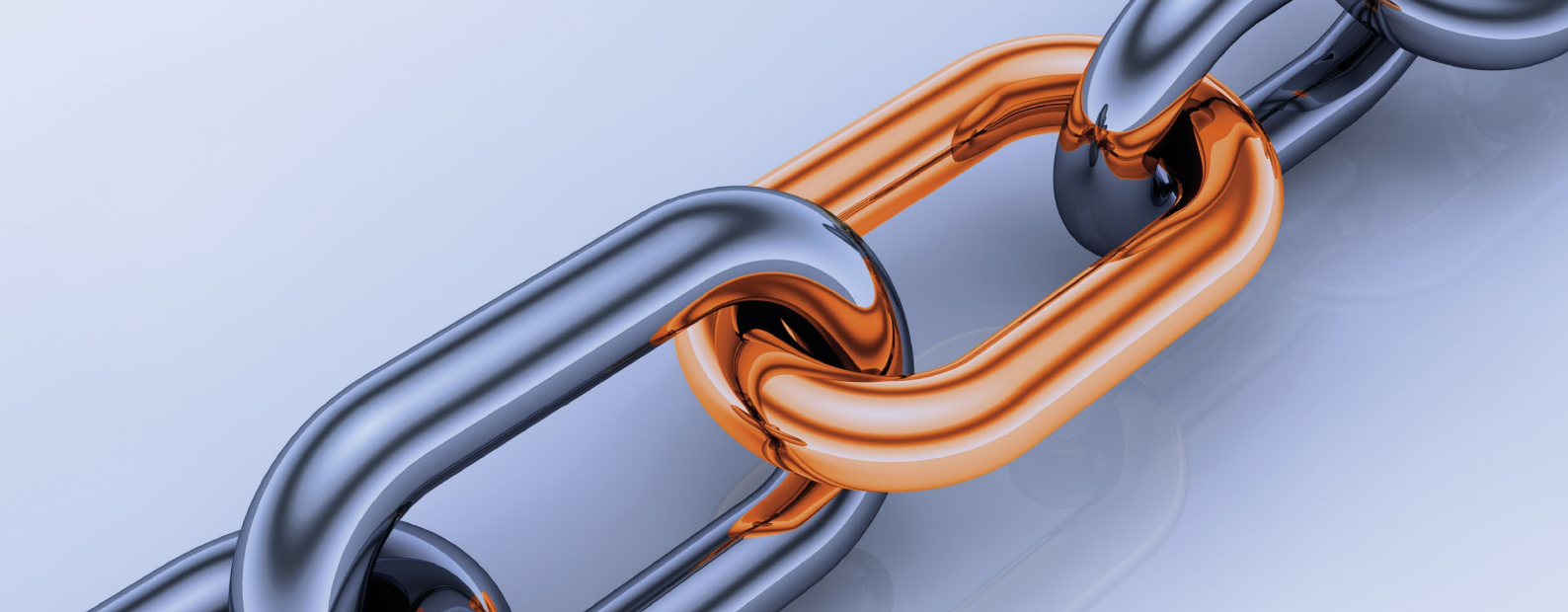




EXAR V 13.0

SOFTWARE SUITE FOR THE CALCULATION OF FAILURE RATES



EXAR FEATURING A SOFTWARE SUITE

EXAR is a Windows software suite for PCs to calculate failure rates.

EN/IEC 61709 or MIL-HDBK-217F can optionally be used as the basis of this calculation for electronic components, complete assemblies and devices. When using IEC 61709, which does not state any basic failure rates, you can apply the Siemens method SN 29500 or your own failure rate values. For the results output, there are numerous variants available for the composition and level of detail of the printouts and files.

The required component data is read from the component database during the calculation or, if necessary, entered with dialogue assistance. Quality data, such as the individual loads acting on the components, is stored in the associated bill of materials together with the elements of a circuit unit, and read from there. Convenient prompting, plus error messages and warnings, facilitate the dialogues and the reading of the results.

The program contains convenient tools to create, maintain and manage the component databases, the bills of material and the user-specific failure rate file.

The reliability technology and the methods used to calculate failure rates are subject to continuous further development and thus to continuous change. This applies to both basic failure rates and the calculation models used.

EXAR is updated as needed. The time and scope of the updates decisively depend on new editions of the failure rate methods and therefore cannot be determined in advance.

THE CALCULATION METHODS

Various methods to calculate failure rates have been considered in EXAR to meet the different demands of users.

IEC 61709 describes a method and conversion models for the calculation of failure rates but does not contain any failure rates of its own.

Siemens Standard SN 29500, with its calculation method corresponding to IEC 61709, provides failure rate values for all major groups of electrical components which are primarily obtained from world-wide field experience gained with the Siemens product range. The individual parts of this standard are updated at irregular intervals as needed, i.e. adjusted to the current state of the art.

MIL-HDBK-217F is published by the U.S. Department of Defense.

