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Abstract

This document is a reference of the format of the Nikon raw photography file.

THE NEF FORMAT

Format of the Nikon RAW implémentation

# Introduction

The .NEF format is Nikon proprietary file format [1]. It’s based on the TIFF specification. This document is based on reverse engineering of the D7200 NEF files.

# the baseline

## The header

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Offset** | **Length** | **Type** | **Description** | **Value** |
| 0x0000 | 1 | short | byte order | Usually 0x4D4D / "MM", except for E5700 ( 0x4949 / "II" ) |
| 0x0002 | 1 | short | TIFF magic value | 0x2a |
| 0x0004 | 1 | long | TIFF offset | 8 |
| 0x0008 |  | IFD | first IFD |  |

## The IFD 0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tag value** | **Name** | **Type** | **Length** | **Description** |
| 0x00fe / 254 | SubfileType | 4 | 1 | 1=Reduced-resolution image |
| 0x0100 / 256 | imageWidth | 4 | 1 | 160 |
| 0x0101 / 257 | ImageHeight | 4 | 1 | 120 |
| 0x0102 / 258 | BitsPerSample | 3 | 3 | [ 8, 8, 8 ] |
| 0x0103 / 259 | Compression | 3 | 1 | 1=uncompressed |
| ... | ... |  |  | ... |
| 0x014a / 330 | **SubIFD tag** | 4 | 2 | [ JpegImageOffset, RawOffset ] : offsets to the 2 child IFDs |
| 0x0214 / 34665 | ReferenceBlackWhite | 5=rational | 6 |  |
| 0x8769 / 34665 | **EXIF** | 4 | 1 | offset to the EXIF IFD. the EXIF IFD contains a pointer to the **Makernote** IFD |
| 0x9286 / 37510 | UserComment | 7 | variable |  |
| ... | ... |  |  | ... |

### SubIFD 0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tag value** | **Name** | **Type** | **Length** | **Description** |
| 0x00fe / 254 | SubfileType | 4 | 1 | 1=Reduced-resolution image |
| 0x0103 / 259 | Compression | 3 | 1 | 6=old/jpeg |
| 0x011a / 282 | XResolution | 5=rational | 1 | 300 |
| 0x011b / 283 | YResolution | 5 | 1 | 300 |
| 0x0128 / 296 | ResolutionUnit | 3 | 1 | 2=pixel\_per\_inch |
| 0x0201 / 513 | JpgFromRawStart | 4 | 1 | offset to image data |
| 0x0202 / 514 | JpgFromRawLength | 4 | 1 | image data length |
| 0x0213 / 531 | YCbCrPositioning | 3 | 1 | 2=co\_sited |

### SubIFD 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tag value** | **Name** | **Type** | **Length** | **Description** |
| 0x00fe / 254 | SubfileType | 4 | 1 | 0=Full-resolution Image |
| 0x0100 / 256 | ImageWidth | 4 | 1 | 3904 for the D60 |
| 0x0101 / 257 | ImageHeight | 4 | 1 | 2616 for the D60 |
| 0x0102 / 258 | BitsPerSample | 1 | 1 | 12bits for the D60 |
| 0x0103 / 259 | Compression | 3 | 1 | 1=uncompressed,  34713=Nikon NEF Compressed |
| 0x0106 / 262 | PhotometricInterpretation | 3 | 1 | 32803=Color Filter Array |
| 0x0111 / 273 | JpgFromRawStart | 4 | 1 | offset to the image data |
| 0x0115 / 277 | SamplesPerPixel | 3 | 1 | 1 |
| 0x0116 / 278 | RowsPerStrip | 3 | 1 | 2616 for the D60 |
| 0x0117 / 279 | JpgFromRawLength | 4 | 1 | image data lenght |
| 0x011a / 282 | XResolution | 5=rational | 1 | 300 |
| 0x011b / 283 | YResolution | 5 | 1 | 300 |
| 0x011c / 284 | PlanarConfiguration | 3 | 1 | 1 = Chunky |
| 0x0128 / 296 | ResolutionUnit | 3 | 1 | 2=pixel\_per\_inch |
| 0x828d / 33421 | CFARepeatPatternDim | 3 | 2 | [2, 2] = 2x2 |
| 0x828e / 33422 | CFAPattern2 | 1 | 4 | [1, 2, 0, 1] = [G, B, R, G] for the D60 |
| 0x9217 / 37399 | SensingMethod | 3 | 1 | 2 = One-chip color area (D60) |

## Data Type

|  |  |
| --- | --- |
| 1 | Byte (u int 8) |
| 2 | Byte (Char) |
| 3 | Unsigned int 16 |
| 4 | Unsigned int 32 |
| 5 | Rational |
| 6 | Signed byte |
| 7 | Byte |
| 8 | Int 16 |
| 9 | Int 32 |
| 10 | Signed rational |
| 11 | 4 bytes |
| 12 | 8 bytes |

## XMPP tag

# The reference image [2]

## First IFD

### Header

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x0000 | byte order | 4949 | Every byte should be flipped |
| 0x0002 | TIFF magic value | 00 2A |  |
| 0x0004 | TIFF offset | 00 00 00 08 |  |
| 0x0008 | first IFD | Start of the IFD |  |

