed changes.

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Change Details:

A) Main General Changes (similar to those already incorporated into other converted ESCC generic specifications e.g. ESCC5000, etc, including: rewording and restructure of various sections, paragraphs and Charts of the specification, plus other editorial changes based on the layout and editorial content of other Generic Specifications already converted to ESCC

format):

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

2) Charts II & III have been replaced by Chart F2 Production Controls & Chart F3, Screening Tests.

3) Chart IV & V, Qualification and Lot Acceptance Testing charts have been incorporated, with some modifications, into a single Chart F4, Qualification, Periodic Testing and

Lot Validation Testing. The tests included in Chart F4 are based on a mix of qualification and LAT level 1 requirements.

Modifications include:
• Periodic testing is mandatory for ESCC qualified components with a defined testing schedule (i.e. 12 months for Endurance Subgroup and 24 months for all other testing).
• Para 8.2 & Chart V, etc, 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.
• Para 8.2.1, The requirement for LAT level 3 as a minimum for non-qualified component procurement is removed.
• Para 9.17, Life is 2000hours for Qualification Testing and when Periodic Testing is being performed due to lapse of qualification; 1000hours for Periodic Testing performed to achieve extension of qualification (previously was 2000hours for Qual / 1000hours for LAT).
• No failures are allowed during Chart F4 testing.
• Sampling for the Environmental/Mechanical and Assembly Capability subgroups in Chart F4 is based on Chart IV sampling.

4) Para 1.2, etc, Introduction of Technology Flow Qualification per ESCC No. 25400 to the Generic spec.

5) Para 1.2, etc, 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.

6) Para 1.2, etc, The Generic Specification has been made applicable and fully usable for procurement of unqualified components as well as for ESCC Qualified components.

7) Para 2.1, etc, Clarification that the term PID is specific to ESCC qualified components.

8) Para 2.1 & 4.5, Material outgassing reference document is corrected to be ESCC No. 22600 (not PSS-01-702). Material restrictions per ESCC No. 22600 are specified.

9) Para 4.1, 4.3, 4.3.2, Chart I, Chart III, etc, The SCC testing levels B and C have been deleted; there is now only a single ESCC testing level, equivalent to old SCC level B, but it is not given a specific designation. All requirements applicable to ESCC level C are deleted.

10) Para 4.3, 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.

11) Para 4.3.1, The maximum allowed delay for Lot failure notification (provided by the Manufacturer) is now 5 working days (was 2).

12) Para 4.4, Marking requirements per ESCC No. 21700 shall apply.

13) Para 5 & Chart F2, Production Control/Special In-Process Controls, replaces Paras 5 & 6 and Chart II. Redundant tests in Chart II are removed (i.e. First Electrical Measurements, optional Seal test, duplicate Electrical Measurements at Reference Temperature, optional Electrical Measurements at High and Low Temperatures, & initial sample External Visual Inspection). Some tests are moved to new Chart F3.

14) Para 7.4.1, etc, Check for lot failure during Screening (PDA), only includes Electrical Parameter limit failures (excluding the mechanical, handling and lost failures counting towards PDA in ESCC 3501 issue 4).

15) Para 9.5 & Chart II, Dimension Check is performed on 3 samples instead of 5.

16) Para 10.1.2, 10.1.3, The minimum required delivered documentation to the customer for procurement is a Certificate of Conformity & a Cover sheet.

B) Other Technical Changes (specific to ESCC 3501):

17) Para 2.1 & 2.2:
Reference documents that are not actually referenced in 3501 or are obsolete are removed, i.e. IEC No. 302, IEC No. 410, IEC No. 444, MIL-STD-105, MIL-STD-414, PSS-01-302.
ESCC 22600, 23100, 25400 and IEC 60122-1 are added.

18) Para 3 , used abbreviations and symbols are corrected and added.

19) Para 4.1.5: Amended to be Customer Source Inspections and Final CSI is added.

20) Weight requirements are added (to Para 5.2.3 & Chart F2).

