TRUE COPY; Ministry of Information and Communications; December 05, 2022 12:04:47

|  |  |
| --- | --- |
| **MINISTRY OF INFORMATION AND COMMUNICATIONS****-------------------**Number: 22 /2022/TT-BTTTT | **SOCIALIST REPUBLIC OF VIETNAM****Independence - Freedom – Happiness****-------------------***Hanoi, November 29, 2022*  |

**CIRCULAR**

**Promulgation of "National technical regulation on Electromagnetic Compatibility for Radio Equipment"**

**-------------------**

*Pursuant to the Law on Standards and Technical Regulations dated June 29, 2006;*

*Pursuant to the Law on Telecommunications dated November 23, 2009;*

*Pursuant to the Law on Radio Frequency dated November 23, 2009;*

*Pursuant to Decree No. 127/2007/ND-CP dated August 1, 2007 of the Government detailing and guiding the implementation of a number of articles of the Law on Standards and Technical Regulations;*

*Pursuant to Decree No. 78/2018/ND-CP dated May 16, 2018 of the Government amending and supplementing a number of articles of Decree No. 127/2007/ND-CP dated August 1, 2007 of the Government detailing the implementation of a number of articles of the Law on Standards and Technical Regulations;*

*Pursuant to Decree No. 48/2022/ND-CP dated July 26, 2022 of the Government regulating the functions, tasks, powers and organizational structure of the Ministry of Information and Communications;*

*At the request of the Director of the Department of Science and Technology,*

*The Minister of Information and Communications promulgates a Circular regulating National technical regulation on Electromagnetic Compatibility for Radio Equipment.*

**Article 1.** Issue the National technical regulation on Electromagnetic Compatibility for Radio Equipment (QCVN 18:2022/BTTTT) together with this Circular

**Article 2.** Effectiveness of implementation

1. This Circular takes effect from May 1, 2023.

2. Circular No. 21/2014/TT-BTTTT dated December 16, 2014 of the Minister of Information and Communications promulgating "National technical regulation on Electromagnetic Compatibility for Radio Equipment” expires from July 1, 2023.

**Article 3**. Application roadmap

1. From July 1, 2023, radio communication terminal equipment (within the scope of regulation in QCVN 18:2022/BTTTT) imported and domestically produced must meet the requirements stipulated in QCVN 18:2022/BTTTT.

2. Encourage businesses, organizations and individuals that produce and import radio communication terminal equipment (within the scope of regulation in QCVN 18:2022/BTTTT) to apply QCVN 18:2022/ BTTTT from the effective date of this Circular.

**Article 4.** Chief of Office, Director of the Department of Science and Technology, Heads of agencies and units under the Ministry of Information and Communications, Directors of Departments of Information and Communications of provinces and centrally run cities and Relevant organizations and individuals are responsible for implementing this Circular.

|  |  |
| --- | --- |
| ***Recipients:***- Prime Minister, Deputy Prime Ministers (to report);- Ministries, ministerial-level agencies, and agencies under the Government;- People's Committees of provinces and centrally run cities;- Department of Information and Communications of provinces and centrally run cities;- Department of Legal Document Inspection (Ministry of Justice);- Official Gazette, Government Electronic Information Portal;- Ministry of Information and Communications: Minister and Deputy Ministers, agencies and units under the Ministry, Electronic Information Portal of the Ministry;- Archive: Filing, Science and Technology (250). | **MINISTER***(Signed and sealed)***Nguyen Manh Hung** |



**SOCIALIST REPUBLIC OF VIETNAM**

**QCVN 18:2022/BTTTT**

**NATIONAL TECHNICAL REGULATION ON ELECTROMAGNETIC COMPATIBILITY FOR RADIO EQUIPMENT**

**HANOI – 2022**

CONTENTS

[1. GENERAL PROVISIONS 5](#_Toc147417672)

[1.1. Scope 5](#_Toc147417673)

[1.2. Applicable subjects 5](#_Toc147417674)

[1.3. References 5](#_Toc147417675)

[1.4. Interpretation 6](#_Toc147417676)

[1.5. Symbol 9](#_Toc147417701)

[1.6. Abbreviation 9](#_Toc147417702)

[2. TECHNICAL REGULATIONS 11](#_Toc147417703)

[2.1. EMC emissions 11](#_Toc147417704)

[2.1.1. Applicability of emission measurements 11](#_Toc147417705)

[2.1.2. Measurement configuration 11](#_Toc147417706)

[2.1.3. Emission from enclosure port 12](#_Toc147417707)

[2.1.4. Emission from DC power input/output ports 12](#_Toc147417708)

[2.1.5. Emission from AC power input/output port 13](#_Toc147417709)

[2.1.6. Harmonic current emission (AC mains input port) 14](#_Toc147417710)

[2.1.7. Flickering and voltage fluctuations (AC mains input port) 14](#_Toc147417711)

[2.1.8. Emission from wired network port 14](#_Toc147417712)

[2.2. Immunity 15](#_Toc147417713)

[2.2.1. Applicability of immunity tests 15](#_Toc147417714)

[2.2.2. Test configuration 15](#_Toc147417715)

[2.2.3. Immunity to radio frequency electromagnetic fields (80 MHz to 6 000 MHz) 16](#_Toc147417716)

[2.2.4. Immunity to electrostatic discharge 16](#_Toc147417717)

[2.2.5. Immunity to surge, general mode 17](#_Toc147417718)

[2.2.6. Immunity to radio frequency, common mode 18](#_Toc147417719)

[2.2.7. Immunity to surges and overvoltages in the transport environment 18](#_Toc147417720)

[2.2.8. Immunity to Voltage dips and interruptions 19](#_Toc147417721)

[2.2.9. Immunity to overpressure 20](#_Toc147417722)

[3. REGULATIONS FOR MANAGEMENT 21](#_Toc147417723)

[4. RESPONSIBILITIES OF ORGANIZATIONS AND INDIVIDUALS 21](#_Toc147417724)

[5. IMPLEMENTATION ORGANIZATION 21](#_Toc147417725)

[Appendix A](#_Toc147417726) [(Regulations)](#_Toc147417727) [Testing conditions 22](#_Toc147417728)

[Appendix B](#_Toc147417729) [(Regulations)](#_Toc147417730) [Auxiliary equipment 25](#_Toc147417731)

[Appendix C](#_Toc147417732) [(Regulations)](#_Toc147417733) [Quality criteria 26](#_Toc147417734)

[Appendix D](#_Toc147417735) [(Regulations)](#_Toc147417736) [Relevant standard parts in the EN 301 489 series of standards 27](#_Toc147417737)

[Appendix E](#_Toc147417738) [(Reference)](#_Toc147417739) [Information provided to testing laboratories 29](#_Toc147417740)

[Appendix F](#_Toc147417741) [(Reference)](#_Toc147417742) [Application of harmonised EMC standards to multi-radio and multi-standard-radio equipment 30](#_Toc147417743)

[Appendix G](#_Toc147417744) [(Regulations)](#_Toc147417745) [HS code of radio communication equipment 31](#_Toc147417746)

[References 36](#_Toc147417747)

**Preface**

QCVN 18:2022/BTTTT replaces QCVN 18:2014/BTTTT.

The technical regulations and measurement methods of QCVN 18:2022/BTTTT are consistent with ETSI standard EN 301 489-1 V2.2.3 (2019-11) of the European Telecommunications Standards Institute (ETSI).

QCVN 18:2022/BTTTT compiled by the Institute of Postal and Technical Sciences, appraised by the Ministry of Science and Technology, approved by the Department of Science and Technology, and issued by the Ministry of Information and Communications together with Circular No. 22/ TT-BTTTT dated November 29, 2022.

**NATIONAL TECHNICAL REGULATION ON ELECTROMAGNETIC COMPATIBILITY FOR RADIO EQUIPMENT**

# 1. GENERAL PROVISIONS

## 1.1. Scope

This regulation specifies general electromagnetic compatibility (EMC) requirements for radio and related auxiliary equipment, excluding broadcast receiver equipment.

Technical specifications relating to radio equipment antenna ports and radiated emissions from radio equipment enclosure ports and radio equipment assemblies and auxiliary equipment are not within the scope of regulation of this regulation.

The appropriate EMC test arrangements and evaluation methods for each type of radio equipment are specified in the relevant Specific conditions sections of the ETSI EN 301 489 series of standards.