### IFD 0

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x008 | Tag number | 00 1C | Number of tag |
| Tag1 | | | |
| 0x0010 | Tag name | 00 FE | SubfileType tag |
| 0x0012 | Tag type | 00 04 | Int 32 u |
| 0x0014 | Tag count | 00 00 00 01 | 1 int 32 |
| 0x0018 | Offset | 00 00 00 01 | Same as data (compression) |
|  | Data | 00 00 00 01 | 1=Reduced-resolution image |
| Tag 2 | | | |
| 0x0022 | Tag name | 01 00 | imageWidth |
| 0x0024 | Tag type | 00 04 | Int 32 u |
| 0x0026 | Tag count | 00 00 00 01 |  |
| 0x0030 | Offset | 00 00 00 A0 | Data |
|  | Data | 00 00 00 A0 | 160 |
| Tag 3 | | | |
| 0x0034 | Tag name | 01 01 | ImageHeight |
| 0x0036 | Tag type | 00 04 | Int 32 u |
| 0x0038 | Tag count | 00 00 00 01 |  |
| 0x0042 | Offset | 00 00 00 78 | Data |
|  | Data | 00 00 00 78 | 120 |
| Tag 4 | | | |
| 0x0046 | Tag name | 01 02 | BitsPerSample |
| 0x0048 | Tag type | 00 03 | U int 16 |
| 0x0050 | Tag count | 00 00 00 03 | Table of 3 int 16 |
| 0x0054 | Offset | 00 00 01 60 | 352 |
|  | Data | See 0x0352 |  |
| Tag 5 | | | |
| 0x0058 | Tag name | 01 03 | Compression |
| 0x0060 | Tag type | 00 03 | U int 16 |
| 0x0062 | Tag count | 00 00 00 01 |  |
| 0x0066 | Offset | 00 00 00 01 |  |
|  | Data | 00 00 00 01 | 1=uncompressed |
| Tag 6 | | | |
| 0x0070 | Tag name | 01 06 | PhotometricInterpretation |
| 0x0072 | Tag type | 00 03 | U int 16 |
| 0x0074 | Tag count | 00 00 00 01 |  |
| 0x0078 | Offset | 00 00 00 02 |  |
|  | Data | 00 00 00 02 | RGB |
| Tag 7 | | | |
| 0x0082 | Tag name | 01 0F | Maker |
| 0x0084 | Tag type | 00 02 | Byte |
| 0x0086 | Tag count | 00 00 00 12 | 18 bytes (string) |
| 0x0090 | Offset | 00 00 01 68 | 360 |
|  | Data | See 0x0360 |  |
| Tag 8 | | | |
| 0x0094 | Tag name | 01 10 | Model |
| 0x0096 | Tag type | 00 02 | Byte |
| 0x0098 | Tag count | 00 00 00 0C | 12 bytes (string) |
| 0x0102 | Offset | 00 00 01 7C | 380 |
|  | Data | See 0x0380 |  |
| Tag 9 | | | |
| 0x0106 | Tag name | 01 11 | StripOffsets |
| 0x0108 | Tag type | 00 04 |  |
| 0x0110 | Tag count | 00 00 00 01 |  |
| 0x0114 | Offset | 00 02 80 00 | 163840 |
|  | Data |  | Not used |
| Tag 10 | | | |
| 0x0118 | Tag name | 01 12 | Orientation |
| 0x0120 | Tag type | 00 03 | U int 16 |
| 0x0122 | Tag count | 00 00 00 01 | 1 |
| 0x0126 | Offset | 00 00 00 01 |  |
|  | Data | 00 00 00 01 | 1= Horizontal ( normal) |
| Tag 11 | | | |
| 0x0130 | Tag name | 01 15 | SamplePerPixels |
| 0x0132 | Tag type | 00 03 | U int 16 |
| 0x0134 | Tag count | 00 00 00 01 |  |
| 0x0138 | Offset | 00 00 00 03 | Data |
|  | Data | 00 00 00 03 | 3 |
| Tag 12 | | | |
| 0x0142 | Tag name | 01 16 | RowPerStrip |
| 0x0144 | Tag type | 00 04 | U int 32 |
| 0x0146 | Tag count | 00 00 00 01 |  |
| 0x0150 | Offset | 00 00 00 78 | Data |
|  | Data | 00 00 00 78 | 120 |
| Tag 13 | | | |
| 0x0154 | Tag name | 01 17 | StripBytesCount |
| 0x0156 | Tag type | 00 04 | U int 32 |
| 0x0158 | Tag count | 00 00 00 01 |  |
| 0x0162 | Offset | 00 00 E1 00 | Data |
|  | Data | 00 00 E1 00 | 57600 (Size of small preview) |
| Tag 14 | | | |
| 0x0166 | Tag name | 01 1A | XResolution |
| 0x0168 | Tag type | 00 05 | Rational (2 u int32 ) |
| 0x0170 | Tag count | 00 00 00 01 |  |
| 0x0174 | Offset | 00 00 01 88 | 392 |
