

**UNITED REPUBLIC OF TANZANIA
TANZANIA COMMUNICATIONS REGULATORY AUTHORITY
ISO 9001: 2015 CERTIFIED**



MINIMUM TECHNICAL SPECIFICATIONS

FOR

Ultra-Wideband (UWB) Devices

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PART 1: Introduction

Tanzania Communications Regulatory Authority (TCRA), established under the Tanzania Communications Regulatory Authority Act No.12 of 2003, is mandated among other duties, to license communications and broadcasting operators and type approve communication equipment for use in the United Republic of Tanzania.

Pursuant to Regulation 4 of the Electronic and Postal Communications (Electronic Communications Equipment Standards and E-Waste Management) Regulations, 2020 the Authority is mandated to formulate technical standards for all the regulated services.

The Authority, therefore, wishes to notify all manufactures and importers of Ultra-Wideband (UWB) devices and the general public the minimum technical requirements and specifications for Ultra-Wideband (UWB) devices. This technical specifications define the technical requirements for UWB transmitters and receivers to operate in one of the authorised frequency bands or frequencies and transmit within the corresponding output power levels.

PART 2: Scope and Purpose

Ultra-wideband technology (UWB) is a technology for short-range radiocommunication, involving the intentional generation and transmission of radio-frequency energy that spreads over a very large frequency range, which may overlap several frequency bands allocated to radiocommunication services. Devices using UWB technology typically have intentional radiation from the antenna with either a –10 dB bandwidth of at least 500 MHz or a –10 dB fractional bandwidth greater than 0.2

This document states the requirements for the utilization of the frequency bands of 30 MHz to 960 MHz, 2.17 GHz to 10.6 GHz, 21.65 GHz to 29.5 GHz and 77 GHz to 81 GHz for devices using Ultra-Wideband (UWB) technology in the United Republic of Tanzania.

The objective of this document is to ensure efficient use of the UWB technology in United Republic of Tanzania with minimal service disruption and radio frequency interference to radiocommunication services within the stated bands.

UWB technology can be integrated into many wireless applications which include short-range indoor and outdoor communications, radar imaging and automotive radar devices.

For the purpose of this document, the definitions of various UWB applications are as follows:

1. **UWB communication device** is a short range communication device using UWB technology to transmit and/or receive information between devices.

2. **UWB automotive radar device** is a radar device using UWB technology mounted on land transportation vehicles to detect the location and/or movement of persons or objects near the vehicle.
3. **UWB radar imaging device** is a device using UWB technology used to obtain images of obstructed objects. This includes in-wall and through-wall detection, ground penetrating radar, medical imaging and surveillance devices.

PART 3: Definitions and Abbreviations

FM	Frequency Modulation
GSM	Global System for Mobile Communications
ITU	International Telecommunication Union
IMT-2000	International Mobile Telecommunications-2000
5G NR	Fifth-generation Network Radio
E-UTRA	Evolved Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access
FDD	Frequency Division Duplex
SIM	Subscriber Identity Module
TDD	Time Division Duplex
IMEI	International Mobile Equipment Identity
SAR	Specific Absorption Rate
EMC	Electromagnetic compatibility
RoHS	Restriction of Hazardous substance
UICC	Universal integrated circuit card
ICNRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
WLAN	Wireless Local Area Network
IEC	International Electro-technical Commission

PART 4: References

S/No	Reference No.	Title
1.	IEC/EN 60950-1	Information technology equipment- Safety – Part1: General requirements.
2.	IEC/EN 62368-1	Audio/video, information and communication technology equipment - Part 1: Safety requirements
3.	EN 302 288	Short Range Devices; Transport and Traffic Telematics (TTT); Ultra-wideband radar equipment operating in the 24,25 GHz to 26,65 GHz range; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
4.	EN 302 065-1	Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Requirements for Generic UWB applications
5.	EN 302 065-2	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 2: Requirements for UWB location tracking.
6.	EN 302 065-3	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 3: Requirements for UWB devices for road and rail vehicle
7.	EN 302 066-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground- and Wall- Probing Radar applications (GPR/WPR) imaging systems; Part 1: Technical characteristics and test methods
8.	EN 302 066-2	Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground and Wall- Probing Radar applications (GPR/WPR) imaging systems; Part 2:

		Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
9.	ITU-R SM.1754	Measurement techniques of ultra-wideband transmissions
10.	ITU-R SM.1755	Characteristics of ultra-wideband technology
11.	ITU R SM.1756	Framework for the introduction of devices using ultra-wideband technology
12.	ITU R SM.1757	Impact of devices using ultra-wideband technology on systems operating within radiocommunication services
13.	Rep. ITU R SM.2057	Studies related to the impact of devices using ultra-wideband technology on radiocommunication services

PART 5: General Requirements

1. Devices using UWB technology shall be type approved by the Authority prior to importation into the country.
2. Devices using UWB technology shall be tested for compliance with the technical requirements, following the appropriate techniques for measuring UWB transmissions given in **ETSI EN 302 065, EN 302 066-1** or **ITU-R SM.1754**.
3. Devices using UWB technology shall not cause harmful interference to primary radiocommunication services operating in the said bands, operate on a non-interference basis and cannot claim protection from these radiocommunication services. These devices, shall not cause interference to and will not claim protection from, or place constraints, on the radiocommunication services.
4. Devices using UWB technology shall be capable of implementing mitigation techniques to provide protection to radiocommunication services and may deploy, but not limited to the following mitigation techniques to reduce the impact on radiocommunication systems:
 - (a) Detect and avoid (DAA) technology: the device detects the presence of signals from other radio systems and reduces its transmitted power down to a level where it does not cause interference to these systems;
 - (b) Low Duty Cycle (LDC) technique: the device operates by lowering the pulse repetition interval or pulse occupation time; and/or;

(c) Any other mitigation techniques as stipulated in the **ITU-R SM.1757** and in **Report ITU R SM.2057**.

