

Super video compact disc — Disc-interchange system-specification

The European Standard EN 62107:2001 has the status of a
British Standard

ICS 33.160.40

National foreword

This British Standard is the official English language version of EN 62107:2001. It is identical with IEC 62107:2000.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment, which has the responsibility to:

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**Super video compact disc -
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(IEC 62107:2000)**

Super vidéodisque compact -
Système d'échange de disques -
Spécifications
(CEI 62107:2000)

Super-Video-Compact-Disc -
Systemanforderungen für den
Plattenaustausch
(IEC 62107:2000)

This European Standard was approved by CENELEC on 2000-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

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

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Foreword

The text of document 100B/261/FDIS, future edition 1 of IEC 62107, prepared by SC 100B, Audio, video and multimedia information storage systems, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62107 on 2000-09-01.

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Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annexes A and B are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62107:2000 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- | | | |
|-----------|------|---|
| IEC 60908 | NOTE | Harmonized as EN 60908:1999 (not modified). |
| IEC 61104 | NOTE | Harmonized as EN 61104:1992 (not modified). |

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INTRODUCTION

There is a market need for a standardized fully digital Compact Disc based video reproduction system. This Super Video CD specification standardizes and upgrades the current Video CD format. It utilizes better Video and Audio quality. It also includes extensions for surround sound multi-channel audio and provisions for PC playback, and is prepared for further future improvements. This standard is based on using variable bit rate (VBR) MPEG2 coding for more efficient use of disc capacity. The target for this standard is further to ensure the best price/performance combination possible with the latest state-of-the-art technology available, and to offer more flexibility for publishers to use the best video/audio quality given limited disc capacity.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. Recipients of this standard are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

SUPER VIDEO COMPACT DISC – Disc-interchange system-specification

1 Scope

This International Standard defines the basic specification of the Super Video Compact Disc, (SuperVCD), characterized by high resolution and high picture quality, which matches current TV receivers.

This standard is intended to be used as a basis for the design, production and compliance testing of SuperVCD discs and playback devices to achieve compatibility with current and future products.

The general SuperVCD disc structure is based on the CD-ROM system (see ISO/IEC 10149).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 10149:1995, *Information technology – Data interchange on read-only 120 mm optical data disks (CD-ROM)*

ISO/IEC 11172-3:1993, *Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s – Part 3: Audio*

ISO/IEC 13818-1:1996, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

ISO/IEC 13818-2:1996, *Information technology – Generic coding of moving pictures and associated audio information: Video*

ISO 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*

ISO 9660:1988, *Information processing – Volume and file structure of CD-ROM for information interchange*

3 Definitions, abbreviations, conventions and symbols

3.1 Definitions

3.1.1

bit rate

rate at which a compressed bit stream is delivered to the input of a decoder

3.1.2

mnemonics

descriptions of different data types used in this standard

3.1.3

mode 2 form 1

CD-ROM track type

3.1.4

mode 2 form 2

CD-ROM track type

3.1.5

mux rate

rate value derived from the sector rate

3.1.6

playback device

any SuperVCD compliant player or other product, such as a PC

3.1.7

program stream

a collection of elementary streams

3.1.8

real-time stream

MPEG2 program stream containing video and audio components to be decoded and presented in time, controlled by timing characteristics in the stream to the decoder

3.1.9

system clock reference

time stamp in the Program Stream

3.1.10

sector

smallest addressable part of a Digital Data Track in the information area that can be accessed independently of other addressable parts of the area
[ISO/IEC 10149]

3.1.11

sector and subcode address representation

all Sector addresses and Subcode addresses are represented in the 3-byte BCD encoded form mm:ss:ff. The minutes field is represented by "mm", the seconds field is represented by "ss", the blocks (Sector) or frames (Subcode) field is represented by "ff"

3.1.12

time-stamp

time of a specific action such as the arrival of a byte or the presentation of a picture

