


Polymer Multi anode Tantalum Capacitor Qualification


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| GSTP Element: | Competitiveness | |
| Note: the project web page cannot go on-line without this information. Ask your ESA Technical Officer to indicate the budget line for the project | Permanent open announcement of opportunity AQO/1-7935/14/NL/CBI for market – oriented activities call for proposal | |
| | GSTP 6 | Element 2 |
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| Document Date: | 1 st March 2018 |
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| Project Name: | Polymer Multi anode Tantalum Capacitor Qualification |
| Contract No.: | 4000123320/18/NL/GLC/fk |

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| Short Description: | <p>The project target is to propose evaluation and qualification of tantalum polymer multi-anode technology. Processed in two key steps – work packages.</p> <p>Target of the proposal is to subject this technology on TRL 5 to space qualification to move to higher TRLs.</p> | | | |
| AVX Project Team: | Stanislav Zednicek Project Garant | Petra Pribanova Project Leader | Alena Vendolska Project Controller | Tomas Zednicek External Support |
| | Ladislav Vilc | Ladislav Marek | Ivana Snitilova | |
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| ESA-ESTEC Team: | Denis Lacombe Technical Officer | Matthew Bullock GSTP Representative | | |
| Prime Contractor Company: | AVX Czech Republic s.r.o | Czech Republic | www.avx.cz www.avx.com |  |

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| Project Objective: | <p>The project target is to propose evaluation and qualification of tantalum polymer multi-anode technology processed in two key steps – work packages.</p> <p>The proposed 24month activity in value of 140k EUR submitted by AVX Czech Republic s.r.o. under GSTP 6. Element 2. programme with 50% financial support is aiming to bring the latest commercially available lowest ESR tantalum capacitor technology - polymer multi-anodes – to space evaluated and qualified level.</p> <p>The design is combining the polymer tantalum capacitor technology and the multi-anode construction approach (ESCC 3012/004) to offer the next lowest ESR capacitor generation to be ready “on time” for space use.</p> <p>Both “multi-anode” and “polymer” tantalum technologies have been already qualified and evaluated for space environment on TRL9, respectively TRL8 levels. Combination of polymer and multi-anode technologies is the next logical further step for further evaluation and qualification of lowest possible ESR tantalum capacitors.</p> <p>Target of the proposal is to subject this technology on TRL 5 to space qualification to move to higher TRLs.</p> <p>Manufacturing, Inspection and Testing are done in the AVX Czech Republic facility.</p>  |
| Features: | <p>The project objective is to propose evaluation and qualification of tantalum polymer multi-anode technology.</p> <p>Tantalum capacitors have been recognized as one the most stable, robust, reliable and high CV (Capacitance times Voltage factor) capacitors with more than fifty years successful history in space applications.</p> <p>Tantalum industry has developed a new second electrode material based on conductive polymer with lower ESR and reduced ignition failure mode. Tantalum polymer capacitors are readily available on the commercial market for more than ten years and thus wide experience from mass manufacturing in diverse applications have been already gained. The downside of polymer technology is a higher sensitivity to thermo-mechanical stress, humidity and oxidisation of polymer in longer life time. These capacitors are up screened version of TCS conductive polymer multi-anode series designed for use in demanding industrial applications requiring extremely low ESR with stable, high frequency CAP retention and longer life performance.</p> <p>The series exhibits improved basic reliability 0.5%/1000 hrs. at 85°C, with robust J-lead design for long operation lifetime.</p> |

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| Project Plan: | <p>The project target is to propose evaluation and qualification of tantalum polymer multi-anode technology.</p> <p>The project has two key steps.</p> <p>The first WP1 evaluation phase will follow the ESCC 2263000 evaluation testing. The WP1 will also include proposal of the ESCC 3012/00x new specification.</p> <p>The second part WP2 is focused on qualification testing.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">monthly planning</th> <th rowspan="2"></th> <th colspan="6">WP 1</th> <th colspan="4">WP 2</th> </tr> <tr> <th>start Month</th> <th>M + 2</th> <th>M + 4</th> <th>M + 8</th> <th>M+10</th> <th>M + 12</th> <th>M + 14</th> <th>M+16</th> <th>M+18</th> <th>M+24</th> </tr> </thead> <tbody> <tr> <td>WP1</td> <td>WP1100</td> <td>ETP Definition</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>WP1200</td> <td>Sample Manufacturing</td> <td></td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>WP1300</td> <td>Evaluation Testing</td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>WP1400</td> <td>Result Analysis</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>WP2</td> <td>WP2100</td> <td>Sample Manufacturing</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td></td> <td>WP2200</td> <td>Qualification Testing</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> </tr> </tbody> </table> | monthly planning | | WP 1 | | | | | | WP 2 | | | | start Month | M + 2 | M + 4 | M + 8 | M+10 | M + 12 | M + 14 | M+16 | M+18 | M+24 | WP1 | WP1100 | ETP Definition | X | X | | | | | | | | | | WP1200 | Sample Manufacturing | | X | X | X | | | | | | | | WP1300 | Evaluation Testing | | | | X | X | X | | | | | | WP1400 | Result Analysis | | | | | | X | X | | | | WP2 | WP2100 | Sample Manufacturing | | | | | | | X | X | X | | | WP2200 | Qualification Testing | | | | | | | | | X | X |
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| monthly planning | | | | WP 1 | | | | | | WP 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | start Month | M + 2 | M + 4 | M + 8 | M+10 | M + 12 | M + 14 | M+16 | M+18 | M+24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP1 | WP1100 | ETP Definition | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WP1200 | Sample Manufacturing | | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WP1300 | Evaluation Testing | | | | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WP1400 | Result Analysis | | | | | | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP2 | WP2100 | Sample Manufacturing | | | | | | | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WP2200 | Qualification Testing | | | | | | | | | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key Issues: | <p>Capability of the new technology to pass the space qualification.</p> <p>Manufacturing and testhouse load and customer orders at the time of sample manufacturing and testing.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Expected main Benefits: | <p>Need for polymer multi-anode 330 and 470μF 6.3V in smallest package was presented as ESA component wish list during the ESA SPCD conference in October 2016. During the same conference, Airbus Defence and Space listed polymer multi-anode tantalum capacitors as the missing ESA qualified components needed for the upcoming space hardware needs. The same was confirmed by Thales Alenia Space presentation identifying polymer multi-anodes as possible substitutes to the currently used conventional MnO₂ tantalum capacitors.</p> <p>Target customers are all space electronic hardware companies including primes - Airbus Defence and Space and Thales Alenia Space.</p> <p>The new design, as subject of this qualification proposal, is combining the polymer tantalum capacitor technology and the multi-anode construction approach to offer the next lowest ESR capacitor generation to be ready “on time” for space.</p> <p>Thus, it is projected that the proposed tantalum polymer multi- anode capacitor technology for qualification may capture more than 30% of the ESA QPL tantalum capacitor needs in five to ten years timeframe.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current Status: | WP1 – Evaluation, SWP 1100 Evaluation Test Plan Definition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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