|  | Data | See 0x0392 |  |
| Tag 15 | | | |
| 0x0178 | Tag name | 01 1B | YResolution |
| 0x0180 | Tag type | 00 05 | Rational (2 u int 32) |
| 0x0182 | Tag count | 00 00 00 01 |  |
| 0x0186 | Offset | 00 00 01 90 | 400 |
|  | Data | See 0x0400 |  |
| Tag 16 | | | |
| 0x0190 | Tag name | 01 1C | PlanarConfiguration |
| 0x0192 | Tag type | 00 03 | U int 16 |
| 0x0194 | Tag count | 00 00 00 01 |  |
| 0x0198 | Offset | 00 00 00 01 | Data |
|  | Data | 00 00 00 01 | 1=Chunky |
| Tag 17 | | | |
| 0x0202 | Tag name | 01 28 | ResolutionUnit |
| 0x0204 | Tag type | 00 03 | U int 16 |
| 0x0206 | Tag count | 00 00 00 01 |  |
| 0x0210 | Offset | 00 00 00 02 | Data |
|  | Data | 00 00 00 02 | 2=Inches |
| Tag 18 | | | |
| 0x0214 | Tag name | 01 31 | Software |
| 0x0216 | Tag type | 00 02 | Byte |
| 0x0218 | Tag count | 00 00 00 0A | 10 bytes (string) |
| 0x0222 | Offset | 00 00 01 98 | 408 |
|  | Data | See 0x0408 |  |
| Tag 19 | | | |
| 0x0226 | Tag name | 01 32 | ModifiyDate |
| 0x0228 | Tag type | 00 02 | Byte |
| 0x0230 | Tag count | 00 00 00 14 | 20 bytes (string) |
| 0x0234 | Offset | 00 00 01 A4 | 420 |
|  | Data | See 0x0420 |  |
| Tag 20 | | | |
| 0x0238 | Tag name | 01 3B | Artist |
| 0x0240 | Tag type | 00 02 | Byte |
| 0x0242 | Tag count | 00 00 00 25 | 37 bytes (string) |
| 0x0246 | Offset | 00 00 01 B8 | 440 |
|  | Data | See 0x0440 |  |
| Tag 21 | | | |
| 0x0250 | Tag name | 01 4A | SubIFDTag |
| 0x0252 | Tag type | 00 04 | U int 32 |
| 0x0254 | Tag count | 00 00 00 03 | Table of 3 uint32 |
| 0x0258 | Offset | 00 00 01 E0 | 480 |
|  | Data | See 0x0480 |  |
| Tag 22 | | | |
| 0x0262 | Tag name | 02 14 | ReferenceBlackWhite |
| 0x0264 | Tag type | 00 05 | Rational (2 u int 32) |
| 0x0266 | Tag count | 00 00 00 06 | Table of 6 rationals |
| 0x0270 | Offset | 00 00 01 EC | 492 |
|  | Data | See 0x0492 |  |
| Tag 23 | | | |
| 0x0274 | Tag name | 02 BC | ApplicationNotes (XMPP tags) |
| 0x0276 | Tag type | 00 01 | Byte (u int 8) |
| 0x0278 | Tag count | 00 00 08 00 | 2048 |
| 0x0282 | Offset | 00 00 02 1C | 540 |
|  | Data | See 0x0540 |  |
| Tag 24 | | | |
| 0x0286 | Tag name | 82 98 | Copyright |
| 0x0288 | Tag type | 00 02 | Byte |
| 0x0290 | Tag count | 00 00 00 37 | 55 bytes (string) |
| 0x0294 | Offset | 00 00 0A 1C | 2588 |
|  | Data | See 0x2588 |  |
| Tag 25 | | | |
| 0x0298 | Tag name | 87 69 | Exif |
| 0x0300 | Tag type | 00 04 | U int 32 |
| 0x0302 | Tag count | 00 00 00 01 |  |
| 0x0306 | Offset | 00 00 0A 68 | Data |
|  | Data | 00 00 0A 68 | 2664 |
| Tag 26 | | | |
| 0x0310 | Tag name | 88 25 | GPSInfo |
| 0x0312 | Tag type | 00 04 | U int 32 |
| 0x0314 | Tag count | 00 00 00 01 |  |
| 0x0318 | Offset | 00 02 06 00 | Data |
|  | Data | 00 02 06 00 | 132 608 |
| Tag 27 | | | |
| 0x0322 | Tag name | 90 03 | DateTimeOriginal |
| 0x0324 | Tag type | 00 02 | Byte |
| 0x0326 | Tag count | 00 00 00 14 | 20 bytes (string) |
| 0x0330 | Offset | 00 00 0A 54 | 2644 |
|  | Data | See 0x2644 |  |
| Tag 28 | | | |
| 0x0334 | Tag name | 92 16 | TIFF-EPStandardID |
| 0x0336 | Tag type | 00 01 | Byte |
| 0x0338 | Tag count | 00 00 00 04 | Table of 4 bytes |
| 0x0342 | Offset | 00 00 00 01 | 1 |
|  | Data | See 0x0001 |  |
|  |  |  |  |