In case of differences (e.g. in special conditions, definitions, abbreviations) between this Regulation and the provisions in the relevant Specific conditions in the parts of the ETSI EN 301 489 standard series, apply Relevant Specific conditions section of the ETSI EN 301 489 series of standards.

In case there are no technical regulations regulating specific conditions for specific radio equipment/services, for example, in the case of new creation of a wireless service or a specific application, this Regulation can be used together with the specific information of the radio equipment provided by the manufacturer to check EMC requirements as stated in this Regulation.

HS codes of equipment within the scope of this regulation are specified in Appendix G.

## 1.2. Applicable subjects

This technical regulation applies to Vietnamese and foreign agencies, organizations and individuals that have production, business and exploitation activities of equipment within the scope of this Regulation in the territory of Vietnam.

## 1.3. References

QCVN 118:2018/BTTTT, National technical regulation on electromagnetic compatibility for multimedia equipment - Emission requirements.

TCVN 7909-4-2:2015 Electromagnetic compatibility (EMC) - Part 4-2: Measurement and testing methods - Immunity test for electrostatic discharge phenomenon.

TCVN 7909-4-3:2015 Electromagnetic compatibility (EMC) - Part 4-3: Measurement and testing methods - Immunity test for radio frequency radiated electromagnetic fields.

IEC 61000-4-4:2012 Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test.

IEC 61000-4-5:2014/AMD1:2017 Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test

IEC 61000-4-11:2004 Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.

ISO 7637-2 (2011), Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only.

IEC 61000-3-3:2013/A1:2017 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current < 16 A per phase and not subject to conditional connection.

CISPR 25, Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on equipment - Limits and methods of measurement.

IEC 61000-3-12:2011 Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and < 75 A per phase.

IEC 61000-3-11:2000 Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current < 75 A and subject to conditional connection.

EN 50561-3 (2016): Power line communication apparatus used in low-voltage installations - Radio disturbance characteristics - Limits and methods of measurement - Part 3: Apparatus operating above 30 MHz.

EN 50561-1:2013/AC:2015 Power line communication apparatus used in low-voltage installations - Radio disturbance characteristics - Limits and methods of measurement - Part 1: Apparatus for in-home use.

IEC 61000-3-2:2014 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current < 16 A per phase).

IEC 61000-4-34:2005/A1:2009 Electromagnetic compatibility (EMC) - Part 4-34: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase.

## 1.4. Interpretation

### 1.4.1. Auxiliary equipment

Equipment used in connection with a receiver or transmitter.

NOTE 1: A equipment is considered an auxiliary equipment when:

* Equipment used in conjunction with a receiver or transmitter to provide additional operating and/or control features to the radio equipment (e.g. to extend control to another location or area ); and
* The equipment cannot be used alone to provide independent use of a receiver or transmitter; and
* The receiver/transmitter to which it is connected is capable of performing some intended operation such as transmitting and/or receiving without the need for auxiliary equipment (i.e. it is not a sub-block of the main equipment necessary to maintain the basic function of the main equipment).

### 1.4.2. Antenna port

Port for connecting an antenna to transmit and/or receive radiated RF energy.

### 1.4.3. Associated equipment

Equipment necessary to perform and/or monitor EUT operations.

### 1.4.4. Base station equipment

Radio and/or auxiliary equipment used at a fixed location and powered directly or indirectly (i.e. via mains or AC/DC converter) by the mains or local DC mains network.

### 1.4.5. Broadcast receivers

The equipment contains a navigator used to receive broadcast services.

NOTE: These broadcasting services are usually radio and television broadcasting services, including terrestrial and satellite broadcasting services.

### 1.4.6. Conditional connection

The equipment connection requires that the user's supply impedance at the interface point be lower than the Zref impedance so that the equipment's emissions comply with the limits in IEC 61000-3-11.

NOTE: Meeting the voltage change limits is not the only condition for connection; Emission limits may have to be met for other phenomena such as harmonics.

### 1.4.7. Continuous phenomena

Electromagnetic interference whose effects on a particular equipment or equipment cannot be classified among the known effects.

NOTE: See IEC 60050-161.

### 1.4.8. Enclosure port

The physical boundary of a equipment into which electromagnetic fields can radiate and influence.

NOTE: In the case of equipment with integral antennas, this port is not isolated from the antenna port

### 1.4.9. Exclusion band

Frequency range(s) are not tested or evaluated

### 1.4.10. Fixed-use

Use the equipment in a permanent location or where the connection to the AC power adapter is based on temporary platforms.

### 1.4.11. Integral antenna

The antenna is designed to be permanently connected to the equipment and is considered part of the connection port. NOTE: The integrated antenna can be mounted internally or externally.

### 1.4.12. Multi-radio equipment

Radio equipment consisting of two or more transmitters and/or receivers, using different technologies that can operate simultaneously.

**Figure 1 - Multi-radio equipment**

Information portals

Standard radio block 2

Standard Digital radio block 2

Standard Digital radio block 1

Standard radio block 1

Antenna port

### 1.4.13. Multi-standard radio equipment

A radio equipment with a receiver and transmitter that can handle two or more carriers simultaneously in RF components operating together over a specific bandwidth with at least one carrier that is technologically different from one other carrier(s).



Antenna port

Information portals

Standard Digital radio block 1

Standard Digital radio block 2

Standard radio block 1+2

**Figure 2 - Multi-standard radio equipment**

### 1.4.14. Occupied bandwidth

width of the frequency range over which the average transmitted power is below the lower frequency limit and the upper frequency limit equal to a defined percentage B/2 of the total average power of a given emission; Unless otherwise stated for the appropriate type of emission, the value of B/2 should be taken as 0,5 %.

### 1.4.15. Operating frequency range

The radio band(s) is defined by the equipment under test (EUT) in its entirety.

### 1.4.16. Port

Specific interface of the known equipment to the electromagnetic environment.

NOTE 1: For example, any connection point on a equipment used to connect cables to/from the equipment is considered a port (see Figure 3).



Antenna port

Signal/control port

Wired network port

AC power port

DC power port

Land port

Equipment

Enclosure port

**Figure 3 - Example of ports**

NOTE 2: Interfaces that use only non-conductive sheathed optical fibers are not ports for testing purposes because it does not interact with the electromagnetic environment in the frequency range, the frequency range applicable to this Regulation. Fiber optic interfaces can still be used for performance evaluation.

NOTE 3: In the case of equipment with integral antennas, the antenna port is the enclosure port.

### 1.4.17. Portable equipment

The radio and/or auxiliary equipment for mobile operation (e.g. portable equipment) uses its own battery power source.

NOTE: The equipment is usually portable.

### 1.4.18. Radio equipment

Electrical or electronic products that emit and/or receive radio waves for radio communications and/or radio transmitters, or an electrical or electronic product must have an accessory such as an antenna to radiate and/or receive radio waves for radio communication and/or radio broadcast

NOTE: The equipment may operate with auxiliary equipment, but in that case it is not dependent on the auxiliary equipment for its basic function.

### 1.4.19. Removable antenna

The antenna can be removed during testing according to the manufacturer's announcement.

### 1.4.20. Signal/control port

Port for connecting the components of the EUT, or between the EUT and the AE, and used according to the relevant specifications (e.g. maximum length of the cable connected to it)

### 1.4.21. Test jig

Associated equipment (AE) to support the EUT during testing according to its intended use.

### 1.4.22. Transient phenomena

The phenomenon of changing between two consecutive steady states within a short period of time compared to the time period under consideration.

Note: See IEC 60050-16.

### 1.4.23. Vehicle use

Radio equipment for installation and use on vehicles and powered by the vehicle's main battery.

### 1.4.24. Wired network port

A wired network port is a connection point for transferring voice, data and signaling signals to link wide-area distributed systems by direct connection to a single-user or multi-user communication network (e.g. cable television network (CATV), public switched telecommunications network (PSTN), integrated multi-service digital network (ISDN), digital subscriber line (xDSL), local area networks (LANs) and similar networks).

NOTE: This port can support shielded or unshielded cables and can also transmit AC or DC electrical energy; it is an integral part of telecommunications specifications.

