SLOVENSKI STANDARD

SIST EN 62330-2:2005

januar 2005

Digitalni videokasetni snemalni sistem z zapisovanjem s poševnimi sledmi na magnetnem traku, širokem 12,65 mm (0,5 in) – Format HD-D5 – 2. del: Kompresijski format (IEC 62330-2:2003)

(istoveten EN 62330-2:2004)

Helical-scan digital video cassette recording system using 12, 65 mm (0, 5 in) magnetic tape - Format HD-D5 - Part 2: Compression format (IEC 62330-2:2003)

ICS 33.160.40

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EUROPEAN STANDARD **EN 62330-2**

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English version

Helical-scan digital video cassette recording system using 12,65 mm (0,5 in) magnetic tape - Format HD-D5 Part 2: Compression format

(IEC 62330-2:2003)

Système de magnétoscope numérique à cassette à balayage hélicoïdal sur bande magnétique de 12,65 mm (0,5 in) - Format HD-D5 Partie 2: Format de compression (CEI 62330-2:2003)

Videokassettensystem mit Schrägspuraufzeichnung auf Magnetband 12,65 mm (0,5 in) - HD-D5-Format Teil 2: Kompressionsformat (IEC 62330-2:2003)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 62330-2:2004 E

Foreword

The text of the International Standard IEC 62330-2:2003, prepared by Technical Area 6: Higher data rate storage media and equipment, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 62330-2 on 2004-03-01 without any modification.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-03-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62330-2:2003 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
ITU-R BT.1543	- [1)]	1 280 x 720, 16 x 9 progressively captured image format for production and international programme exchange in the 60 Hz environment	-	-
ITU-R BT.709-5	- [1)]	Parameter values for the HDTV standards for production and international programme exchange	-	-

1) Undated reference.

INTERNATIONAL STANDARD

IEC 62330-2

First edition
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Helical-scan digital video cassette recording system using 12,65 mm (0,5 in) magnetic tape – Format HD-D5 –

Part 2: Compression format

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HELICAL-SCAN DIGITAL VIDEO CASSETTE RECORDING SYSTEM USING 12,65 mm (0,5 in) MAGNETIC TAPE – FORMAT HD-D5 –

Part 2: Compression format

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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6) Attentions drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62330-2 has been prepared by Technical Area 6: Higher data rate storage media and equipment of IEC technical committee 100: Audio, video and multimedia systems and equipment.

It was submitted to the national committees for voting under the Fast Track Procedure as the following documents:

CDV	Report on voting
100/505/CDV	100/604/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.

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 2008. At this date, the publication will be

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

IEC 62330 consists of the following parts, under the general title *Helical-scan digital video cassette recording system using 12,65 mm (0,5 in) magnetic tape – Format HD-D5*.

Part 1: VTR specifications

Part 2: Compression format

Part 3: Data stream format

Part 1 describes the VTR specifications which are tape, magnetization, helical recording, modulation method and basic system data for high definition video compressed data on 29,97 or 59,94 frame rate.

This part 2 describes the specifications for encoding process and data format for 1080i and 720p systems.

Part 3 describes the specifications for transmission of HD-D5 compressed video and audio data stream over 360 Mb/s serial digital interface.

HELICAL-SCAN DIGITAL VIDEO CASSETTE RECORDING SYSTEM USING 12,65 mm (0,5 in) MAGNETIC TAPE – FORMAT HD-D5 –

Part 2 – Compression format

1 Scope

This part of IEC 62330 defines the encoding process of the HD-D5 video compression and its data format for the 1 080/59,94i system (hereinafter referred to as the 1 080i system) and the 720/59,94p system (hereinafter referred to as the 720p system).

2 Normative references

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.1543, *1 280 × 720, 16 × 9 progressively-captured image format for production and international programme exchange in the 60 Hz*

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

3 Acronyms

BUF	Buffer memory
C	Colour difference signal
C3RMB	Compressed data of 3 RMBs
C(t, u)	The value of the DCT coefficient at frequency (t, u)
C_B/C_R	Colour difference signal
CC0 ~ CC2	Categories for C DCT block
Ccoef( )	C DCT CG
CG	Coefficient group
CGNR	CG number of one Y/C DCT coefficient block in one RMB
CGNS	CG number of one Y/C DCT coefficient block in one SMB
CN	C3RMB number in one RMBG
CRcoef( )	Rearranged C DCT CG
CS	C DCT block number in one SMB
CY0 ~ CY3	Categories for Y DCT block
DCT	Discrete cosine transform
DIF	Digital interface
DIF(n)	DIF block numbered n
DN	DIF block number
EOB	“End of block” code
EOM	“End of 3 RMBs” code

