

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

DTV profiles for uncompressed digital video interfaces –  
Part 1: General

(standards.iteh.ai)

Profils DTV des interfaces vidéo numériques non comprimées –  
Partie 1: Généralités

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DTV PROFILES FOR UNCOMPRESSED DIGITAL VIDEO INTERFACES –**

**Part 1: General**

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International Standard IEC 62315-1 has been prepared by technical area 4, Digital systems interfaces, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This bilingual version (2012-12) corresponds to the monolingual English version, published in 2003-03.

The text of this standard is based on the following documents:

CDV	Report on voting
100/507/CDV	100/608/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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# DTV PROFILES FOR UNCOMPRESSED DIGITAL VIDEO INTERFACES –

## Part 1: General

### 1 Scope

This part of IEC 62315 specifies requirements for digital television (DTV) monitors that use an uncompressed, baseband, digital video interface. These requirements apply to baseband, digital, video interfaces that use the VESA E-EDID™ Standard for the discovery of supported video formats.

This standard also specifies the video formats to be supported by a DTV monitor. The timing requirements for 14 video formats are specified along with requirements for video format discovery. A mechanism allowing a video source to discover the preferred format of a DTV monitor is also described.

A digital video interface is not specified in this part; however, it is envisaged that such interfaces will appear in future parts of IEC 62315.

NOTE It is recommended that devices using the DTV profiles defined in this document, incorporate a digital content protection system on such interfaces in order to ensure interoperability between devices.

### 2 Normative references

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The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ITU-R BT.601-5: 1995, *Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios*

ITU-R BT.709-5: 2002, *Parameter values for the HDTV standards for production and international programme exchange*

VESA E-EDID™ Standard, *VESA Enhanced Extended Display Identification Data Standard*, Release A, Revision 1, February 9, 2000.

VESA E-DDC™ Standard, *VESA Enhanced Display Data Channel Standard*, Version 1, September 2, 1999.

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### aspect ratio

ratio of width to height of a picture or display screen

#### 3.2

##### aspect ratio, display

aspect ratio of the DTV monitor



**3.3****aspect ratio, picture**

aspect ratio of the picture, which is made up of the active pixels in the video format

NOTE The pixels are not necessarily square. The video image may be smaller than the active pixel region, with background data filling the rest of the region.

**3.4****digital television (DTV)**

device that receives, decodes, and presents audio and video material that has been transmitted in a compressed form

NOTE The device may be a single unit or it may be constructed from individual components (e.g. a digital terrestrial set top box and an analogue television).

**3.5****digital video interface**

cable between a video source and DTV monitor that transfers uncompressed digital video information

**3.6****monitor**

device capable of displaying video

**3.7****monitor, DTV**

EDTV, HDTV or SDTV monitor, or any combination of these three

**3.8****monitor, EDTV**

device capable of displaying 640x480p and either 720x576p or 720x480p in 16:9 or 4:3 aspect ratios

**3.9****monitor, HDTV**

EDTV monitor, with a 16:9 screen, capable of displaying 1920x1080i or 1280x720p video

**3.10****monitor, SDTV**

device capable of displaying 720x480i video in 16:9 or 4:3 aspect ratios

**3.11****tuner**

video source that decodes a digital video transmission and outputs this transmission as video

**3.12****tuner, EDTV**

tuner capable of converting signals into 640x480p and either 720x576p or 720x480p

**3.13****tuner, HDTV**

EDTV tuner capable of converting signals into 1920x1080i and 1280x720p

**3.14****video source**

device that sends video information to a DTV monitor using the digital video interface