## 1.5. Symbol

β Bandwidth

Bandrx (lower) Lower limit of the frequency range of the receiver under evaluation

Bandrx (upper) Upper limit of the frequency range of the receiver under evaluation

BWRX Receiver frequency table width (or receiver within a transceiver)

ChWRX Receiver channel width (or receiver in transceiver)

Exband (lower) Lower limit of the exclusion band

Exband (upper) Upper limit of the exclusion band

## 1.6. Abbreviation

|  |  |
| --- | --- |
| AC | Alternating Current |
| AEAMN | Associated EquipmentArtificial Mains Network |
| ANBSCB | Artificial NetworkBase StationCitizens Band |
| CDMA  | Code Division Multiple Access |
| CDNCISPR | Coupling/Decoupling NetworkInternational Special Committee on Radio Interference (from the French: Comité International Special des Perturbations Radioélectriques) |
| DCEFTA  | Direct CurrentEuropean Free Trade Association |
| EG | ETSI Guide |
| EM | ElectroMagnetic |
| EMC | ElectroMagnetic Compatibility |
| EPSEU | External Power SupplyEuropean Union |
| EUTFSSGNSS  | Equipment Under TestFixed Satellite ServiceGlobal Navigation SatelliteSystems |
| ISDN | Integrated Services Digital Networks |
| ISO | International Standards Organisation |
| ITU-R | International Telecommunication Union - Radio |
| LAN | Local Area Network |
| MEDS | Medical Data Service Equipment |
| MES | Mobile Earth station |
| MSS | Mobile Satellite Services |
| PLC | PowerLine Communications |
| PMR | Private Mobile Radio |
| PSTN | Public SwitchedTelecommunications Networks |
| RF | Radio Frequency |
| rms | root mean square |
| RNSS | Radio Navigation Satellite Service |
| ROMES | Receive Only Mobile Earth Station |
| SRD | Short Range Equipment |
| TV | Television |
| UWB | Ultra Wide Band |
| VHF | Very High Frequency |
| xDSL | x-type Digital Subscriber Line |

# 2. TECHNICAL REGULATIONS

## 2.1. EMC emissions

### 2.1.1. Applicability of emission measurements

Table 1 lists the emission measurements for the radio equipment and/or associated auxiliary equipment that must be tested.

**Table 1- Emission requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Phenomenon** | **Port** | **Applicability** | **Reference in this Regulation** |
| **Fixed use** | **Use on means of transport** | **Portable use** |
| Radiation emissions | Enclosure port of auxiliary equipment | Applicable | Applicable | Applicable | 2.1.3 |
| Conducted emission | DC power input/output port | Applicable | Applicable | Not applicable | 2.1.4 |
| Conducted emission | AC power input/output port | Applicable | Not applicable | Not applicable | 2.1.5 |
| Harmonic current emission | AC power input port | Applicable | Not applicable | Not applicable | 2.1.6 |
| Flickers and voltage fluctuations | AC power input port | Applicable | Not applicable | Not applicable | 2.1.7 |
| Conducted emission | Wired network port | Applicable | Not applicable | Not applicable | 2.1.8 |

### 2.1.2. Measurement configuration

Perform conducted emission measurements for all radio equipment with wired connections.

It is not mandatory to perform radiated emission measurements on the antenna port and/or enclosure port (see 2.1.3) for radio equipment.

* Perform measurements when the EUT is working properly and in the mode that produces the largest emissions in the band under investigation;
* Must set up the equipment configuration in normal operating mode as in reality;
* If the equipment under test is part of a system or connected to auxiliary equipment, the equipment shall be measured when connected to the auxiliary equipment with the minimum representative configuration necessary to test the ports;
* If the equipment has multiple ports, a sufficient number of ports must be selected to simulate actual operating conditions and to ensure testing of all different types of terminations;
* Must connect port to or to the piece of equipment to which, in normal operation, it is connected, or to cable lengths with suitable terminations to simulate the impedance of the equipment to which they are connected.
* The configuration and operating mode of the equipment during testing must be recorded in the measurement report.

### 2.1.3. Emission from enclosure port

**2.1.3.1. General**

This measurement applies only to the enclosure port of an auxiliary equipment not incorporated in the radio equipment and is evaluated independently of its associated radio equipment.

Perform measurements on a configuration representative of the auxiliary equipment.

**2.1.3.2. Measurement methods**

The measurement method must comply with QCVN 118:2018/BTTTT, Article 2.2.

**2.1.3.3. Limit**

Auxiliary equipment must satisfy the limits for type B equipment specified in Table 4 and Table 5 of QCVN 118:2018/BTTTT.

Additionally, for auxiliary equipment used only in industrial environments or telecommunications centers, the equipment must meet the emission limits for Class A equipment specified in Table 2 and Table 3 of QCVN 118:2018/BTTTT.

### 2.1.4. Emission from DC power input/output ports

**2.1.4.1. General**

This measurement is applicable only to radio equipment and auxiliary equipment for fixed use intended for connection to an adjacent DC mains or to an internal battery with a connection cable longer than 3 m (see Appendix E).

If the DC power cable of the radio and/or auxiliary equipment is shorter than or equal to 3 m, use it for direct connection to a separate AC/DC power supply, the measurement must be performed on the AC power input port of the power supply as specified in 2.1.5. If this DC power cable is longer than 3 m, additional measurements must be made on the DC power port of the mobile radio and/or auxiliary equipment.

If the DC power cable between the radio and/or auxiliary equipment and the separate DC/DC power converter is shorter than or equal to 3 m, the measurement can be limited to the DC power input port of this power converter. If the DC power cable is longer than 3 m, measurements must be additionally performed on the DC power port of the mobile radio and/or auxiliary equipment.

This measurement shall be performed on a representative configuration of the radio equipment, associated auxiliary equipment or a representative configuration of a combination of radio equipment and auxiliary equipment.

This measurement is intended to evaluate the level of internal electrical noise present on the DC power input/output ports.

**2.1.4.2. Measurement methods**

For mobile radio equipment and auxiliary equipment connected to the vehicle's DC mainboard, an artificial network (AN) as specified in CISPR 25 shall be used and connected to the DC power source.

For all other equipment, apply the requirements specified in 2.3, QCVN 118:2018/BTTTT to measure the AC mains port.

The measuring frequency range extends from 150 kHz to 30 MHz. When the EUT is a transmitter operating on frequencies below 30 MHz, the transmitter exclusion frequency range (see A.3, Annex A) is applicable for measurements in transmit mode.

For emission measurements on DC output ports, the relevant port needs to be connected to the power consuming load via AMN/AN.

**2.1.4.3. Limit**

The equipment must meet the following conducted emission limit values including average and quasi-peak limits corresponding to using an average detector receiver, a quasi-peak detector receiver and suitable measurements as described in measurement method section 2.1.4.2 above. If the averaging limit is met using a quasi-peak detector, the equipment shall be considered to satisfy both limits and it is not necessary to perform measurements with an averaging detector.

The equipment must meet the limits in Table 2 below.

**Table 2 - Conducted emission limits**

|  |  |  |
| --- | --- | --- |
| **Frequency range** | **Quasi-peak, dBμV** | **Average, dBpV** |
| 0.15 MHz-0.5 MHz | 79 | 66 |
| 0.5 MHz - 30 MHz | 73 | 60 |

### 2.1.5. Emission from AC power input/output port

**2.1.5.1. General**

This measurement applies to radio equipment and/or auxiliary equipment for fixed use supplied with AC mains power.

This measurement shall be performed on a configuration that is representative of the radio equipment, associated auxiliary equipment, or a configuration that is representative of a combination of radio equipment and auxiliary equipment.

This measurement evaluates the level of internal electrical noise present on the AC mains input/output ports.

**2.1.5.2. Measurement methods**

The measurement method must comply with QCVN 118:2018/BTTTT, article 2.3 and use an artificial power network (AMN) to connect to the AC mains power source.

The measuring frequency range extends from 150 KHz to 30 MHz. When the EUT is a transmitter operating at frequencies below 30 MHz, the transmitter's exclusion frequency range (see Annex A section A.3) is applicable for measurements in transmit mode.

For emission measurements at the AC output ports of the EUT, the relevant port must be connected via the AMN to the power consuming load. In the case where the AC output port is connected directly (or via a circuit breaker) to the AC power input port of the EUT, there is no need to test the AC power output port.