21) Para 9.2 electrical measurement test methods: some changes for the purposes of clarification & simplification are implemented (as well as reflecting IEC 60122-1 instead of the obsolete IEC Nos. 302 & 444)

22) Para 9.2.5: Table 6 testing does not only apply to Endurance Testing. Test title amended accordingly.

23) Para. 9.4.2 Vibration: Acceleration condition corrected per IEC test method to be 200m/s2 (was 196m/s2)

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24) Para 9.5 Seal: maximum immersion pressure units changes to SI i.e. bar to kPa

25) Para. 9.6 (& 7.1.1), 9.17, 9.17.2: Pre-Burn-in, Burn-in, and Life test:
Burn-in/Life test details specifically for OCXO components added (i.e. moved from Detail specs to Generic spec).
Burn-in/Life temperature for other types fixed at 105degC (i.e. also moved from Detail specs to Generic spec).

26) Various tests (i.e. Shock, Vibration, Solderability, Climatic Sequence, Rapid Change of Temperature, Life) Final visual examination added to each test.

27) Chart F4, etc, The Chart title is amended in line with general DCR1027.

28) Annex I is deleted.

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 3501 draft 5 is written to closely follow the layout, format and content of the latest converted ESCC Generic specifications such as ESCC 5000, 9000, 4001, 3001, etc. The justifications for the related policy and editorial changes given in all other previous DCRs related to the conversion of ESCC Generic Specifications also apply to this DCR.

Note: For information purposes, and to hopefully aid the review process, an MSWord document of an associated Detail Specification in the “converted” format is attached to this
DCR. i.e. 3501/018 draft 6A

Attachments:

3501018_draft_6c_to_assist_review_of_dcr_for_3501_draft_5d(2).docx, escc3501iss_5_for_publishing.docx, 3501_draft_5d_for_conversion_dcr_review(2).docx

Modifications:

Modifications

The following additional change items shall apply to this DCR1243 as detailed in the revised DCR attachment 3501 Draft 5D.

Note: the stated Rakon justification for each change is also provided in each item.

29) Para. 9.3, Shock: The peak acceleration and duration of the pulse during Qualification & MoQ testing (New Chart F4) for specific package styles is added to be:

: 1000g for packages similar to style TO-5 (i.e. 3501/018)

: 500g for packages similar to style TO-8 (i.e. 3501/019)

(Rakon justification: Increase of mechanical shock level to be closer to customer need and to MIL-PRF-3098 level)

30) Para. 7.1.1 (ref. new Para 8.3.2.1), Burn-in duration: changed to be 720h minimum for crystals for OCXO applications (was 240h)

(Rakon justification: to allow for an extrapolation of aging).

31) Para. 9.4, Vibration: The vibration amplitude is changed to be 40g (3mm or 400/ms2) (was 20g; 1.5mm to 200m/s2))

(Rakon justification: Increase of sine vibration level to be closer to customer need)

32) Para. 9.15, Rapid Change of Temperature: Number of cycles is changed to 50 (was 10)

(Rakon justification: Increase of number of rapid change to be closer to customer need)

33) Para. 9.17, Life Test (specifically for OCXO applications) (ref. new Para 8.11.1): Only final measurements apply at 1000h or 2000h, as applicable (i.e. the 500h & 1000h intermediate measurements are deleted).

For the daily measurements of Resonance Frequency, only a minimum of 4 measurements per week need be recorded.

(Rakon justification: Drift calculation is limited to full test (0 / 1000h or 2000h) because resistance cannot be measured without removing quartz crystal from oscillator and resonance frequency drift necessary to achieve frequency aging of such crystal is below the 3 ppm with a lot of margin)

34) Para 9.13, Solderability: For gold plated terminals the test is split in to 2 steps: Degolding & Tinning

(Rakon justification: Clarification of test for gold plated terminals)

35) new Chart F4 (see also point 3)): The sampling for the various test subgroups is reduced when Periodic testing for extension of qualification is being performed; see attached for details.

(Rakon justification: RAKON requests to limit quantity to be tested for maintenance of qualification (periodic testing). The increase of quantity to 41 components (in draft 5B) versus 16 components in issue 4 is very high versus quartz crystal business (batch size some tens and quantity produced by year)).

Approval signature:

Date signed:

2020-02-14