



مواصفات أجهزة استقبال البث الإذاعي الصوتي الأرضي الـ T-DAB+/FM/AM بالمنطقة العربية

**The Terrestrial Radio Receiver Specifications for AM/FM/T-DAB+ in Arab Region**



## **Introduction**

This Technical Regulation describes the specification of devices which can receive terrestrially transmitted AM, FM and DAB+ radio services. This specification covers all types of receiver, including home receivers, portable receivers, and vehicle receivers. This specification applies to all producers, manufacturers, importers and retailers who wish to sell radio receivers and all other products which have built-in radio receivers in the Arab Region.

### **1- Scope:**

This specification shall apply to all producers, manufacturers, importers and retailers.

This specification details the requirements for automotive, domestic and portable radio receivers.

This specification covers devices which can receive terrestrially transmitted AM, FM and DAB+ radio services. Some of these devices may also receive other digital radio services via alternative delivery platforms, such as the internet. This specification does not cover details of a receiver intended to receive digital services via these alternative delivery platforms.

This specification covers many types of receiver, including home receivers, portable receivers, devices integrated into the vehicle dashboard and aftermarket devices mounted in the dashboard, behind the dashboard, to the vehicle windscreen or elsewhere. This specification covers devices whose sole function is to receive radio services, and also devices which have one or more other functions in addition to receiving radio services.

This specification details the minimum requirements for low cost radio receivers, which represents the low-end receiver market. However, the receiver requirements were compared to the parameters used for network planning in order to meet the required field strength and protection ratios.

### **2- Technical Requirements:**

All radio receivers shall be able to receive terrestrially transmitted AM, FM and DAB+ sound broadcasting services and shall comply with the requirements at clause 4 and at Annex (1) and (2).



### **3- Terms and definition**

For the purposes of this document unless stated otherwise the word Receiver refers to an Automotive, Domestic and Portable Radio Receiver.

For the purposes of this document an automotive receiver is defined as any radio receiver that is designed specifically for use within a vehicle.

For the purposes of this document the word Adaptor refers to a DAB+ Digital Radio Adaptor. An Adaptor is defined as a device that provides a DAB+ capability to another device, for example an analogue radio (AM or FM) that does not have that capability.

Requirements for AM receivers operating in MF and HF bands are referring to low cost sound broadcasting receivers.

Requirements for FM receivers operating in VHF bands are referring to low cost mono and stereo sound broadcasting receivers.

### **4- Minimum requirements**

The minimum requirements for receivers sold in the ASBU region shall be largely identical to those sold in Europe which meet the requirements of ETSI TS 103 461, but with three important exceptions:

- all receivers are required to display DAB+ labels in Arabic text;
- all receivers are required to provide AM reception to the requirements stated in Annex (2);
- all receivers are required to provide FM reception to the requirements stated in Annex (2).

These differences are detailed in clauses 5, 6, 7 and 8 and Annexes (1) and (2) of this document.

### **5-Minimum requirements for portable and domestic digital radio receivers**

The requirements specified in ETSI TS 103 461 clause 5 shall be used, with the exception of clause 5.10, which is replaced as follows:

#### **5.10 Text display**

Products shall have a means of displaying text to the user.

The text display shall display the name of the audio components available for selection. Products shall display the complete label.

Products shall display the service label when a primary audio component is selected. Products shall display the service component label when a secondary audio component is selected.

Products shall decode the dynamic label from the X-PAD (short X-PAD, variable length X-PAD, whether the dynamic label is the only PAD application or if it is one of a number of PAD applications) of the currently selected service and display it to the user legibly. Products shall act upon the command to remove the label from the display by immediately removing the label, even if it has only been partially displayed.



Receivers shall have a display capable of rendering all the requirements of the ASBU regional profile, as specified in ETSI TS 103 176, annex I.4, correctly mapped, visually well-formed and clear.