#### 4 Symbols and abbreviated terms

ATSC	Advanced Television Systems Committee
DDWG	Digital Display Working Group
DTV	Digital TeleVision
DVI	Digital Visual Interface
E-DDC	Enhanced Display Data Channel
E-EDID	Enhanced Extended Display Identification Data
EDTV	Enhanced Definition Television
EIA	Electronic Industries Alliance
HDTV	High Definition Television
i	interlaced scanning
p	progressive scanning
lsb	least significant bit
LVDS	Low Voltage Differential Signalling
MPEG	Moving Picture Experts Group
MTS	Monitor Timing Specification (a specific VESA standard)
OpenLDI	Open LVDS Display Interface
PSIP	Program and System Information Protocol
SDTV	Standard Definition Television
SMPTE	Society of Motion Picture and Television Engineers
VESA	Video Electronics Standards Association

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#### 5 General requirements

Any DTV monitor conforming to this standard shall support the 640x480p format at 60 Hz, as defined in 6.2.1. The DTV monitor shall also support either 720x480p or 720x576p, as defined in 6.2.4 and 6.2.9 respectively, in one of two picture aspect ratios, 4:3 or 16:9. Additionally, any HDTV monitor conforming to this standard shall have a 16:9 display aspect ratio and shall support either 1280x720p or 1920x1080i, as defined in 6.2.2, 6.2.3, 6.2.6, 6.2.7, and 6.2.8. Formats of 720x576i and 720x480i, defined in 6.2.10 and 6.2.5 are optional within this standard.

NOTE 1 This implicitly allows any source device to only support 720x576p, 720x480p, or 640x480p. For the source device to supply high definition content to any HDTV monitor, it should be capable of supporting 1280x720p and 1920x1080i, since an HDTV monitor may only support one of the two formats. In some cases, the source device will need to convert video from its original format (e.g. 720x480i) to a format supported by the DTV Monitor (e.g. 720x480p).

The DTV tuner and DTV monitor requirements specified by this standard are summarized in Table 1. The requirements of 50 Hz applications are different from the requirements of 60 Hz applications, as given in Table 1.

NOTE 2 The product definitions are explained in Clause 3.

**Table 1 – Video formats**

Product definition	Video format	EDTV monitor	HDTV monitor	EDTV tuner	HDTV tuner
<b>50 Hz applications</b>					
SDTV	720x576i, 50 Hz	o	o	o	o
EDTV	640x480p, 60 Hz	X	X	X*	X*
EDTV	720x576p, 50 Hz	X	X		
HDTV	1280x720p, 50 Hz	o	X*	o	X
HDTV	1920x1080i, 50 Hz	o		o	X
<b>60 Hz applications</b>					
SDTV	720x480i, 60 Hz	o	o	o	o
EDTV	640x480p, 60 Hz	X	X	X*	X*
EDTV	720x480p, 60 Hz	X	X		
HDTV	1280x720p, 60 Hz	o	X*	o	X
HDTV	1920x1080i, 60 Hz	o		o	X
<b>Key</b>					
X Required by this standard					
X* At least one of the two formats is required, the other is optional					
o Optional					

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## 6 Waveform timing requirements

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Timing parameters shall conform to Table 2 and to the timing diagrams in 6.2. The DTV monitor shall be capable of displaying either 59,94 or 60 Hz (frame rate for progressive scan and field rate for interlaced scan) for those formats listed in Table 1 that it supports. Therefore, the 59,94 Hz and 60 Hz versions of a format shall be considered as the same format with slightly different pixel clocks. DTVs shall accept video when its pixel clock is accurate to within 0.5 % of the clock frequencies specified in Table 2.

