

Change Summary of MIL-PRF-38535 Revision K

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| Throughout the document | Add "class Y". | Add class Y non-hermetic for space application QML products to the MIL-PRF-38535. | DLA Land and Maritime, JEDEC JC-13/G-12 Class Y task group and Space community. | |
| Throughout the document | Update Non-government organization name and contact information: "ASTM INTERNATIONAL (ASTM)". | Update NGS contact information. | DLA Land and Maritime | |
| Throughout the document | Update Non-government organization name and contact information: EIA to JEDEC–SOLID STATE TECHNOLOGY ASSOCIATION (JEDEC). | Update NGS contact information. | DLA Land and Maritime | |
| 2.3 | Add JEDEC standard : <ul style="list-style-type: none"> • JESD22-A110 - Highly Accelerated Temperature and Humidity Stress test (HAST) - biased and • JESD22-A118 - Highly Accelerated Temperature and Humidity Stress Test (HAST) - unbiased . | Add HAST test for class Y non-hermetic devices instead of moisture resistance test TM 1004. | DLA Land and Maritime, JEDEC JC-13/G-12 class Y task group and Space community. | 3 |
| 2.4, A.2.4, B.2.4, C.2.4, F.2.4, G.2.4, H.2.4, J.2.4, | Update paragraph "Order of precedence" | To comply MIL-STD-961. | DLA Land and Maritime, AF-85 and AF-99 | 3, 48, 103, 110, 129, 138, 149, 181, |
| 3.4.1b | Correct reference paragraph number to H.3.2 | Update/Clarification. | Manufacturing community | 6 |

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| 3.4.3, A.3.4.1.3 and C.3.3.1 | Update paragraph for Qualification to RHA level: Qualification to a RHA level shall consist of characterization to the highest offered RHA level of total ionizing dose (TID). The conditions for radiation testing shall consist of exposing the devices in a step-stress manner to the highest dose level offered and as a minimum the two next consecutive lower RHA levels. The levels are identified as follows: 3K Rad(Si), 10K Rad(Si), 30K Rad(Si), 50K Rad(Si), 100 K Rad(Si), 300K Rad(Si), 500K Rad(Si), 1M Rad(Si). The radiation testing plan (QM Plan) and qualification to the appropriate quality and reliability assurance level for device classes B, Q, S, V, Y or T shall be submitted for QA approval. The designator RHA levels are defined below | Update/Clarification for TID test requirement. | DLA Land and Maritime, Space community and JC-13.4 RHA community | 10, 57,110 |
| 3.6.2.5 and Table A-V | Add "Lead finish letter F" for Tin-lead alloy as defined in the applicable device document. | Add "Lead finish letter F" for Tin-lead alloy for Ball grid array (BGA)/Column grid array (CGA) packages. | DLA Land and Maritime, JEDEC JC-13/G-12 Class Y task group and Space community. | 13, 71 |
| 4.3 | Update paragraph Technology conformance inspection by adding "Both class V and class Y shall be capable of passing the flow of class level S and Appendix B herein." | Required for class V and class Y test flow which shall meet class level S and appendix B requirements. | DLA Land and Maritime, JEDEC JC-13/G-12 Class Y task group and Space community. | 17 |
| 4.4 | Correct reference paragraph number to H.3.4 and H.3.4.6 | Update/Clarification. | Manufacturing community | 17 |

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| Table IA | Add/update/modification of table IA: Screening procedure for hermetic classes Q, V and non-hermetic class Y microcircuits test flow. | To make an identical requirement for screening test flow of class Q, class V and class Y (class level B and S) to MIL-PRF-38535 screening table and TM 5004 of MIL-STD-883. | JEDEC JC-13/G-12 class Y TG and Space community; TM 5004 of MIL-STD-883 vs 38535 TCI/QCI table alignment task group (TG) and DLA Land and Maritime-VAC conducted EP studies recommendations. | 18-22 |
| Table IB | Add/update/modification to table IB: Inspection for delamination test requirements C-SAM TM 2030 and HAST test requirement JESD22-A118. | Update/Clarification. | Space community/ DLA Land and Maritime | 23 |
| Table II | Add/update/modification of table II: Group B mechanical and environmental QCI/TCI test requirements for class Q, class V and class Y microcircuits. | To make an identical QCI/TCI group B test requirements for class Q, class V and class Y (class level B and S) test to MIL-PRF-38535 and TM 5005 of MIL-STD-883. | JEDEC JC-13/G-12 class Y TG and Space community; TM 5004 of MIL-STD-883 vs 38535 TCI/QCI table alignment task group (TG) and DLA Land and Maritime-VAC conducted EP studies recommendations. | 24-27 |
| Table III | Add/update/modification of table III: Group A electrical QCI/TCI test requirements for class Q, class V and class Y microcircuits. | To make an identical QCI/TCI group A electrical test requirements for class Q, class V and class Y (class level B and S) test to MIL-PRF-38535 and TM 5005 of MIL-STD-883. | JEDEC JC-13/G-12 class Y TG and Space community; TM 5004 of MIL-STD-883 vs 38535 TCI/QCI table alignment task group (TG) and DLA Land and Maritime-VAC conducted EP studies recommendations. | 28 |