The failure rates depend not only on the type of component element but also on its production and further processing, type and conditions of its usage, and thus on the development, manufacturing and testing of the devices. Consequently, a certain component type may exhibit different failure rates in different devices or in the case of different device manufacturers. EXAR provides the option to create and maintain a user-specific failure rate file in which every user can enter their individual basic failure rates. All other constants and calculation models required for the calculation of the failure rates are adopted from IEC 61709 or SN 29500 in this case.

FAILURE RATE PREDICTIONS FOR INDIVIDUAL COMPONENTS

EXAR offers the following options to calculate the prediction for an individual component:

- Selection of the desired method and type of printout.
- Decision if missing data is to be replaced with reference values from SN 29500 or with practically oriented ranges.
- Input of the ambient conditions such as ambient temperatures.
- Input of type name or part number/item code of the component to be calculated.
- If the desired component is found in the component database there is no need to query further component data.
- Input of all quality-relevant component data.
- Input of the quality data and specific loads to which the component is subjected.
- Calculation of the failure rate, display and printout of error messages, warnings and comments, printout of the entire prediction result.
- Query of the next steps.
- Calculate new component or repeat prediction with modified global or individual load values for the same component.



Predictions for individual components are useful whenever detailed printouts are required or for the purpose of training users who are less familiar with reliability technology.

THE COMPONENT DATABASE

The data of a component entered in the dialogue is saved in an internal component database under a type name, part number/item code or ident number. The relevant part will then be available for subsequent calculations under the saved names. This results in the creation of a component database in EXAR that is adjusted to the needs of the respective user.

All components in the database with specific characteristics, which are freely selectable, can be listed in a compact format (e.g. all memory ICs in plastic dual in-line housings with 20 pins). Components in files from other EXAR users can be copied into your own file.

In addition, the EXAR suite contains an extensive external component database. This external file is write-protected, but any desired segments of this file may be copied into the internal component database of the respective user. An updated version of the external file is provided in conjunction with any program update. EXAR initially searches components in the internal file. If they cannot be found there, the search will continue in the external file.

For increasingly used combined components, consisting of several components consolidated in an engineered assembly, several

components may be consolidated under one name in the component database. For a fibre optic transmitter, for example, the laser diode, the Peltier cooling element, the fibre optic connection and the integrated drivers and control circuits may be combined in one item of the file. For predictions, the entire item will be treated as a single component, with the failure rates for the individual components being summed up.

EXAR AND BILLS OF MATERIAL

In general, the failure rate is not calculated for an individual component but for a complete device.

For this purpose, EXAR provides for bills of material (BOM) being created and automatically processed in the course of a failure rate prediction. In addition to the quantity and type of a component, individual quality and load data may be entered in such a BOM. Furthermore, it is permissible to insert comments that will not be considered in the prediction.

EXAR contains a word processing module that can be used to create, edit and save bills of material. Self-explanatory dialogues are provided for entering new items or individual data. A maximum of 4,000 lines is permissible per bill of material.

The BOMs are saved in a database. A BOM can be obtained for further processing or calculating a prediction by means of a consecutive number or one of the names that have been entered. Several databases, each with a capacity of 100,000 BOMs, can be created.

Both components and subordinate

BOMs are permissible as items in a BOM. The subordinate BOMs themselves may contain subordinate BOMs as well. A maximum of 6 hierarchy levels is permissible. All subordinate bills of material must be stored in the same database as the superordinate ones.

Many users have existing bills of material stored in a database. For efficiency reasons, they would like to translate these bills of material into the EXAR BOM format by means of a utility. Utilities of this type are not included in the EXAR suite because they decisively depend on the details of the relevant database. However, the format of the EXAR BOM will be communicated to enable a respective implementation.



FAILURE RATE PREDICTIONS WITH BILLS OF MATERIAL

The prediction for a device when using a bill of materials takes place as follows:

- Saving of a bill of materials with all reliability-relevant items. Non-relevant components may be excluded from the calculation by respective markers or component codes.
- Checking if all required components are already stored in one of the component files. Missing components will be listed by the program and may be entered in the internal component file by the user.
- Dialogue inputs of the prediction parameters: name of BOM, desired calculation method, global data such as ambient temperature or ambient conditions; they are identical for all the components of an assembly or a device. Structure and language of the printout or results file.
- Calculation process flow: resolution of the BOM across all hierarchy levels, reading of all the required component data from the BOM

databases, calculation of the failure rate for each item according to the method selected, listing of all items for which missing data has been noted, summing up of the failure rates for the entire device.

- Output of results: printout and/or saving of the results including error messages and warnings at selectable level of detail. A statistic shows the failure rate fraction of individual units or components in the total failure rate. In addition, a classification of subordinate BOMs by failure rate levels specified by the user is possible. The entirety of the parameters entered for a calculation can be saved as a "profile" and used again for subsequent calculations.

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