



Industry
Canada

Industrie
Canada

BETS-7
Issue 3
February 2015

Spectrum Management and Telecommunications

Broadcasting Equipment Technical Standard

Technical Standards and Requirements for Radio Apparatus Capable of Receiving Television Broadcasting

Aussi disponible en français - NTMR-7

Canada 

Preface

BETS-7 establishes the technical standards and requirements for radio apparatus equipped with Advanced Television Systems Committee (ATSC) and/or National Television System Committee (NTSC) tuners for the reception of television broadcasting and intended for sale or resale to the public.

Equipment manufactured or imported solely for re-export, prototyping, demonstration, exhibition or testing purposes does not have to comply with the technical standards and requirements in this document.

Contents

1.	General	1
2.	Definitions.....	1
3.	Testing and Labelling	2
4.	Technical Standards and Requirements	4
	4.1 Requirements for All Television Receiving Apparatus.....	4
	4.2 Additional Requirements for Cable-Compatible Television Receiving Apparatus	5
5.	Reference Documents	7

1. General

BETS-7 applies to all radio apparatus equipped with ATSC and/or NTSC tuners for the reception of television (TV) broadcasting, and intended for sale or resale to the public. This includes television sets, set-top boxes for digital-to-analog conversion, and other interface devices such as videocassette recorders (VCRs), DVD recorders and digital video recorders (DVRs). Such apparatus must conform to the technical standards and requirements established in this document.

Apparatus designed to receive mobile digital television broadcasting under standards such as ATSC-M/H (Advanced Television Systems Committee — Mobile/Handheld) are outside the scope of this document. Nonetheless, if some of these devices are also designed to receive television broadcasting that falls within the scope of this document, they must conform to the applicable technical standards and requirements, as established.

2. Definitions

The following definitions become effective with the publication of this new issue of BETS-7:

- 2.1 *National Television System Committee (NTSC)*: the committee that created the standards for the production and distribution (over-the-air) of analog colour television broadcasting signals in Canada and the United States. Refer to the document titled [*BTS-3, Broadcasting Transmission Standard: Television Broadcasting*](#), for the standards governing analog TV broadcasting systems in Canada.
- 2.2 *Advanced Television Systems Committee (ATSC)*: the committee that was formed to establish the technical standards for advanced television systems. It has defined the broadcast standards for digital television (DTV) in Canada and the United States. Refer to the ATSC standards documents in Section 5 for further details.
- 2.3 *Digital Television Receiving Apparatus*: a receiver that incorporates an ATSC tuner for reception of digital television broadcasting signals. It can tune to digital over-the-air channels in the VHF and UHF bands.
- 2.4 *Analog and Digital Television Receiving Apparatus*: a receiver that incorporates an NTSC tuner for reception of analog television broadcasting signals, as well as an ATSC tuner for reception of digital television broadcasting signals. It can tune to analog and digital over-the-air channels in the VHF and UHF bands, and it may be connected to a cable distribution undertaking through a coaxial cable input terminal.
- 2.5 *Cable-Compatible Analog and Digital Television Receiving Apparatus*: a receiver that incorporates an NTSC tuner for reception of analog television broadcasting signals, as well as an ATSC tuner for reception of digital television broadcasting signals. It can tune to analog and digital over-the-air channels in the VHF and UHF bands. It is designed and intended to be connected to a cable distribution undertaking through a coaxial cable input terminal.

- 2.6 *Type* (for the purpose of this document): a unit that, as one of many similar units, has been manufactured in accordance with a particular electronic design and physical pattern, subject to improvements or minor changes which do not degrade its performance.
- 2.7 *Cable distribution undertaking*: an undertaking for the reception of broadcasting and the retransmission thereof by radio waves or other means of telecommunication to more than one permanent or temporary residence or dwelling unit or to another such undertaking.
- 2.8 *CW*: a continuous wave signal without modulation.
- 2.9 *IF*: intermediate frequency.
- 2.10 *Spurious emission*: an undesired emission on a frequency or frequencies which are outside the necessary bandwidth of the desired channel.
- 2.11 *Mid-band channels*: the nine channels, commonly identified by the alphabetical designators A, B, C, D, E, F, G, H and I, used in the 120 to 174 MHz frequency band.
- 2.12 *Super-band channels*: the 14 channels, commonly identified by the alphabetical designators J, K, L, M, N, O, P, Q, R, S, T, U, V and W, used in the 216 to 300 MHz frequency band.
- 2.13 *Ultra high frequency (UHF) channels*: the channels identified by the numerical designators 14 to 69, used in the 470 to 806 MHz frequency band.
- 2.14 *Very high frequency (VHF) channels*: the channels identified by the numerical designators 2 to 13, used in the 54 to 72 MHz, 76 to 88 MHz and 174 to 216 MHz frequency bands.

