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|--|-------------------------------------|--|---|--|--------------------------|
|  | | APPLICATION FOR EXTENSION OF ESCC TECHNOLOGY FLOW APPROVAL | | | Page 1 |
| | | Component Title: | Thin Film Technology for Chip, Wraparound, Single and Network Resistors, Fixed | | Appl. No. 287H |
| Executive Member: | | CNES | Date: 15/03/2023 | | |
| Technology Flow submitted for Extension of Qualification Approval: 1 | | | | | |
| SUMMARY DESCRIPTION | | TEST STRUCTURES | | COMPONENTS PROPOSED FOR QUALIFICATION | |
| P : Single resistor 0402, 0603, 0805, 1206, 2010 chip PRA : 2 to 8 resistors of similar value, based on 0603 (PRA 100), 0805 (PRA135) or 1206 (PRA182) units CNW : 2 to 8 resistors with at least two different values with the same form factor as PRA Substrate : Alumina Resistive layer : Nickel Chromium Protection : Silicon nitride Termination : Nickel Barrier Processes : Thin Film deposition Finish : SnPbAg or Au | | P0402, P0603, P0805, P1206 and P2010 with min., critical resistance and max. values, PRA100, PRA135, PRA182 with min., critical resistance and max. values. | | By form factor : ESCC4001023 var. 15 and 13, 14(*) ESCC4001023 var. 01, 05 (*) and 09 ESCC4001023 var. 02, 06 (*) and 10 ESCC4001023 var. 03, 07 (*) and 11 ESCC4001023 var. 04, 08 (*) and 12 ESCC4001025 var. 01 to 07, 22 to 28 ESCC4001025 var. 08 to 14, 29 to 35 ESCC4001025 var. 15 to 21, 36 to 42 (*) Note that gold finish variants are not intended for de-golding and tinning | |
| Component Manufacturer 2 | | Location of Manufacturing Plant(s) 3 | | Date of original qualification approval: 4 | |
| VISHAY SA Division Résistances de Très Haute Précision | | Nice (France) | | Date: 15/02/2009 Certificate 287 Ref No. | |
| ESCC Specifications used for Maintenance testing: 5 | | Deviations to LVT testing and Detail Specification used: 6 | | Qualification Extension Report reference and date: 7 | |
| Generic: 4001 Issue: 5 Detail(s): 4001/023 Issue: 12 4001/025 Issue: 8 | | No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> (supply details in Box 15) Deviation from current Specifications: No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (Supply details) | | QML Quality Synthesis reports : QML 2021 Synthesis, 06/01/2022 QML 2022 Synthesis, 06/01/2023 | |
| Summary of procurement or equivalent test results during current validity period in support of this application (those to ESCC listed first) 8 | | | | | |
| Customer | Component | LVT | Date code | Quantity Delivered | |
| TAS Belgium, RC Micro, ALTER, TTI, TAS It, RUAG ... | PHR1206 PHR0805 PHR0603 | LVT1 | | 2021: 92 636 2022: 115 863 | |
| TTI, ALTER, TAS It ... | PRA / CNW | | | 2021: 11 289 2022: 9 496 | |
| Vishay Dale, TTI, ALTER ... | PFRR 0805 PFRR 0402 PFRR 1206 | - | | 2021: 18 961 2022: 8 655 | |
| PID changes since last maintenance of qualification 9 | | Current PID Verified by: JP Bussenot, CNES 10 | | | |
| None <input type="checkbox"/> Minor* <input checked="" type="checkbox"/> Major* <input type="checkbox"/> | | Name of Executive Representative Ref No: PID-TFD P PRA CNW Issue: 13 Date: 27/04/2022 Rev.: Date: 20/07/2022 | | | |
| *Provide details in box: 19 | | | | | |
| Current Manufacturing facilities surveyed by: <u>L. Fontaine, CNES</u> on <u>27/02/2023</u> 11 | | | | | |
| (Name of Executive Representative) (Date) | | | | | |
| Satisfactory: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Satisfactory: Yes | | | | | |
| Report Reference: <u>2023.0003306-CR-Fontaine-Visite -Vishay-Fevrier-2023</u> | | | | | |



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Date: **15/03/2023**

Page 2

Appl. No.

