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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 38771-2020

General specification for microwave switches for space applications

宇航用微波开关通用规范

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard was proposed and managed by the National Aerospace Technology and Application Standardization Technical Committee (SAC/TC425). This standard was drafted by: Beijing Aerospace Micro Electromechanical Technology Institute, Xi'an Space Radio Technology Institute. The main drafters of this standard. Zhang Chuxian, Changqun Feng, Wen Ping, Yang Jun, Zhu Dan, Tian Yawei, Cai Libing, Zheng Guolong, Wang Wentao, Jiang Dongming, Liu Hong. General specifications for microwave switches for aerospace

1 Scope

China's national general specification for the microwave switches used on spacecraft. It specifies the terms and definitions, the general requirements, the design requirements and the verification. A microwave switch routes radio frequency signals between antennas, amplifiers and receivers, and on a communications satellite there may be dozens of them arranged so that a failed amplifier can be switched out and a spare switched in. That redundancy is the reason the switch exists, which makes its own reliability a peculiar problem: it is the component whose failure defeats the arrangement designed to tolerate failure. The switches are electromechanical - a moving element physically changing the signal path - because that gives the isolation and the low loss that solid state switching cannot match at these powers. So they are mechanisms, in a vacuum, expected to actuate reliably after years of standing still, which is what the design and verification requirements are written around.

This standard specifies the general requirements for the design and verification of microwave switches for aerospace (hereinafter referred to as microwave switches). This standard is applicable to the design and verification of microwave switch products for aerospace, not to microwave integrated circuit switch chips.

2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this article Pieces. For the cited documents without date, the latest version (including all amendments) applies to this document.

GB/T 191 Graphic mark for packaging, storage and transportation

GB/T 2421.1-2008 Overview and guidelines for environmental testing of electrical and electronic products

GB/T 7826-2012 system reliability analysis technology failure mode and impact analysis (FMEA) program

GB/T 19247-2003 (all parts) printed board assembly

GB/T 25915.1-2010 Clean room and related controlled environment Part 1. Air cleanliness level

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Coaxial switch The high-frequency interface is the microwave switch of the coaxial connector.

3.2 Waveguide switch The high-frequency interface is a microwave switch of a waveguide.

3.3 Action voltage pick-upvoltage The minimum voltage required for a microwave switch to switch from one state to another.

3.4 Operating voltage Within the scope of the specified working environment, ensure the microwave switch can normally switch the voltage range.

3.5 Switching time When the microwave switch is switched, the time required from receiving the excitation signal to the microwave switch switching and stabilizing to the target state.

Note. For coaxial microwave switches, the switching time includes reed spring time, and for waveguide microwave switches, the switching time includes rotor jitter time.

3.6 Command interference sensitivity ripplesensitivity When there is some interference in the excitation circuit of the system, the microwave switch does not have the ability to malfunction.