### Tag data

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x0346 | Padding | 00 00 00 00 00 00 |  |
| 0x0352 | BitsPerSample | 00 08  00 08  00 08 | 8,  8,  8 |
| 0x0360 | Maker | 4E 49 4B 4F  4E 20 43 4F  52 50 4F 52  41 54 49 4F  4E 00 | NIKON CORPORATION |
| 0x0378 | ? |  |  |
| 0x0380 | Model | 4E 49 4B 4F  4E 20 44 37  31 30 30 00 | NIKON D7100 |
| 0x0392 | XResolution | 00 00 01 2C  00 00 00 01 |  |
| 0x0400 | YResolution | 00 00 01 2C  00 00 00 01 |  |
| 0x0408 | Software | 56 65 72 2E  31 2E 30 31  20 00 | Ver.1.01 |
| 0x0418 | Padding | 00 00 |  |
| 0x0420 | ModifiyDate | 32 30 31 36  3A 30 35 3A  30 37 20 30  37 3A 35 31  3A 31 36 00 | 2016:05:07 07:51:16 |
| 0x0440 | Artist | 20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  00 00 00 00 | Empty because not set on the camera |
| 0x0477 | Padding | 00 00 00 |  |
| 0x0480 | SubIFDTag | 00 02 EA 00  00 02 EA 78  00 02 EB 5C | 190 976, (JpegImageOffset)  191 096, (RawOffset)  191 324 (Unknow ?) |
| 0x0492 | ReferenceBlackWhite | 00 00 00 00  01 00 00 00  FF 00 00 00  01 00 00 00  00 00 00 00  01 00 00 00  FF 00 00 00  01 00 00 00  00 00 00 00  01 00 00 00  FF 00 00 00  01 00 00 00 |  |

### XMPP tags

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x0540 |  | 3C 3F 78 70  61 63 6B 65  74 20 62 65  67 69 6E 3D  22 EF BB BF  22 20 69 64  3D 22 57 35  4D 30 4D  70 43 65 68  69 48 7A 72  65 53 7A 4E  54 63 7A 6B  63 39 64 22  3F 3E 3C 78  3A 78 6D 70  6D 65 74 61  20 78 6D 6C  6E 73 3A 78  3D 22 61 64  6F 62 65 3A  6E 73 3A 6D  65 74 61 2F  22 3E 3C 72  64 66 3A 52  44 46 20 78  6D 6C 6E 73  3A 72 64 66  3D 22 68 74  74 70 3A 2F  2F 77 77 77  2E 77 33 2E  6F 72 67 2F  31 39 39 39  2F 30 32 2F  32 32 2D 72  64 66 2D 73  79 6E 74 61  78 2D 6E 73  23 22 3E 3C  2F 72 64 66  3A 52 44 46  3E 3C 2F 78  3A 78 6D 70  6D 65 74 61  3E 20 20 20  20 20 20 20  …(filled) …  20 20 20 20  20 3C 3F 78  70 61 63 6B  65 74 20 65  6E 64 3D 22  77 22 3F 3E | <?xpacket begin="ï»¿" id="W5M0MpCehiHzreSzNTczkc9d"?>  <x:xmpmeta xmlns:x="adobe:ns:meta/">  <rdf:RDF xmlns:rdf= "http://www.w3.org/1999/02/22-rdf-syntax-ns#">  </rdf:RDF></x:xmpmeta>  <?xpacket end="w"?> |

### Data tag (next)

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x2588 | Copyright | 20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 20 20  20 20 00 | Empty |
| 0x2643 | Padding | 00 |  |
| 0x2644 | DateTimeOriginal | 32 30 31 36  3A 30 35 3A  30 37 20 30  37 3A 35 31  3A 31 36 00 | 2016:05:07 07:51:16 |

