

# **PDF417 Decode SDK v2.5**

## **USER MANUAL**

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# 1. Introduction

## 1.1. PDF417 Barcode introduction

### About PDF417

PDF417 is a multi-row, variable-length symbology offering high data capacity and error-correction capability. PDF417 can be scanned by linear PDF417 barcode scanners, rastering laser scanners, or two-dimensional imaging devices. One PDF417 symbol is capable of encoding more than 1100 bytes, 1800 ASCII characters, or 2700 digits, depending on the selected data compaction mode.

Every PDF417 symbol is composed of stack of rows, from a minimum of 3 to a maximum of 90 rows. Each PDF417 row contains start and stop patterns, left and right row indicators, and from one to thirty data symbol characters. Since both the number of rows and their length are selectable when printed, the aspect ratio of a PDF417 symbol can be varied to suit spatial requirements for printing.

A PDF417 symbol character consists of seventeen modules arranged into four bars and four spaces. The entire set of symbol characters is divided into three mutually exclusive encodation sets, or "clusters". Each cluster encodes the 929 available PDF417 symbol character values, or codewords, with distinct bar-spaces patterns so that one cluster cannot be confused with another. Because any two adjacent rows use different clusters, the decoder can utilize data from scans that cross rows while decoding a PDF417 symbol.

By adding error correction codewords to the data message, PDF417 supports correction of lost or missing data. Each PDF417 symbol requires two error correction codewords for error detection. In addition, up to 510 codewords of error correction can be added when printing the symbol. This allows for decoding security that mathematically is many orders of magnitude stronger than that of bar codes with simple check characters.

PDF417 offers three data compaction modes. Each mode defines a conversion or mapping between codeword sequences and byte sequences. The three modes are Text Compaction mode, Byte Compaction mode, and Numeric Compaction mode.

The interpretation of the byte sequences encoded by a compaction mode is determined by the Global Label Identifier (GLI). A GLI is a special codeword sequence which activates a set of interpretations. The implementation of GLIs enables PDF417 to encode international character sets, and industry - and user-defined character sets, as well as ASCII.

Macro PDF417 provides a means for creating a distributed representation of files too large to be represented by a single PDF417 symbol. Macro PDF417 symbols

differ from ordinary PDF417 symbols in that they contain additional control information used to support this distributed representation. This allows a decoder to make use of this information to correctly reconstruct and verify the file, independent of the symbol scanning order.

In a relatively clean environment in which damage to the label is unlikely, Truncated PDF417 can be used. This version omits the right row indicator and simplifies the stop pattern into a single module width bar. This reduces the non-data overhead, with some trade-off in robustness, or the ability to withstand degradation. Truncated PDF417 is fully reader-compatible with standard PDF417.

Characteristics of PDF417	
Encode Character Set .....	All 128 ASCII characters All 128 Extended ASCII Characters 8-Bit Binary Data Up to 811,800 Different Character Sets or interpretations
Code Type .....	Continuous, Multi-row
Character Self Checking .....	Yes
Symbol Size:	
Height .....	Variable (3 to 90 Rows)
Width .....	Variable (90X to 583X)
Bidirectional Decoding .....	Yes
Error Correction Characters .....	.. 2 to 512
Maximum Data Characters per Symbol .....	1850 texts 2710 digits 1108 bytes
Additional Features ...	Selectable Levels of Error Correction Can Utilize Scans that Cross Rows
Additional Options .....	Macro PDF417 Global Label Identifiers Truncated PDF417

## Symbol Structure



Above Figure shows a typical PDF417 symbol and its structure

Every PDF417 symbol contains a minimum of 3 to a maximum of 90 rows. Each row consists of:

- a. Leading quiet zone
- b. Start pattern
- c. Left row indicator symbol character
- d. One to thirty data symbol characters
- e. Right row indicator symbol character
- f. Stop pattern
- g. Trailing quiet zone

A symbol character consists of seventeen modules arranged into four bars and four spaces. each symbol character represents a value in the range of 0 to 928; within this documents, these symbol character value are referred to as "codewords"

Because the number of row is variable, and rows are variable in length (i.e., in the number of symbol character "columns"), the height/width proportion, or aspect ration, of a PDF417 symbol can be varied to suit spatial requirements for printing. However, the number of symbol characters in all rows of a given symbol must be the same.

