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

**GB/T 46189-2025**

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**Space environment - General requirements of ground  
simulation test for space environmental effects of spacecraft  
unit**

空间环境 航天器组件空间环境效应地面模拟试验通用要求

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## Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the Chinese Academy of Sciences. This document is under the jurisdiction of the National Technical Committee on Standardization of Aerospace Technology and Its Applications (SAC/TC425). This document was drafted by: Beijing Institute of Satellite Environmental Engineering, National Space Science Center of the Chinese Academy of Sciences, and Shenzhen Space-Ground Twin Technology Co., Ltd. Limited Company, Shanghai Satellite Equipment Research Institute, Harbin Institute of Technology, Harbin Institute of Technology (Shenzhen), Aerospace Dongfanghong Satellite Co., Ltd. Beijing Zero Gravity Space Technology Co., Ltd., China Academy of Space Technology, Xi'an Longfei Electric Technology Co., Ltd., Beijing Oriental Measurement and Testing Research Institute Research Institute, Beijing Lezhixing Technology Co., Ltd. The main drafters of this document are. Shen Zicai, Ji Qizheng, Li Xingji, Zhang Lixin, Yu Lantao, Wang Shijin, Yuan

Jungang, Wang Fengbin, and Zhang Zhenlong. Wang Zhizhong, Wang Bin, Xiao Qi, Zhou Yuan, Su Xinming, Zhang Yuanyuan, Feng Xueshang, Wang Xinyue, Cao Lin, Li Changhong, Li Shupeng, Gao Haiyang, Zuo Pingbing, Feng Na Zhang Kun, Yang Jianqun, Lan Lidong, Hu Xiao, Tang Xu, Nie Haifeng, Sun Wei, Liu Wei. Space environment spacecraft components space environment General requirements for ground simulation tests of effects

## 1 Scope

GB/T 46189-2025 is the Chinese national standard covering reproducing the space environment for a unit on the ground - the vacuum, thermal cycling, radiation and charging tests, the acceleration factors and their limits, the instrumentation during exposure, and the pass criteria. First edition, with the component-level test standard GB/T 46174-2025. Already in force. Issued on 5 October 2025, it has been in force since 5 October 2025.

This document specifies the laboratory environment and test system (including vacuum system, test...) for ground simulation tests of spacecraft component space environment effects. Basic requirements for test control systems, test measurement systems, test specimens, test safety, and ground simulation tests (including real space environment effects) Air-cooled welding test, vacuum discharge test, vacuum discharge test, thermal test, gas venting test, micro-vibration test, total ionization dose effect test, surface The purpose and parameters of tests including charge/discharge effect test, atomic oxygen erosion effect test, ultraviolet radiation effect test, and strong magnetic field effect test. Special requirements. This document applies to ground-based simulation tests of the space environment effects on spacecraft components during their on-orbit flight phase. It covers both spacecraft system-level and subsystem-level simulations. This is for reference in ground-based simulation experiments of space environment effects.

## 2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 30114.2 Terminology for Space Science and Its Applications Part

## 3 Terms and Definitions

The terms and definitions defined in GB/T 30114.2, GB/T 32452 and GB/T 44000-2024, as well as the following terms and definitions, apply to this document.

3.1 Multipacing In a vacuum, the time it takes for an electron to pass between two

discharge surfaces separated by a certain distance is half a cycle of the alternating voltage applied to the two surfaces. When the period is an odd multiple, a vacuum discharge phenomenon occurs due to the secondary electron multiplication effect.

3.2 Disturbance source Equipment, mechanisms, or components that generate on-orbit micro-vibration environments.

3.3 Changes in component-related parameters caused by the annealing or growth of radiation-induced charges during and after irradiation.

4. Abbreviations The following abbreviations apply to this document.