#### **6-Minimum requirements for in-vehicle digital radio receivers**

The requirements specified in ETSI TS 103 461 clause 6 shall be used, with the exception of clause 6.10, which is replaced as follows:

##### **6.10 Text display**

Products shall have a means of displaying text to the user.

The text display shall display the name of the audio components available for selection.

Products shall display the complete label.

Products shall display the service label when a primary audio component is selected. Products shall display the service component label when a secondary audio component is selected.

Receivers shall have a display capable of rendering all the requirements of the ASBU regional profile, as specified in ETSI TS 103 176, annex I.4, correctly mapped, visually well-formed and clear.

NOTE: In-vehicle receivers are not required to implement dynamic label.

#### **7-Test specification for core technology**

The tests specified in ETSI TS 103 461 clause 7 shall be used, with the exception of clause 7.4, which is replaced as follows:

##### **7.4 Character sets**

The testing in this clause ensures that the DUT is able to handle all character set decoding correctly. The minimum character support is specified in ETSI TS 103 176, annex I.4, encoded using FIG type 1 and FIG type 2 labels.

The tests are performed in transmission mode I using a conducted method. The test setup is shown in figure **Erreur ! Source du renvoi introuvable.** Any band III channel may be used. The signal level shall be set to -70 dBm. The tests specified in table 1 shall be performed using suitable ETI files.



**Table 1: Character set testing**

<b>Test number</b>	<b>Test description</b>	<b>Valid result</b>
4.1.1	The DUT will support the display of all characters from the Complete EBU Latin-based repertoire character set when the Charset field = 0000 (Complete EBU Latin-based repertoire) in the FIG type 1 labels. The ETI files for product testing (see annex A) may be used.	All characters are displayed correctly
4.1.2	The DUT will support the display of all characters except the Complete EBU Latin-based repertoire specified in TS 103 176, annex I.4 with the encoding set to UCS-2 in the FIG type 2 labels.	All characters are displayed correctly
4.1.3	The DUT will support the display of all characters except the Complete EBU Latin-based repertoire specified in TS 103 176, annex I.4 with the encoding set to UTF-8 in the FIG type 2 labels.	All characters are displayed correctly
4.1.4	The DUT will display numeric blocks and mirrored characters correctly when surrounded by Arabic letters.	All numeric blocks and all mirrored characters are displayed correctly.

For domestic technology, the dynamic label tests specified in ETSI TS 103 461, clause 7.8, shall be carried out using the same test files as for European products. However, it is also required to check that presentation of RTL dynamic labels works correctly. This shall be done using suitable ETI files containing dynamic labels with the text control field set to 0100b and using Arabic characters only.

### **8-Test Specification for Products**

The tests specified in ETSI TS 103 461 clause 8 shall be followed. Additionally, for domestic products, the tests specified in this document under clause 7 including the additional test for RTL dynamic labels shall be carried out.

### **9- Normative References:**

Documents contain provisions which, through reference in this text, constitute provisions of the present document.

- ETSI TS 103 461 Digital Audio Broadcasting (DAB); Domestic and in-vehicle digital radio receivers; Minimum requirements and Test specifications for technologies and products
- ETSI TS 103 176 Digital Audio Broadcasting (DAB); Rules of implementation; Service information features
- ETSI EN 300 401 (V2.1.1): "Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers";



- ETSI TS 101 756: Digital Audio Broadcasting (DAB); Registered Tables.
- ETSI TS 102 563 Digital Audio Broadcasting (DAB); Transport of Advanced Audio Coding (AAC) audio.
- ETSI 300 384: Radio broadcasting systems; Very High Frequency (VHF), frequency modulated, sound broadcasting transmitters
- RECOMMENDATION ITU-R BS.415-2 - Minimum performance specifications for low-cost sound-broadcasting receivers
- ITU-R BS.703 Characteristics of AM sound broadcasting reference receivers for planning purposes
- ITU-R BS.560-4 Radio-frequency protection ratios in LF, MF and HF broadcasting
- IEC 60315-3:1989/AMD1:1999; Amendment 1 - Methods of measurement on radio receivers for various classes of emission. Part 3: Receivers for amplitude-modulated sound-broadcasting emissions
- ITU-R BS.450-3 - Transmission standards for FM sound broadcasting at VHF
- ETS 300 384 - Radio broadcasting systems; Very High Frequency (VHF), frequency modulated, sound broadcasting transmitters
- ITU-R BS.641 - Determination of radio-frequency protection ratios for frequency-modulated sound broadcasting
- ITU-R BS.412-9 - Planning standards for terrestrial FM sound broadcasting at VHF
- IEC 62106:2015 RDS (Radio Data System)