The data region of a PDF417 symbol is the central area of codeword columns between the left row indicator column and the right row indicator column. The first (upper left) codeword of the data region is the symbol length descriptor. Its value indicates the total number of codewords in the data region, including the symbol length descriptor itself, but excluding the error correction codewords. The remaining codewords in the data region (including the data codewords, pad codewords, and error correction code words, in that order) are arranged with the most significant codeword adjacent to the symbol length descriptor and are read from left to right, top row to bottom. The number of codewords in the data region of a single PDF417 symbol cannot exceed 928.

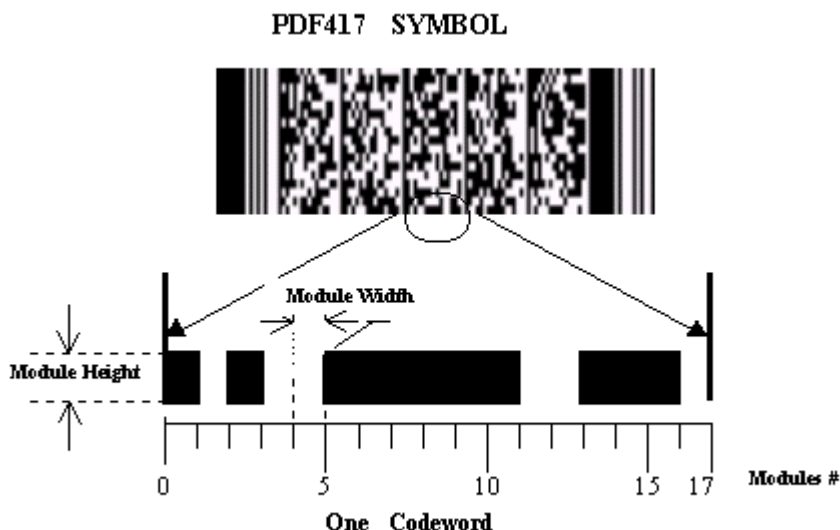
## **Symbol Character Encodation**

### ***Structure***

A symbol character consists of four bars and four spaces; each bar or space contains one to six modules. In all cases, the four bars and four spaces of any symbol character measure 17 modules in total. The width of one module is the X dimension of that symbol.

### **Clusters and Symbol Character Definitions**

The entire set of PDF417 symbol characters is divided into three mutually exclusive encodation sets, or "clusters". Each cluster encodes all 929 defined PDF417 codewords with distinct bar and space patterns. Within each cluster, each symbol character is associated with a unique value in the range of 0 to 928; this value is called the symbol character value or codeword.



### 1.3. MicroPDF417 Barcode introduction

Micro PDF-417 is a 2D, multi-row symbology, derived from and closely based on [PDF-417](#). Micro PDF-417 is designed for applications with a need for improved area efficiency, but without the requirement for PDF-417's maximum data capacity. A limited set of symbol sizes is available, together with a fixed level of error correction for each symbol.

Reduced version of PDF417, smaller, but smaller capacity. Number of error correction codewords is fixed for each available row/column combination, from 7 to 50 codewords pre symbol.

#### Symbol size:

- Number of rows : 4 to 44
- Number of cols : 1,2,3 or 4

Data encoding mode	Maximum capacity
Text compaction	250 characters
Numeric compaction	366 characters
Byte compaction	150 characters

CW : Codeword, EC : Error correction codewords, RW : Number of non error codewords-really used codewords without error correction codewords

#### MicroPDF417 characteristics

Number of data columns	Number of rows	Total CW	Number of EC	% EC/CW	Max.data bytes	Max.alpha chars	Max. digits
------------------------	----------------	----------	--------------	---------	----------------	-----------------	-------------

1	11	11	7	64	3	6	8
1	14	14	7	50	7	12	17
1	17	17	7	41	10	18	26
1	20	20	8	40	13	22	32
1	24	24	8	33	18	30	44
1	28	28	8	29	22	38	55
2	8	16	8	50	8	14	20
2	11	22	9	41	14	24	35
2	14	28	9	32	21	36	52
2	17	34	10	29	27	46	67
2	20	40	11	28	33	56	82
2	23	46	13	28	38	64	93
2	26	52	15	29	43	72	105
3	6	18	12	67	6	10	14
3	8	24	14	58	10	18	26
3	10	30	16	53	15	26	38
3	12	36	18	50	20	34	49
3	15	45	21	47	27	46	67
3	20	60	26	43	39	66	96
3	26	78	32	41	54	90	132
3	32	96	38	40	68	114	167
3	38	114	44	39	82	138	202
3	44	132	50	38	97	162	237
4	4	16	8	50	8	14	20
4	6	24	12	50	13	22	32
4	8	32	14	44	20	34	49
4	10	40	16	40	27	46	67
4	12	48	18	38	34	58	85
4	15	60	21	35	45	76	111
4	20	80	26	33	63	106	155
4	26	104	32	31	85	142	208
4	32	128	38	30	106	178	261
4	38	152	44	29	128	214	331
4	44	176	50	28	150	250	366



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### **1.3. About trial version**

With 2D barcode encoder and decoder SDK, some of the input element will be replaced with char '\*' before encoding, and some of the output element will be replaced with '\*' after decoding.