3.1.13

track

continuous area on the disc with one and the same Track Number in the CD Subcode

3.1.14

variable bit rate

variation in time of arrival of the bytes at the input of a decoder

3.2 Abbreviations

BCD	Binary Code Decimal
bslbf	bit string, left bit first
CBR	Constant Bit Rate
CD-ROM	Compact Disc Read Only Memory
CRC	Cyclic Redundancy Check
DTS	Decoding Time Stamp
ECC	Error Correction Code
EDC	Error Detection Code
EOF	End of File
EOR	End of Record
kbps	kilo bit per second (1 024 bits/s)
lsb	least significant bit
LSB	Least Significant Byte
mbps	mega bit per second (1 000 000 bits/s)
MPEG	Moving Picture Experts Group
MPEG PS	MPEG2 Program Stream
msb	most significant bit
MSB	Most Significant Byte
N/A	Not Applicable
NRT	Non-Real-Time
PES	Packetized Elementary Stream
PS	Program Stream
PSD	Play Sequence Descriptor
PTS	Presentation Time Stamp
PVD	Primary Volume Descriptor
RT	Real Time
SCR	System Clock Reference
SPI	Segment Play Item
TOC	Table of Contents
uimsbf	unsigned integer, most significant bit first
VBR	Variable Bit Rate

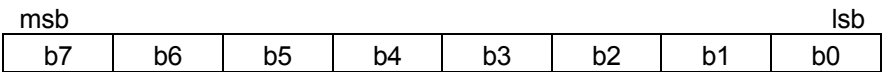
3.3 Conventions and symbols

Text written in *italics* is informative.

The mathematical operators used are similar to those used in the **C** programming language and the use of brackets – {} – in tables is in accordance with the pseudo-c syntax (see 2.2 and 2.3 of ISO/IEC 13818-1).

Unless otherwise indicated, in this document the conventions used are as follows.

Bit ordering – The graphical representation of all multiple-bit quantities is such that the most significant bit (msb) is on the left and the least significant bit (lsb) is on the right.



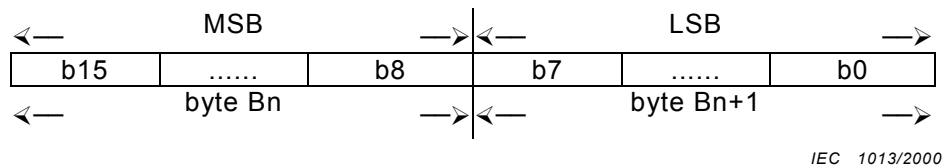
IEC 1012/2000

The most significant bit is the bit with the highest bit position number.

Figure 1 – Example of bit ordering for one 8-bit byte

Byte ordering – Quantities which require more than eight bits for their representation are held in more than one byte on the disc. For all such quantities, the ordering of bytes on the disc (as seen at the interface to the disc driver) is such that the Most Significant Byte (MSB) is first and the Least Significant Byte (LSB) is last.

Multiple-byte quantities are represented graphically such that the left-most or upper-most byte is most significant and the right-most or lower-most byte is least significant.



The most significant byte is the byte with the lowest byte position number.

Figure 2 – Example of byte ordering for 2 bytes

Character String – Character Strings are always given between double quotation marks, as "_____", coded according to ISO 646 if not indicated otherwise.

Hex – All hexadecimal values are preceded by a \$. The most significant nibble is on the left, the least significant nibble is on the right.

Binary – Binary values are preceded by a % or presented within single quotation marks ' '. The most significant bit is on the left, the least significant bit is on the right. A binary value is represented by a 0, 1 or x where x is a 0 or a 1.

Decimal – All decimal values are preceded by a blank space or the range indicator (..) when included in a range. The most significant digit is on the left, the least significant digit is on the right.

Units of measure – 1 K denotes 1 024 units.

Range – Constant_1..Constant_2 or (Constant_1..Constant_2) denotes the range from and including Constant_1 up to and including Constant_2, in increments of 1.

Ordering within tables – The items within a table are contiguous, starting with the top line from the left to the right item, then the next line from the left to the right item, and so on, down to and including the bottom line from the left to the right item.

3.4 Compatibility conventions

The SuperVCD specification is intended to ensure full compatibility, so that all discs can play, with at least those functions designated as mandatory in the SuperVCD specifications, in all compliant playback devices.