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| Table IV | Add/update/modification of table IV: Group C life test QCI/TCI requirements for class Q, class V and class Y microcircuits. | To make an identical QCI/TCI group C life test requirements for class Q, class V and class Y (class level B and S) test to MIL-PRF-38535 and TM 5005 of MIL-STD-883. | JEDEC JC-13/G-12 class Y TG and Space community; TM 5004 of MIL-STD-883 vs 38535 TCI/QCI table alignment task group (TG) and DLA Land and Maritime-VAC conducted EP studies recommendations. | 29 |
| Table V | Add/update/modification of table V: Group D package related QCI/TCI requirements for class Q, class V and class Y microcircuits. | To make an identical QCI/TCI group D test requirements for class Q, class V and class Y (class level B and S) test to MIL-PRF-38535 and TM 5005 of MIL-STD-883. | JEDEC JC-13/G-12 class Y TG and Space community; TM 5004 of MIL-STD-883 vs 38535 TCI/QCI table alignment task group (TG) and DLA Land and Maritime-VAC conducted EP studies recommendations. | 30-33 |
| 6.4.31 | Add new class Y definition: A microcircuit employing a ceramic non-hermetic package, which meets all applicable requirements of this specification including qualification, screening and TCI/QCI requirements, and all applicable requirements of Appendix B herein. | Add new class Y non-hermetic space application QML devices definition. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime-VAC conducted EP studies recommendations. | 37 |
| 6.4.41 | Update/modification paragraph Second party facility. | Update/Clarification. | Manufacturing community | 38 |
| 6.4.45 | To replace 'shall' with "will". | To comply MIL-STD-961 paragraph 4.6.6.h. | DLA Land and Maritime, AF-99 and AF-85 | 38 |

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| 6.4.47 | Add definition of Multi-Product Wafer (MPW). | Add new definition of Multi-Product Wafer (MPW) for fabrication of multi wafer lot requirements. | JEDEC JC-13.2 MPW TG and Manufacturing community | 38 |
| 6.4.48 | Add definition of Package integrity demonstration test plan (PIDTP). | Add new definition of package integrity demonstration test plan (PIDTP) requirements for non-traditional microcircuits packages assembly techniques. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime-VAC conducted EP studies recommendations. | 38 |
| Table A-I | Add flip chip devices major changes requirements: x. Flip chip devices: Solder bump materials/dimension, Wafer bumping process, Underfill process and materials selection . | Add new requirement for Flip chip devices changes identified as major change. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime-VAC conducted EP studies recommendations. | 63 |
| A.3.5.6.2 | Add Lead or terminal material types: h. Type H: Tin-lead alloy solder balls, bumps or columns. i. Type J Tin-lead alloy with copper spiral columns. | Add BGA and CGA packages lead or terminal materials/alloy types for solder bumps, balls or columns. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime-VAC conducted EP studies recommendations | 65 |
| A.3.5.6.3.4 | Update description of figure A-1. "Solder dipping area when seating plane is not defined" | Update/clarification. | DLA Land and Maritime | 66 |
| A.4.3.2.2 and A.4.3.2.3 | Add new destructive test method 2038 for solder column pull test. Add non-destructive C-SAM method 2030. | Add new test requirements for CGA packages column pull test TM 2038 and C-SAM test TM 2030. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime-VAC conducted EP studies recommendations | 76, 77 |

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| A.4.4.2 - A.4.4.2.5 | Editorial updates. | Update/clarification. | DLA Land and Maritime/ Manufacturing community | 79 |
| B.3.1 | Update paragraph B.3.1 General requirements. | Update/clarification. | Space community | 103 |
| B.3.10 | Add new requirements for package integrity demonstration test plan (PIDTP). | Add PIDTP requirements for solder terminations devices that address manufacturability, test, quality and reliability issues unique to specific non-traditional assembly/package technologies intended for space applications. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 104 |
| B.3.11 | Add Solder terminated microcircuits e.g. Ball Grid Array (BGA) or Column Grid Array (CGA) requirements. | Update/clarification for solder terminations BGA / CGA microcircuits packages requirements. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 104 |
| B.3.12 | Add Assembly material for BGA and CGA packages solder balls, bumps and solder columns requirements. | Update/clarification for solder terminations BGA / CGA microcircuits packages assembly requirements. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 104 |
| B.3.13 | Add Moisture sensitivity level (MSL) requirements for non-hermetic devices such as class Y that exhibit sensitivity to moisture-induced stress and must be handled, packaged, and stored in a proper manner to avoid potential damage during assembly solder reflow attachment and/or repair operations. | Update/clarification for non-hermetic nature of class Y devices moisture sensitivity level (MSL) requirements. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 104 |