With 1D linear barcode encoder and decoder, some of the input element will be replaced with char '0' before encoding, and some of the output element will be replaced with '0' after decoding.

The Trial version have 30 days' evaluation time, you must remove it from your computer and your application after expiration.

We will mail the licensed version or register serial no to you after you order it.



## 2. SDK

### 2.1. Static link library

#### 2.1.1 Data structure

The following data structure define the properties of the PDF417 decoding result, it can be returned from from the decoding process

```
typedef struct tagResult
{
    BYTE *pData;           //The buffer of decoding result
    int nSize;             //The result size;
    POINT ptsBarcode[4];    //The barcode position
}Result;
```

#### 2.1.2. Function or procedure

##### 2.1.2.1. \_PDF417DecodeImage

The \_PDF417DecodeImage function read PDF417 barcode from BITMAP handler.

**Result \* \_\_stdcall \_PDF417DecodeImage(HBITMAP hImage);**

##### Parameters

##### **hImage**

[in] The handler of the image in BITMAP format

##### Return values

Result \* : the result of the decoding.

return NULL if no barcode detected.

### 2.1.2.2. **\_PDF417DecodeImageFile**

The `_PDF417DecodeImageFile` function decode the PDF417 barcode from image file such as BMP,PNG,JPG,GIF and other formats.

**Result \* \_\_stdcall \_PDF417DecodeImageFile(char \*pImageFile);**

#### **Parameters**

##### **pImageFile**

[in] The image file name including path.

#### **Return values**

If the function succeeds, the return value is Result \*,otherwise , return NULL.

### 2.1.2.3. **\_PDF417DecodeGrayImage**

The `_PDF417DecodeGrayImage` function decode the PDF417 barcode from an image buffer which come from converting from an image or video frame buffer. The buffer contains the pixels row bu row, every pixel occupies one BYTE. the value from 0 to 255.

**Result \* \_\_stdcall \_PDF417DecodeGrayImage(BYTE \*pGray,int nWidth,int nHeight);**

#### **Parameters**

##### **pGray**

[in] The image buffer

##### **nWidth**

[in] The width of the image

##### **nHeight**

[in] The height of the image

#### **Return values**

If the function succeeds, the return value is Result \*,otherwise , return NULL.

#### 2.1.2.4. **\_PDF417Free**

The `_PDF417Free` function free environment of the PDF417 decoding

```
void __stdcall _PDF417Free(Result *r);
```

##### **Parameters**

**Result \*r**

[in] The pointer of PDF417 barcode result.

##### **Return values**

void

#### 2.1.2.5. **\_PDF417ReaderRegister**

The `_PDF417ReaderRegister` function can register the license.

```
int __stdcall _PDF417ReaderRegister(char *pMailBox,char *pRegCode);
```

##### **Parameters**

**pMailBox**

[in] Mailbox or domain of the user

**pRegCode**

[in] license code converting from pMailBox

##### **Return values**

If the function succeeds, the return TRUE, otherwise , return FALSE.

#### 2.1.3. **Example for Microsoft visual C++**

##### **Example1**

```
#include "stdafx.h"
```

```
#include <stdio.h>
```

```
#include "../PDF417DecodeLib.h"
```

```

int main(int argc, char* argv[])

{

    Result *r = _PDF417DecodeImageFile("c:\\testpdf417.bmp");

    printf("Result =%s\n",r->pData);

    _PDF417Free(r);

    return 0;

}

LIBRARY for linking
PDF417DecodeLIB.lib

```

## 2.2. Dynamic link library

### 2.2.1. Data structure

The following data structure define the properties of the PDF417 decoding result, it can be returned from from the decoding process

```

typedef struct tagResult
{
    BYTE *pData;           //The buffer of decoding result
    int nSize;             //The result size;
    POINT ptsBarcode[4];   //The barcode position
}Result;

```

### 2.2.2. Function or procedure

#### 2.2.2.1. PDF417DecodeImage

The PDF417DecodeImage function read PDF417 barcode from BITMAP handler.

