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Electronic still-picture imaging — Removable memory —

Part 1:
Basic removable-memory module

Imagerie de prises de vue électroniques — Mémoire mobile —

Partie 1: Module de mémoire mobile de base

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 12234 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 12234-1 was prepared by Technical Committee ISO/TC 42, *Photography*.

ISO 12234 consists of the following parts, under the general title *Electronic still-picture imaging — Removable memory*:

— *Part 1: Basic removable-memory module*

— *Part 2: TIFF/EP image data format*

— *Part 3: Design rule for camera file system (DCF)*

Annexes A, B, C and D of this part of ISO 12234 are for information only.

Introduction

This part of ISO 12234 addresses removable-memory requirements for electronic still-picture cameras. Unlike a traditional photographic system, an electronic photography system divides the imaging chain into discrete components separately devoted to image acquisition, storage, transmission, processing and display. Since the components may be made by different manufacturers, there is a need to specify a standard format for data interchange among the various components of an electronic imaging system.

This part of ISO 12234 describes data interchange using a removable-storage media. The purpose of the removable-storage media is to store images digitally in a media that is compact, low in power and mechanically rugged. These removable-storage media will be used to transport the data to other components in the imaging chain. This part of ISO 12234 further specifies the required information content for a removable-memory data format. The information content includes both the image data and data items describing the image. Informative annexes B through D describe various conforming formats. The data features supported by each of these formats are also described in clause 6.

An implementation is said to be in compliance if, at a minimum, all mandatory elements are present. Recommended features are not required, but will substantially enhance interoperability, performance and/or robustness.

In developing this part of ISO 12234, a structured methodology was followed. A reference model describes the environment in which this part of ISO 12234 is used as well as its overall architecture. The architecture separates the software-only layers, termed the image data format, from the hardware technology-dependent layers, termed the media profile. An image data format is media independent and contains the image data, image related data and a means for structuring these data elements.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of patents from the following companies:

— Eastman Kodak Company

— Konica Corporarion

— Fuji Photo Film Company Ltd.

The holders of these patent rights have assured the ISO that they are willing to negotiate licenses under reasonable and non-discriminatory terms and conditions throughout the world. In this respect, the statement of the holder of this patent right is registered with the ISO. Information may be obtained from the companies listed. Other companies have also determined that, upon approval of this International Standard, they too will grant patent licenses in accordance with ISO Directives, Part 2. Information regarding these companies may also be obtained from the ISO Central Secretariat

The PCMCIA/JEIDA PC Card Standard, referenced in informative annex A, is claimed to contain intellectual property rights from the following companies:

— AMP Incorporated

— Honda Connectors

— Intel Corporation

— Japan Aviation Electronics Industry Ltd. (JAE)

— M-Systems

A "PCMCIA Reciprocal Grant of Immunity and Sublicense" for the intellectual property rights from the five companies afore-mentioned is available from:

Personal Computer Memory Card International Association (PCMCIA)
2635 N. First Street, San Jose, CA 95134 USA

under reasonable and non-discriminatory terms and conditions throughout the world.

PCMCIA has been informed that the following companies believe that implementation of this part of ISO 12233 could infringe their proprietary rights. For more information, contact these parties:

⎯ Berg Electronics

⎯ International Business Machines Corporation

The ISO takes no position concerning the evidence, validity and scope of any of the patent rights listed.

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Electronic still-picture imaging — Removable memory —

Part 1:
Basic removable-memory module

1   Scope

This part of ISO 12234 specifies a basic removable-memory reference model for storing data from digital electronic still-picture cameras that allows the data to be interchanged among various components of an electronic imaging system by means of a removable-storage media. The removable-storage media usable in digital electronic still-picture cameras is termed "Removable memory".

This part of ISO 12234 is applicable to monochrome and colour digital electronic still-picture cameras.

2   Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 12234. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 12234 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 ISO and IEC maintain registers of currently valid International Standards.

ISO 12232:1998, *Photography — Electronic still-picture cameras — Determination of ISO speed*

ISO 12233:2000, *Photography — Electronic still-picture cameras — Resolution measurements*

ISO 12234-2:—[1]), Electronic still-picture imaging — Removable memory — Part 2: TIFF/EP image data format

ISO 14524:1999, *Photography — Electronic still-picture cameras — Methods for measuring opto-electronic conversion functions (OECFs)*

3   Terms and definitions

For the purposes of this part of ISO 12234, the following terms and definitions apply.

