

ICS 03.120.01; 03.120.99
CCS L 05



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 37981-2019

**Analysis techniques for dependability - Reliability block
diagram and Boolean methods**

Issued on: August 30, 2019

Implemented on: March 1, 2020

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

- Foreword
- Introduction
- 1 Scope
- 2 Normative references
- 3 Terms and definitions
- 4 symbols and abbreviations

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the translation method equivalent to IEC 61078.2006 "Reliability Analysis Technology Reliability Block Diagram Method and Boolean Algebra Method".

This standard has made the following editorial changes.

--- In order to make the diagram consistent with the explanatory text, the format of the characters in some basic configuration diagrams in Table A.1 of Appendix A is modified;

--- In order to maintain the consistency of the full-text formula, the product symbol "·" omitted by some formulas is added;

--- Table A.1 of Appendix A, supplemented by the ellipsis missing from the partial basic configuration diagram consisting of n modules.

This standard was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This standard is under the jurisdiction of the National Technical Committee for Reliability and Maintainability of Electrical and Electronic Products (SAC/TC24).

This standard was drafted. The Fifth Institute of Electronics, Ministry of Industry and Information Technology.

Introduction

Different methods can be used for credibility analysis, and reliability block diagram (RBD) is one of them. When applying one or a composite application

When evaluating the reliability and availability of a given system or component in several ways, the analyst can prioritize the RBD method, and also consider each

The results available in one method, the data required for analysis, the complexity of the analysis, and other factors in this standard.

The RBD method is a graphical representation of the reliability of the system, which can represent the successful operation of the system (which will be used later in the "system success").

(Function) The logical relationship of the component.

Credibility analysis

Reliability Block Diagram Method and Boolean Algebra

1 Scope

This standard describes the process of system credibility analysis modeling and the use of models to calculate reliability and availability metrics.

Reliability Block Diagram (RBD) modeling technology is mainly used for systems that do not consider repairs and do not consider the order of failures.

Other ordering techniques (such as the Markov method) would be more appropriate for systems with a sequence of repairs or repairs.

It should be noted that although the term "repair" is often used in this standard, the term "recovery" is equally applicable. It should also be noted that

"Products" and "Modules" are also widely used in this standard and are interchangeable in most cases.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 2900.13-2008 Electrotechnical terminology credibility and quality of service (IEC 60050-191.1990, IDT)

IEC 61025 Fault Tree Analysis (FTA) [Faulttreeanalysis (FTA)]

ISO 3534-1.1993 Statistical terms and symbols - Part 1. Probability and basic statistical terms (Statistical-Vocabulary

andsymbols-Part 1.Probabilityandgeneralstatisticalterms)

3 Terms and definitions

The terms and definitions defined in GB/T 2900.13-2008 and ISO 3534-1:1993 apply to this document.

4 symbols and abbreviations

The following symbols and abbreviations apply to this document.

Symbol/abbreviation meaning

A, B, C, in Boolean expressions, these symbols indicate that products A, B, C, etc. are available

A, B, C, in Boolean expressions, these symbols indicate that products A, B, C, etc. are not available

FS system failure probability

$f_A(t)$ Probability density function for module A. The term "module" is used to mean a collection of one or more components.

$Pr(SS|X_{\text{failed}})$ Conditional probability of assuming system success when product X is not working

R, R(t), RS(t) Reliability. The probability that the product will perform the required function under given conditions and within a given time interval (0, t)

Reliability of RA, RB, .. module A, module B, etc.

RS system reliability

RSW detection and conversion device reliability

SF system failure (used in Boolean expressions)