**Result \* \_\_stdcall PDF417DecodeImage(HBITMAP hImage);**

#### **Parameters**

##### **hImage**

[in] The handler of the image in BITMAP format

#### **Return values**

Result \* : the result of the decoding.

return NULL if no barcode detected.

### **2.2.2.2. PDF417DecodeImageFile**

The PDF417DecodeImageFile function decode the PDF417 barcode from image file such as BMP,PNG,JPG,GIF and other formats.

**Result \* \_\_stdcall PDF417DecodeImageFile(char \*pImageFile);**

#### **Parameters**

##### **pImageFile**

[in] The image file name including path.

#### **Return values**

If the function succeeds, the return value is Result \*,otherwise , return NULL.

### **2.1.2.3. PDF417DecodeGrayImage**

The PDF417DecodeGrayImage function decode the PDF417 barcode from an image buffer which come from converting from an image or video frame buffer. The buffer contains the pixels row bu row, every pixel occupies one BYTE. the value from 0 to 255.

**Result \* \_\_stdcall PDF417DecodeGrayImage(BYTE \*pGray,int nWidth,int nHeight);**

#### **Parameters**

**pGray**

[in] The image buffer

**nWidth**

[in] The width of the image

**nHeight**

[in] The height of the image

**Return values**

If the function succeeds, the return value is Result \*,otherwise , return NULL.

## 2.1.2.4. PDF417Free

The PDF417Free function free environment of the PDF417 decoding

```
void __stdcall PDF417Free(Result *r);
```

**Parameters****Result \*r**

[in] The pointer of PDF417 barcode result.

**Return values**

void

## 2.1.2.5. PDF417ReaderRegister

The PDF417ReaderRegister function can register the license.

```
int __stdcall PDF417ReaderRegister(char *pMailBox,char *pRegCode);
```

**Parameters****pMailBox**

[in] Mailbox or domain of the user

**pRegCode**

[in] license code converting from pMailBox

**Return values**

If the function succeeds, the return TRUE, otherwise , return FALSE.

### 2.2.3. Example for Microsoft visual C++

#### Example1

```
#include "stdafx.h"

#include "../PDF417DecodeDll.h"

int main(int argc, char* argv[])

{

    Result *r = PDF417DecodeImageFile("c:\\tzd.bmp",6);

    if (r)

    {

        printf("Result =%s\n",r->pData);

        PDF417Free(r);

    }

    return 0;

}

LIBRARY for linking
    PDF417DecodeDLL.lib
Runtime library
    PDF417DecodeDLL.DLL
```

### 2.2.4. Example for Borland Delphi

#### 2.2.4.1. Redclaration of the data type and function

type

```

TRESULT = record
  pData : LPBYTE;
  nSize : integer;
  ptsBarcode : array[1..4] of Tpoint;
end;

procedure PDF417Free(pResult : LRESULT); stdcall; external
'PDF417DecodeDll.dll';
function LoadImageEx(lpImagFile : PChar) : HBITMAP; stdcall; external
'PDF417DecodeDll.dll';
function PDF417Decode(hImage : HBITMAP) : LRESULT; stdcall; external
'PDF417DecodeDll.dll';
function PDF417DecodeGrayImage(pRgb : LPBYTE; nWidth : Integer; nHeight :
Integer; pCount : LPINT) : LRESULT; stdcall; external 'PDF417DecodeDll.dll';
function PDF417DecodeImageFile(pImageFile : PChar) : LRESULT; stdcall;
external 'PDF417DecodeDll.dll';
function PDF417ReaderRegister(pMailBox : PChar; pRegCode : PChar) : boolean; stdcall;
external 'PDF417DecodeDll.dll';

```

## 2.2.4.2. Example

### Example1

```

var
.....
pReturn : LRESULT;
begin
  pReturn := nil;
  pFilePath := @strFiles[1];
  pReturn := PDF417DecodeImageFile(pFilePath);
  if (pReturn <> nil) then
  begin
    .....
    PDF417Free(pReturn);
  end;

end;

```



## 2.3. Decoder for IOS [iPhone/iPad/iPod]

### 2.3.1 Data structure

The following data structure define the properties of the PDF417 decoding result, it can be returned from from the decoding process

```
typedef struct tagResult
{
    BYTE *pData;           //The buffer of decoding result
    int nSize;             //The result size;
    POINT ptsBarcode[4];   //The barcode position
}Result;
```

### 2.3.2. Function or procedure

#### 2.3.2.1. \_PDF417DecodeGrayImage

The PDF417DecodeGrayImage function decode the PDF417 barcode from an image buffer which come from converting from an image or video frame buffer. The buffer contains the pixels row bu row, every pixel occupies one BYTE. the value from 0 to 255.