All **mandatory** parts of the specification have to be recorded on all discs and are intended to be implemented in all playback devices.

Extension parts of the specification define non-mandatory additional functionality.

A disc with extensions should play on a playback device only supporting the mandatory functionality of the specification, and a playback device supporting some or all extensions should also play discs without these extensions.

The specification also includes **optional** meta-data, intended to support improved performance of a playback device. It is recommended that optional items be recorded on the disc, but it is not required that they be included.

4 SuperVCD introduction

4.1 System overview

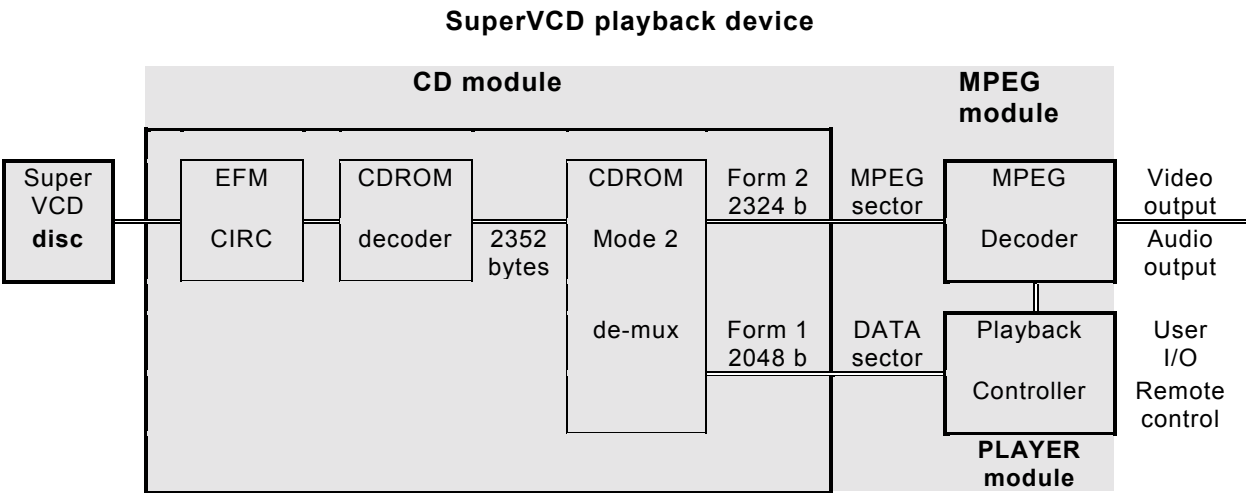
SuperVCD is a reproduction system for presenting full motion pictures with associated audio by using the Compact Disc format. The system uses the ISO/IEC MPEG2 standard definitions to compress the video, still picture and audio information for full screen TV quality pictures together with associated high-quality audio. The SuperVCD disc can also carry high-quality still pictures with associated audio and a Play Sequence Descriptor file for interactive control of the playback of still and motion pictures.

Variable bit rate (VBR) MPEG coding is used for more efficient use of the disc capacity. The playing time for a fully recorded disc can vary from 35 min to more than 70 min depending on the average bit rate used.

The SuperVCD format is based on the CD-ROM Mode 2 disc format. SuperVCD discs can be played on SuperVCD playback devices, and other compliant hardware and software platforms.

4.2 SuperVCD system reference model

The SuperVCD system consists of a SuperVCD disc and the playback device, normally a SuperVCD player.



IEC 1014/2000

Figure 3 – SuperVCD system reference model

5 General SuperVCD disc format

The general SuperVCD disc structure is based on the CD-ROM system (ISO/IEC 10149) with the specific additions and restrictions defined in this clause.

The disc is intended to be played either sequentially starting from the first MPEG Track, or by playing Play Lists using the Play Sequence Descriptor (PSD) with on-screen "menu" control.

A karaoke/music application has normally one track per song. This means that song number 1 is recorded in Track No. 2, and song number 2 in Track No. 3, and so on.

A movie title can be divided into different coded parts, such as INTRO, COPYRIGHT, FILM, CREDITS. The film itself can also be subdivided into chapters.