**2.1.5.3. Limit**

**2.1.5.3.1. General**

The equipment shall meet the following values including average limits and corresponding quasi-peak limits when using an averaging receiver, a quasi-peak detector and appropriate measurements as described in measurement method 2.1.5.2 above. If the average limit is met using a quasi-peak detector, then the equipment is considered to meet both limits and measurements with the average detector need not be made.

**2.1.5.3.2. The AC power port is only used for power supply**

The equipment must meet the emission limits for class B equipment specified in Table 10, QCVN 118 2018/BTTTT.

For equipment used only in industrial environments or telecommunications centers, the emission limits for Class A equipment specified in Table 9, QCVN 118:2018/BTTTT must apply.

**2.1.5.3.3. The AC power input port is also used for PLC information**

When the equipment's AC power port is also used for PLC communications between 1.6 MHz and 30 MHz, the EUT shall comply with the requirements in Clause 6 of EN 50561- 1:2013/AC:2015, in lieu of the requirements contained in 2.1.5.3.2 of this Regulation.

When the equipment's AC power port is also used for PLC information > 30 MHz, the EUT shall comply with the requirements in Clause 6 of EN 50561-3, which supersede the requirements contained in 2.1.5.3.2 of this Regulation.

### 2.1.6. Harmonic current emission (AC mains input port)

For equipment with input currents up to and including 16 A per phase, according to the classification in Clause 5 of IEC 61000-3-2:2014, the limits in Clause 7 of IEC 61000-3-2:2014, and the assessment requirements in Clause 6 of IEC 61000-3-2:2014 apply.

For equipment with input currents greater than 16 A per phase, the limits for harmonic current emissions according to Clause 5 of IEC 61000-3-12:2011 and the assessment requirements in Clause 7 of IEC 61000-3-12:2011 apply.

### 2.1.7. Flickering and voltage fluctuations (AC mains input port)

For equipment with input currents up to and including 16 A per phase, if conditional connection is not required, the limits of Clause 5 of IEC 61000-3- 3:2013/A1:2017 apply, and the assessment requirements in Clause 6 of IEC 61000-3- 3:2013/A1:2017.

For equipment with input currents up to and including 16 A per phase, a conditional connection is required and for equipment with input currents greater than or equal to 16 A and including 75 A per phase, the limits in Clause 5 of IEC 61000-3-11 apply together with the assessment requirements in Clause 6 of IEC 61000-3-11.

### 2.1.8. Emission from wired network port

**2.1.8.1. General**

This test applies to radio equipment and/or auxiliary equipment for fixed use, with wired network ports.

This measurement shall be performed on a configuration that is representative of the radio equipment, associated auxiliary equipment, or a configuration that is representative of a combination of radio equipment and auxiliary equipment.

This test evaluates the level of unwanted emissions at wired network ports.

**2.1.8.2. Measurement methods**

The measurement method must comply with QCVN 118:2018/BTTTT, Article 2.3.

The test frequency range extends from 150 KHz to 30 MHz. When the EUT is a transmitter operating at frequencies below 30 MHz, the transmitter exclusion band (see A.3, Appendix A) is applicable for the transmitter mode measurements.

**2.1.8.3. Limit**

The wired network port must meet the emission limits for class B equipment in Table 12, QCVN 118:2018/BTTTT.

In addition, for equipment used only in industrial environments or telecommunications centers, the emission limits for class A equipment in Table 11, QCVN 118:2018/BTTTT apply.

## 2.2. Immunity

### 2.2.1. Applicability of immunity tests

Immunity tests for radio equipment and/or related auxiliary equipment are specified in Table 4.

**Table 4 - Immunity requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| **Phenomenon** | **Port** | **Applicability** | **Reference in this Regulation** |
| **Fixed use** | **Use on means of transport** | **Portable use** |
| RF electromagnetic fields (from 80 MHz to 6 000 MHz) | Enclosure port | Applicable | Applicable | Applicable | 2.2.3 |
| Electrostatic discharge | Enclosure | Applicable | Not applicable | Applicable | 2.2.4 |
| Fast transients, common mode | Signal, wired network ports, control ports, DC and AC power ports | Applicable | Not applicable | Not applicable | 2.2.5 |
| RF, Common Mode from 0.15 MHz to 80 MHz | Signal, wired network ports, control port, DC and AC power ports | Applicable | Not applicable | Not applicable | 2.2.6 |
| Surge and overvoltage on transport means | DC power input port | Not applicable | Applicable | Not applicable | 2.2.7 |
| Voltage dips and voltage interruptions | AC power input port | Applicable | Not applicable | Not applicable | 2.2.8 |
| Overvoltage line-to-line, wire-to-earth | AC mains power input port, wired network port | Applicable | Not applicable | Not applicable | 2.2.9 |

### 2.2.2. Test configuration

This section sets out the configuration requirements for immunity testing as follows:

* The immunity test shall take into account the test conditions specified in Appendix A;
* The test must be performed within the prescribed operating environment and the equipment is supplied with rated power;
* If the equipment is part of a system or connected to an auxiliary equipment, the equipment shall be tested while connected to the auxiliary equipment with a minimum representative configuration sufficient to test the ports;
* If the equipment has an integral antenna, the equipment shall be tested with the antenna in normal operation;
* For auxiliary equipment immunity tests without separate pass/fail criteria, use the evaluation results of the receiver or transmitter coupled to the auxiliary equipment to consider whether the auxiliary equipment passes or fails the immunity test;
* If the equipment has multiple ports, enough ports must be selected to simulate actual operating conditions and to ensure testing of all different types of terminations;
* Ports that are not connected to a cable during normal operation, such as service ports, programming ports, temporary ports, etc., will not be connected to any cable during EMC testing. If it is necessary to connect cables to these ports or to extend internal connection cables to test the EUT, precautions must be taken to not affect the evaluation of the EUT;
* The configuration and operating mode of the equipment during the test must be recorded in the measurement report.

### 2.2.3. Immunity to radio frequency electromagnetic fields (80 MHz to 6 000 MHz)

**2.2.3.1. General**

This test applies to radio equipment and related ancillaries.

The test shall be carried out on a configuration that is representative of the radio equipment, associated auxiliary equipment, or a configuration that is representative of a combination of radio equipment and auxiliary equipment.

This test evaluates the ability of the EUT to operate normally in the presence of radio frequency electromagnetic field disturbances.

**2.2.3.2. Test method**

The measurement method must comply with TCVN 7909-4-3:2015.

Apply the following requirements and evaluate the test results:

* Test level (test field strength) is 3 v/m (measured without modulation). The test signal shall be amplitude modulated with a modulation depth of 80 % by a 1 000 Hz sinusoidal audio signal. If the wanted signal is modulated at 1 000 Hz, a 400 Hz audio signal shall be used.
* Tests shall be performed over the frequency range 80 MHz to 6000 MHz, applying appropriate exclusion bands for transmitters, receivers and duplex transceivers (see A.3, Appendix A).
* Stepwise increase in frequency is 1% of the current operating frequency;
* The dwell time of the immunity test phenomenon at each frequency must not be less than the time needed to test the EUT and the time it takes the EUT to respond.

NOTE: Dwell time depends on the equipment.

* Must record in the test report the frequencies selected and used in the test

**2.2.3.3. Quality criteria**

Quality criteria for continuous phenomena must be applied (as specified in C.2, Appendix C).

### 2.2.4. Immunity to electrostatic discharge

**2.2.4.1. General**

This test applies to radio equipment and related ancillaries.

This test shall be performed on a configuration representative of the radio equipment, associated auxiliary equipment, or a configuration representative of a combination of radio equipment and auxiliary equipment.

This test evaluates the ability of the EUT to operate normally in the event of electrostatic discharge.

**2.2.4.2. Test method**

Complies with the requirements of Clauses 6, 7 and 8 of IEC EN 61000-4-2: 2009.

For radio and auxiliary equipment, apply the requirements and evaluate the test results below:

The level of test level (test voltage level) for contact discharge must be ±4 kV, air discharge must be ±8 kV. All other details include average test levels according to TCVN 7909-4-2:2015.

Apply the electrostatic discharge test to all exposed surfaces of the EUT unless the instructions for use specify requirements for appropriate protective measures (as specified in 8 3 2 and 8.3.3 of IEC EN 61000-4-2: 2009).

**2.2.4.3. Quality criteria**

Quality criteria for continuous phenomena must be applied (as specified in C.2, Appendix C).