**Result \*\_\_stdcall \_PDF417DecodeGrayImage(BYTE \*pGray,int nWidth,int nHeight);**

#### Parameters

##### pGray

[in] The image buffer

##### nWidth

[in] The width of the image

##### nHeight

[in] The height of the image

#### Return values

If the function succeeds, the return value is Result \*,otherwise , return NULL.

### 2.3.2.2. **\_PDF417Free**

The `_PDF417Free` function free environment of the PDF417 decoding

```
void __stdcall _PDF417Free(Result *r);
```

#### **Parameters**

**Result \*r**

[in] The pointer of PDF417 barcode result.

#### **Return values**

void

### 2.3.2.3. **\_PDF417ReaderRegister**

The `_PDF417ReaderRegister` function can register the license.

```
int __stdcall _PDF417ReaderRegister(char *pMailBox,char *pRegCode);
```

#### **Parameters**

**pMailBox**

[in] Mailbox or domain of the user

**pRegCode**

[in] license code converting from pMailBox

#### **Return values**

If the function succeeds, the return TRUE, otherwise , return FALSE.

### 2.3.4. **Example for Object C**

```
#include "PDF417Reader.h"
.....
#pragma mark AVCaptureSession delegate
- (void)captureOutput:(AVCaptureOutput *)captureOutput
didOutputSampleBuffer:(CMSampleBufferRef)sampleBuffer
fromConnection:(AVCaptureConnection *)connection
{
    /*We create an autorelease pool because as we are not in the main_queue our code is
```

not executed in the main thread. So we have to create an autorelease pool for the thread we are in\*/

```
// if (display == YES) return;
```

```
CVImageBufferRef imageBuffer = CMSampleBufferGetImageBuffer(sampleBuffer);
/*Lock the image buffer*/
CVPixelBufferLockBaseAddress(imageBuffer,0);
/*Get information about the image*/
uint8_t *baseAddress = (uint8_t *)CVPixelBufferGetBaseAddressOfPlane(imageBuffer,0);
size_t bytesPerRow = CVPixelBufferGetBytesPerRow(imageBuffer);
size_t width = CVPixelBufferGetWidth(imageBuffer);
size_t height = CVPixelBufferGetHeight(imageBuffer);

/*Create a CGImageRef from the CVImageBufferRef*/
bytesPerRow = width;
CGColorSpaceRef colorSpace = CGColorSpaceCreateDeviceGray();
CGContextRef newConext = CGContextCreate(baseAddress, width, height, 8,
bytesPerRow, colorSpace, kCGImageAlphaNone);
CGImageRef newImage = CGContextCreateImage(newConext);

/*We release some components*/
CGContextRelease(newConext);
CGColorSpaceRelease(colorSpace);

/*We display the result on the custom layer. All the display stuff must be done in the main
thread because
UIKit is no thread safe, and as we are not in the main thread (remember we didn't use the
main_queue)
we use performSelectorOnMainThread to call our CALayer and tell it to display the
CGImage.*/
[self.customLayer performSelectorOnMainThread:@selector(setContents:) withObject:
(id)newImage waitUntilDone:YES];

/*We display the result on the image view (We need to change the orientation of the image so
that the video is displayed correctly).
Same thing as for the CALayer we are not in the main thread so ...*/
UIImage *image= [UIImage imageWithCGImage:newImage scale:1.0
orientation:UIImageOrientationRight];

/*We relase the CGImageRef*/
CGImageRelease(newImage);
// [self.imageView performSelectorOnMainThread:@selector(setImage:) withObject:image
waitUntilDone:YES];
```

```

Result *pResult = _PDF417DecodeGrayImage(baseAddress,width,height);

if (pResult)
{
    [self.captureSession stopRunning];
    if (single.switchOn) {
        [single.player play];
    }

    char szStr[3000]={0};
    memcpy(szStr,pResult->pData,pResult->nSize);

    _PDF417Free(pResult);
    /*We unlock the image buffer*/
    CVPixelBufferUnlockBaseAddress(imageBuffer,0);
    imageViewDisPlay = [[DisplayImageViewController alloc]init];
    imageViewDisPlay.image = image ;

    imageViewDisPlay.strLabel = [NSString stringWithCString:szStr
encoding:NSUTF8StringEncoding];
    [imageViewDisPlay setModalTransitionStyle:UIModalTransitionStyleCrossDissolve];
    [self presentModalViewController:imageViewDisPlay animated:YES];
    [imageViewDisPlay release];
}

/*We unlock the image buffer*/
CVPixelBufferUnlockBaseAddress(imageBuffer,0);

}