287H

12

Failure Analysis, DPA, NCCS available: Yes No (Supply data)

Ref. No's and purposes:

13

The undersigned hereby certifies on behalf of the ESCC Executive - that the above information is correct; - that the appropriate documentation has been evaluated; - that full compliance to all ESCC requirements is evidence (except as stated in box 15;) - that the reports and data are available at the ESCC Executive and therefore applies on behalf of CNES as the responsible Executive Member for ESCC qualification status to be extended to the component(s) listed herein.

Date: **15/03/2023**

G.QUADRI

(Signature of the Executive Coordinator)

14

Continuation of Boxes above:

Box 6: Periodic Testing is defined in paragraph 6 of the Technology Flow PID (See page 3)



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Page 3

Appl. No.

287H

Non compliance to ESCC requirements:

15

| No.: | Specification | Paragraph | Non compliance |
|------|---------------|-----------|---|
| 1 | 4001 | Chart F4 | Chart F4 testing replaced with the implementation of periodic testing as described in PID paragraph 6.3 |

Additional tasks required to achieve full compliance for ESCC qualification or rationale for acceptability of noncompliance:

16

None

Executive Manager Disposition

17

Application Approval: Yes No

Action / Remarks:

Date:

B. Schade: Head of the Product Assurance and Safety Department



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Page 4

Appl. No.

287H

ANNEX 1: LIST OF TESTS DONE TO SUPPORT EXTENSION OF QUALIFICATION

18

Tests conducted in compliance with:

- ESCC 4001 generic specification; Chart F4 (for ESCC/QPL parts);
- or PID-TFD **P PRA CNW Issue 12** (for ESCC/QML parts)

Tests vehicle identification/description:

| | |
|---|---|
| PHR2010 dc 2037 (160K) PHR0805 dc 2028 (160K) | PRAHR dc 2014 (22K) CNWHR dc 2007 (2K49/10K) |
| PHR0805 2109 (1K21) PHR1206 dc 2109 (15K) PHR2010 2109 (79K6) | PHR0402 dc 2118 (1K) PHR0402 dc 2119 (11K) PHR2010 dc 2120 (182K) |
| PHR0402 dc 2128 (30R) PHR0603 dc 2136 (3K16) PHR1206 dc 2140 (243R) | PHR0603 dc 2150 (470R) PHR0805 dc 2204 (1K) PHR2010 dc 2143 (1M2) |
| PRAHR dc 2103 (16K2) PRAHR dc 2103 (10K) PRAHR dc 2110 (4K7) | PRAHR dc 2224 (20K4) PRAHR dc 2214 (33K2) |

Detail Specification reference: **4001/023 & 4001/025**

Extracted from 2021 & 2022 QML Synthesis

| Chart F4 | Test | Tick when done | Conditions | Date Code | Tested Qty | N° of Rejects | Comments if not performed. Comments on Rejection |
|--|-----------------------------|-------------------------------------|-------------------------|--|--|---------------|--|
| Environmental /Mechanical Subgroup (1) | Mounting | <input checked="" type="checkbox"/> | IEC 60115-1 clause 4.31 | 2028 2037 2014 2007 2109 2109 2109 2118 2119 2120 2128 2136 2140 2103 2103 2110 2150 2204 2143 2224 2214 | 5 | 0 | |
| | Rapid Change Of Temperature | <input checked="" type="checkbox"/> | IEC 60068-2-14 | 2028 2037 2014 2007 2109 2109 2109 2118 2119 2120 2128 2136 2140 2103 2103 2110 2150 2204 2143 2224 2214 | 5 | 0 | |
| | Vibration | <input type="checkbox"/> | IEC 60068-2-6 | | | | NA |

| | | | | | | | |
|--|----------------------------|-------------------------------------|-------------------------|--|--|---|--|
| | Climatic test Sequence | <input checked="" type="checkbox"/> | ESCC 4001, Para 8.10 | 2028 2037 2109 2109 2109 2118 2119 2120 2128 2136 2140 2150 2204 2143 | 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0 | |
| | Seal Test | <input type="checkbox"/> | IEC 60068-2-17 | | | | NA |
| Environmental /Mechanical Subgroup (2) | Mounting | <input checked="" type="checkbox"/> | IEC 60115-1 clause 4.31 | 2028 2037 2109 2109 2109 2118 2119 2120 2128 2136 2140 2150 2204 2143 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 0 | |
| | Robustness of Terminations | <input checked="" type="checkbox"/> | IEC 60068-2-21 | 2028 2037 2109 2109 2109 2118 2119 2120 2128 2136 2140 2150 2204 2143 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 0 | Adhesion followed with Substrate bending |
| | Climatic test Sequence | <input checked="" type="checkbox"/> | ESCC 4001, Para 8.10 | 2028 2037 2109 2109 2109 2118 2119 2120 2128 2136 2140 2150 2204 2143 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 0 | |
| | Seal Test | <input type="checkbox"/> | IEC 60068-2-17 | | | | NA |



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Page 6

Appl. No.