5.1 SuperVCD disc structure

The SuperVCD disc has a lead-in area, a program area, and a lead-out area.

Lead-in area	
Program area	Track No. 1 SuperVCD DATA track
	Track No. 2
	... SuperVCD MPEG tracks
	Track No. n
Lead-out area	

IEC 1015/2000

Figure 4 – SuperVCD disc layout

5.1.1 Lead-in area

The lead-in area is encoded as a CD-ROM DATA track (with track number = 00) containing Empty Sectors of Mode 2 Form 2 with file number = \$00, and Submode = \$20.

Table 1 – Lead-in area subcode

POINT	\$A0
PSEC	\$20
PFRAME	\$00

5.1.2 Program area

There are two types of SuperVCD track format:

- SuperVCD **DATA track** format
- SuperVCD **MPEG track** format

The first track shall be a SuperVCD DATA track and other tracks shall be SuperVCD MPEG tracks with playable MPEG2 audio/video Program Streams.

All sectors in a SuperVCD track are of CD-ROM Mode 2.

5.1.3 Lead-out area

The lead-out area is encoded as a CD-ROM DATA track containing Empty Sectors of Mode 2 Form 2 with file number = \$00, and Submode = \$20.

5.2 SuperVCD sector format

A track is divided into Mode 2 sectors of 2 352 sequential bytes each. Each sector can be uniquely addressed by a BCD-coded absolute time value in the header field of the sector.

SuperVCD information is stored in SuperVCD sectors.

There are two types of SuperVCD sectors, namely Form 1 and Form 2 sectors. A Form 1 sector has an extra Error Correction Code (ECC) field, as in CD-ROM Mode 1. A Form 2 sector is intended for real time MPEG data and has no ECC field, but 2 324 user data bytes instead, giving a 14 % higher bit rate or capacity.

Table 2 – Form 1 SuperVCD sector fields

Field type	Number of bytes	Note
Synchronization	12	See CD-ROM
Header	4	See CD-ROM
Subheader	8	4 bytes repeated
Form 1 User Data	2 048	Same as CD-ROM Mode 1
Form 1 EDC	4	Same as CD-ROM Mode 1
Form 1 ECC	276	Same as CD-ROM Mode 1

Table 3 – Form 2 SuperVCD sector fields

Field type	Number of bytes	Note
Synchronization	12	See CD-ROM
Header	4	See CD-ROM
Subheader	8	4 bytes repeated
Form 2 User Data	2 324	Used for MPEG data
Form 2 EDC	4	Same as CD-ROM Mode 1

5.2.1 SuperVCD sector Subheader structure

The SuperVCD Subheader field consists of eight bytes: File Number, Channel Number, Submode, and Coding Information bytes, each written twice for better data integrity.

Table 4 – Layout of Subheader field

Sector byte number	Byte value
16	File Number
17	Channel Number
18	Submode
19	Coding Information
20	File Number
21	Channel Number
22	Submode
23	Coding Information

The Subheader is used to define different types of sectors for storing information with special characteristics. The values are defined in table 5.

Depending on the SuperVCD information, three types of sectors are defined, namely an **Empty sector** with no user data information, a **Data sector** with non-real-time data and an **MPEG** sector for MPEG real-time data.

The Submode byte defines the global attributes of a sector, and the Coding Information byte defines if the sector contains MPEG PS stream data.

Table 5 – Sub-header bytes

Sector Type	File number	Channel number	Submode bits (msb....lsb)	Coding Information	Used for
Empty sector Form 2, NRT	\$00	\$00	%00100000	\$00	Lead-in, Lead-out, MPEG Track Pause, padding of Play Item Segments to 150 sector boundary
Data sector Form 1, NRT	\$00	\$00	%y0001000	\$00	All sectors with valid data in a Data Track that are not MPEG sectors
MPEG sector Form 2, RT	\$01	\$01	%y11x001z	\$80	All sectors that contain an MPEG Program Stream

The bits indicated as **x**, **y**, and **z** are defined below; other bits shall be set as indicated above.