```

Linked library:

libPDF417Reader.a

## 2.4. PDF417 decoder for android

### 2.4.1 Data structure

The following data structure define the properties of the PDF417 decoding result, it can be returned from from the decoding process

```
package com.aipsys;

public class Result
{
    public byte[] data;
    public String type;
    public int x1,x2,x3,x4;
    public int y1,y2,y3,y4;
}
```

### 2.4.2. Function or procedure

#### 2.4.2.1. decode

The decode function read PDF417 barcode from gray image buffer.

```
public native static Result decode(byte[] gray, int width, int height)
```

#### Parameters

gray

[in] The image buffer converting from image or video frame

width

[in] width of the gray image

height

[in] height of the gray image

#### Return values

Result : the result of the decoding.

return NULL if no barcode detected.

### 2.4.2.2. RegisterDecoder

The RegisterDecoder function is designed for verify the license.

```
public native static boolean RegisterDecoder(String mailBox, String regCode);
```

#### Parameters

mailBox

[in] mailbox or domain name of the user

regCode

[in] license code generating from mailBox

#### Return values

TRUE if sucess and FALSE if failed.

return NULL if no barcode detected.

### 2.4.3. Example

```
package com.aipsys.PDF417Scanner;
```

```
.....
```

```
private void decode(byte[] data, int width, int height) {
```

```
    PlanarYUVLuminanceSource source =  
    activity.getCameraManager().buildLuminanceSource(data, width, height);
```

```
    if (source != null)
```

```
    {
```

```
        com.aipsys.Result r =  
        scanner.decode(source.getMatrix(),source.getWidth(),source.getHeight());
```

```

    if (r != null )
    {
        ResultPoint[] resultPoints = new ResultPoint[4];

        resultPoints[0] = new ResultPoint(r.x1,r.y1);

        resultPoints[1] = new ResultPoint(r.x2,r.y2);

        resultPoints[2] = new ResultPoint(r.x3,r.y3);

        resultPoints[3] = new ResultPoint(r.x4,r.y4);

        rawResult = new Result
(r.getText(),r.data,resultPoints,BarcodeFormat.PDF_417);

    }

}

.....

}

```

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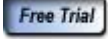





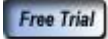




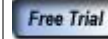










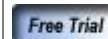










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ActiveX		 \$125	 \$179	 \$379	 \$1,090	 \$2,199	1.2
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QRCode Encode SDK							
Static Library			 \$495	 \$990	 \$2,180	 \$3,099	1.2
Dynamic Library		 \$125	 \$179	 \$379	 \$949	 \$2,199	1.2
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Static Library			 \$495	 \$990	 \$2,180	 \$3,099	1.2
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PDF417 Encode SDK							
Static Library			 \$495	 \$990	 \$2,180	 \$3,099	1.2
Dynamic Library		 \$125	 \$179	 \$379	 \$949	 \$2,199	1.2



ActiveX		 \$125	 \$179	 \$379	 \$949	 \$2,199	1.2
ASP Component			 \$179	 \$379	 \$949	 \$2,199	1.2
Aztec Encode SDK							
Static Library			 \$495	 \$990	 \$2,180	 \$3,099	1.2
Dynamic Library		 \$125	 \$179	 \$379	 \$949	 \$2,199	1.2
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ActiveX	300222367	300222368	300222369	300222370	300222371	1.2
ASP Component		300222388	300222389	300222390	300222391	1.2
QRCode Encode SDK						
Static Library		300222413	300222284	300222285	300222286	1.2
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Static Library		300222291	300222292	300222293	300222294	1.2
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PDF417 Encode SDK						
Static Library		300222280	300222281	300222282	300222283	1.2
Dynamic Library	300222299	300222300	300222301	300222303	300222305	1.2
ActiveX	300222337	300222338	300222339	300222340	300222341	1.2
ASP Component		300222372	300222373	300222374	300222375	1.2
Aztec Encode SDK						
Static Library		300222288	300222414	300222289	300222290	1.2
Dynamic Library	300222323	300222327	300222329	300222330	300222331	1.2

ActiveX	300222362	300222363	300222364	300222365	300222366	1. 2
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