## Exif IFD

### IFD

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x2664 | Tag number | 00 21 | 33 tags |
| Tag1 | | | |
| 0x2666 | Tag name | 82 9A | ExposureTime |
| 0x2678 | Tag type | 00 05 | Rational |
| 0x2670 | Tag count | 00 00 00 01 |  |
| 0x2674 | Offset | 00 00 0B FC | 3068 |
|  | Data | See 0x3068 |  |
| Tag 2 | | | |
| 0x2678 | Tag name | 82 9D | FNumber |
| 0x2680 | Tag type | 00 05 | Rational |
| 0x2682 | Tag count | 00 00 00 01 |  |
| 0x2686 | Offset | 00 00 0C 04 | 3076 |
|  | Data | See 0x3076 |  |
| Tag 3 | | | |
| 0x2690 | Tag name | 88 22 | ExposureProgram |
| 0x2692 | Tag type | 00 03 | Int 16 u |
| 0x2694 | Tag count | 00 00 00 01 |  |
| 0x2698 | Offset | 00 00 00 03 | Data |
|  | Data | 00 00 00 03 | 3 = Aperture-Priority |
| Tag 4 | | | |
| 0x2702 | Tag name | 88 27 | ISO |
| 0x2704 | Tag type | 00 03 | U int 16 |
| 0x2706 | Tag count | 00 00 00 01 |  |
| 0x2710 | Offset | 00 00 00 64 | Data |
|  | Data | 00 00 00 64 | 100 |
| Tag 5 | | | |
| 0x2714 | Tag name | 88 30 | SensitivityType |
| 0x2716 | Tag type | 00 03 | U int 16 |
| 0x2718 | Tag count | 00 00 00 01 |  |
| 0x2722 | Offset | 00 00 00 02 |  |
|  | Data | 00 00 00 02 | 2 = Recommended exposure index |
| Tag 6 | | | |
| 0x2726 | Tag name | 90 03 | DateTimeOriginal |
| 0x2728 | Tag type | 00 02 | Byte |
| 0x2730 | Tag count | 00 00 00 14 | 20 bytes (string) |
| 0x2734 | Offset | 00 00 0C 0C | 3084 |
|  | Data | See 0x3084 |  |
| Tag 7 | | | |
| 0x2738 | Tag name | 90 04 | CreateTime |
| 0x2740 | Tag type | 00 02 | Byte |
| 0x2742 | Tag count | 00 00 00 14 | 20 bytes (string) |
| 0x2746 | Offset | 00 00 0C 20 | 3104 |
|  | Data | See 0x03104 |  |
| Tag 8 | | | |
| 0x2750 | Tag name | 92 04 | ExposureCompensation |
| 0x2752 | Tag type | 00 0A | Signed Rational |
| 0x2754 | Tag count | 00 00 00 01 | 12 bytes (string) |
| 0x2758 | Offset | 00 00 0C 34 | 3124 |
|  | Data | See 0x3124 |  |
| Tag 9 | | | |
| 0x2762 | Tag name | 92 05 | MaxAperturevalue |
| 0x2764 | Tag type | 00 05 | Rational |
| 0x2766 | Tag count | 00 00 00 01 |  |
| 0x2770 | Offset | 00 00 0C 3C | 3132 |
|  | Data | See 0x3132 |  |
| Tag 10 | | | |
| 0x2774 | Tag name | 92 07 | MeteringMode |
| 0x2776 | Tag type | 00 03 | U int 16 |
| 0x2778 | Tag count | 00 00 00 01 |  |
| 0x2782 | Offset | 00 00 00 02 | Data |
|  | Data | 00 00 00 02 | 2 = Center Weighted Average |
| Tag 11 | | | |
| 0x2786 | Tag name | 92 08 | LightSource |
| 0x2788 | Tag type | 00 03 | U int 16 |
| 0x2790 | Tag count | 00 00 00 01 |  |
| 0x2794 | Offset | 00 00 00 00 | Data |
|  | Data | 00 00 00 00 | 0 = Unknown |
| Tag 12 | | | |
| 0x2798 | Tag name | 92 09 | RowPerStrip |
| 0x2800 | Tag type | 00 03 | U int 16 |
| 0x2802 | Tag count | 00 00 00 01 |  |
| 0x2806 | Offset | 00 00 00 10 | Data |
|  | Data | 00 00 00 10 | 16 = No flash |
| Tag 13 | | | |
| 0x2810 | Tag name | 92 0A | FocalLenght |
| 0x2812 | Tag type | 00 05 | Rational |
| 0x2814 | Tag count | 00 00 00 01 |  |
| 0x2818 | Offset | 00 00 0C 44 | 3140 |
|  | Data | See 0x3140 |  |
| Tag 14 | | | |
| 0x2822 | Tag name | 92 7C | MakerNoteNikon (pointer to the makernote) |
| 0x2824 | Tag type | 00 07 | Byte |
| 0x2826 | Tag count | 00 01 F9 78 | 129400 byte |
| 0x2830 | Offset | 00 00 0C 88 | 3208 |
|  | Data | See 0x3208 |  |
| Tag 15 | | | |
| 0x2834 | Tag name | 92 86 | UserComment |
| 0x2836 | Tag type | 00 07 | Byte |
| 0x2838 | Tag count | 00 00 00 2C | 44 bytes (string) |
| 0x2842 | Offset | 00 00 0C4C | 3148 |
|  | Data | See 0x3148 |  |
| Tag 16 | | | |
| 0x2846 | Tag name | 92 90 | SubSecTime |
| 0x2848 | Tag type | 00 02 | Byte |
| 0x2850 | Tag count | 00 00 00 03 | 3 bytes (string) |
| 0x2854 | Offset | 00 00 30 35 | 12341 |
|  | Data | See 0x12341 |  |
| Tag 17 | | | |
