

MCM & Hybrid Part Assessment

Use this section for MCM/Hybrid testing, qualification and monitoring requirements.

Class H is the recommended class for the “normal” and “severe” environments. Requirements for Class H can be found in MIL-PRF-38534. Equivalent test data, monitors, or historical records may be used when available and approved by the approval activity of the application.

Test Methods

Conditions and methods of test should be in accordance with MIL-STD-883 or equivalent JEDEC test methods. Other test methods or circuits may be substituted if such a substitution in no way relaxes the requirements. A system for control and calibration of test equipment should be established. If a manufacturer elects to eliminate or reduce all or any conformance, qualification or screening step by substituting a process monitor or SPC procedure, they should only be relieved of the responsibility of performing that step only. The manufacturer should still be responsible for providing microcircuits, which meet all of the performance, quality, and reliability requirements for the application.

Element Evaluation

Element evaluation is used to verify that procured materials and devices meet their specified characteristics and are adequate to perform as intended under the conditions experienced in the application. Element characteristics required assuring device performance and assembly process capability should be identified. These evaluations should be completed on all materials before their use in production devices. These evaluations may be modified by the manufacturer based on:

- a. Element quality and reliability history.
- b. Device quality and reliability history.
- c. Supplier history.
- d. Supplier/manufacturer relationship.
- e. Possible impact of element evaluation failure after assembly.

Note: Approved elements may be assembled into the device before final element lot acceptance. However, the hybrid manufacturer should have a system approved to maintain traceability of all

such elements for purposes of recall. This system should be employed only when a work stoppage situation is encountered, or when a lengthy test is required. Element evaluation will be successfully completed before device shipment.

Evaluation Recommendations

Microcircuit and semiconductor dice from each wafer lot should be evaluated in accordance with MIL-PRF-38534 appendix C Table C-II and Chapter 3.3.1 through Chapter 3.3.6.1. For Class H devices, element evaluation testing is not required for JANHC or JANKC discrete semiconductors, which have been tested in accordance with MIL-PRF-19500.

Passive elements from each inspection lot will be evaluated in accordance with MIL-PRF-38534 appendix C Table C-III and Chapter 3.4.1 through Chapter 3.4.6. This evaluation is not required when the elements are acquired from the Established Reliability series of military specifications and is listed on the QPL.

SAW elements will be evaluated in accordance with MIL-PRF-38534 appendix C Table C-IV and Chapter 3.5.1 through Chapter 3.5.3.

Alternate element evaluation should be used only in cases where full device performance cannot be adequately ascertained outside the actual end item (e.g., hybrid microcircuit RF component). The sample built into devices should successfully complete evaluation before release of the balance of the incoming lot. In lieu of packaged element evaluation tests, elements may be assembled into devices and screened per Mil-PRF-38534 appendix Table C-IX through final electrical. Acceptance of these elements should be based on the ability of the device to meet all group A, subgroups 1, 2, and 3 (plus 4, 7, and 9, as applicable) electrical tests required for the device. A minimum of 10 elements or 100% of the elements, whichever is less, (0 defects) should be assembled into at least 3 devices. Devices assembled for the purpose of element evaluation are deliverable, provided all of the provisions of this specification are met. Element wire bond evaluation for elements may be accomplished using a second or additional sample of elements wire bonded for that purpose only. When the device build option for evaluation is selected, the manufacturer should establish and maintain a sample plan or procedure to identify the sample prior to electrical test. In case of lot failure when alternative element evaluation is used, all the device samples and the inspection lot will be rejected. When the manufacturer chooses to analyze the failed devices to isolate the cause of failure and this analysis determines that the cause of failure is not related to the element being tested and that the element has been correctly stressed during the required screening and testing, then the inspection lot may be accepted. If the element has not been correctly stressed, the failed device may be reworked or new sample replacement devices may be assembled.

Substrates should be evaluated in accordance with MIL-PRF-38534 appendix C Table C-V and Chapter 3.7.1 through Chapter 3.7.5.3.3.

NOTE: Substrates fabricated by the device manufacturer using a qualified process will be exempt from this evaluation.

Package cases or covers should be evaluated in accordance with MIL-PRF-38534 appendix C Table C-VI and Chapter 3.8.1 through Chapter 3.8.5. In addition, laser marked surfaces should be subjected to and pass subgroups 3, 5, and 6 of Table C-VI.

Integral Substrate/Packages (ISP) should be evaluated in accordance with MIL-PRF-38534 Table C-VII and Chapter 3.9.1 through Chapter 3.9.9.

The polymeric adhesives used in device applications should be subjected to and pass the evaluation procedures detailed in MIL-STD-883, Method 5011.