Table 6 – Submode bit definitions

Bit number	Indication	Type	Definition
0	z	EOR	Sectors containing the sequence_end_code of a Still Picture have the End of Record bit set to %1
4	x	Trigger	The Trigger bit is set to %1 in a sector where the playback device shall execute the Auto_pause function (see 9.3), or else set to %0
7	y	EOF	The End of File bit to be set to %1 in last sector of any file or Play Item, else set to %0

5.2.2 Form 1 SuperVCD sector ECC and EDC fields

The EDC and ECC fields are defined as for CD-ROM Mode 1, with the following exceptions.

- The EDC shall be calculated from the beginning of the Subheader field to the end of the 2 048 byte User Data field.
- Parity P of the ECC shall be calculated from the beginning of the Header field to the end of the EDC field as if the content of the Header field were all zero.
- Parity Q of the ECC shall be calculated from the beginning of the Header field to the end of the EDC field as if the content of the Header field were all zero.

5.2.3 Form 2 SuperVCD sector EDC field

The EDC field is defined as for CD-ROM Mode 1 with the following exception.

- The EDC shall be calculated from the beginning of the Subheader field to the end of the 2 324 byte User Data field.

5.3 SuperVCD DATA track format

This shall be the first track of the disc.

The DATA TRACK starts with a pre-gap of 150 Empty sectors.

Data files use Mode 2, Form 1 (2 048 byte sector) DATA sectors, and MPEG files use Mode 2, Form 2 (2 324 bytes) MPEG sectors.

The DATA TRACK contains ISO 9660 file management, SuperVCD Information files, Segment Play Item Area and, optionally, other program data files.

(mm:ss:ff)		
00:00:00	Pre-gap	150 sectors
00:02:00	User Area	–
00:02:16	Primary Volume Descriptor	ISO 9660
	–	–
00:04:00	SuperVCD Information files	Disc Information "INFO.SVD" (mandatory) Entry table "ENTRIES.SVD"(mandatory) List ID Offset table "LOT.SVD" (extension) Play Sequence Descriptor "PSD.SVD" (extension) Search table "SEARCH.DAT" Tracks table "TRACKS.SVD" (mandatory)
	Segment Play Item area	Segment Play Items (Still Picture, Motion Picture, Audio) in segments of 150 sectors
	Other Files	"EXT" directory "SCANDATA.DAT"

IEC 1016/2000

Figure 5 – Example of layout of a DATA TRACK

5.3.1 SuperVCD Information files

These files are located in the SuperVCD directory and are defined in 6.3.

They are encoded in successive sectors starting at Sector 00:04:00.

The "INFO.SVD" file is located at Sector 00:04:00 and the "ENTRIES.SVD" file is located at Sector 00:04:01.

The optional file "LOT.SVD" is located from 00:04:02 to 00:04:33.

The optional file "PSD.SVD" has a start location 00:04:34 and a variable length up to a maximum of 256 sectors.

5.3.2 Segment Play Item (SPI) area

This area in the DATA track contains Segment Play Items as described in 6.5.1.

A Segment Play Item (SPI) is a SuperVCD MPEG2 Program Stream stored in a Data Track, intended for interactive playback under control of the Play Sequence Descriptor.

Segment Play Items are not accessed directly by the normal track playing mechanism, but indirectly by interpretation of the Play Sequence Descriptor (PSD).

The SPI is stored into contiguous segments of 150 sectors in length and is addressed by a segment number. The length of the SPI Area shall be any integer number of segments ranging from 1 to a maximum of 1 980. The segments are numbered consecutively starting from No. 1, which is the first segment.

The start sector address of the SPI Area is indicated in the First Segment Address entry of "INFO.SVD".

Segment Play Items shall conform to Program Stream coding as described in the Program Stream format Section.

Segment Play Items may occupy one or more segments, and the data shall start at a segment boundary. The SPI data is padded with **Empty Sectors** to the end of a whole segment. An SPI is identified by its SPI number, which is equal to the number of its first segment. Only segment numbers that correspond to the first segments of Segment Play Items and are in the range 1..1980 are valid SPI numbers. The figure below gives an example of the Segment Play Items in the SPI Area.