| 0x2858 | Tag name | 92 91 | SubSecTimeOriginal |
| 0x2860 | Tag type | 00 02 | Byte |
| 0x2862 | Tag count | 00 00 00 03 | 3 bytes (string) |
| 0x2866 | Offset | 00 00 30 35 | 12341 |
|  | Data | See 0x12341 |  |
| Tag 18 | | | |
| 0x2870 | Tag name | 92 92 | SubSecTimeDigitized |
| 0x2872 | Tag type | 00 02 | Byte |
| 0x2874 | Tag count | 00 00 00 03 | 3 bytes (string) |
| 0x2878 | Offset | 00 00 30 35 | 12341 ? |
|  | Data | See 0x12341 |  |
| Tag 19 | | | |
| 0x2882 | Tag name | A2 17 | SensingMethod |
| 0x2884 | Tag type | 00 07 | Byte |
| 0x2886 | Tag count | 00 00 00 01 |  |
| 0x2890 | Offset | 00 00 00 02 | Data |
|  | Data | 00 00 00 02 | 2 = One chip color area |
| Tag 20 | | | |
| 0x2894 | Tag name | A3 00 | FileSource |
| 0x2896 | Tag type | 00 02 | Byte |
| 0x2898 | Tag count | 00 00 00 01 |  |
| 0x2902 | Offset | 00 00 00 03 | Data |
|  | Data | 00 00 00 03 | 3 = Digital camera |
| Tag 21 | | | |
| 0x2906 | Tag name | A3 01 | SceneType |
| 0x2908 | Tag type | 00 07 | Bye |
| 0x2910 | Tag count | 00 00 00 01 |  |
| 0x2914 | Offset | 00 00 00 01 | Data |
|  | Data | 00 00 00 01 | Always one |
| Tag 22 | | | |
| 0x2918 | Tag name | A3 02 | CFAPattern |
| 0x2920 | Tag type | 00 07 | Byte |
| 0x2922 | Tag count | 00 00 00 08 | 8 bytes |
| 0x2926 | Offset | 00 00 0C 78 | 3192 |
|  | Data | See 0x3192 |  |
| Tag 23 | | | |
| 0x2930 | Tag name | A4 01 | CustomRendered |
| 0x2932 | Tag type | 00 03 | U int 16 |
| 0x2934 | Tag count | 00 00 00 01 |  |
| 0x2938 | Offset | 00 00 00 00 | Data |
|  | Data | 00 00 00 00 |  |
| Tag 24 | | | |
| 0x2942 | Tag name | A4 02 | ExposureMode |
| 0x2944 | Tag type | 00 03 | U int 16 |
| 0x2946 | Tag count | 00 00 00 01 |  |
| 0x2950 | Offset | 00 00 00 00 | Data |
|  | Data | 00 00 00 00 | 0 = Auto |
| Tag 25 | | | |
| 0x2954 | Tag name | A4 03 | WhiteBalance |
| 0x2956 | Tag type | 00 03 | U int 16 |
| 0x2958 | Tag count | 00 00 00 01 |  |
| 0x2962 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = Auto |
| Tag 26 | | | |
| 0x2966 | Tag name | A4 04 | DigitalZoomRatio |
| 0x2968 | Tag type | 00 05 | Rational |
| 0x2970 | Tag count | 00 00 00 01 |  |
| 0x2974 | Offset | 00 00 0C 80 | 3200 |
|  | Data | See 0x3200 |  |
| Tag 27 | | | |
| 0x2978 | Tag name | A4 05 | FocalLenghtin35mmFormat |
| 0x2980 | Tag type | 00 03 | U int 16 |
| 0x2982 | Tag count | 00 00 00 01 |  |
| 0x2986 | Offset | 00 00 00 4B | Data |
|  | Data | 75 |
| Tag 28 | | | |
| 0x2990 | Tag name | A4 06 | SceneCaptureType |
| 0x2992 | Tag type | 00 03 | U int 16 |
| 0x2994 | Tag count | 00 00 00 01 |  |
| 0x2998 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = Standard |
| Tag 29 | | | |
| 0x3002 | Tag name | A4 07 | GainControl |
| 0x3004 | Tag type | 00 03 | U int 16 |
| 0x3006 | Tag count | 00 00 00 01 |  |
| 0x3010 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = none |
| Tag 30 | | | |
| 0x3014 | Tag name | A4 08 | Contrast |
| 0x3016 | Tag type | 00 03 | U int 16 |
| 0x3018 | Tag count | 00 00 00 01 |  |
| 0x3022 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = Normal |
| Tag 31 | | | |
| 0x3026 | Tag name | A4 09 | Saturation |
| 0x3028 | Tag type | 00 03 | U int 16 |
| 0x3030 | Tag count | 00 00 00 01 |  |
| 0x3034 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = Normal |
| Tag 32 | | | |
| 0x3038 | Tag name | A4 0A | Sharpness |
| 0x3040 | Tag type | 00 03 | U int 16 |
| 0x3042 | Tag count | 00 00 00 01 |  |
| 0x3046 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = Normal |
| Tag 33 | | | |
| 0x3050 | Tag name | A4 0C | SubjectDistanceRange |
| 0x3052 | Tag type | 00 03 | U int 16 |
| 0x3054 | Tag count | 00 00 00 01 |  |
| 0x3058 | Offset | 00 00 00 00 | Data |
|  | Data | 0 = Unknown |
| 0x3062 | Padding | 00 00 00 00  00 00 00 |  |

