INTERNATIONAL STANDARD

ISO 23569

First edition
2021-11

Space systems — Spacecraft system level radio frequency (RF) performance test in compact range

Systèmes spatiaux — Essai de performance des radiofréquences (RF) dans une gamme compacte au niveau du système de l'engin spatial

Reference number
ISO 23569:2021(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

System level test for RF performance of spacecraft, which is the test for spacecraft expected performance on orbit, includes test of EIRP, *G*/*T*, SPFD, AFR, group delay, PIM, etc. In some conditions, it also includes verification of the antenna pattern on two crossed planes (normally the antenna pattern is measured in unit level and subsystem level; if it is necessary to measure in system level, the antenna pattern on two crossed planes would be chosen for verification purpose). Compact range is suitable for spacecraft full-link RF performance test, which includes uplink and downlink.

Currently there are well-defined requirements for acceptance test of integrated spacecraft as final RF performance verification tests, especially for commercial communication spacecraft. RF performance test for the payload system (including the transponder and Tx/Rx antennas) is becoming more and more important and should be verified before launch. At present, the system level RF performance test has become one important step listed in the spacecraft production flow. It is carried out to verify whether there is unexpected variation during the assembling of the spacecraft and whether the RF performance in coverage area (footprint) can satisfy the specification.

According to ISO 15864, the system level RF performance test items have been identified as necessary functional performance parameters in acceptance tests, so they can be tailored to the test requirement for each kind of spacecraft or test plan.

Space systems — Spacecraft system level radio frequency (RF) performance test in compact range

1 Scope

This document specifies the verification test activities for assessing the RF performance of integrated spacecraft, including test items, test requirements, and typical test procedures, test facility and chamber environment, with respect to the testing using compact range. This document is applicable to the RF performance test for spacecraft at system level using compact range.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
nominal plane wave axis of compact range
NPA
axis of propagation of a single plane wave generated by the compact range reflector

3.2
effective free space distance in compact range
R
equivalent distance from the feed, where spherical attenuation exists

4 Abbreviated terms

AFR	amplitude-frequency response
AM	amplitude modulation
ALC	automatic level control
CR	compact range
DUT	device under test
EIRP	effective isotropically radiated power
EM	electrical model
FM	frequency modulation
G/*T*	ratio of gain-to-noise temperature (quality factor of spacecraft receiving system)