

ICS 33.100
CCS L06



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

GB/T 38659.3-2022

**Electromagnetic compatibility - Risk assessment - Part 3: Risk
analysis method for device**

电磁兼容 风险评估 第3部分：设备风险分析方法

Issued on: October 12, 2022

Implemented on: May 1, 2023

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms, Definitions and Abbreviations	1
4 Overview	5
5 Equipment EMC risk analysis object	5
5.1 Division of Equipment Risk Assessment Units	5
5.2 EMC risk elements	5
6 Mechanical structure EMC risk analysis	6
6.1 Analysis Item	6
6.2 Connector Position (CP) Analysis	7
6.3 Cable shielding (CS) analysis	8
6.4 Port EMC device (I/O-ED) analysis	10
6.5 Board Ground (PG) Analysis	12
6.6 Analysis of ground connection between circuit boards (GCBP)	16
6.7 Interconnect Signal Processing (ISP) Analysis	17
6.8 Metal Part Bond (MPB) Analysis	19
6.9 Board Ground Loop (PGL) Analysis	22
6.10 Equipment Grounding (EG) Analysis	23
7 EMC risk analysis of PCB	25
7.1 PCB risk analysis project	25
7.2 Basis for PCB risk analysis	25
7.3 PCB risk analysis tools	26
7.4 PCB Risk Analysis Procedure	26
7.5 Special Signal Processing (SSP) Analysis	26
8 Verification of digital prototype and sample delivery equipment	29
9 Submission of risk analysis results	29

Foreword

This document was issued on 12 October 2022 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 May 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese

reviewer applies when assessing a submission.

It is classified under Chinese classification L06.

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules for Standardization Documents" drafting.

This document is part 3 of GB/T 38659 "Electromagnetic Compatibility Risk Assessment". GB/T 38659 has released the following parts.

--- Part 1. Electrical and electronic equipment;

--- Part 2. Electrical and electronic systems;

--- Part 3. Equipment risk analysis method;

--- Part 4. System risk analysis method.

Please note that some contents of this document may refer to patents. The issuing agency of this document assumes no responsibility for identifying patents.

This document is proposed and managed by the National Radio Interference Standardization Technical Committee (SAC/TC79).

This document is drafted by. Shanghai Electrical Apparatus Research Institute, Shanghai Robot Industry Technology Research Institute Co., Ltd., Sichuan Drug Inspection Research Institute

Research Institute (Sichuan Provincial Medical Device Testing Center), Schneider Electric (China) Co., Ltd. Shanghai Branch, Nanjing Panda Electronics Co., Ltd.

Division, Henan Medical Device Inspection Institute, Xihua University, Nantong Shangyan Robot Technology Co., Ltd., Shanghai Electrical Appliance Science Research Institute (Group) Co., Ltd.

Company, Shanghai Tianwei Certification Technology Co., Ltd., Xiamen Product Quality Supervision and Inspection Institute, China Electric Power Research Institute Co., Ltd., Shanghai Power

Instrument Equipment Testing Institute Co., Ltd., Bronte Robotics Co., Ltd., Guangdong Liwang High-tech Co., Ltd.

The main drafters of this document. Zheng Junqi, Yu Chao, Qiao Feng, Zhang Yifei, Li Yang, Zhang Wei, Cao Lin, Chen Hao, Yuan Shuchuan, Song Jiangwei, Ye Qiongyu,

Xie Yanping, Cheng Jianghe, Hu Bei, Zhang Fengxian, Xing Lin, Zhu Yining, Zheng Kaiyu, Guo Jinlong, Sun Chunyang.

Introduction

Electromagnetic compatibility (EMC) risk assessment technology is based on the EMC design method, using general risk assessment methods, according to the risk

risk assessment procedures, classify risk levels, and establish ideal models for equipment design (equipment includes electronic and electrical systems and electronic and electrical equipment, electronic and electrical

The gas system is composed of multiple electronic and electrical equipment, and the risk assessment of the electronic and electrical system is based on the completed evaluation of the electrical and electronic equipment.

Based on the above), determine the risk factors, and then compare the information of the actual design of the equipment with all the risk factors in the ideal model to identify

Identify the EMC risk of the equipment, and finally obtain the EMC risk level of the equipment through a specific algorithm through a relatively mature risk assessment technology.

EMC risk level is used to indicate the performance of equipment in response to various EMC phenomena, and it is a new model for equipment EMC performance evaluation.

GB/T 38659 aims to establish EMC risk assessment methods and analysis methods applicable to electrical and electronic equipment and systems. It is proposed to consist of four parts.

--- Part 1. Electrical and electronic equipment. The purpose is to analyze the principles and implementation of the given EMC risk assessment for electrical and electronic equipment method.

--- Part 2. Electrical and electronic systems. The purpose is to give analysis principles and implementation of EMC risk assessment for electrical and electronic systems method.

--- Part 3. Equipment risk analysis method. The purpose is to provide specific operational methods for the risk analysis of electrical and electronic equipment.

laws and procedures.

--- Part 4. System risk analysis method. The purpose is to provide specific implementation methods for the risk analysis of electrical and electronic systems.

laws and procedures.

The mechanical structure design, interconnection cable design, application environment and other elements of the electrical and electronic system will affect the electromagnetic

compatibility risk of the electrical and electronic system.

Assessment provides guidance. Engineering personnel have an in-depth understanding of EMC risk assessment techniques and correctly use the EMC risk assessment specified in this document

method, which will uncover the black box of EMC design of electronic and electrical systems, and can evaluate the EMC performance of the system, and can also be combined with EMC testing

The results are combined with a comprehensive EMC evaluation of electrical and electronic systems.

Designers or users of electrical and electronic systems, through correct EMC risk assessment, can clearly find that the existing system is

The advantages, disadvantages and risks of EMC can be used to predict the pass rate of the EMC test of the system, and it can also predict the system in its life.

EMC performance at each stage of the cycle.

Electromagnetic Compatibility Risk Assessment

Part 3. Equipment risk analysis method

1 Scope

GB/T 38659.3-2022 applies risk analysis to electromagnetic compatibility. EMC is normally handled by compliance: a product is tested against defined immunity levels and passes or fails. That works where the environment resembles the test, and it says nothing about the case that matters most - equipment whose malfunction would be dangerous, installed somewhere the electromagnetic environment is worse than the standard assumed, near a radio transmitter, a welding shop or a traction supply. A pass gives no margin information, so it cannot answer how likely interference is or what would follow. Risk analysis reframes the question in the terms used everywhere else in safety engineering: what disturbance, how likely, with what consequence, and what reduces it. This part gives the method for obtaining the risk elements in the EMC risk assessment of electrical and electronic equipment, the values used, and the procedures for the analysis. Under CCS L06, it is written for the designers of equipment with safety-related functions, for the EMC consultants and laboratories supporting them, and for the industries - medical, rail, industrial control - where an immunity test alone is not considered sufficient evidence.

This document gives the risk assessment values for obtaining risk elements in the electromagnetic compatibility (EMC) risk assessment of electrical and electronic equipment,

The procedures and methods for risk analysis of risk elements are required, including