### Exif Tag data

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 0x3068 | ExposureTime | 00 00 00 0A  00 00 03 E8 |  |
| 0x3076 | FNumber | 00 00 00 3F  00 00 00 0A |  |
| 0x3084 | DateTimeOriginal | 32 30 31 36 3A 30 35 3A 30 37 20 30 37 3A 35 31 3A 31 36 00 | “2016:05:07 07:51:16” |
| 0x3104 | CreateTime | 32 30 31 36 3A 30 35 3A 30 37 20 30 37 3A 35 31 3A 31 36 00 | “2016:05:07 07:51:16” |
| 0x3124 | ExposureCompensation | 00 00 00 06 00 00 00 00 |  |
| 0x3132 | MaxAperturevalue | 00 00 00 0A 00 00 00 0A |  |
| 0x3140 | FocalLenght | 00 00 00 0A  00 00 01 F4 |  |
| 0x3148 |  | 41 53 43 49 49 00 00 00 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 |  |
| 0x3192 | CFAPattern | 02 00 02 00 00 01 01 02 |  |
| 0x3200 | DigitalZoomRatio | 01 00 00 00 01 00 00 00 |  |

## MakerNote

### MakerNote Header

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 3208 | Magic value | 4E 69 6B 6F 6E 00 | “Nikon” |
| 3214 | Version | 02 11 |  |
| 3216 | Padding ? | 00 00 |  |
| 3218 | Byte order | 49 49 | Reverse byte order |
| 3220 | Tiff magic value | 00 2A |  |
| 3222 | Tiff offset | 00 00 00 08 |  |

### MakerNote IFD 0

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 3226 | Tag number | 00 3C | 60 tags |
| Tag 1 | | | |
| 3228 | Tag name | 00 01 | Version |
| 3230 | Tag type | 00 07 | Byte |
| 3232 | Tag count | 00 00 00 04 |  |
| 3236 | Offset | 30 32 31 31 | Data |
|  | Data | “0211” |
| Tag 2 | | | |
| 3240 | Tag name | 00 02 | ISO |
| 3242 | Tag type | 00 03 | U int 16 |
| 3244 | Tag count | 00 00 00 02 |  |
| 3248 | Offset | 00 00 00 64 | Data |
|  | Data | 100 |
| Tag 3 | | | |
| 3252 | Tag name | 00 04 | Quality |
| 3254 | Tag type | 00 02 | Byte |
| 3256 | Tag count | 00 00 00 08 | 8 bytes (String) |
| 3260 | Offset | 00 00 02 DE | 734 |
|  | Data | See 0x3952 | Offset is from start of makernote (add 3218) |
| Tag 4 | | | |
| 3264 | Tag name | 00 05 | WhiteBalance |
| 3266 | Tag type | 00 02 | Byte |
| 3268 | Tag count | 00 00 00 0D | 13 bytes (string) |
| 3272 | Offset | 00 00 02 E6 | 742 |
|  | Data | See 3960 |  |
| Tag 5 | | | |
| 3276 | Tag name | 00 07 | FocusMode |
| 3278 | Tag type | 00 02 | Byte |
| 3280 | Tag count | 00 00 00 07 | 7 bytes (string) |
| 3284 | Offset | 00 00 02 F6 | 758 |
|  | Data | See 3976 |  |
| Tag 6 | | | |
| 3288 | Tag name | 00 08 | FlashSetting |
| 3290 | Tag type | 00 02 | Byte |
| 3292 | Tag count | 00 00 00 0D | 13 bytes (string) |
| 3296 | Offset | 00 00 02 FE | 766 |
|  | Data | See 3984 |  |
| Tag 7 | | | |
| 3300 | Tag name | 00 09 | FlashType |
| 3302 | Tag type | 00 02 | Byte |
| 3304 | Tag count | 00 00 00 14 | 20 bytes (string) |
| 3308 | Offset | 00 00 03 0E | 782 |
|  | Data | See 4000 |  |
| Tag 8 | | | |
| 3312 | Tag name | 00 0B | WhiteBalanceFineTune |
| 3314 | Tag type | 00 08 | Int 16 |
| 3316 | Tag count | 00 00 00 02 |  |
| 3320 | Offset | FF FF 00 00 | Data |
|  | Data | ? |
| Tag 9 | | | |
| 3324 | Tag name | 00 0C | WB\_RBLevels |
| 3326 | Tag type | 00 05 | Rationnal |
| 3328 | Tag count | 00 00 00 04 |  |
| 3332 | Offset | 00 00 03 22 | 802 |
|  | Data | See 4020 |  |
| Tag 10 | | | |
| 3336 | Tag name | 00 0D | ProgramShift |
| 3338 | Tag type | 00 07 | Byte |
| 3340 | Tag count | 00 00 00 04 |  |
| 3344 | Offset | 00 01 06 00 | Data |
|  | Data |  |
| Tag 11 | | | |
| 3348 | Tag name | 00 0E | ExposureDifference |
| 3350 | Tag type | 00 07 | Byte |
| 3352 | Tag count | 00 00 00 04 |  |
| 3356 | Offset | 00 01 0C 00 | Data |
|  | Data |  |
| Tag 12 | | | |
| 3360 | Tag name | 00 11 | PreviewIFD |
| 3362 | Tag type | 00 04 | U int 32 |
| 3364 | Tag count | 00 00 00 01 |  |
| 3368 | Offset | 00 00 5B 4A | Data |
|  | Data | Offset to the preview IFD (23370/26588 in the file) |
| Tag 13 | | | |
| 3372 | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
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| Tag 2 | | | |
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|  | Tag name |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
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| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
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|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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|  | Data |  |  |
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|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
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|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 2 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 58 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 59 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |
| Tag 60 | | | |
|  | Tag name |  |  |
|  | Tag type |  |  |
|  | Tag count |  |  |
|  | Offset |  |  |
|  | Data |  |  |