### 2.2.5. Immunity to surge, general mode

**2.2.5.1. General**

This test must be performed on the AC mains power port (if any) of the radio and associated auxiliary equipment.

This test shall also be performed on the signal ports, information ports, control ports, and DC power ports of the radio equipment and related auxiliary equipment if the connecting cables are longer than 3 m.

In the case of ports that cannot be used with cables longer than 3 m, this test should not be performed on those ports, and these ports must be listed in the test report.

This test evaluates the ability of the EUT to operate normally in the event of a rapid surge on one of the input/output ports.

**2.2.5.2. Test method**

The measurement method must comply with IEC 61000-4-4:2012.

Apply the following requirements and evaluate the test results:

* The test level for signal ports, wired network ports (including xDSL networks) and control ports must be an open circuit voltage of 0.5 kV with a repetition frequency of 5 kHz as specified in Clause 5 of IEC 61000- April 4:2012.
* The test level for the xDSL wired network port must be an open circuit voltage of 0.5 kV with a repetition frequency of 100 kHz as specified in Clause 5 of IEC 61000-4-4:2012.
* The test level for the DC power input port shall be an open circuit voltage of 0.5 kV with a repetition frequency of 5 kHz as specified in Clause 5 of IEC 61000-4-4:2012.
* The test level for the AC mains input port shall be an open circuit voltage of 1 kV with a repetition frequency of 5 kHz as specified in Clause 5 of IEC 61000-4-4:2012.

**2.2.5.3. Quality criteria**

Apply quality criteria for surges (according to C.3, Appendix C).

### 2.2.6. Immunity to radio frequency, common mode

**2.2.6.1. General**

This test must be performed on the AC mains power port (if any) of the radio and associated auxiliary equipment.

This additional test shall be performed on the signal ports, wire network ports, control ports, and DC power ports of the radio equipment and related auxiliary equipment if the connecting cables are longer than 3 m.

In the case of ports that cannot be used with extension cables longer than 3 m, do not perform this test on those ports, and these ports must be listed in the test report.

This test shall be performed on a configuration representative of the radio equipment, associated auxiliary equipment, or a configuration representative of a combination of radio equipment and auxiliary equipment.

This test evaluates the ability of the EUT to operate normally in the presence of radio frequency electromagnetic interference on the input/output ports.

**2.2.6.2. Test method**

The measurement method must comply with TCVN 7909-4-6:2015.

Apply the following requirements and evaluate the test results:

* The test level must be level 2 as in TCVN 7909-4-6:2015 corresponding to 3V rms without modulation. The test signal shall be amplitude modulated with a modulation depth of 80 % by a 1 000 Hz sinusoidal signal. If the wanted signal is modulated at 1 000 Hz, a test signal modulated at 400 Hz shall be used.
* The test shall be performed over the frequency range 150 kHz to 80 MHz except for the exclusion bands for transmitters, receivers and duplex transceivers (see Appendix A).
* For receivers and transmitters, the frequency gain must be 1% of the current frequency gain value in the frequency range 150 kHz to 80 Mhz;
* Injection method must be selected in accordance with TCVN 7909-4-6:2015.
* Responses on the receiver or on the receiver part of the transceiver occurring at discrete frequencies are narrowband responses (spurious responses) which are ignored when performing the test (see Appendix A).

The dwell time of the immunity test at each frequency shall not be less than the time required to test the EUT and the time it takes the EUT to respond.

* The frequencies of the immunity test signals selected and used in the test must be recorded in the test report.

**2.2.6.3. Quality criteria**

Quality criteria for continuous phenomena must be applied (according to C.2, Appendix C).

### 2.2.7. Immunity to surges and overvoltages in the transport environment

**2.2.7.1. General**

This test applies to radio and auxiliary equipment used in vehicles.

This test shall be performed on the nominal 12 V and 24 V DC power input ports of mobile and auxiliary radio equipment also used mobile in vehicles.

This test shall be performed on a configuration that is representative of the mobile radio equipment, associated auxiliary equipment, or a configuration that is representative of a combination of radio and auxiliary equipment.

This test evaluates the ability of the EUT to operate properly in the event of surges and overvoltages on the equipment's DC power input ports in a vehicle environment.

**2.2.7.2. Test method**

The measurement method must be in accordance with ISO 7637-2:2004 for 12 V and 24 V DC power equipment.

The test method must comply with ISO 7637-2:2004 when using pulse types 1, 2a, 2b, 3a, 3b, 4 and using immunity test level III. For EMC testing purposes, it is necessary to perform 10 tests for each pulse type: 1, 2a, 2b, 4 and apply a duration of 20 minutes for each pulse type 3a, 3b.

**2.2.7.3. Quality criteria**

When using pulses 3a and 3b, the quality criteria for continuity phenomena apply (see c.2, Appendix C).

When using pulses 1, 2a, 2b, 4, apply quality criteria for surge phenomena (see C.3, Appendix C), except that the communications link need not be maintained during EMC exposure and may require re-establishment.

### 2.2.8. Immunity to Voltage dips and interruptions

**2.2.8.1. General**

This test must be performed on the AC mains power port (if any) of the radio equipment and associated auxiliary equipment.

This test shall be performed on a configuration representative of the radio equipment, associated auxiliary equipment, or a configuration representative of a combination of radio equipment and auxiliary equipment.

This test evaluates the ability of the EUT to operate normally in the event of Voltage dips and voltage interruptions on the AC mains input port.

**2.2.8.2. Test method**

Apply the following requirements and evaluate the test results:

Compliant with IEC 61000-4-11 or IEC 61000-4-34:2005/A1:2009 for equipment requiring supply current greater than 16 A.

The test levels should be:

- Voltage dip: 0 % remaining voltage for 0.5 cycles;

- Voltage dip: remaining voltage is 0% for 1 cycle;

- Voltage dip: remaining voltage 70 % for 25 cycles (with 50 Hz);

- Voltage interruption: remaining voltage 0 % for 250 cycles (with 50 Hz).

**2.2.8.3. Quality criteria**

For Voltage dip tests, 0 % remaining voltage, the following quality criteria for Voltage dip apply:

* Apply quality criteria for surges (see C.3, Appendix C).

For Voltage dip and voltage interruption tests, the remaining voltage of 70 % applies the following quality criteria:

* In case the equipment is equipped or connected to a backup battery source, the quality criteria for surge phenomena specified in C.3, Appendix C apply.
* In case the equipment is only powered from the mains network (do not use backup battery power) frequently changed user data may be lost and if so there is no need to maintain a communication link and lost functions may be restored by the user or operator;
* There shall be no unintended responses at the end of the test, when the voltage is restored to the rated level;
* In case of loss of functions or loss of user data, these factors must be recorded in the test report.

### 2.2.9. Immunity to overpressure

**2.2.9.1. General**

This test shall be performed on the AC mains power port (if any) of the radio equipment and associated auxiliary equipment.

This additional test must be performed on wired network ports, if any.

This test shall be performed on a configuration representative of the radio equipment, associated auxiliary equipment, or a configuration representative of a combination of radio equipment and auxiliary equipment.

This test evaluates the ability of the EUT to operate normally when overvoltage occurs on the AC mains input ports and wired network ports.

**2.2.9.2. Test method**

**2.2.9.2.1. General**

Complies with requirements in Clauses 7 and 8 of IEC 61000-4-5:2014/AMD1:2017.

The requirements and evaluation of test results stated in 2.2.9.2.2 (wired network ports, outdoor cables), 2.2.9.2.3 (wired network ports, indoor cables) and 2.2 shall be applied. 9.2.4 (mains ports), but does not require a test where the normal function cannot be performed due to the action of the CDN decoupling circuit on the EUT.

**2.2.9.2.2. Test method for wired network ports connected directly to outdoor cables**

The test level applicable to a wired network port operating symmetrically connected directly to an outdoor cable must be 1 kV (applied to wire-to-ground) as specified in Clause 5 of IEC 61000- 4-5:2014/AMD1: 2017. The test signal generator must provide 10/700 μs pulses as specified in A.2 AnnexA of EC 61000-4-5:2014/AMD1:2017.

The test level for applying asymmetrical wired network ports directly connected to the telecommunications network by outdoor cables must be 1 kV (apply wire-to-ground, or screened to ground) and 0.5 kV (apply wire-to-wire use) as specified in Article 5 of CENELEC EN 61000-4-5: 2014, A1:2017. The test signal generator must provide 1.2/50 μs pulses as specified in 6.2 of IEC 61000-4-5:2014/AMD1:2017.

