INTERNATIONAL STANDARD

IEC 62107

First edition
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Super Video Compact Disc –

Disc-interchange system-specification

Super Vidéodisque Compact –
Système d'échange de disques – Spécifications

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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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International Standard IEC 62107 has been prepared by subcommittee 100B: Audio, video and multimedia information storage systems, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
100B/261/FDIS	100B/272/RVD

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 3.

Annexes A and B are for information only.

A bilingual version of this standard may be issued at a later date.

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- withdrawn;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.

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/IEC 13818-3:1998, *Information technology – Generic coding of moving pictures and associated audio information – Part 3: Audio*

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*

ANSI/EIA-608-94, *Recommended Practice for Line 21 Data Service*

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

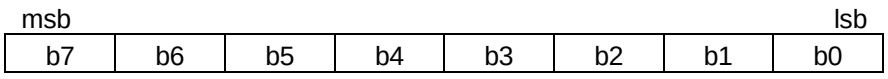
3.3 Conventions and symbols

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.



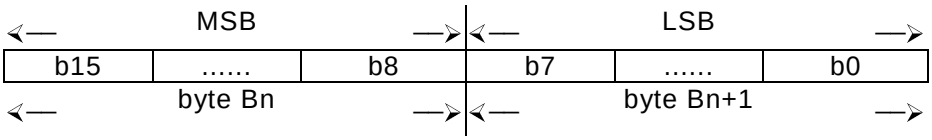
IEC 1012/2000

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.

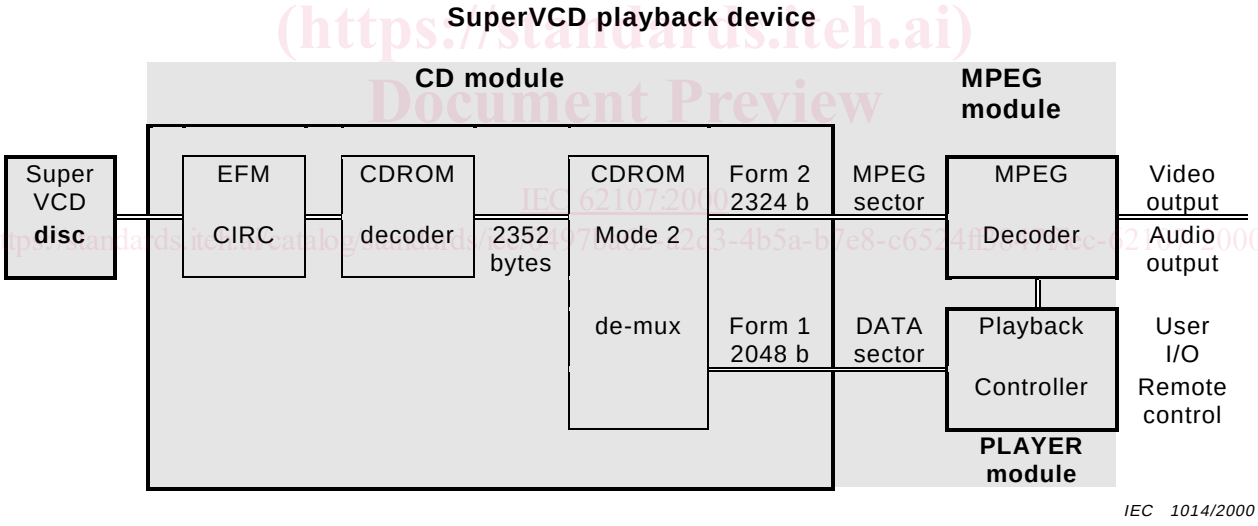


Figure 3 – SuperVCD system reference model

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.

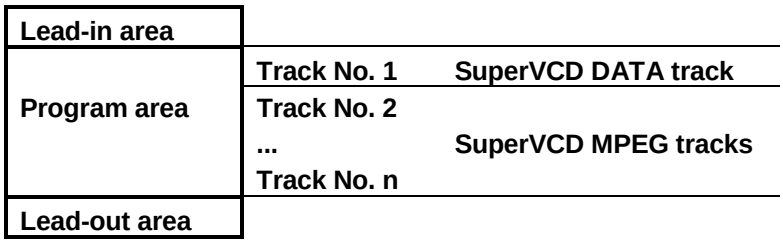


Figure 4 – SuperVCD disc layout

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.