3.1
file system
software structure which specifies how the data is logically organized on a given storage media

3.2
image data format
structure and content which specify image data and the organization of the image-related data in a device-independent manner

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1)   To be published.

**3.3
image storage application profile
ISAP**
media profile plus image data format

NOTE   The ISAP specifies all the information necessary to completely implement the removable memory.

**3.4
media profile**
portion of the memory module specification which is specific to a given memory technology, including the form factor, interconnection and access protocol

**3.5
memory card**
specific type of memory module with a physical form factor no larger than that of a credit card in outline i.e. approximately 85 mm × 55 mm

**3.6
memory module**
physical implementation of the removable memory, containing the image data format combined with a specified physical form factor, interconnect definition and access protocol

**3.7
removable memory**
storage in a user-removable form factor which is transportable and intended for the digital storage of image data in electronic still-picture cameras

NOTE   The memory media may be read/write, write once, etc., but has to be non-volatile when removed from the camera, i.e. it has to retain the data.

**3.8
sound compression**
process of altering the sound-data coding in order to reduce the size of a sound file in the electronic still-picture camera

NOTE   Compare with the definition of sound recording.

**3.9
sound recording**
recording of the sound data relative to an image acquired by the electronic still-picture camera

NOTE 1   The sound recording may be made before, during or after the time of the image acquisition.

NOTE 2   A sound recording attached to an electronic still-picture is considered to be an annotation of the image, as distinct from a sound recording which is attached to and synchronized with motion pictures or video pictures.

4   Reference model

4.1   Overview

Table 1 illustrates the reference model for this work item. The reference model is layered for flexibility and the implementation of any one layer can be changed without affecting the implementation of any other layer. The reference model describes the model of usage, the boundaries of the work item and the types of elements included in each layer.

4.2　Image storage application profiles (ISAP)

The image storage application profile completely specifies all the information necessary to implement a particular type of removable storage. The image storage application profile consists of two parts: the image data format, which describes the structure and content of the image data, plus a particular media profile, which describes the media containing the image data.

Table 1 — Reference model for removable storage

Layer	Intent	Attributes/Examples	Implementation		
Application	Defines content-image data and parameters	Image data	Image and image-related data		Image data format
Presentation	Defines structure of image data and encoding mechanism	Tags or tuples	Tuple-based format	Tag-based format	
Session	Defines data organization on media	Filing system for image storage/retrieval	MP_0	MP_1	Media profile
Transport	Defines communication of data across a channel	Data transmission protocol			
Network	Describes conformance layer	Compatibility and interoperability with other systems			
Data link	a)　Assures reliable data read/write b)　Stores media-specific recording information	a)　Card information structure b)　Error correction methods c)　Control for insert/removal			
Physical	Assures basic compatibility in physical form factor and electrical signals	a)　Form factor, pin alignment, size b)　Electrical interface specification c)　Protocol/command sets			

4.3　Image data format

The image data format consists of the application and presentation layers. The application layer defines the content of the image data. The presentation layer defines the encoding of the image data. This part of ISO 12234 specifies image data formats that are consistent across implementations and independent of the media used for storage.

The content defined in the application layer includes the image and image-related information, such as the date the image was captured. The encoding defined in the presentation layer includes the structures which define the image and the image-related information as digital values. For example, the encoding describes whether the image is stored as strips or tiles and whether the image-related data is stored as numbers or characters. The detailed elements in three allowed image data formats are described in clause 6.

The image data formats described in this part of ISO 12234 provide an explicit binding between the content in the application layer and the encoding method given in the presentation layer.

4.4　Media profiles

It is expected that a multitude of removable memory types will be available for use in electronic still-photography devices. The actual storage technology may include solid state, magnetic, optical, etc. Each of these various removable memory types shall be described by an associated media profile.

The media profile definition includes the information required for the session, transport, network, data link and physical layers. The session layer defines the data organization on the media. The transport layer defines the protocol for how this data is transported between the camera and the removable memory. The network layer describes the conformance requirements needed to maintain compatibility and interoperability with other systems. The data link layer describes the mechanisms for assuring reliable communications and the specifications for reading, writing, erasing, removing and inserting specific types of media. The physical layer assures the basic compatibility of the physical and electrical interface. It defines the physical form factor, connector specifications and electrical interface specifications.

