



AEROSPACE STANDARD

AS6023™

Issued 2017-02

Active and Battery Assisted Passive Tags Intended for Aircraft Use

RATIONALE

Increased use of Radio Frequency Identification (RFID) in supply chain and logistics has led to increasing demand for, and subsequent development of, a myriad of active battery-powered RFID tags with read ranges ranging from a few meters to kilometers and including non-volatile memory, sensors, and human-machine interfaces. Aerospace industry adoption of RFID technology will be enhanced significantly by standardization of Active RFID tags.

The requirements for Active RFID tags to be used in the aerospace industry are significantly different from non-aviation uses. Active RFID tags transmitting during flight have the potential to interfere with aircraft operation. The technology is required to perform within specification under extreme operating conditions over many years. Furthermore, the aerospace industry is subject to unique considerations regarding qualification, regulations, and safety, which are enforced by national authorities such as the FAA, EASA, FCC, etc. These requirements, coupled with the relatively low manufacturing volumes, will drive up the per-part cost of tags developed for the aerospace industry. This will generate the need for a unique set of RFID tags specifically designed for use on aircraft. Adherence to this standard will decrease the development cost of these low-volume, high-capability RFID tags.

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1. SCOPE

The scope of this document is to:

- Provide a requirements document for RFID Tag Manufacturers to produce active RFID tags for the Aerospace industry.
- Identify the minimum performance requirements for active RFID tags to be used on or in close proximity to aircraft.
- Specify the test requirements specific to active RFID tags for aircraft use, in addition to RTCA DO-160 compliance requirements separately called out in this document.
- Identify existing standards applicable to active RFID Tag.
- Provide a certification standard for RFID tags which will use permanently-affixed installation on aircraft and aircraft parts.
- Battery standards are separately captured and not included in this document.

1.1 Purpose

Active and battery assisted passive RFID tags are being widely endorsed for aircraft applications. Some of the applications include, sensing temperature, vibration, stress, fatigue, cargo handling, etc. Because these tags have a battery and transmit RF there is a possibility they could interfere with safety of flight.

This document contains minimum performance standards for the active and battery assisted passive RFID tags (hereafter refers to as active RFID tags). These standards specify tag characteristics that should be useful to designers, manufactures, installers and users of the tag.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS9100 Quality Management Systems - Requirements for Aviation, Space and Defense Organizations

2.1.2 RTCA Publications

Available from RTCA, Inc., 1150 18th Street, NW, Suite 910, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

RTCA/DO-160 Environmental Conditions and Test Procedures for Airborne Equipment

RTCA/DO-311 Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems

2.1.3 EUROCAE Publications

Available from EUROCAE, 102, rue Etienne Dolet, 92240 Malakoff, France, Tel: +33.1.40.92.79.30, www.eurocae.net.

EUROCAE ED-14 Environmental Conditions and Test Procedures for Airborne Equipment

2.1.4 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

Title 14, CFR part 25, app. F, Part 1 - Test Criteria and Procedures for Showing Compliance with §25.853 (a) (14 CFR part 25, Appendix F)

Title 47, CFR Chapter 1 Federal Communications Commission, part 15 - Radio Frequency Devices (47 CFR part 15)

2.1.5 Airlines for America, formerly known as Air Transport Association, Publications

Available from Airlines for America website: <https://publications.airlines.org/CommerceProductDetail.aspx?Product=166>.

ATA Spec 2000, Chapter 9: Automated Identification and Data Capture

2.1.6 Federal Aviation Authority (FAA) Publications

Available from the FAA website: <https://www.faa.gov/>

TSO-C142a Non-Rechargeable Lithium Cells and Batteries, and TSO-C179, Rechargeable Lithium Cells and Lithium Batteries

TSO-C179 Rechargeable Lithium Cells and Lithium Batteries

2.1.7 European Standards Publications

Available from the European Standards website: <http://www.en-standard.eu/>

EN 9100 Quality Management Systems - Requirements for Aviation, Space and Defense Organizations

2.2 Definitions

CFR: Title 14 of the Code of Federal Regulations

A4A: Airlines for America (formerly Air Transport Association/ATA): Airline trade association whose purpose is Airlines for America (A4A) advocates on behalf of its members to shape crucial policies and measures that promote safety, security and a healthy U.S. airline industry. A4A through the ATA e-Business Program coordinates standards creation within Engineering, Maintenance and Material.

ACTIVE RFID: RFID device having the ability of producing a radio signal in accordance with ISO 19762:2016 standard.

AEROSPACE APPLICATIONS: Used on products created for the aerospace industry.

AIRBORNE USE: Used on aircraft while in flight—as opposed to Ground Service Equipment, which is used on aircraft, but only while the aircraft is on the ground.

BAR-CODE: A standard method of identifying items based on lines of varying widths and spacing that are visually read by a scanner.

BAP: Battery Assisted Passive RFID tags that have an on-board battery or other power source to power the electronics in the tag, minimizing the power required from the reader RF Beam. They backscatter like a Passive UHF tag only when they are interrogated. BAP tags have greater read ranges than purely passive tags.