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| B.4.1 | Add/update/modification of Screening test requirements for class V and class Y. These requirements are additional or exception from the main body of table IA. | Update/clarification for screening requirements for space level hermetic class V and non-hermetic class Y. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 105 |
| B.4.2 | Add Screening for solder termination microcircuits of class V and class Y requirements. "In addition to the screening tests specified in the main body of this specification for solder terminated microcircuits, the screening tests specified below shall be performed, unless prior approval for deletion or modification is given by the qualifying activity." | Update/clarification for screening test requirements for solder termination microcircuits for class V and class Y. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 105 |
| B.4.2.1 | Add Ball grid array (BGA) microcircuits post-assembly screening burn-in test may be performed before the solder balls have been attached to the package. Electrical test shall be performed across the full military temperature range after attach of the solder balls on the package. | Update/clarification for BGA microcircuits post-assembly screening test requirements. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 105 |
| B.4.2.2 | Add requirements for Column grid array (CGA) microcircuits post-assembly screening (including electrical test and burn-in) may be performed before the solder columns have been attached to the package. Electrical test shall be performed across the full military temperature range before attach of the solder columns on the package. After column attach, electrical test shall be performed at 25°C as a minimum to verify that no electrical/mechanical damage has been introduced due to the column attach process, and visual inspection shall be performed according to method 2009 of MIL-STD-883. | Update/clarification for CGA microcircuits post-assembly screening test requirements including electrical test and burn-in. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 105 |

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| B.4.3 a | <p>Add Technology Conformance Inspection (TCI) for class V and class Y requirements for table II, group B and these requirements are class V and class Y exceptions or additions:</p> <ol style="list-style-type: none"> 1) Resistance to solvents test is not required for laser marked device. 2) Device packages with lid/heat sink attached on the back side of a flip chip die require a lid shear or lid torque test. Manufacturers shall submit test procedures of lid shear test for approval of QA. Lid torque test shall be performed in accordance with TM 2024. 3) Device with solder terminations: For ball grid array (BGA) packages, ball shear test shall be performed in accordance with JESD22-B117. For column grid array (CGA) packages, solder column pull test shall be performed in accordance with TM 2038. | Update/clarification for group B TCI/QCI test exceptions or additional requirements for class V and class Y including BGA/CGA packages | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 106 |
| B.4.3 b | Update table III, group C or Group B/subgroup 5 life test TCI/QCI requirements for class V and class Y. | Update/clarification for group C or group B subgroup 5 TCI/QCI life test requirements for class V and class Y. | JEDEC JC-13/G-12 class Y TG, Space/RHA community and DLA Land and Maritime | 107 |
| B.4.3 d | Updated Group E inspection for RHA TCI/QCI requirements table C-I. | Update RHA group E QCI/TCI test table C-I by deleting table B-I in appendix B and make one group E table C-I for all classes Q, V and Y in appendix C. | JEDEC JC-13/G-12 class Y TG and Space/RHA JC-13.4 community and DLA Land and Maritime | 107 |

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| Table C-I | Add/update/modification of RHA group E QCI/TCI test table C-I requirements for class Q, class V and class Y microcircuits by combining one RHA table C-I for RHA group E test. | To make an identical QCI/TCI group E RHA test requirements for class Q, class V and class Y (class level B and S) test to MIL-PRF-38535 and TM 5005 of MIL-STD-883. | JEDEC JC-13/G-12 class Y TG and Space community; TM 5004 of MIL-STD-883 vs 38535 TCI/QCI table alignment task group (TG) and DLA Land and Maritime-VAC conducted EP studies recommendations. | 116-118 |
| H.3.1.9 b | Update Overview of QML Approval Process by adding v) Metallization stability over life. f) QML listing of approval parts. | Update/clarification. | Space/Manufacturing community | 153 |
| H.3.2.1.1.1 c | Update paragraph performance verification with requirements for burn-in circuits. | Update/clarification. | Space community | 154 |
| H.3.2.1.1.3 | Add mechanical characterization requirements to Package Design paragraph. | Update/clarification. | Space community | 156 |
| H.3.2.1.2.1 | Update Wafer fabrication checklist for Class level S products. | Update/clarification. | Space community | 158-159 |
| H.3.2.1.3 | Update requirements for SPC and in-process monitoring program for class level S. | Update/clarification. | Space community | 158 |
| H.3.2.1.5 | Update paragraph "Assembly and packaging". | Update/clarification. | JEDEC/Space community | 163 |