The output impedance of the overvoltage generator must comply with the provisions of 6.2 and A.2 Annex A of IEC 61000-4-5:2014/AMD1:2017.

**2.2.9.2.3. Test method for wired network ports connected to indoor cables**

The test level applied to wired network ports used to connect to indoor cables (cable length more than 30 m) must be 0.5 kV (apply wire-to-ground, or screened to ground). In this case, the total output impedance of the overvoltage generator including the CDN circuit must comply with the provisions of 6.2 and 6.3 of IEC 61000-4-5:2014/AMD1:2017. The test signal generator must provide 1.2/50 μs pulses as specified in 6.2 of IEC 61000-4- 5:2014/AMD1.2017.

**2.2.9.2.4. Test method for mains power ports**

The test level applicable to the mains input ports shall be 2 kV line-to-ground and 1 kV line-to-line with the output impedance of the overvoltage generator including the CDN circuit as specified in 6.2 and 6.3 of IEC 61000- 4-5:2014/AMD1:2017.

In telecommunications centers, a test level of 1 kV line-to-ground and 0.5 kV line-to-line must be used.

The test signal generator must provide 1.2/50μs pulses as specified in 6.2 of IEC 61000-4-5:2014/AMD1:2017.

**2.2.9.3. Quality criteria**

Apply quality criteria for voltage surges (see C.3, Appendix C).

# 3. REGULATIONS FOR MANAGEMENT

3.1. Radio equipment and related ancillaries within the scope of regulation specified in 1.1 must comply with the technical regulations in this Regulation.

3.2. In cases where radio equipment has its own technical regulations, any technical specifications related to antenna ports and equipment enclosure ports in that technical regulation shall prevail over the corresponding technical specifications in this Regulation. The remaining technical specifications of this Regulation must still be applied to evaluate the EMC compliance of the equipment.

# 4. RESPONSIBILITIES OF ORGANIZATIONS AND INDIVIDUALS

Relevant organizations and individuals are responsible for declaring conformity and are subject to inspection by state management agencies according to current regulations.

# 5. IMPLEMENTATION ORGANIZATION

5.1. The Authority of Telecommunications and the Departments of Information and Communications are responsible for guiding and organizing the implementation and management of public land mobile base stations according to this Regulation.

5.2. This regulation is applied to replace QCVN 18:2014/BTTTT, National technical regulations on electromagnetic compatibility for radio equipment.

5.3. In case the regulations stated in this Regulation are changed, supplemented or replaced, the provisions in the new document shall comply.

5.4. During the implementation of this Regulation, if any problems or difficulties arise, relevant organizations and individuals should report in writing to the Ministry of Information and Communications (Department of Science and Technology) for guidance and solutions./.

# Appendix A

# (Regulations)

# Testing conditions

**A.1. General**

The measurement configuration and operating mode representative of the intended use of the equipment shall be recorded in the test report.

**A.2. Arrangement of test signals**

**A.2.1. General**

Independent transmitters and receivers must be tested separately. Transceiver equipment must be tested to confirm each direction of operation of the equipment.

**A.2.2. Arrangement of test signal at the transmitter input**

The transmitter must be tested with a signal that shows the intended use of the EUT.

When the test signal is generated by an external source, the signal source must be located outside the test environment.

**A.2.3. Arrangement of test signal at the transmitter RF output**

The equipment (AE) monitoring the desired RF output signal from the transmitter under test must be located outside the test environment.

For transmitters with integral antennas, the desired RF output signal to establish a communication link must be provided by the EUT to the measurement antenna located within the measurement environment. This antenna must be connected to the output (AE) monitoring equipment in a manner that is not affected by signals within the test environment.

For transmitters with removable antennas, the desired RF output signal to establish a communication link must be supplied from the antenna connector to the monitoring equipment (AE) using a shielded conductor such as a coaxial cable.

The level of the desired RF output signal in transmit mode shall be set to the maximum apparent power level of the EUT.

**A.2.4. Arrangement of test signal at the receiver RF input**

The source providing the desired RF input signal to the receiver under test must be located outside the test environment.

For receivers with integral antennas, the desired RF input signal to establish a communication link must be delivered to the EUT from an antenna located within the measurement environment. This antenna must be connected to the external RF signal source by means that are not affected by signals within the test environment.

For receivers with separate antennas, the desired RF input signal to establish a communication link must be fed to the antenna connector of the EUT using a shielded conductor such as a coaxial cable. This cable must be connected to an external RF signal source.

The level of the desired RF input signal must be set to 40 dB greater than the receiver's minimum operable signal level. For radiated immunity testing this input signal level is measured while the power amplifiers generating EM noise are turned on, but without excitation.

NOTE: This desired RF input signal gain is intended to represent a normal operating signal level and is sufficient to avoid broadband interference from amplifiers that generate EM noise due to measurement effects.

**A.2.5. Arrangement of test signal at the receiver output**

The equipment that monitors the RF output signal from the receiver under test must be located outside the test environment.

For receivers with an output connector or port providing the desired output signal, this port must be used with the cable, compatible with standard cables used in normal operation and connected to the output (AE) monitoring equipment outside the test environment.

For receivers without output connectors, to give an audio or visual indication of the received signal, the output shall be coupled via a non-conductive medium to the monitoring equipment (AE) outside the test environment (for example, via a camera equipment to read the display).

A test fixture can be used to perform the measurement.

**A.3. RF exclusion band of radio equipment**

**A.3.1. General**

Exclusion bands shall be determined using the methods detailed in clauses A.3.2 and A.3.3 of this Regulation.

Whenever an exclusion band is applied, the specific band(s) to be excluded from evaluation shall be detailed in the technical documentation.

**A.3.2. Exclusion band for the transmitter or transmitter portion of the transceiver**

**A.3.2.1. General**

Do not apply exclusion bands when measuring transmitters in standby mode.

**A.3.2.2. Channeling equipment**

For multiplexing equipment, the exclusion band must extend 250% of the channel width on both sides of the transmitter's center frequency.

NOTE: The exclusion band is extended to 250% based on ITU-R Radio Regulations, 1.146, 1.146A and 1.146B

**A.3.2.3. Unchannelized equipment**

For unchannelized equipment, the exclusion band shall extend 250 % of the occupied bandwidth on either side of the transmitter's center frequency.

NOTE: The 250 % exclusion band is based on ITU-R Radio Regulations 1.146, 1.146A and 1.146B.

**A.3.3. Exclusion band for the receiver or receiver in the transceiver**

**A.3.3.1. Applicability**

Do not apply exclusion bands when testing the emissions of the receiver or the receiver portion of the transceiver.

**A.3.3.2. Channelized equipment**

For channelized equipment, the exclusion band is calculated using the following formulas:

For the lower limit of the exclusion band:

EXband(lower) = BandRx(lower) – nChWRx

For the upper limit of the exclusion band:

EXband(upper) = BandRx(upper) + nChWRx

Where n = number of channel widths required for the exclusion band.

NOTE: For equipment supporting multiple channel widths, the channel width used should be the largest channel width supported by the EUT.

In case this Regulation is used independently, the value of n must be 1.

**A.3.3.3. Unchannelized equipment**

For non-channelized equipment, the exclusion band is calculated using the following formulas:

For the lower limit of the exclusion band:

EXband(lower) = BandRx(lower) – UBWRX

For the upper limit of the exclusion band:

EXband(upper) = BandRx(upper) + OBWRX

Where n = multiple of the total bandwidth required to determine the exclusion band.

The receiver bandwidth is the bandwidth occupied by the corresponding transmitter signal.

In case this Regulation is used independently, the value of n must be 1.

# Appendix B

# (Regulations)

# Auxiliary equipment

**B.1. Auxiliary equipment**

Auxiliary equipment is tested and evaluated in one of the following two ways:

- Separate the auxiliary equipment from the radio equipment outside the measurement area but still connect to the auxiliary equipment; or

- According to the combination of auxiliary equipment and radio equipment, both are located in the measurement area.

If you choose the first option, the exclusion band will not be applied to auxiliary equipment.

# Appendix C

# (Regulations)

# Quality criteria

**C.1. Introduction**

Quality criteria are used to determine whether or not a radio equipment passes immunity tests.

