ICS 29.020
CCS L 10

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 44794-2024

Automatic electric control for household and similar use-Technical requirements and evaluation methods for microwave sensing function

家用和类似用途电自动控制器 微波传感功能的技术要求和评价方法

Issued on: October 26, 2024 **Implemented on: May 1, 2025**

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

Table of Contents

Preface III
Introduction IV
1 Scope 1
2 Normative references 1
3 Terms and Definitions 1
4 Technical Requirements 3
4.1 General requirements 3
4.2 Detection distance 3
4.3 Detection Field of View 3
4.4 Detection Accuracy 4
4.5 Presence or absence detection application 4
4.6 Motion Presence Detection Application 4
4.7 Micro-motion Presence Detection Application 4
4.8 Stationary Presence Detection Application 4
4.9 Application of personnel statistics 4
4.10 Personnel Activity Tracking Application 4
4.11 Action (Gesture) Recognition 5
4.12 Human Posture Recognition 5
4.13 Vital Signs Detection 5
4.14 Other microwave function applications 5
5 Evaluation Methods 5
5.1 Evaluation Material Requirements 5
5.2 Requirements for tested samples 6
5.3 Test site and equipment requirements 7
5.4 Detection distance evaluation method 9
5.5 Evaluation Method of Detection Field of View Angle 10
5.6 Evaluation Method of Detection Accuracy 11
5.7 Evaluation Methods for Presence Detection Applications 11
5.8 Evaluation Methods for Human Motion Presence Detection Applications 12
5.9 Evaluation Methods for Human Micro-Motion Presence Detection Applications 13
5.10 Evaluation Methods for Stationary Person Presence Detection Applications 13
5.11 Evaluation Methods for Headcount Statistics Applications 14

5.12 Evaluation Methods for Personnel Activity Trajectory Tracking and Detection Applications 14
5.13 Evaluation Methods for Motion (Gesture) Recognition Applications 15
5.14 Evaluation Methods for Human Posture Recognition Applications 16
5.15 Evaluation Methods for Vital Sign Detection Applications 17
References 19

Foreword

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 is required.

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document is proposed by the China Electrical Equipment Industry Association.

This document is under the jurisdiction of the National Technical Committee for Standardization of Home Automation Controllers (SAC/TC 212).

This document was drafted by: Guangdong Zhongchuang Zhijia Science Research Co., Ltd., China Electric Power Research Institute Co., Ltd., Guangdong Midea Refrigeration Equipment Co., Ltd., Zhuhai Gree Electric Appliances Co., Ltd., Xiamen Hualian Electronics Co., Ltd., Hisense Air Conditioning Co., Ltd., Qing Daoguochuang Intelligent Home Appliance Research Institute Co., Ltd., Midea Group Co., Ltd., Weikai Testing Technology Co., Ltd., Panasonic Home Appliances (China) Co., Ltd.

Co., Ltd., Qingdao Haier Refrigerator Co., Ltd., Hisense Rongsheng (Guangdong) Refrigerator Co., Ltd., Hefei Midea Refrigerator Co., Ltd., Qingdao Haier Refrigerator Co., Ltd.

Haier Washing Machine Co., Ltd., Beijing Xiaomi Electronics Co., Ltd., Qingdao Haier Intelligent Technology R&D Co., Ltd., Guangdong Midea Kitchen and Bathroom Appliances Manufacturing Co., Ltd., Ningbo Kelian Electronics Co., Ltd., Hangzhou Xingzhi Yunqi Technology Co., Ltd., China Mobile (Hangzhou) Information Technology Co., Ltd., Sanmen Kangchuang Electronic Technology Co., Ltd., Huizhou Tuobang Electrical Technology Co., Ltd., Wangli Security Technology Co., Ltd., Hangzhou EZVIZ Software Co., Ltd., Sanqiaohui (Foshan) New Materials Co., Ltd., Shenzhen Yitan Technology Co., Ltd., Shenzhen Haiman Technology Co., Ltd., Shenzhen Megmeet Electric Co., Ltd., Shenzhen Pinstar Technology Co., Ltd., Ninghai Kaiteli Electric Co., Ltd., Zhuhai Derun Tong Electronic Technology Co., Ltd., Zhongshan Kezhuoer Electric Co., Ltd., Ningbo Yinqiu Technology Co., Ltd., Ningbo Ouzhi Electric Technology Co., Ltd.

Co., Ltd., Zhejiang Gaodu Environmental Protection Technology Co., Ltd., Hunan Megmeet Electrical Technology Co., Ltd., Zhejiang Tanpoqiuer Sensing Technology Co., Ltd.

