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

GB/T 46190-2025

**General requirements of protection for space environmental
effects on spacecraft**

航天器空间环境效应防护通用要求

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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 was proposed and is under the jurisdiction of the National Technical Committee on Standardization of Aerospace Technology (SAC/TC425). This document was drafted by: Beijing Satellite Environmental Engineering Institute, Beijing Spacecraft Overall Design Department, and the National Space Science Center of the Chinese Academy of Sciences. Learning Center, Shenzhen Star-Ground Twin Technology Co., Ltd., China Academy of Space Technology, Aerospace Dongfanghong Satellite Co., Ltd., Xiangtan University, Xi'an Longfei Electric Technology Co., Ltd., Nanjing University of Aeronautics and Astronautics, Beijing Zero Gravity Space Technology Co., Ltd., Harbin Institute of Technology (Shenzhen), Beijing Tiangong Scientific Instruments Space Technology Co., Ltd. The main drafters of this document are. Shen Zicai, Hu Yanqi, Ji Qizheng, Ouyang Xiaoping, Qu Shaojie, Yu Qingkui, Zhao Yuxin, Li Changhong, and Wang Shijin. Wang Ningping, Feng Xueshang, Zhang Zhenlong, Zhang Yuanyuan, Yuan Jungang, Wang Fengbin, Lan Lidong, Tang Xiaobin, Zuo Pingbing, Zhang Qiongyu, Wang Zhizhong, Zhang Kun, Cao Zhiqiang Liu Wei. General requirements for protection against spacecraft space environment effects

1 Scope

GB/T 46190-2025 is the Chinese national standard covering designing a spacecraft against its environment - the shielding against total dose, the part selection and mitigation for single event effects, the surface charging and the grounding that prevents discharge, the atomic oxygen and the debris protection, and the margins required on each. At 20,500 words. First edition, under the Chinese Academy of Sciences, already in force. Issued on 5 October 2025, it has been in force since 5 October 2025.

This document specifies the procedures for protecting spacecraft from the effects of the space environment, including single-event effects, total ionization dose effects, displacement damage effects, and surface effects. Surface charging and discharging effect, internal charging effect, ultraviolet radiation damage effect, pollution effect, atomic oxygen erosion effect, and impact of space debris and micrometeoroids. General requirements for protection against the effects. This document applies to the protection of spacecraft products against 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 4937.2 Mechanical and climatic testing methods for semiconductor devices - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 32452, GB/T 30114.2 and GB/T 44385-2024, as well as the following terms and definitions, apply to this document.

3.1 The ratio of the radiation dose that causes a material or device to fail due to radiation to the ambient radiation dose at the actual location of use on the satellite.

3.2 Watchdogtimer;WDT A timer circuit that uses hardware or software to generate a reset signal and restart the system when a program malfunctions.

3.3 wake effect When a spacecraft is orbiting in a low-altitude, non-polar Earth orbit, its speed exceeds the speed of sound of ions, causing [the following to occur] within the spacecraft. The phenomenon of an ion depletion region being formed in the opposite direction of motion.

3.4 During strong solar activity events such as coronal mass ejections, the solar wind compresses the Earth's magnetopause to below the altitude of geosynchronous orbit, leading to...