U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: RTCA, INC., DOCUMENT RTCA/DO-254, DESIGN ASSURANCE GUIDANCE FOR AIRBORNE ELECTRONIC HARDWARE

Date: 6/30/05 **AC No:** 20-152
Initiated By: AIR-100 **Change:**

1. PURPOSE.

a. This advisory circular (AC) applies to manufacturers and installers of products or appliances incorporating complex custom micro-coded components with hardware design assurance levels of A, B, and C. These complex custom micro-coded components include application specific integrated circuits (ASIC), programmable logic devices (PLD), field programmable gate arrays (FPGA), or similar electronic components used in the design of aircraft systems and equipment. This AC provides a means (but is not the only means) to gain Federal Aviation Administration (FAA) approval by showing the equipment design is appropriate for its intended function. Further, using this AC will help you satisfy airworthiness requirements when these types of electronic components are implemented.

b. When designing level D devices, manufacturers may choose to use RTCA, Inc. document RTCA/DO-254, *Design Assurance Guidance For Airborne Electronic Hardware*, dated April 19, 2000, or continue to use their existing design assurance practices. However, if you choose to follow the guidance in RTCA/DO-254 for your level D devices, we do not need to review the life cycle data for that device.

2. WHY USE RTCA/DO-254?

a. By following the guidance and procedures outlined in RTCA/DO-254, you have assurance that the hardware design performs its intended functions within the environment it was designed for, and the assurance of meeting all the applicable airworthiness requirements.

b. RTCA/DO-254 distinguishes between complex and simple electronic hardware; recognizes five classes of failure conditions, from catastrophic to no effect; and provides guidance for each hardware design assurance level associated with a given failure condition classification.

c. This AC recognizes the guidance in RTCA/DO-254 applies specifically to complex custom micro-coded components with hardware design assurance levels of A, B, and C, such as ASICs, PLDs, and FPGAs.

NOTE: We don't intend that you apply RTCA/DO-254 to every type of electronic hardware.

3. WHO CAN USE RTCA/DO-254? Users of RTCA/DO-254 include:

a. Applicants for:

- Type certificates (TC)
- Supplemental type certificates (STC)
- Amended type certificates (ATC)
- Amended supplemental type certifications (ASTC)
- Technical standard order (TSO) authorizations
- Parts manufacturer approvals (PMA)

b. Manufacturers of aircraft products or appliances incorporating custom micro-coded components.

NOTE: We recognize that the hardware life cycle data for commercial-off-the-shelf (COTS) microprocessors may not be available to satisfy the objectives of RTCA/DO-254. Therefore, we don't intend that you apply RTCA/DO-254 to COTS microprocessors. There are alternative methods or processes to ensure that COTS microprocessors perform their intended functions and meet airworthiness requirements. Coordinate your plans for alternative methods or processes with us early in the certification project.

4. FUTURE CHANGES OR REVISIONS. We may revise this or other associated ACs, or publish policy changes to clarify the use of RTCA/DO-254 for a specific part of Title 14 of the Code of Federal Regulations (14 CFR).

5. RELATED DOCUMENTS.

a. Code of Federal Regulations. 14 CFR parts 21, 23, 25, 27, 29, and 33.

b. RTCA, Inc. Document RTCA/DO-254. Order copies of RTCA/DO-254, *Design Assurance Guidance For Airborne Electronic Hardware,* dated April 19, 2000, from RTCA, Inc., 1828 L Street, NW, Suite 805, Washington, D.C. 20036; or online at http://www.rtca.org/.

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