287H

NOTES ON THE COMPLETION OF THE APPLICATION FORM FOR ESCC QUALIFICATION EXTENSION APPROVAL

ENTRIES

- Form heading shall indicate: - the title of the component as given in its detail specification or the name of the series, family; - the Executive Member; - the entering date; - the certificate number and its sequential suffix.
- Box 1** shall provide details given in the table; in particular there shall be listed: - the variants or range of variants; - the range of components (the ESCC code is recommended to indicate the values or values range, the tolerance, the voltage, etc); the designation given in the detail specification as 'base on'; - under Test Vehicle enter either an ESCC code or the specific characteristic capable of identifying the component tested (e.g., voltage of coil for a relay); - under component similar enter a cross if relevant.
- Box 2; 3 and 4** As per QPL entry; otherwise, an explanation of the changes must be supplied.
- Box 5** Will show the ESCC Generic and Detail specifications, including issue number and revision letter, current at the time the tests reported were performed. If the specifications are different from those current on the date of the application, see Box 6.
- Box 6** Will show the deviations from the Generic and Detail Specifications listed in Box 5, in particular deviations from testing. In case of deviations this must be listed in Box 15. In case the referenced specification in Box 5 have currently a different issue and/or revision indicate also whether the test data deviates or not from such current documents.
- Box 7** Must reference the report(s) supplied in support of the application.
- Box 8** Should provide the details of procurement to the full ESCC System, documentation of all of which should already have been delivered to the ESCC Executive under the terms of the relevant Generic Specification. An appropriate table has been drawn in this box.
- Box 9** If the PID evolved after the Original Qualification or after the last Extension of Qualification, adequate details of such evolution shall be provided together with the reasons for the changes. Major changes shall be clearly marked.
- Box 10** Identify the current PID issue status, date and actual date of verification. The date of verification of the current PID should be arranged as close as possible to the required date of extension.
- Box 11** This box can be completed only after a physical visit to the plant to confirm that no unexplained changes occurred and that the practices, procedures, material, etc. used in manufacturing the components are as described in the PID. This survey shall be carried out in accordance with the requirements of ESCC Basic Specification No. 20200 and its findings shall be recorded.
- Box 12** Provide details of, or reference to, any Destructive Physical Analysis (DPA) and Failure Analysis reports as well as any Nonconformance(s) (NCCS) occurred during the qualification validity period, stating if established corrective action have produced satisfactory results.
- Box 13** Enter only the name of the Executive Member (i.e., CNES, DLR, ESTEC, etc.) and the signature of the responsible Executive Coordinator.
- Box 14** To be used when there is a need to expand any of the boxes from 1 through 12. Identify box affected and reference the Box 14 in the relevant Box. Box 14 can be broken into 14a, 14b, etc. if several boxes have to be expanded.
- Box 15** Fill in Table as requested.
- Box 16** Any additional action deemed necessary by the Executive Member to bring the submitted data to a standard likely to be accepted by the ESCC Executive should be listed herein or the reason(s) to accept the noncompliance.
- Box 17** All Executive Manager recommendations on the application itself, special conditions or restrictions, modifications of the QPL or QML entry, letters to the manufacturer, etc. shall be entered clearly in Box 19, signed by the representative for ESA, and dated.
- Box 18** Fill in Table as requested.
- Box 19** Confidential Details of PID changes including those of a confidential nature, shall be provided.
- Box 20** State noncompliance with reference to specification(s) and paragraph(s). To simplify reference in Box 16 each nonconformance shall be sequentially numbered. If relevant state 'None'.
- Box 21** Any additional action deemed necessary by the Executive Member to bring the submitted data to a standard likely to be accepted by the ESCC Executive should be listed herein or the reason(s) to accept the noncompliance.
- Box 22** Additional Comments.