Reference to other documents or sources may be existing and is noted in the document where applicable.



**Annex No. (1): Additional Requirement table for DAB+**

<b>No.</b>	<b>Resource</b>	<b>Reference/ Details</b>	<b>Req.</b>	<b>Notes</b>
<b>1</b>	<b>User information</b>			
1.1	Easy to Use and Simple Documentation	Receivers shall be simple to set up and operate and be provided with clear easy to understand user documentation in both Arabic and English in line with that requirement.	Req.	
1.2	Support Package	The following peripheral items shall be included within a baseline package: <ul style="list-style-type: none"> <li>• Batteries for Remote control (if included)</li> <li>• An easy to understand user manual in both Arabic and English</li> <li>• Reception antenna(s) for supported band(s) (if antenna is not integrated). Note: not mandatory for automotive receivers.</li> </ul>	Req.	



**Annex No. (2): Requirement table for AM/FM capability**

No.	Resource	Reference/ Details	Req.	Notes
<b>1</b>	<b>AM radio Type A: a low sensitivity receiver for operation in MF</b>			
1.1	Frequency range	526.5kHz - 1606.5kHz	Req.	
1.2	Type of modulation	A3 (Double sideband amplitude modulation with full carrier)	Req.	
1.3	Channel spacing	9 kHz	Req.	In the case of a tuner using PLL (Phase Locked Loop), the radio shall be able to change the receiving frequency in 9kHz steps.
1.4	RF - Sensitivity	Not worse than <b>5mV/m</b> (with a built-in antenna with facilities for using an external antenna)	Req.	Sensitivity of receivers is understood as "noise limited sensitivity" in terms of field strength, required to achieve a signal to noise ratio of 26dB at the audio output at 30% modulation of 400Hz tone. The AF signal-to-noise ratio shall be according to the IEC Publication 60315-3 and the field strength values for MF band are measured according to the IEC Publication 60315-3
1.5	RF - Selectivity	Overall selectivity for a low sensitivity receiver shall be:  at -6dB points: passband not less than <b>±3kHz</b> ,  at -20dB points: passband not greater than <b>±10kHz</b>	Req.	Selectivity of a receiver is a measure of its ability to discriminate between a wanted signal to which the receiver is tuned and unwanted signals entering through the antenna circuit. The selectivity measurement is based on the Recommendation ITU-R SM.332-4.
1.6	RF - Image, intermediate freq. and spurious response ratio	Image rejection ratio shall not be less than <b>30dB</b>	Req.	
1.7	Audio performance	If Audio output is available, then the Audio power output shall not be less than <b>0.1W</b> for less than 10% distortion.	Req.	
No.	Resource	Reference/ Details	Req.	Notes
<b>3</b>	<b>FM radio</b>			
3.1	Frequency range	<b>87.5MHz - 108.00MHz</b>	Req.	
3.2	Type of modulation	Receiver shall be designed to demodulate: <b>F3</b>	Req.	Character "F" stands for Frequency modulation, and the number "3" designates the "One channel containing analogue