Specific descriptions of media profiles are given as annexes to this part of ISO 12234. A specific media profile is described in informative annex A for the case of the PC card described jointly by PCMCIA and JEIDA. It is anticipated that additional media profiles will be included as additional annexes in revisions of this part of ISO 12234.

5 Requirements for image storage application profiles

5.1 General

This section defines the criteria which the image data formats and media profiles should meet. These criteria were used in developing this part of ISO 12234 and will be used in developing future extensions of it.

5.2 Interoperability

This part of ISO 12234 fosters interoperability between systems manufactured by different vendors. Here, interoperability is defined as permitting:

a)   the storage of image data on a removable medium;

b)   the removal of that media from an electronic still camera;

c)   the insertion of that media into a second system; and

d)   the transfer of the image data to the second device.

5.3 Flexibility

This part of ISO 12234 permits flexibility across applications requiring different levels of feature sets. Some image formats allow default values for specific data elements in order to simplify the implementation.

5.4 Extensibility

This part of ISO 12234 allows for various extensions. Some image data formats include the capability for private extensions to meet special needs. In future revisions of this part of ISO 12234, new features may be added to the present image data formats. In addition, new media profiles or image data formats may be included.

5.5 Ease of implementation

This part of ISO 12234 permits easy and unambiguous implementation. In particular, many electronic still-picture cameras have limited processing power and even many of the hosts reading the data may have limited processing power. Hence, the standard format requires minimal encoding and decoding of the image data.

5.6 Platform independence

Because it will be necessary to exchange data between different hardware platforms running under different operating systems, this part of ISO 12234 is platform independent. In particular, the data and data structures presented to the application are platform independent.

5.7 Multiple physical media types

This part of ISO 12234 supports multiple physical media types. Media based on various different storage technologies, e.g. solid state EEPROM and rotating magnetic disc storage, are supported for use as removable storage media in electronic still-picture cameras.

5.8 Elimination of redundancy

Information should appear once and only once within the image data format. This prevents conflicts if the data is entered in two different places and happens to be inconsistent. If a type of information does appear in multiple places, the writer of the data shall make the information consistent, e.g., assign equivalent values. This applies both to explicitly entered data and to data implicitly derived from other fields.

6 Image data format specification

The image data format corresponds to the application and presentation layers of the reference model and is independent of the storage media used. The image data formats described in annexes B, C and D are intended to be used as an image interchange format for photographic images within the scope of the reference model. It is recognized that images from sources other than electronic still-picture cameras may use different image data formats.

6.1 Image data application layer

This defines what image data may be present in the information to be exchanged between systems. The data defined here determines what information is available to a host system about the image, the image conditions, the camera system which took the image and any annotations to help describe the image for the user. Table 2 represents a list of image data features that should be included in an image data format.

6.2 Image data presentation layer

This defines what data may be present in the information to be exchanged between systems. The data defined here describes the organization of data in the format and is media independent.

6.3 Image data formats

It is recognized that different applications require different levels of support. Some applications will be highly standardized with many of the data elements assuming default values, while other applications will require more flexibility. To accommodate different applications, this part of ISO 12234 allows multiple image data formats. Three image data formats, known as SISRIF, Exif and TIFF/EP, are described in informative annexes B, C and D and are listed in Table 2. TIFF/EP is further specified in ISO 12234-2. The image data formats differ in their required elements and degree of flexibility.

NOTE   The use of the SISRIF image data format in new electronic still-picture imaging systems is not encouraged.

Table 2 summarizes the image data features supported by the three (allowed) image data formats. For each image data format, the support for the feature can be mandatory, recommended, optional or not used. Further information concerning implementation of each format is contained in the informative annexes.

Different requirements are imposed on writing, reading and editing devices by the image data format. The writing device should support all mandatory features, but need not support features listed as recommended or optional. The reading device should support all mandatory features as well as optional or recommended features, at least to the extent of allowing the image to be interpreted without corrupting the data. Therefore, a reader may ignore recommended or optional features as long as it is done so in a safe manner. If an editor ignores some features, it is required that the ignored features be passed along unchanged as part of the data file, rather than truncating or eliminating the unknown features. This permits the unknown features to be interpreted by a subsequent reader.