Table 2 – Timing parameters for the uncompressed digital video interface

Frequency ±0,5% Hz	Vertical lines		Horizontal pixels		Vertical blanking µs	Horizontal frequency kHz	Pixel frequency MHz	Horizontal blanking µs	Horizontal period µs	Picture aspect ratio	Source of original specification Bibliography reference number
	Active	Total	Active	Total							
60	480	525	640	800	1429	31,500	25,200	6,35	31,75	4x3	[17]
60	1080	1125	1920	2200	667	33,750	74,250	3,77	29,63	16x9	Normative reference (Clause 2)
60	720	750	1280	1650	667	45,000	74,250	4,98	22,22	16x9	Normative reference (Clause 2)
60	480	525	720	858	1429	31,500	27,027	5,11	31,75	4x3,16x9	[5]
60	480	525	1440*	1716*	1429	15,750	27,027	10,21	63,49	4x3,16x9	[5]
50	1080	1125	1920	2640	800	28,125	74,250	9,70	35,56	16x9	[10]
50**	1080	1250	1920	2304	2720	31,250	72,000	5,33	32	16x9	Normative reference (Clause 2)
50	720	750	1280	1980	800	37,500	74,250	9,43	26,67	16x9	[12]
50	576	625	720	864	1568	31,250	27,000	5,33	32,00	4x3,16x9	[21]
50	576	625	1440*	1728*	1568	15,625	27,000	10,67	64,00	4x3,16x9	[2]

\* The pixels are double-clocked for each line to meet minimum clock speed requirements, thus the active horizontal pixels listed are 1440 rather than 720.

\*\* Some regions are adopting this format instead of 1125 vertical lines in order to improve compatibility with 100 Hz cathode-ray tube televisions.

Timing for the digital video interface on a DTV monitor shall support a base format of 640x480p, 60 Hz.

In countries supporting 50 Hz, the DTV monitor shall support an additional base format of 720x576p, 50 Hz, in at least one of the two picture aspect ratios, 4:3 and 16:9. In countries supporting 60 Hz, the DTV monitor shall support an additional base format of 720x480p, 60 Hz, in at least one of the two picture aspect ratios, 4:3 and 16:9.

An HDTV monitor shall support the timing requirements for either 1280x720p, 1920x1080i, or both, at the frequency appropriate for its country, 50 Hz or 60 Hz.

NOTE The 720x576i, 50 Hz, and 720x480i, 60 Hz, timings are optional.

## 6.1 Aspect ratio

The 720-line formats (720x576p, 720x576i, 720x480p, 720x480i) are available in two different picture aspect ratios, 4:3 and 16:9. The DTV monitor shall support at least one of these and shall state which picture aspect ratio it supports for a given format (see notes 1 and 2).

The DTV monitor shall list only one picture aspect ratio for a 720-vertical-line format in the E-EDID structure at any given time and the signal shall be processed accordingly (see notes 3 and 4).

NOTE 1 Formats with different picture aspect ratios are considered to be different formats that may be independently supported and discovered.

NOTE 2 The source is able to choose how to supply the picture aspect ratio that a DTV monitor supports. For example, with the 16x9 data format and a 4x3 DTV monitor, the source may:

- a) use pan and scan information to crop the data to fewer horizontal pixels and then resample up to the required pixels for output to the DTV monitor, or
- b) vertically resample and create blank panels above and below the picture to send this "letterbox" with the required lines for output.

Other picture scaling methods are possible in either the video source or DTV monitor. For example, picture aspect scaling (picture expand, shrink, etc.) can be accomplished in the video source, such as adding black lines in the active video portion of the signal for non-standard picture aspect ratios.

NOTE 3 It is possible for a DTV monitor to support both aspect ratios of the 720x480 formats through a user-selectable option on the DTV monitor. In this case, the E-EDID timing descriptor may be changed to reflect the user-requested picture aspect ratio. Video sources should have a method for tracking changes to user-selected aspect ratios.

NOTE 4 As shown in the timing diagrams (see 6.2), there is no difference in the timing parameters for formats that have different picture aspect ratios but are otherwise the same format. For a DTV monitor to simultaneously support both formats, the DTV monitor requires an indication from the source that describes the aspect ratio in which the video should be displayed. These involve sending picture aspect ratio information from a video source to the DTV monitor. It is envisaged that future parts of this standard will provide standardized methods to accomplish this task.

## 6.2 Timing diagrams

### 6.2.1 640x480p, 59,94/60 Hz

The timing parameters for 640x480p, 59,94/60 Hz, shall be as illustrated in Figure 1.