No.	Resource	Reference/ Details	Req.	Notes
				information"
3.3	Channel spacing	Channels spacing shall be <b>100 kHz</b>	Req.	In the case of a tuner using PLL (Phase Locked Loop) a FM receiver shall be able to tune the receiving frequency in 100 kHz steps.
3.4	RF - Sensitivity	Not worse than <b>-75dB rel. 1mW</b> (32 <sup>1</sup> dB(μV/m))	Req.	Sensitivity of receivers is understood as "noise limited sensitivity" in terms of field strength, required to achieve a signal to noise ratio of 30dB at the 50mW audio output.
3.5	RF - Signal to noise ratio	Better than <b>30dB</b>	Req.	
3.6	RF – Intermediate frequency	Shall be <b>10.7MHz</b>  This does not apply to Software Defined Radios (SDR).	Req.	The local oscillator position can be 10,7MHz higher or lower from the receiving frequency.
3.7	RF - Selectivity	At least - <b>30dB at ±300kHz</b>  This does not apply to Software Defined Radios (SDR).	Req.	Selectivity of a FM receiver is a measure of its ability to discriminate between a wanted signal to which the receiver is tuned and unwanted signals entering through the antenna circuit. Channel separation is 100kHz.
3.8	RF – Receiver bandwidth	Shall be <b>± 75 kHz</b>  This does not apply to Software Defined Radios (SDR).	Req.	
3.9	RF – Radiation of the local oscillator	The local oscillator radiation should be less than the limits specified by CISPR 22 or EN 55022.	Req.	TRA Technical specification on EMC and Safety Requirements to be considered.
3.10	Audio performance – power output	If the Audio Output is available then the Audio power output shall be not less than <b>0.1W</b>	Req.	
3.11	Audio performance – Distortion	The distortion shall be less than <b>5%</b> for a frequency deviation varying between ±15 kHz and ±75 kHz with a modulation frequency of 400 Hz and an output power of 50mW.	Req.	
3.12	Audio performance – De-emphasis	De-emphasis of the sound signal shall be <b>50μs</b>	Req.	
3.13	Radio Data System (RDS)	Automotive receivers have to comply with the RDS (Radio Data System) standard <b>IEC 62106:2015</b>	Req.	Chapter 3.13 mandatory for automotive receivers! Optional for other receivers.
3.13.1	Basic RDS features	Programme Identification (PI)	Req.	For automotive receivers!

<sup>1</sup> To convert dBm to dBuV add 107 dB (for 50 ohm systems)

No.	Resource	Reference/ Details	Req.	Notes
3.13.2	Basic RDS features	Programme Service (PS) name	Req.	For automotive receivers!
3.13.3	Basic RDS features	Alternative Frequency (AF) lists	Req.	For automotive receivers!
3.13.4	Basic RDS features	Traffic Programme (TP) code	Req.	For automotive receivers!
3.13.5	Basic RDS features	Traffic Announcement (TA) signal	Req.	For automotive receivers!
3.13.6	Additional RDS features	Decoder Information (DI)	Opt.	For automotive receivers!
3.13.7	Additional RDS features	Music Speech (MS)	Opt.	For automotive receivers!
3.13.8	Additional RDS features	Programme Type (PTY)	Req.	For automotive receivers!
3.13.9	Additional RDS features	Programme Item Number (PIN)	Opt.	For automotive receivers!
3.13.10	Optional RDS Additional	Enhanced Other Networks information (EON)	Req.	For automotive receivers!
3.13.11	Additional RDS features	Clock Time and date (CT)	Opt.	For automotive receivers!
<b>4 User information</b>				
4.1	Easy to Use and Simple Documentation	Receivers shall be simple to set up and operate and be provided with clear easy to understand user documentation in both Arabic and English in line with that requirement.	Req.	
4.2	Support Package	The following peripheral items should be included within a baseline package: <ul style="list-style-type: none"> <li>• Batteries for Remote control (if included)</li> <li>• An easy to understand user manual in both Arabic and English</li> <li>• Reception antenna(s) for supported band(s) (if antenna is not integrated). Note: not mandatory for automotive receivers.</li> </ul>	Req.	

**Req:** means that the specification is “Required” and therefore mandatory

**Opt:** means that the specification is “Optional” and therefore voluntary but highly recommended