Table 2 — Image data feature descriptions and requirements with field names and codes

	Feature name	Description	SISRIF Annex B	Exif Version 2.x Annex C	TIFF/EP Annex D
		Camera information			
1	Make	Manufacturer of camera that captured the image (ASCII)	NU	R Tag code = 271	M Tag code = 271
2	Model	Model number of the camera that captured the image (ASCII)	NU	R 272	M 272
3	Software version	Version of software or firmware within camera (ASCII)	NU	O 305, Software	M 305, Software
		Camera/lens characterization			
4	ISO speed	ISO speed of the camera, as defined in ISO 12232:1998	NU	O 34855, ISO speed ratings	O 34855, ISO speed ratings
5	Focal length	Focal length of the lens	NU	O 37386, Focal length	O 37386, Focal length
6	Interlace scan	Field number of multifield images	M 90h, Scanning system	NU	O 34857, Interlace
7	Spatial frequency response	Electro-optical spatial frequency response of the camera, as defined in ISO 12233:2000	NU	O 41484	O 37388
8	Noise	The r.m.s. noise levels of each camera channel at one or more signal levels	NU	NU	O 37389
9	Opto-electronic conversion function (OECF)	The relationship between the focal plane or input scene luminances and the digital output levels, as defined in ISO 14524:1999	NU	O 34856	O 34856
10	Focal plane X Resolution	Number of pixels in the focal plane in the X-direction, per focal plane resolution unit	NU	O 41486	R 37390
11	Focal plane Y Resolution	Number of pixels in the focal plane in the Y-direction, per focal plane resolution unit	NU	O 41487	R 37391
12	Focal plane Resolution unit	Measurement unit for focal plane resolution data	NU	O 41488	R 37392
13	Max aperture value	Minimum f-number that the camera can attain, in APEX units	NU	O 37381	O 37381
14	CFA pattern	Colour filter array pattern on sensor	NU	O 41730	O 33422

Table 2 (*continued*)

Feature name		Description	SISRIF Annex B	Exif Version 2.x Annex C	TIFF/EP Annex D
		Image annotation			
15	Date time original	Date and time of image capture	O 81h, Recording date and time	O 36867, Date time original	R 36867, Date time original
16	Date time last modified	Date and time of last modification to image file	NU	R 306, Date time	M 306, Date time
17	Image description	Description of image e.g. title or subject (ASCII)	NU	R 270	M 270
18	Image number	Index number assigned to image (ASCII)	NU	NU	O 37393
19	Artist	Identifier for creator of image (ASCII)	NU	O 315	O 315
20	Copyright	Image copyright holder (ASCII)	NU	O 33432	M 33432
21	Security classification	Identifier specifying the security classification given to the image	NU	NU	O 37394
22	Image history	Text describing the history of modifications to the image (ASCII)	NU	NU	O 37395
		Image Information			
23	Thumbnail	Differentiate image (full resolution) and thumbnail image (reduced resolution) data	NU	O Image in IFD0, thumbnail in IFD1 only	M 254, New sub file type
24	Image width	Number of pixel columns	M 90h, Number of pels /Horizontal pels	M(*1) 256	M 256
25	Image length	Number of pixel rows	M 90h, Number of pels /Vertical pels	M(*1) 257	M 257
26	Aspect ratio (pixel)	Ratio of X Resolution to Y Resolution.	M 90h, Pixel aspect ratio	M(*2)	M(*2)
27	Aspect ratio (image)	Ratio of X Resolution/Image width to Y Resolution/Image length	M 90h, Pixel aspect ratio	M(*3)	M(*3)
28	X Resolution	Number of pixels per output distance unit in the image width direction	NU	M 282	M 282
29	Y Resolution	Number of pixels per output distance unit in the image length direction	NU	M 283	M 283
30	Resolution unit	Physical units for output distance data	NU	M 296	M 296
31	Orientation	Orientation of the captured image relative to its rows and columns	NU	R 274	O 274

Table 2 (*continued*)