3. Testing and Labelling

- 3.1 Before importing or offering for sale and/or use in Canada any radio apparatus falling into the category described in Section 1, the manufacturer or importer shall ensure that the apparatus or a production sample or other representative unit of that type of apparatus is tested to determine whether it conforms to the applicable technical standards and requirements established in this document.
- 3.2 Every manufacturer or importer referred to in Section 3.1 shall:
- (a) forward electronically to the Director General, Engineering, Planning and Standards Branch of Industry Canada (email: bets_ntmr_notifs@ic.gc.ca), a notification in PDF file format, attesting that the apparatus meets the requirements set in this document and giving the make and model/type number of the apparatus;

- (b) keep and make available to the Minister of Industry on demand, for a period of five years, a copy of all test data obtained as a result of the tests carried out as required under Section 3.1;
- (c) alternatively, if desired, forward the above documents in paper format to:

Director General
Engineering, Planning and Standards Branch
Industry Canada
235 Queen Street
Ottawa, Ontario K1A 0H5
Canada

- 3.3 Every manufacturer or importer referred to in Section 3.1 shall ensure at the time of import or before offering the apparatus for sale, as appropriate, that each unit of the type bears, in a location convenient for inspection, a permanent label or marking containing the following statement (in English and French):

- (a) for the **Digital Television Receiving Apparatus** defined in Section 2.3:

“Digital Television Receiving Apparatus — Appareil de réception de télévision numérique, Canada BETS-7 / NTMR-7”

- (b) for the **Analog and Digital Television Receiving Apparatus** defined in Section 2.4:

“Analog and Digital Television Receiving Apparatus — Appareil de réception de télévision analogique et numérique, Canada BETS-7 / NTMR-7”

- (c) for the **Cable-Compatible Analog and Digital Television Receiving Apparatus** defined in Section 2.5:

“Cable-Compatible Analog and Digital Television Receiving Apparatus — Appareil de réception de télévision analogique et numérique câblocompatible, Canada BETS-7 / NTMR-7”

For apparatus with an integral (non-removable) display screen, an electronic label (e-label) may be used in lieu of a physical label to fulfill the above requirements. The [Certification and Engineering Bureau Notice 2014-DRS1003](#) provides additional instructions on using e-labels.

- 3.4 Equipment which is not labelled in accordance with Section 3.3 is not considered to have met the technical standards and requirements of this document.

4. Technical Standards and Requirements

Apparatus with a built-in display for viewing the image being broadcast (e.g. television sets) must meet the definition set out in Section 2.4 or 2.5 to ensure that they are able to receive analog television broadcasting signals.

Apparatus without a built-in display can be associated with the definition in Section 2.3, 2.4 or 2.5.

4.1 Requirements for All Television Receiving Apparatus

4.1.1 Channel Selection Requirements

Every NTSC tuner is required to receive television broadcasting from an over-the-air broadcasting transmitting undertaking on all VHF and UHF channels. Additionally, those apparatus able to connect to a cable distribution undertaking must also support mid-band and super-band channels.

Every ATSC tuner is required to receive television broadcasting from an over-the-air broadcasting transmitting undertaking on all VHF and UHF channels.

4.1.2 Noise Figure

Note: This requirement does not apply to the features that provide for reception of digital television signals.

The internal noise created by a receiver is often expressed in terms of noise figure. The noise figure of a receiver is the effective amount of noise created by the input circuitry of the receiver, measured relative to a physical limit on noise known as thermal noise and referenced to the input of the receiver.

The noise figure shall not exceed 14 dB for any UHF television channel. If a tuner has a built-in splitter, a relaxation of 4 dB shall be applied to the above limit.

4.1.3 Radiated Emission Limits

The field strength of radiated emissions produced by the apparatus at a distance of 3 m shall not exceed:

- (a) 100 $\mu\text{V/m}$, in the frequency range from 30 MHz to below 88 MHz;
- (b) 150 $\mu\text{V/m}$, in the frequency range from 88 MHz to below 216 MHz;
- (c) 200 $\mu\text{V/m}$, in the frequency range from 216 MHz to below 960 MHz;
- (d) 500 $\mu\text{V/m}$, for frequencies above 960 MHz.

The standards contained in the International Special Committee on Radio Interference (CISPR) publication 32, *Electromagnetic compatibility of multimedia equipment – Emission requirements*, Edition 1.0 (2012), may be used as an alternative to the above-cited emission limits.

The television test signal is the standard television colour bar signal in accordance with the International Telecommunication Union's (ITU) recommendation known as [ITU-R Recommendation BT.471-1](#).

For the measurement method, refer to IEEE Standard 187-2003, *Measurement Methods of Emissions from FM and Television Broadcast Receivers in the Frequency Range of 9 kHz to 40 GHz*, Section 7 (where it applies to Television Broadcast Receivers). The number of test frequencies shall be adequate to ensure measurement of maximum emission levels within the 30 MHz to 1 GHz frequency range. Measurements shall be taken on six channels evenly spaced across the required radio frequency (RF) input range.