exnor	Logical exclusive nor
f( )	Offset value table for SMBG distribution
FCB	Category flag of C_B DCT block
FCB′	Category flag of C_B DCT block
FCR	Category flag of C_R DCT block
FCR′	Category flag of C_R DCT block
FFL	Field number flag
FMB	Category flag of the MB
FMB′	Category flag of the MB
FYa ~ FYd	Category flags of the four DCT blocks (Ya ~ Yd) of the MB
FYa′ ~ FYd′	Category flags of the four DCT blocks (Ya ~ Yd) of the MB
H	The horizontal SMB position number in one video field (1 080i system) or one video frame (720p system)
HR	The column position number of RMB
HS	The column position number of SMB in one SMBG
IDCT	Inverse discrete cosine transform
int (A)	Integer part of A
LEN	The byte length of C3RMB
MB	Macro block
mod	Modulus operator
N.A.	Not applicable
Offset( )	Offset value for RMB shuffling
P(r, s)	The value of the pixel at the position (r, s) in Y/C DCT block
Qno	Quantization number
Qstep	Quantization step value
r	The horizontal pixel position number in Y/C DCT block
Rg	The RMBG number within the RMBs
RMB	Rearranged macro block
RMBG	Rearranged macro block group
Rn	The number of RMB coding order in each RMBG
s	The vertical pixel position number in Y/C DCT block
SA	The starting address of the remainder data in buffer memory
SABM	One byte data of SA (two bytes)
Sg	The SMBG number in one video field (1 080i system) or one video frame (720p system)
SMB	Super macro block
SMBG	Super macro block group
t	The horizontal frequency number in Y/C DCT coefficient block
TableCY0 ~ 3	Set up value tables for Y weighting function
TableCC0 ~ 2	Set up value tables for C weighting function
u	The vertical frequency number in Y/C DCT coefficient block
V	The vertical position number of SMB in one video field (1 080i system) or one video frame (720p system)
VLC	Variable length coding

VR	The row position number of RMB
VS	The row position number of SMB in one SMBG
W(t, u)	Weighting value at frequency (t, u)
Y	Luminance signal
Ya ~ Yd	Four Y DCT blocks in one MB
Ycoef( )	Y DCT CG
YR	The Y DCT coefficient block number in one RMB
YRcoef( )	Rearranged Y DCT CG
YS	The Y DCT block number in one SMB
Z	The row position number of the RMB after RMB shuffling
ZRL	Code of 15 successive zero coefficients followed by a coefficient of zero amplitude

4 Video processing

4.1 Overview

Luminance (Y) and colour difference components (C_B and C_R) from 1 080i or 720p video signal are sampled by 74,25/1,001 MHz and 37,125/1,001 MHz respectively.

After discarding samples in vertical and horizontal blanking periods, active video samples are divided into four super macro block groups (SMBG) per field (1 080i) or per frame (720p). Each SMBG consists of 1 080 super macro blocks (SMB).

Each SMB consists of two MBs. Each MB consists of four luminance DCT blocks (8 × 4 pixel matrix) and one each of C_B DCT block (8 × 8 pixel matrix) and C_R DCT block (8 × 8 pixel matrix).

As described later, two horizontally adjacent luminance DCT blocks are overlapped by one pixel column at their junction. Two horizontally adjacent chrominance DCT blocks are overlapped by one pixel column at their junction when they are formed into SMB.

Each DCT block is transformed to represent DC and AC coefficients. Coefficients are weighted through the prearranged categories prior to shuffling, then formed into rearranged MBs (RMB).

DCT coefficients within one rearranged MB group (RMBG) are quantized, and made into a fixed length data set through VLC.

The VLC output code words from one RMBG are formed into 360 DIF blocks.

The compressed video data for one 1 080i field or one 720p frame consists of 5 760 DIF blocks.

The block diagram of the outline about video processing is shown in Figure 1.

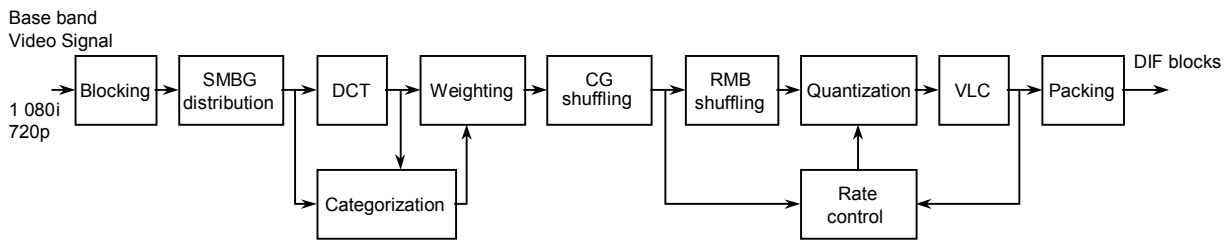

Figure 1 – Block diagram of outline about video processing

4.2 Video signal

4.2.1 Sampling process

The sampling structure is defined in ITU-R BT.709 and ITU-R BT.1543. Sampling structures of the luminance (Y) and the two colour difference signals (C_B/C_R) are described in Table 1.

4.2.1.1 Line structure in one field (1 080i system) or frame (720p system)

For the 1 080i system, 540 lines for Y, C_B and C_R signals from each field shall be transmitted. For the 720p system, 720 lines for Y, C_R and C_B signals from each frame shall be transmitted. The transmitting lines on a television frame are defined in Table 1.

Table 1 – The construction of video signal sampling

		1 080i system		720p system	
Sampling frequency	Y	74,25 MHz / 1,001			
	C_B/C_R	37,125 MHz / 1,001			
Total number of pixels per line	Y	2 200		1 650	
	C_B/C_R	1 100		825	
The number of active pixels per line	Y	1 920		1 280	
	C_B/C_R	960		640	
Total number of lines per frame		1 125		750	
The number of active lines per frame		1 080		720	
The active line numbers		Field 1	21 to 560	Frame	26 to 745
		Field 2	584 to 1 123		
Quantization		Each sample is linearly quantized to 10 bits for Y, C_B and C_R			
The relation between video signal level and quantized level	Scale	4 to 1 019			
	Y	Quantized level: 877 Video signal level of white: 940 Video signal level of black: 64			
	C_B/C_R	Quantized level: 897 Video signal level of gray: 512			