	Feature name	Description	SISRIF Annex B	Exif Version 2.x Annex C	TIFF/EP Annex D
32	Samples per pixel	Number of components (samples) stored for each pixel	M 90h, Image mode	M(*1) [a] 277	M 277
33	Bits per sample	Number of bits used to store each sample or component	M 90h, Bits per pel	M(*1) 258	M 258
34	Actual bits per sample	Number of valid bits within the bits per sample	NU	NU	O 37396
35	Compressed bits per pixel	Setting of bit rate at the time of compression	M 90h, Compression ratio	O(*2) 37122	O 37122
36	Reference black white (polarity)	Minimum and maximum code values used to specifiy black and white in the image for each component	M 90h, Signal level	O 532 Reference black white	R 34675 (ICP, TRC tags)
37	Compression	Type of image compression method (none, JPEG, DPCM, etc.) applied to the image data	M 90h, Coding method	M(*1) 259	M 259
38	JPEG Tables (DQT, DHT)	Tables to aid in decoding compressed image data; e.g. Huffman tables	M (VIDEO1) 80h, Option code	M(*1) JPEG marker	O 347, JPEG tables or JPEG marker
39	Planar configuration	Storage pattern of the colour components in the image data (interleaving pattern)	M 90h, Uncompressed data recording mode	M(*1) 284	M 284
40	Photometric interpretation	Image colour space: RGB, YCbCr, etc.	M 90h, Image mode	M(*1) 262	M 262
41	Components configuration	Order of the image data colour components for each pixel within an image	M 90h, Image mode/component ID	M(*2) [b] 37121	Included in 262
42	YCbCr Subsampling	Subsampling factors for the chrominance components	M 90h, Number of pels	M(*1) 530	M(*5) [e] 530
43	YCbCr Positioning	Position of subsampled chrominance components relative to luminance samples	NU	M (*5) 531	M(*5) 531

Table 2 (*continued*)

Feature name		Description	SISRIF Annex B	Exif Version 2.x Annex C	TIFF/EP Annex D
		Camera settings			
44	Light source	Actual lighting present during image capture (daylight, tungsten, fluorescent, flash, etc.)	NU	O 37384, Light source	O 37384, Light source
45	F number (aperture)	Focal length of lens/diameter of lens opening	NU	O 33437, F number	O 33437, F number
46	Aperture value (APEX)	Lens aperture value in APEX units	NU	O 37378, Aperture value	O 37378, Aperture value
47	Exposure time	Time in seconds for exposure	NU	O 33434, Exposure time	O 33434, Exposure time
48	Time value	The exposure time or shutter speed value in APEX units	NU	O 37377, Shutter speed value	O 37377, Shutter speed value
49	Exposure bias	Exposure bias relative to a normal exposure in APEX units	NU	O 37380, Exposure bias value	O 37380, Exposure bias value
50	Metering mode	Method used for exposure metering	NU	O 37383, Metering mode	O 37383, Metering mode
51	Exposure program	Type of exposure program used	NU	O 34850, Exposure program	O 34850, Exposure program
52	Brightness value	Measured scene brightness in APEX units	NU	O 37379, Brightness value	O 37379, Brightness value
53	Subject distance	Distance of camera from the subject within the captured image	NU	O 37382, Subject distance	O 37382, Subject distance
54	Flash	State of flash during image capture: on, off, fill or backlight	NU	O 37385, Flash on/off	O 37385, Flash

Table 2 (*continued*)

Feature name		Description	SISRIF Annex B	Exif Version 2.x Annex C	TIFF/EP Annex D
		Colour management information			
55	Gamma (up to 3)	Gamma exponents (one for each colour component) used to transform image data from linear space to gamma-corrected space (values)	M 90h, Gamma characteristic	NU	NU
56	Primary chromaticities	RGB reference primaries (values)	NU	R 319	R 34675, Colourant tags
57	Whitepoint	White reference chromaticity	NU	R 318	R 34675, Media white point tag
58	Transfer function	RGB look-up tables to scene reflectance from output code values	O 92h Gamma tuple	R 301	R 34675, TRC tags
59	Matrix	An (nxn) matrix used in processing the colour image data	NU	NU	O 34675, Colourant tags
60	YCbCr Coefficients	Coefficients of colour space conversion from RGB to YCbCr	NU	O 529	M(*5) 529
61	Colour space info	Colour device profile	NU	M 40961 Colour space	R 34675, Inter-colour profile
		Profile information			
62	Format used	Profile used (0,1,2)	M 80h, File format name and version	M TIFF or JIF header	M TIFF header
63	Version and standard identifier	Current version of profile/format used	M 80h, File format name and version	M 36864 Exif version	M 37398 TIFF/EP standard ID
64	Byte order	Meaning of first byte accessed, i.e. whether MSB or LSB	M 80h, Order of data storage	M TIFF header	M TIFF header
65	Control parameters	Control values used in relating files to one another	O (relation)	NU	NU
66	Vendor unique	Information unique to a particular vendor	O 82h, Options tuple	O 37510 Maker note	O TIFF private tags