There are two types of quality criteria applied in this Regulation:

* Quality criteria for continuous phenomena;
* Quality criteria for surges.

NOTE: Usually, quality criteria depend on the type of radio equipment. Therefore, this Regulation only includes general quality criteria commonly used to evaluate radio equipment. More relevant and specific quality criteria for a particular type of radio equipment can be found in the Specific conditions relating to each part of the EN 301 489 series of standards.

**C.2. Quality criteria for continuous phenomena**

While performing the test, the equipment must:

- Continue operations as planned;

- Not released without intention;

- Not change the operating status of the equipment unintentionally;

- Not change important stored data unintentionally.

**C.3. Quality criteria for surges**

For all ports, surge behavior with the exception described below, applies as follows:

- The application of surge must not lead to a change in operating mode (e.g. unintentional transmission) or loss of important stored data.

- After applying the surge, the equipment must operate as intended.

For overvoltage testing applied to symmetrically operated wireline network ports intended for direct connection to outdoor lines, the following criteria apply:

- For products with only one symmetrical port for connection to an outdoor line, lost functionality is permitted, provided that the functionality is self-recoverable, or can be restored by other means. Information stored in memory will not be lost, or is protected by battery backup.

- For products with more than one symmetrical port for connection to an outdoor line, loss of function on the port under test is permitted, provided that function can be restored automatically. Information stored in memory will not be lost, or is protected by battery backup.

# Appendix D

# (Regulations)

# Relevant standard parts in the EN 301 489 series of standards

This regulation is Part 1 of the EMC multi-part standard for radio equipment and has the following structure:

* A set of EMC standards for all radio equipment made up of several standard parts.
* All general technical requirements on interference emissions and immunity have been placed in the general standards section, which is this Regulation.
* Separate standard sections contain separate requirements related to testing conditions, testing organization, evaluation of indicators, quality criteria, etc. for a particular radio equipment.
* The "Special conditions" section contained in all specific radio standards is used to appropriately add additional or different requirements of each radio equipment to the general requirements specified in this Regulation. .

To fully demonstrate the EMC requirements, this Regulation shall be used in conjunction with the separate conditions section for the particular radio equipment.

The EN 301 489 standard set includes:

**Part 1: Common technical requirements;**

Part 2: Specific conditions for radio paging equipment";

Part 3: Specific conditions for Short-Range Equipment operating in the frequency range between 9 Khz and 40 GHz;

Part 4: Specific conditions for fixed radio links; stations, auxiliary equipment and broadcast data transmission services;

Part 5: Specific conditions for private land mobile equipment (PRM) and auxiliary equipment (voice and non-voice);

Part 6: Specific conditions for Digital Enhanced Cordless Telecommunications (DECT) equipment

Part 9: Specific conditions for wireless microphone equipment, radio frequency analog audio connection equipment, audio equipment and wireless monitoring headsets;

Part 11: Specific conditions for terrestrial broadcasting transmitters;

Part 12: Specific conditions for VSAT, satellite ground stations operating in the frequency range from 4 GHz to 30 GHz in fixed satellite service (FSS);

Part 13: Specific conditions for amateur band (CB) radio and auxiliary equipment (voice and non-voice);

Part 14: Specific conditions for analog and digital terrestrial television transmitters.

Part 15: Specific conditions for commercially available amateur radio equipment;

Part 17: Specific conditions for broadband data transmission systems;

Part 19: Specific conditions for receive-only mobile land stations operating in the 1.5 GHz band to provide data information (ROMES);

Part 20: Specific conditions for mobile terrestrial stations (MES) used in mobile satellite services (MSS);

Part 22: Specific conditions for fixed and mobile aviation radio equipment in the VHF band;

Part 27: Specific conditions for ultra-low power implantable medical equipment (ULP-AMI) and related peripherals (ULP-AMI-P);

Part 28: Specific conditions for wireless digital video links;

Part 29: Specific conditions for digital medical equipment (MEDS) operating in the bands 401 MHz to 402 MHz and 405 MHz to 406 MHz;

Part 31: Specific conditions for ultra-low power implantable medical equipment (ULP-AMI) and related peripheral equipment (ULP-AMI-P) operating over the frequency range 9 kHz to 315 kHz;

Part 33: Specific conditions for ultra-wideband (UWB) communications equipment;

Part 34: Specific conditions for external power supplies (EPS) for mobile phones.

Part 35: "Particular requirements for low power active medical implants (LP-AMI) operating in the bands from 483.5 MHz to 2 500 MHz";

Part 50: "Specific conditions for base stations (BS), repeater stations and auxiliary equipment in mobile communications";

Part 51: "Specific conditions for automotive vehicles and surveillance radar equipment using 24.05 GHz to 24.25 GHz, 24.05 GHz to 24.5 GHz, 76 GHz to 77 GHz and 77 GHz to 81 GHz";

Part 52: "Specific conditions for mobile and portable equipment (UE) and auxiliary equipment in mobile communications".

# Appendix E

# (Reference)

# Information provided to testing laboratories

The manufacturer must provide the following information for recording in the test report at the time of equipment submission:

- The main functions of the radio equipment to be evaluated during and after EMC exposure;

- The intended features of the radio equipment must be consistent with the technical documentation accompanying the equipment;

- User monitoring functions, stored data required for equipment operation, and methods used to evaluate whether these functions and stored data are lost after the equipment is exposed to EMC:

- Modulation type (normal test modulation), transmission characteristics used for testing (random bitstream, message format, etc.) and test equipment required for EUT evaluation;

- Auxiliary equipment combined with radio equipment for measurement and testing (if applicable);

- Full list of ports with maximum allowable cable length, classifying ports by power source or telecommunication/signal/surveillance. The power port must be further classified as an AC power port or a DC power port;

- The frequency ranges in which the equipment will operate;

- Any thermal limitations of the equipment that prevent continuous testing of the EUT;

- The operating environment of the equipment;

- The bandwidth occupied by the corresponding transmitter signal for non-channelized equipment.

If this regulation is used to demonstrate compliance with the European Directive 2014/53/EU for a particular type of equipment, radio where the Specific conditions section of EN 301 489 cannot be determined for this type of radio equipment, the manufacturer must provide the following information for recording in the measurement report at the time of equipment submission:

- Testing conditions, Appendix A;

- The value n is used to determine the exclusion bands in section A.3 of Annex A.

# Appendix F

# (Reference)

# Application of harmonised EMC standards to multi-radio and multi-standard-radio equipment

**F.1. Introduction**

This clause details the additional considerations when dealing with multi-radio and multi-standard-radio equipment

**F.2. Multi-radio equipment capable of independent operation**

If the individual radio equipment and their corresponding radio links operate independently in normal usage, then separate testing may be used. Where separate testing is performed the individual radio equipment should be assessed to the appropriate harmonised EMC standards.

**F.3. Multi-radio equipment and multi-standard-radio equipment not capable of independent operation**

However, where operation of the individual radio equipment and their corresponding radio links is simultaneous in normal usage, then separate testing should not be used. In this case testing should be performed on the complete radio equipment. An overall performance criteria is required for the radio equipment. This may be developed by examining the individual performance criteria of the various radio equipment involved. The performance criteria used should be recorded.

Where multiple operational frequencies are used, exclusion bands should be defined for each of the operating bands in use and all of these should be applied during testing.

**F.4. Multi-radio equipment comprising of numerous identical radio transmitters**

Typically this situation exists where a baseband amplifier is used to feed, multiple radio preamplifiers, they can be placed at different locations to amplify the baseband signal. In this situation, individual parts can be tested separately against the appropriate harmonized EMC standard applicable to that product.