### MakerNote IFD tag data

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 3948 | Padding | 00 00 00 00 |  |
| 3952 | Quality | 52 41 57 20 20 20 20 00 | RAW |
| 3960 | WhiteBalance | 41 55 54 4F 32 20 20 20 20 20 20 20 00 | AUTO2 |
| 3973 | Padding | 00 00 00 |  |
| 3976 | FocusMode | 41 46 2D 41 20 20 00 | AF-A |
| 3983 | Padding | 00 |  |
| 3984 | FlashSetting | 20 20 20 20 20 20 20 20 20 20 20 20 00 | Empty |
| 3997 | Padding | 00 00 00 |  |
| 4000 | FlashType | 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 | Empty |
| 4020 | WB\_RBLevels | 40 02 00 00 00 01 00 00 98 01 00 00 00 01 00 00 00 01 00 00 00 01 00 00 00 01 00 00 00 01 00 00 |  |
| 4052 |  |  |  |
|  |  |  |  |
|  |  |  |  |

## PreviewIFD

### IFD

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 26588 | Tag number | 00 07 | 7 tags |
| Tag 1 | | | |
| 26590 | Tag name | 01 03 | Compression |
| 26592 | Tag type | 00 03 | U int 16 |
| 26594 | Tag count | 00 00 00 01 |  |
| 26598 | Offset | 00 06 00 00 | Data |
|  | Data | 6 = Jpeg (old) |
| Tag 2 | | | |
| 26602 | Tag name | 01 1A | Xresolution |
| 26604 | Tag type | 00 05 | Rationnal |
| 26606 | Tag count | 00 00 00 01 |  |
| 26610 | Offset | 00 00 5B A6 | 23 462 |
|  | Data | See 26680 | Added 3218 |
| Tag 3 | | | |
| 26614 | Tag name | 01 1B | YResolution |
| 26616 | Tag type | 00 05 |  |
| 26618 | Tag count | 00 00 00 01 |  |
| 26622 | Offset | 00 00 5B AE | 23 470 |
|  | Data | See 26688 | Added 3218 |
| Tag 4 | | | |
| 26626 | Tag name | 01 28 | ResolutionUnit |
| 26628 | Tag type | 00 03 | U int 16 |
| 26630 | Tag count | 00 00 00 01 |  |
| 26634 | Offset | 00 00 00 02 | Data |
|  | Data | 2 = inches |
| Tag 5 | | | |
| 26638 | Tag name | 02 01 | PreviewImageStart |
| 26640 | Tag type | 00 04 | U int 32 |
| 26642 | Tag count | 00 00 00 01 |  |
| 26646 | Offset | 00 00 5D 6E | Data |
|  | Data | 23 918 (27136) |
| Tag 6 | | | |
| 26650 | Tag name | 02 02 | PreviewimageLenght |
| 26652 | Tag type | 00 04 | U int 32 |
| 26654 | Tag count | 00 00 00 01 |  |
| 26658 | Offset | 00 01 9B 13 | Data |
|  | Data | 105 235 (bytes ?) |
| Tag 7 | | | |
| 26662 | Tag name | 02 13 | YCbCrPositionning |
| 26664 | Tag type | 00 03 | U int 16 |
| 26666 | Tag count | 00 00 00 01 |  |
| 26670 | Offset | 00 02 00 00 | Data |
|  | Data | 2 = Co-sited |

### Tag data

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 26674 | Padding | 00 00 00 00 00 00 |  |
| 26680 | XResolution | 00 00 00 01 00 00 01 2C |  |
| 26688 | YResolution | 00 00 00 01 00 00 01 2C |  |
| 26696 | Padding | 00 00 00 00  …filled…  00 00 00 00 | Until the preview Image |

### Preview Image data(JPEG)

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Offset** | **Name** | **Raw Value** | **Comment/Value** |
| 27136 | Jpeg of the preview |  |  |
| 132371 | Padding | 00 00 00 00  ...filled…  00 00 00 00 |  |
| 136480 |  |  |  |
|  |  |  |  |

# References

|  |  |
| --- | --- |
| [1] | «http://lclevy.free.fr/nef/,» lclevy, 2009. [En ligne]. Available: http://lclevy.free.fr/nef/. [Accès le 2016]. |