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| H.3.2.1.5.1 | Update paragraph "Assembly and packaging technology certification:" | Update/clarification. | JEDEC/Space community/ Manufacturing community | 163 |
| H.3.2.1.6 | Update paragraph "SPC and in-process monitoring program" requirements: Flip chip die pull off test shall be performed (before underfill dispense) in accordance with TM 2031 and bump shear test shall be performed for wafer bump technology qualification. | Update/clarification requirement for Flip chip pull off test TM 2031 before underfill dispense and bump shear test shall be performed at wafer bump technology qualification. | Space community, Manufacturing community and DLA Land and Maritime | 164 |
| H.3.2.1.7 | Update paragraph "Test Capability". | Update/clarification. | JEDEC/Space community | 164 |
| H.3.2.1.8 | Update paragraph "Certification Approval". | Update/clarification. | JEDEC/Space community | 164 |
| H.3.2.2.2 | Paragraph title changed to "TCV Program". | Update/clarification. | Manufacturing community | 164 |
| H.3.2.2.4 | Update paragraph "Reliability Assessment Report". | Update/clarification. | Manufacturing community | 167 |
| H.3.4.1 | Update Note for complex devices initial technology qualification requirement. | Update/clarification. | DLA Land and Maritime and RHA community | 168 |
| H.3.4.1.3 | Update paragraph "Demonstration Vehicles" requirements. | Update/clarification. | Manufacturing community | 169 |
| H.3.4.4 | Update paragraph "Assembly/Packaging technology validation". | Update/clarification. | JEDEC/Space community | 170 |

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| H.3.4.4.1 | Add paragraph for Package Integrity Demonstration Test Plan (PIDTP) requirement | Required PIDTP for solder terminations devices | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 171 |
| H.3.4.4.1.1 | Add paragraph for class Y Non-hermetic Packages requirements. | Required PIDTP for class Y microcircuits and need to address issues unique to non-hermetic construction and materials. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 171 |
| H.3.4.4.1.2 | Add requirements for Flip-chip devices assembly and following items: 1) Substrate materials, 2) Bump geometry. 3) Solder bump deposition process and materials. 4) Flux materials. 5) Underfill materials.6) Lid attach/adhesive materials. 7) Flip chip bump shear test. | Required PIDTP for flip chip devices and which address substrate materials, bump geometry, solder bump deposition process and materials, flux materials, underfill materials, lid attach/adhesive materials and flip chip bump shear test. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 171 |
| H.3.4.4.1.3 | Add requirements for Solder terminations. | Required PIDTP for solder termination devices that address materials and processes unique to solder terminations, such as ball/column integrity, attachment integrity, damage due to test, protection for shipment and shelf life. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 171 |

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| TABLE H-IA | Add/update/modification of table H-IA for Assembly process technology testing for hermetic and non-hermetic packages. | Update/modification table H-IA for hermetic class Q, and class V and non-hermetic class Y assembly process technology testing requirements. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 172 |
| TABLE H-IB | Add/update/modification of Table H-IB for Assembly process technology testing for plastic packages. | Update/clarification. | DLA Land and Maritime | 173 |
| TABLE H-IIA | Add/update/modification of Table H-IIA for Technology characterization testing for hermetic and non-hermetic packages. | Update/modification table H-IB for hermetic class Q, and class V and non-hermetic class Y technology characterization testing requirements. | JEDEC JC-13/G-12 class Y TG and Space community and DLA Land and Maritime | 174 |
| TABLE H-IIB | Add/update/modification of Table H-IB for Technology characterization testing for plastic packages. | Update/clarification. | DLA Land and Maritime | 175 |
| H.3.4.5 | Update Technology Qualification Report Approval requirement.. | Update/clarification. | Manufacturing community | 176 |
| H.3.4.8 b | Add requirement for Product Qualification for Multi-Product wafer (MPW). | Add product qualification test for Multi-Product wafer (MPW) requirements. | JEDEC JC-13.2 and Manufacturing community | 177 |
| J.3.9.3 | Update Technology Conformance Inspection of Multi-Product Wafer lots. | Add product qualification test for Multi-Product wafer (MPW) requirements. | JEDEC JC-13.2 and Manufacturing community | 183 |