

Frequently Asked Questions

1. What is the relation between VITA 51.1 and revisions to MIL-HDBK-217?

VITA 51.1 is an industry standard that provides consensus based modification factors for use with MIL-HDBK-217 Revision F, Notice 2. VITA 51.1 was developed prior to the launch in 2008 of the DoD-led effort to revise MIL-HDBK-217. It provided uniformity of practice for use of MIL-HDBK-217 Rev F, Notice 2 and consensus based modification factors for the models.

MIL-HDBK-217 Rev F, Notice 2 was published in 1995 and has become obsolete for many technologies. Most companies that use the methodology have supplemented it with internally developed modification factors based on product testing and/or field failure data.

The effort to revise MIL-HDBK-217, led by the Naval Surface Warfare Center (NSWC) in Crane, IN, was organized into two phases. First, a Revision G was developed to provide modifications to the existing models but no new models or modeling methods. The second phase will develop further revisions and include advanced methods such as physics of failure methods. Many of the same people worked on both VITA 51.1 and MIL-HDBK-217 Rev G. All the data collected and used for VITA 51.1 was provided to the MIL-HDBK-217 revision working group as a starting point, but there was further development of the modification factors using new data.

2. What is the current status of the effort to revise MIL-HDBK-217?

The current status as of June 14, 2011 of MIL-HDBK-217 Rev G is that the NSWC Crane working group produced a final draft but it was withheld from public review and publication was delayed due to discussions within the DoD about the future of reliability in general. See VITA reliability forum for current information.

3. What is Physics of Failure?

Physics of Failure (PoF) analysis focuses on modeling physical failure mechanisms and providing detailed information on how environmental and usage stresses lead to fatigue failure. PoF analysis presents a paradigm shift relative to reliability prediction. It changes the analysis of the system equipment from a box of parts to a box of failure mechanisms.

4. When would you use Physics of Failure methods instead of handbook predictions?

Physics of Failure (PoF) methods provide a detailed assessment of the environmental and usage stresses that lead to fatigue failure. PoF should be used whenever you need to understand the effects of fatigue to predict a time-to-failure (TTF), analyze the end-of-life, or understand the effects of environmental stresses such as vibration and thermal cycling.

5. How can I use Physics of Failure in a cost effective manner?

VITA 51.2 section 2.1 and Figure 1 provide guidelines for selection of PoF models for different program phases. It is very difficult to apply PoF to a complex system of hardware and software. There are many failure mechanisms that invoke the limited number of failure models, and not all model parameters are available to the reliability engineer. It is subsequently the responsibility of each organization to define and document the breadth, depth, and the extent to which they apply PoF to meet their program needs and contractual requirements. PoF planning is recommended at the individual program or organizational levels.

6. What does VITA 51.2 provide?

VITA 51.2 provides rules and recommendations for the application of Physics of Failure (PoF) methods to reliability prediction of electronics at the board, packaging and component levels. It is a compilation in good faith, of existing physics of failure models selected by consensus of the working group of best practices in industry.

7. Is the Reliability Community an industry-wide effort?

Yes, this is an industry-wide effort. The sponsors of the Reliability Community are working to encourage technology suppliers and developers to both follow the guidelines as established in the VITA 51 specifications and documents.

8. Where can I find suppliers that meet the VITA 51 requirements?

The current list of active supporters is maintained on the VITA website at www.vita.com/home/MarketingAlliances/Reliability/reliability.html. Suppliers are being asked to include their companies on this list as they begin to adopt the VITA 51 guidelines.

9. Where can I get the Reliability specifications?

The specifications are copyrighted and distributed by VITA. It is available free to VITA members and for a fee to non-members. Order online at: <https://vita.com/secure/online-store.html>.

10. Where can I go to get answers to additional questions that I might have about Reliability guidelines?

The VITA Reliability Community has established a LinkedIn user forum. LinkedIn members can search for Reliability Community under groups. You can join existing discussions or start a new one on your specific topic.

11. Where can I go to learn more?

A list of articles is maintained at www.vita.com/home/MarketingAlliances/Reliability/reliability.html. Check there for the latest information.

12. How can my company get involved with the Reliability Community technical working group?

Contact VITA to become involved with either of these efforts. www.vita.com/home/AboutUs/Contacts.html. You must be a member of VITA to participate in this organization.

13. What is the basis of "Quality level of PiQ=0.1" for Rule 2.1.4-2 of the ANSI/VITA 51.1-2008 (R2013) Reliability Prediction MIL-HDBK-217 Subsidiary Specification?

The "used Pi Q" was a value used to adjust a MIL-HDBK-217FN2 prediction to match it with a failure rate derived from the field failure. It was not derived, or gotten from some other source. It was a value that was found to fit the observations. The problem is that the match was not exact, and this has caused confusion in the past in trying to duplicate what was done. Generally, a conservative value was picked, and the committee tried not to deviate too far from the original MIL-HDBK-217FN2 handbook.

The values provided in VITA 51.1 are recommendations. The user is provided with the supporting documentation and data so he or she may decide whether to use what is provided.

14. I am looking for some guidance with regards to inputting adjustment factors or class changes to MIL-217 components to make my prediction models more realistic compared to real life experience. Currently the predictions are far too conservative to be believable. Which of your standards would you recommend for me. I don't want to purchase and find out it is not what I need.

This information can be found in ANSI/VITA 51.1.

15. According to the ANSI/VITA 51-1 – 200 (R2013), the MIL-HDBK-217 standard can be adapted to be more representative of most of commercial components.

For example, the MIL-HDBK-217 recommends to apply a PiQ factor of 10 for commercial components as shown in the below picture.

Rule 2.1.4-1 allows us to apply a PiQ = 1 for commercial resistors.

Rule 2.1.4-2 allows us to apply a PiQ = 0.1 for commercial resistors similar to type RM resistors of MIL-PRF-55342 standard.

According to MIL-HDBK-217, chip (SMD) resistors have to be of RM type. But if Chip resistor are of RM Type, is it possible to apply PiQ = 0.1 ? Because Rule 2.1.4-2 talks about a MIL-PRF-55342 reference.

Many manufacturers propose resistors of the commercial type but without conformity to MIL-PRF-55342.

The standard allows the use of Pi Q of 0.1 for "commercial resistors of known pedigree similar to type RM resistors of MIL-PRF-55342", the key term here is "of known pedigree". It is the user's responsibility to assure that the part is manufactured by a class word manufacturer who doesn't necessarily qualify the part to the MIL specification but can still demonstrate 2 level of reliability/quality compatible with the Mil qualified parts. That can be demonstrated through applying the guidelines of Appendix C of the standard ANSI/VITA 51.1-2008 (R2013).