Table 2 (*continued*)

Feature name		Description	SISRIF Annex B	Exif Version 2.x Annex C	TIFF/EP Annex D
		Data location information			
67	Strip/Tile offsets	Location of image data segments	M 80h, Data area start address	M(*3) c 273, StripOffsets	M(*4) d 273, StripOffsets or 324, TileOffsets
68	Strip/Tile length	Number of rows in each image data segment	NU	M(*3) c 278, RowsPerStrip	M(*4) d 278, RowsPerStrip or 323, TileLength
69	Strip/Tile byte counts	Number of bytes in each image data segment (strip or tile)	NU	M(*3) c 279, StripByteCounts	M(*4) d 279, StripByteCounts or 325, TileByteCounts
70	Tile width	Number of columns in each image data segment (tile)	NU	NU	M(*2) b 323, TileLength

The status for a particular information field for the image data formats described in annexes B, C and D may fall into one of these categories:

Mandatory (M): These features shall be present.

Recommended (R): These features are not required, but their implementation is strongly advised.

Optional (O): These features may be present but are not required. If not present there are no defaults to be assumed. Readers are required to respond gracefully to optional information fields. Writers are not required to implement optional features.

Not Used (NU): These features are not applicable and are not present in the given profile.

NOTE 1   ICC is the International Color Consortium profile, which specifies colour space information.

NOTE 2   For item 28, the Aspect Ratio (Pixel) = XResolution/YResolution.

NOTE 3   For item 29, the Aspect Ratio (Image) = (ImageWidth/XResolution)/(ImageLength/YResolution).

a   M(*1): Tag not used with JPEG compressed image, because same information is contained in the JPEG marker.

b   M(*2): Tag used only for JPEG compressed image.

c   M(*3): Tag not used with JPEG compressed image, because information is not needed.

d   M(*4): All M(*4) tags shall refer either to strips, or to tiles, but not both.

e   M(*5): All M(*5) tags shall be present for YCC images, but not for RGB images.

6.4   Sound data application layer

This defines what sound data may be present in the information to be exchanged between systems. The data defined here determines what information is available to a host system about the sound, the sound conditions and information used to interpret the sound.

Table 3 is a list of sound data features to be included in a sound data format. The data may be supplied implicitly by setting some of the fields to default values.

Sound data recording is defined within the SISRIF and Exif format, but not in TIFF/EP. For TIFF/EP, sound may be recorded in a separate file that is not described in this part of ISO 12234.

Table 3 — Sound data format

	Multimedia information	Description	SISRIF Annex B	Exif Annex C
1	Sound duration	Length of time in seconds	O	NU
2	Sample frequency	A/D conversion frequency	O	NU*
3	Quantizing bits	Number of bits per sample	O	NU*
4	Coding method	Method to code data (PCM, ADPCM, etc.)	O*	NU*
5	Sound data	Binary data representing a digitized sound recording	O(EL)	NU**
6	Number of channels	Number of audio channels	O(EL)	NU*
Information fields which are required or optional may be categorized by allowable values as follows:				
EL	Enumerated list of valid values for this field.			
NU	Not used.			
O	Optional.			
O*	ITU-T G726 (SOUND 1).			
NU*	Same information is contained in the WAVE format.			
NU**	PCM, ITU-T G.711,IMA-ADPCM.			

Annex A
(informative)

Media profile — PC card

This annex gives a media profile based on PC cards. This media profile is based on activities undertaken by PCMCIA and JEIDA. The reader is referred to the following documents for a description and implementation of this media profile.

— JEIDA "IC Memory Card Specification", Version 4.1;

— JEIDA "DSC-68 (Digital Still Camera 68-pin) File Standard", Version 1.0;

— PCMCIA "Socket Services";

— PCMCIA "Card Services".