NOTE This timing is based on *VESA Monitor Timings Specification*, version 1.0 revision 0.8 [16]\*. The only difference is that the VESA version defines blanking to not include the border, while this standard includes the border within the blanking interval.

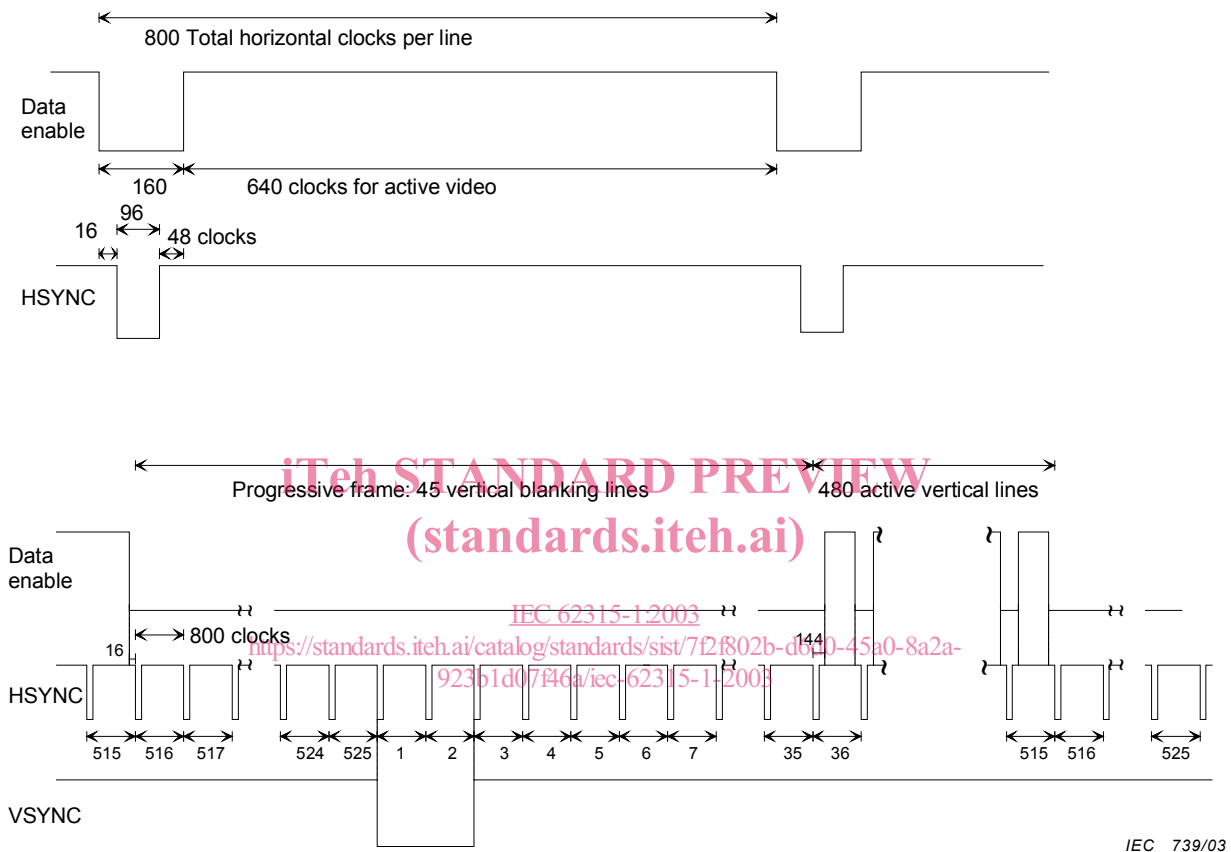


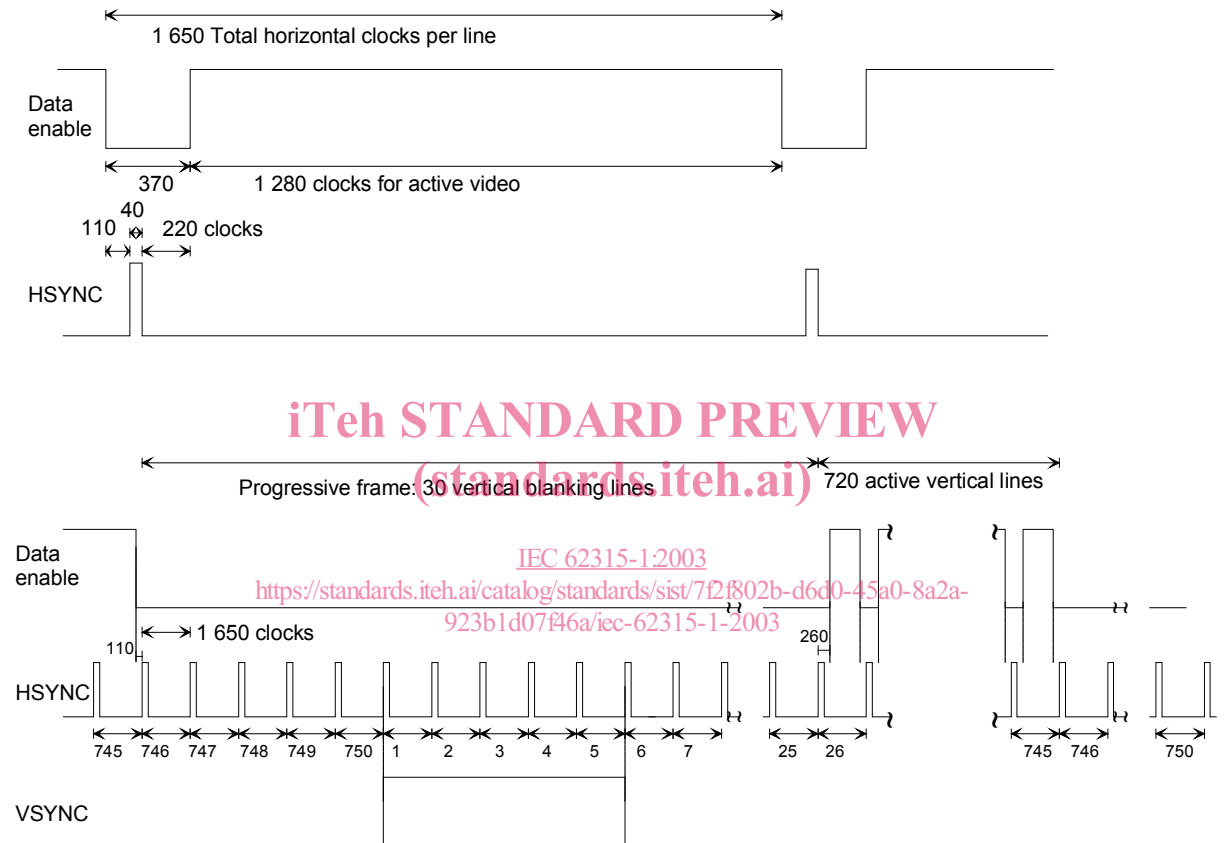
Figure 1 – Timing parameters for 640x480p, 59,94/60 Hz

\* Figures in square brackets refer to the bibliography.

**6.2.2 1280x720p, 59,94/60 Hz**

The timing parameters for 1280x720p, 59,94/60 Hz, shall be as illustrated in Figure 2. This format uses a 16:9 aspect ratio.

NOTE This timing is based on EIA-770.3-C [6], but there are two differences. First, EIA-770.3-C uses tri-level sync, while this standard uses bi-level. Bi-level sync timing is accomplished using the second half of the EIA-770.3-C tri-level sync, defining the actual sync time to be the rising edge of that pulse. Second, EIA-770.3-C uses a composite sync while this standard uses separate sync signals, thus eliminating the need for serrations during vertical sync.



IEC 740/03

**Figure 2 – Timing parameters for 1280x720p, 59,94/60 Hz**