4.1.4 Reception of Digital Television

4.1.4.1 Decoder

The receiver shall be capable of receiving and presenting for display program material that has been encoded in any of the video formats supported by the ATSC A/53 document (see Section 5).

4.1.4.2 PSIP Processing

The receiver shall process and display the program and system information protocol (PSIP) data (see [ATSC A/65](#)) to provide the user with tuned channel and program information. Refer to [ATSC A/69](#) for further guidance.

4.2 Additional Requirements for Cable-Compatible Television Receiving Apparatus

This section applies only to apparatus labelled as “Cable-Compatible Analog and Digital Television Receiving Apparatus — Appareil de réception de télévision analogique et numérique câblocompatible, Canada BETS-7 / NTMR-7” in accordance with Section 3.3 (c). The following requirements apply specifically to the analog portion of the said apparatus.

4.2.1 Cable Input Conducted Emissions

When the receiver is connected to a cable distribution undertaking, the level of any local oscillator signal and any signal of an undesired or spurious nature generated within the apparatus and arriving at the cable input terminals of the apparatus shall not exceed:

- (a) -26 dBmV from 54 MHz up to and including 300 MHz;
- (b) -20 dBmV from 300 MHz up to and including 450 MHz;
- (c) -15 dBmV from 450 MHz up to and including 804 MHz.

Refer to the latest version of CEA Standard 23-B, Section 4.1, Cable Input Conducted Emissions, for further details on the test procedure, test conditions, calibration and measurement procedure.

4.2.2 Adjacent Channel Interference

Spurious signals within the intermediate frequency (IF) passband shall be attenuated at least 55 dB below the visual carrier of the desired signal when in the presence of a lower adjacent channel continuous wave (CW) signal set at 1.5 MHz below the visual carrier frequency of the desired signal.

Refer to the latest version of CEA Standard 23-B, Section 5.4, Lower Adjacent Channel Performance, for the test procedure, test conditions, calibration and measurement procedure.

4.2.3 Direct Pickup Interference

The immunity requirements of cable-compatible television receiving apparatus are given by the ratio of the desired to the undesired co-channel interfering ambient field at the IF passband, which shall be at least 45 dB. The average ratio over the six channels tested shall be at least 50 dB.

Refer to the latest version of CEA Standard 23-B, Section 5.1, Immunity of Subscriber Equipment to Co-channel Direct Pick-up, for the test procedure, test conditions, calibration and measurement procedure.

4.2.4 Impedance

The signal input shall be through a 75 ohm impedance coaxial connection.

4.2.5 Receiver Overload

When the receiving apparatus is subject to strong over-the-air signals, the spurious signals present within the IF passband shall be attenuated by at least:

- (a) 55 dB below the visual carrier of the desired channel from 54 MHz to 550 MHz; and
- (b) 51 dB below the visual carrier of the desired channel from 550 MHz to 804 MHz.

Refer to the latest version of CEA Standard 23-B, Section 5.3, Tuner Overload Performance, for the test procedure, test conditions, calibration and measurement procedure.

4.2.6 Image Channel Interference

The interference experienced by the receiving apparatus when tuned to a specific channel in the presence of another TV signal 90 MHz above the visual carrier of the tuned channel is referred to as image channel interference.

Any image frequency shall be attenuated by at least 60 dB on TV channels from 54 MHz to 714 MHz (inclusive), and by at least 50 dB for TV channels from 714 MHz to 804 MHz.

Refer to the latest version of CEA Standard 23-B, Section 5.2, Image Rejection, for the test procedure, test conditions, calibration and measurement procedure.

5. Reference Documents

[ATSC A/53, ATSC Digital Television Standard, Parts 1-6, 3 January 2007](#)

[ATSC A/65, ATSC Standard: Program and System Information Protocol for Terrestrial Broadcast and Cable, August 2013](#)

[ATSC A/69, ATSC Recommended Practice: Program and System Information Protocol Implementation Guidelines for Broadcasters, December 2009](#)

[BTS-3, Broadcasting Transmission Standard: Television Broadcasting, Issue 2, December 1997](#)

[CEA Standard 23-B, Measurement Procedures for Determining Compliance with FCC Rules for “Cable-Ready Consumer Electronics Equipment,” April 2010](#)

[IEEE Standard 187-2003, Measurement Methods of Emissions from FM and Television Broadcast Receivers in the Frequency Range of 9 kHz to 40 GHz, 2003](#)

[International Special Committee on Radio Interference \(CISPR\), Pub. 32, Electromagnetic compatibility of multimedia equipment – Emission requirements, Edition 1.0, 2012](#)

[ITU-R Recommendation BT.471-1, Nomenclature and description of colour bar signals](#)