Sijie Microelectronics (Xiamen) Co., Ltd., Guangzhou Chengzhen Electronic Technology Co., Ltd., Zhejiang Jinkaide Smart Home Co., Ltd., China Quality Certification Center Co., Ltd., Ningbo Jingxin Technology Co., Ltd., Jiangyin Zhijun Electrical Wire and Cable Co., Ltd., Guangdong Dangjiaren Intelligent Appliances Co., Ltd., Beijing Siemens Siberus Electronics Co., Ltd., Pinghu Li Ting Machinery Manufacturing Co., Ltd., Guangdong Jinya Technology Co., Ltd., Guangdong Baijin New Energy Co., Ltd., Shenzhen Sihe Technology Co., Ltd., Shenzhen Chuangrongfa Electronics Co., Ltd., Shandong Yaosi Intelligent Technology Co., Ltd., Jinjiu Technology Co., Ltd.

The main drafters of this document are: Zhuang Weiwei, Kong Ruixun, Xia Yunlong, Hong Yijiu, Zhang Fan, Bie Qingfeng, Wang Ye, Huang Xinjian, Jing Yixin, Li Jilei, Zhou Xiaojun, Han Zhiqiang, Chen Xing, Xiong Guilin, Wu Jirong, Yin Junming, Zhao Xiaoping, Wen Lianggong, Xu Sheng, Zhang Lixiao, Li Ping, Wang Xiongwei, Lin Lulu, Shen Yuanhai, Qu Keyong, Lan Huixue, Zhi Chongzheng, Li Hangkuai, Long Kewen, Song Zhe, Zeng Yonggang, Zhao Yingjun, Zheng Haohua, Chu Zhikan, Zhu Rongchuan, Lu Jianen, Xia Jianan, Ke Cilong, Zeng Zhaoliang, Fang Wanglin, Dai Baiqing, Lu Yumin, Li Jun, Tang Xiangiang, Wang Yabin, Wang Jianli, Tao Ruitao, Chen Weihui, Lin Yongming, Ma Zhijun, Jiang Huixing, Xue Shiding, Li Ting, Wang Xuefen, Pi Kunlin, Li Qiang, Hong Baoxuan, Chen Jiaxian, Wang Zhesi, and Mao Xiaoyao.

Introduction

The microwave sensing function of household and similar electric automatic controllers is generally achieved by emitting electromagnetic waves in the millimeter or centimeter wave bands and After calculating and processing the reflected signal, it can sense the detected object and output the corresponding control signal, so that various electrical products can be used around the user.

Provides functional services based on user status.

At present, the microwave sensing function of household and similar electric automatic controllers has been deeply developed in combination with algorithms, and has achieved These applications can be categorized as follows.

--Personnel presence detection. - With or without detection; - Distance detection; - Coordinate detection. --Individual identification. - Headcount;

- Activity trajectory tracking. --Body recognition.

- Action (gesture) recognition; - Human posture recognition.

--Vital signs detection. Detects vital signs such as breathing and heart rate of personnel, and outputs relevant vital signs data.

--Other detection applications.

During actual functional deployment, the microwave sensing module can also integrate the above applications to achieve more complex functions.

Combined with the underlying technology implementation of microwave sensing functions, the evaluation methods of this document can be mainly divided into two categories.

--Technical indicators that are highly correlated with microwave emission and reception characteristics, such as detection distance and detection accuracy, may be affected by other electromagnetic To avoid interference or influence of radio waves, it is recommended to conduct evaluation tests in an anechoic chamber that meets appropriate technical specifications to simulate open field conditions.

The microwave sensing module works under the following conditions.

--Application layer functions that require the combination of more complex algorithms, such as personnel counting and motion recognition, need to be verified in the terminal application.

In order to achieve the desired effect, the evaluation test was conducted in a simulated home scene without additional electromagnetic shielding.

Considering that there are certain recognition errors in microwave sensing function at this stage, this document mainly The "accuracy limit" indicator is used. for example, in multiple measurements, as long as the microwave sensing function meets the repeatability limit requirement, it is sufficient.

The evaluation indicators of this document mainly include detection success rate, false alarm rate and missed detection rate. The detection success rate also includes error (uncertainty) and Refresh rate (latency) and other indicators. False alarm rate can be divided into static false triggering and motion/object false recognition.

Microwave sensing has a wide range of applications, and its technical indicators vary greatly in different application scenarios.

The main purpose of the test is to verify whether the specific technical indicators of the microwave sensing function can reach the specified indicator level under the conditions of the manufacturer's self-declaration.

Level as the basis for judgment.

Automatic electrical controls for household and similar purposes Technical requirements and evaluation methods for microwave sensing functions

1 Scope

This document specifies the terms, definitions, technical requirements and evaluation