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Guidance for the Development of Portable Electronic Devices (PED) Tolerance for Civil Aircraft

RTCA DO-363A
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FOREWORD

This document was prepared by RTCA Special Committee 234 (SC-234) and EUROCAE Working Group 99 (WG-99) and approved by the RTCA Program Management Committee (PMC) and the EUROCAE Council on June 23, 2022.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Standards Development Organization and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;
- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;
- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and
- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

The organization's recommendations are often used as the basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders and advisory circulars.

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EXECUTIVE SUMMARY

The United States Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA) requested that RTCA, Inc. and EUROCAE form a special committee to present an up-to-date evaluation of the use of portable electronic devices (PEDs) on board civil aircraft with emphasis on intentional transmitters such as mobile phones, wireless RF network devices, and other wireless-enabled devices such as personal digital assistants (PDAs).

RTCA Special Committee 234 (SC-234) and EUROCAE Working Group 99 (WG-99) included representatives from consumer electronic, avionics manufacturers, aircraft manufacturers, airlines, aircraft operators, regulatory agencies, and related industry associations.

This report addresses the specific Terms of Reference to address aircraft design to tolerate operation of PEDs. Previous RTCA reports on aircraft interference from PEDs have emphasized risk assessments and then recommended restrictions on the use of PEDs on board the aircraft. This report departs from the earlier RTCA reports and is directed to aircraft design recommendations that lead to aircraft tolerance to both intentional RF transmissions and spurious RF emissions from PEDs.

There are two aspects to the aircraft design recommendations in this report. One aspect defines aircraft system and equipment RF susceptibility qualification recommendations that provide tolerance to RF from intentionally transmitting PEDs. This is commonly referred to as protection from PED back door coupling. The recommendations closely follow existing practices for aircraft system high intensity radiated field (HIRF) protection. Acceptable test approaches for verifying the aircraft system RF susceptibility qualification are defined.

The second aspect defines acceptable interference path loss (IPL) between aircraft radio receivers and PEDs that emit spurious RF. This is commonly referred to as protection from PED front door coupling. Extensive analysis of measured PED spurious emissions was performed previously so that the interference path loss targets are based on statistics of actual PED emissions rather than regulatory specifications. Interference path loss test methods are defined.

This report also defines recommended approaches for demonstrating tolerance with aircraft design to meet regulatory requirements including aspects of aircraft alteration and continued airworthiness.

This report is intended to supersede previous applicable guideline documents RTCA DO-294 and EUROCAE ED-130. All propositions defined are intended to be in line with the Revision of RTCA DO-307B/EUROCAE ED-239A.

The update to RTCA DO-363A and EUROCAE ED-130B addresses the spectrum expansion of the 5G technology and the introduction of PED transmitting in the frequency spectrum above 5.9 GHz, for example WiFi-6e. This has led to:

- A redefinition of transmitter technologies that are classified as low-power technologies and
- A requirement to address the potential for front-door interference to radio altimeter, including 5G, that is addressed in DO-307B/ED-239A.

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1.1 Introduction

The PED ARC (Aviation Rulemaking Committee) established in 2013 made recommendations to clarify and provide guidance on allowing PED~~s~~ usage from gate to gate without compromising the continued safe operation of the aircraft. This lead to the creation of the FAA operation guidance, see Appendix C. On EASA side, specific acceptable means of tolerance and guidance material to allow PED operation gate-to-gate can be found in Table 3-2. The guidance contained in these FAA and EASA references are only intended for operational approval, they do not cover methods acceptable for aircraft certification.

This report includes some of the ARC's recommendations for allowing additional PED usage on airplanes as well as expanding on the operational guidance. It also provides additional methods for demonstrating PED tolerance. This document supplements existing guidance provided in RTCA DO-307 (and later revisions)/EUROCAE ED-239 (and later revisions), updates the previous ED-130 and supersedes DO-294. An overview of the document is provided in Figure 1-1.