5. UWB radar imaging devices shall be authorized to the following: Emergency and Rescue agencies, Law enforcement agencies, Government departments/ Agencies and organizations associated with Scientific, Research, Commercial Mining, Medical and Construction.

PART 6: Technical Requirements

1. The use of UWB devices in the frequency bands mentioned below shall adhere to the stipulated RF power limitations.

Frequency range (GHz)	Maximum average e.i.r.p. density (dBm/MHz)	Maximum peak e.i.r.p. density (dBm/50 MHz)
Below 1.6	-90	-50
1.6-2.7	-85	-45
2.7-3.1	-70	-30
3.1-4.95	-70	-30
4.95-6	-70	-30
6-9	-41.3	0
9-10.6	-65	-25
Above 10.6	-85	-45

2. UWB communication device which operates in the frequency band of 3.1 GHz to 10.6 GHz shall only be utilized for communication purposes and shall only be used in confined areas of buildings or localized on-site operations.
3. The use of outdoor mounted antenna is not permissible.
4. The emission of UWB communication device shall not be intentionally directed outside of the building in which the device is being used.
5. The transmission of UWB communication device shall only be permitted when it is communicating with an intended receiver. The device shall cease transmission unless it receives acknowledgment from the intended receiver.
6. The operation of UWB communication device is not permissible to-
 - (a) Devices and/or antenna used or connected at fixed outdoor location;
 - (b) Devices installed in flying models, aircraft or other aviation; and
 - (c) Devices installed in marine vessels.

7. The use of UWB automotive radar device shall be contained within the frequency bands of 21.65 GHz to 29.5 GHz and/or 77 GHz to 81 GHz.
8. The operation of UWB automotive radar device shall only be activated when the terrestrial transportation or vehicle is operating.
9. The use of UWB automotive radar devices shall not operate in the 23.6-24.0 GHz band. It is of crucial importance for weather forecasting, water and climate modelling and other related operations. It is also instrumental to environmental activities having social and economic implications, including enhancement of public safety.
10. The use of UWB radar imaging device shall be contained within the frequency bands of 30 MHz to 960 MHz and/or 2.17 GHz to 10.6 GHz.
11. The use of UWB radar imaging shall be used for the following purposes only, ground penetrating radar, in wall/through wall imaging radar, medical imaging and surveillance.
12. UWB devices shall be accessed to make sure that they comply with safety requirements as specified in **IEC 60950-1**, **IEC/EN 62368-1** and any other relevant safety standard.

PART 7: Testing and Certification Requirements

UWB devices shall comply with this minimum technical specification and other national and international standards accepted and adopted in the country. The equipment shall be certified with the type approval certificate from TCRA prior to importation into the United Republic of Tanzania.

PART 8: Document Administration

8.1 Amendment

TCRA may from time-to-time, review, and update or modify this document to ensure its continued service and to meet the international and/or national performance requirements as necessary

8.2 Enforcement

This document is enforced by appropriate provisions of the TCRA Act, 2003, the Electronic and Postal Communications Act, 2010 and the Electronic and Postal Communications (Electronic Communications Equipment Standards and E-Waste Management) Regulations, 2020 and effective from the date it has been published.

8.3 Publication

This document shall be published on the TCRA website <https://www.tcra.go.tz> for public information, compliance and reference purposes.

Operational characteristics of UWB applications

UWB technology can be integrated into many applications. Some UWB devices may support more than one application. Examples of the broad categories of UWB applications and their operational characteristics are given in Table below

UWB application	Operational characteristics
1 Radar imaging	<ul style="list-style-type: none"> – Mostly occasional use by professionals in limited numbers – Use is limited to specific locations or geographic areas
Ground penetrating radar	<ul style="list-style-type: none"> – Occasional use by professionals at infrequent intervals and specific sites – A specific application may have a limited number of devices that operate in mobile continuous use on roadways – Transmission is directed towards the ground
In-wall radar imaging	<ul style="list-style-type: none"> – Occasional use at infrequent intervals – Professional users: typically engineers, designers, and professional of the construction industry – Transmission is directed toward a wall – Devices are operated typically in direct contact with the wall to maximize measurement resolution and sensitivity
Through-wall radar imaging	<ul style="list-style-type: none"> – Device is transportable – Used by trained personal: normally police, emergency teams, security and military – Occasional use at infrequent intervals – Deployed in limited numbers – Transmission is directed towards a wall – Devices may operate at some distance from the wall to maximize operation safety in case of hostile action
Medical imaging	<ul style="list-style-type: none"> – May be used for a variety of health applications for imaging inside the body of a person or an animal – Indoor stationary occasional use by trained personnel – Transmission is directed towards a body
2 Surveillance	<ul style="list-style-type: none"> – Operate as “security fences” by establishing a stationary RF perimeter field and detecting the intrusion of persons or objects in that field – Continuous outdoor and indoor use in a stationary manner

3 Vehicular/ Automotive radar	<ul style="list-style-type: none"> – Mobile usage – High-density use may occur on highways and major roads – Terrestrial transportation use only – Transmission is generally in a horizontal direction
4 Measurement	<ul style="list-style-type: none"> – Stationary indoor/outdoor use
5 Location sensing and tracking	<ul style="list-style-type: none"> – Typically fixed infrastructure; mostly stationary use – Transmitters always under positive control
6 Communication	<ul style="list-style-type: none"> – High-density use may occur in certain indoor environments such as office buildings – Some applications have occasional use such as an UWB wireless mouse