# Appendix G

# (Regulations)

# HS code of radio communication equipment

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Product name according to QCVN** | **HS code** | **Product description** |
| 1 | Wireless telephone equipment (subscription extension type) | 8517.11.00 | - The central block (also called the base station or the mother machine): is fixed and connected to the telephone pair of the public telephone network (PSTN); use an integrated antenna or an external antenna;- Mobile unit (also called portable unit): portable machine using integrated antenna and table-top or mounted on mobile vehicles using external antenna. This block carries the telephone subscriber number of the central block and can talk internally with the central block. |
| 2 | Single-side and/or duplex amplitude-modulated radio equipment in the civil band 27 MHz | 8517.61.00 | Base station (equipment with antenna socket, used in fixed location); |
| 8517.14.00 |  Mobile equipment (equipment with an antenna socket, commonly used in vehicles or mobile stations) used to transmit data and voice;Portable mobile equipment (with antenna socket; or without external antenna socket) for data and voice transmission;  |
| 8517.62.59 |  Mobile equipment (equipment with an antenna socket, commonly used in vehicles or mobile stations) used for data transmission;Portable mobile equipment (with antenna socket; or without external antenna socket) used for data transmission.  |
| 3 | Equipment for low-speed data transmission in the 5.8 GHz band applied in the field of transportation | 8517.62.59 |  Equipment for low-speed data transmission in the 5.8 GHz band used in road traffic (transmission equipment combined with receiver equipment);- With a radio and antenna output connection or with a built-in antenna;- For data transmission only;- Upstream and downstream data rates up to 31.5 kbit/s;- Operates on radio frequencies in the range 5725 MHz to 5875 MHz.  |
| 4 | C-band VSAT equipment | 8517.62.59 | VSAT equipment (transmission equipment combined with receiver) operating in C band of satellite communication services via geostationary orbit satellite. |
| 5 | Ku-band VSAT equipment | 8517.62.59 | VSAT equipment (transmission equipment combined with receiver) operating in Ku band of satellite communication services via geostationary orbit satellite. |
| 6 | Mobile earth stations for Global Non-Geostationary Mobile – Satellite Service Systems   operate in 1GHz - 3 GHz band | 8517.62.59 | Mobile earth terminal station (equipment) in non- geostationary global satellite communicating systems global operating in 1 GHz - 3 GHz band (transmission equipment combined with receiver) |
| 7 | Aeronautical landing   angle navigator | 8526.91.10 | Civil aeronautical landing angle navigator for use on land, operate in 328.6 MHz ~ 335.4 MHz band. |
| 8 | Radio transmitters, transceivers used for remote positioning and distance measurement (excluding equipment used for offshore oil and gas industry) | 8517.62.598517.62.69 | Radio transmitters, transceivers used for remote    positioning    and distance measurement (excluding equipment used for offshore oil and gas industry) but not applicable for telegraph / telephone applications. |
| 9 | Radio navigator | 8526.91.108526.91.90 | Radio navigator used for navigation and alarming obstacles in maritime radio navigation services, maritime satellite radio navigation services, aeronautical radio navigation service, satellite aeronautical radio navigation service. |
| 10 | Mobile terminal using 5th generation of cellular network (5G) | 8517.62.598517.13.008517.14.00 |  Telephones or mobile terminals (transmitter combine with receiver) using 5th generation of cellular network (5G) integrated with or without one or more of following functions:- Land mobile terminal;- Radio modulation technique using spread spectrum in the 2.4 GHz;- Accessing 5 GHz radio band;- Transmitting, transcribing short-range radio bands;  |
| 11 | Base station equipment in 5th generation cellular network (5G) | 8517.61.00 |  Base transceiver stations (BTS) used in a 5th generation cellular network (5G) integrated with or without one or more of following functions:- Base transceiver stations in network using GSM technology;- Base transceiver stations in network using W-CDMAFDD technology;- Base transceiver stations in network using E-UTRA FDD technology;  |
| 12 | 5th generation cellular network (5G) repeater | 8517.62.59 | Equipment has function of receiving and repeating radio signals from E-UTRA FDD (4G/LTE) network integrated with or without one or more of following functions:- Repeating signals from GSM network;- Repeating signals from W-CDMA FDD network.- Repeating signals from E-UTRA FDD network. |
| 13 | Radio transmitters and transceiver used for LPWAN | 8517.61.008517.62.218517.62.598517.62.698517.62.998517.69.00 | Base station equipment, radio access equipment or terminal equipment having function of sensing, measure, record, and transmit measured data via radio interface |
| 9015.10.909026.80.20 | Sensor having function of measuring environment data and transmit measured data via radio interface |
| 14 | Radar equipment (except for radar equipment used for seagoing ships and radars of short range radio transmitters, transceivers) | 8526.10.108526.10.90 | All types of radar equipment used on the ground, or equipped on civil aircraft, except radar equipment used for ships at sea and Radar of the type of short-range radio transmitters, transceivers. |
| 15 | Digital super high frequency equipment | 8517.62.59 | The super high frequency transmission equipment combined with the receiver equipment uses digital microwave technology. |
| 16 | Land mobile radio equipment using an integral antenna intended primarily for analogue speech | 8517.14.00 | Portable radio transmitter having integrated antenna using angle modulation in land mobile radio communication service, primarily for analog speech, frequency range from 30 MHz to 1000 MHz, channel spacing is 12.5 kHz and 25 kHz. |
| 17 | Land mobile radio equipment having an external antenna connector intended for the transmission of data (and speech) | 8517.61.008517.14.00 | - Base station equipment (antenna socket is used at a fixed location)- Mobile station (with antenna socket commonly used on a means of transport or as a mobile station) or a handset for the purpose of transmitting data and/or speech |
| 18 | Land mobile radio equipment having an integral antenna intended primarily for data transmission (and speech) | 8517.14.00 | Land mobile radio equipment using angle constant envelope modulation, operating frequency from 30 MHz to 1GHz, channel spacing is 12.5 kHz and 25 kHz, including digital radio handset or equipment using combination of analog/digital, having integral antenna, for the purpose of data and/or speech transmission. |
| 19 | Land mobile radio equipment having an external antenna connector intended primarily for analogue speech |   | Radio equipment using angle modulation in land mobile radio communication service, frequency range from 30 MHz to 1000 MHz, channel spacing is 12.5 kHz and 25 kHz, used for analog speech, including: |
| 8517.61.00 | - Base station equipment (having antenna socket); |
| 8517.14.00 | - Mobile station equipment (having antenna socket)- Portable transmitter having antenna socket; or not having antenna socket (integral antenna equipment) but having fixed or temporary 50 Ω RF connector inside which allows connecting to output port of transmitter and input port of receiver. |
| 20 | Short-range   radio transmitter and transceiver used for non-specific application | 8517.62.598517.62.698517.62.598526.10.108526.10.908526.92.00 | Equipment has external antenna connector and/or integrated antenna for the transmission or record of speech, image or other data form, including active NFC (Near Field Communications) equipmentRadio detection and alarm equipment, radio remote control equipment, radio telemetry equipment, general data transmission equipment operating in the frequency range from 40 GHz to 246 GHz for below cases :- Have a radio output connection with a separate antenna or with an integrated antenna;- Use any type of modulation;- Fixed or mobile or portable equipment |
| 21 | Emergency Locator Transmitter (ELT) | 8517.62.61 | Radio equipment for transmitting emergency position used on aircraft (ELT) |
| 22 | Radio navigation equipment | 8526.91.108526.91.90 | Radio navigation equipment used for navigation and obstacle warning purposes in the satellite radio navigation, and aeronautical navigation services. |
| 23 | Radar equipment for road or rail traffic applications | 8526.10.108526.10.90 | Short range radar equipment used for applications in traffic information (road or railway) such as cruise control, detection, warning, collision avoidance between vehicles and surrounding objects. |
| 24 | Other short-range radio equipment | 8517.62.598526.10.108526.10.908526.92.00 |  Short-range radio transmitters and transceivers has not been listed in item 2 of Appendix I of this Circular and item 4 of Appendix II of this CircularShort-range radio transmitters and transceivers which has been listed in item 2 of Appendix I of this Circular and item 4 of Appendix II of this Circular but not under application scope of respective national technical regulation  |
| 25 | Other equipment | 8517.62.598517.62.698517.62.998517.69.008526.10.108526.10.908526.91.108526.91.908526.92.00 |  Radio transmitters, receivers and transmitters with the band between 9 kHz and 400 GHz and with a transmitting power of 60 mW or more not listed in item 1 of the List in Appendix I and Section 3 of this Decree. The list is in Appendix II of this Circular.- Radio transmitters, receivers and transmitters with a band between 9 kHz and 400 GHz and with a transmitting capacity of 60 mW or more listed in item 1 of the List in Appendix I and Section 3. of the List in Appendix II of this Circular but not within the scope of the respective applicable technical regulations. |

# References

EN 301 489-1 V2.2.3 (2019-11) Electro Magnetic Compatibility (EMC) Standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU.