User's Guide

OME-A822PG ISA-BUS
Multi-Functional Board
Windows 95/98/NT Software Manual

omega.com®
OMEGA®

OMEGAnet® Online Service www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA:
ISO 9001 Certified
One Omega Drive, P.O. Box 4047
Stamford CT 06907-0047
TEL: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1, Canada
TEL: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico: En Español: (001) 203-359-7803 e-mail: espanol@omega.com
FAX: (001) 203-359-7807 info@omega.com.mx

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 3472121 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: sales@omegaeng.nl

Czech Republic:
Frystatska 184, 733 01 Karviná, Czech Republic
TEL: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France:
11, rue Jacques Cartier, 78280 Guyancourt, France
TEL: +33 (0)1 61 37 29 00 FAX: +33 (0)1 30 57 54 27
Toll Free in France: 0800 466 342
e-mail: sales@omega.fr

Germany/Austria:
Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
TEL: +49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

United Kingdom:
ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5BD United Kingdom
TEL: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
Toll Free in United Kingdom: 0800-488-488
e-mail: sales@omega.co.uk

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OME-A-822PGL/H

Software Manual

[Windows 95/98 and NT]

Table of Contents

1. INTRODUCTION

The OME-A-822PGH/L is a multifunction, 12-bit resolution, A/D, D/A and digital I/O card. The features of the OME-A-822PGH/L are given as below:

- 12-bit A/D, 16 single-ended channels or 8 differential channels
- OME-A-822PGL : low gain (1/2/4/8), the analog input signal range configuration code is given in Sec. 2.1
- OME-A-822PGH : high gain (1/10/100/1000), the analog input signal range configuration code is given in Sec. 2.1
- 12-bit D/A, 2 channels, 0-5V or 0-10V output by **hardware JP1 setting**
- 16 TTL-compatible digital input channels
- 16 TTL-compatible digital output channels

The A822.DLL and A822.Vxd (or A822.sys) are a collection of data acquisition subroutines for OME-A822PG for Windows 95/98 (or NT) Applications. These subroutines are written in C language and perform a variety of data acquisition operations.

The subroutines in A822.DLL are easy to understand because of the user friendly names. It provides powerful, easy-to-use subroutine for developing your data acquisition applications. Your program can call these DLL functions by VC++, VB, Delphi and Borland C++ Builder easily. To speed-up your development process, some demonstration source programs are provided.

The OME-A822 software consists of these DLLs and device drivers:

For Windows 95/98

- A822.dll → Libraries for A822 PGL/PGH card
- A822.Vxd → Device driver for Windows 95/98

For Windows NT

- A822.dll → Libraries for A822 PGL/PGH card
- A822.sys, Napwnt.sys → Device driver for Windows NT

1.1 REFERENCES

Please refer to the following user manuals:

- **Readme.txt:**
  Describes files that install into your system, and where you can find it

- **Whatnew.txt:**
  Describes the differences in the software versions

- **SoftInst.pdf:**
  How to install the software package under Windows 95/98/NT/2000

- **CallDll.pdf:**
  How to call the DLL functions with VC++5, VB5, Delphi3 and Borland C++ Builder 3

- **ResCheck.pdf:**
  How to check the resources I/O Port address, IRQ number and DMA number for add-on cards under Windows 95/98/NT/2000

1.2 RANGE CONFIGURATION

The A/D converter of OME-A822PGH/L is 12 bits under all configuration codes. If the analog input range is configured to +/- 5V range, the resolution of one bit is equal to 2.44 mV. If the analog input range is configured to +/- 2.5V range, the resolution will be 1.22 mV. If the analog input signal is about 1 V, using configuration 0/1/2 (for OME-A822PGL) will get nearly the same result **except resolution. So choose the correct configuration code can achieve the highest precision measurement.**

OME-A-822PGL Input Signal Range Configuration Code Table

Bipolar/Unipolar	Input Signal Range	Configuration Code
Bipolar	**+/- 5V**	**0**
Bipolar	**+/- 2.5V**	**1**
Bipolar	**+/- 1.25V**	**2**
Bipolar	**+/- 0.0625V**	**3**
Unipolar	**0V ~ 10V**	**4**
Unipolar	**0V ~ 5V**	**5**
Unipolar	**0V ~ 2.5V**	**6**
Unipolar	**0V ~ 1.25V**	**7**
Bipolar	**+/- 10V**	**8**

OME-A-822PGH Input Signal Range Configuration Code Table

Bipolar/Unipolar	Input Signal Range	Configuration Code
Bipolar	**+/- 5V**	**0**
Bipolar	**+/- 0.5V**	**1**
Bipolar	**+/- 0.05V**	**2**
Bipolar	**+/- 0.005V**	**3**
Unipolar	**0 ~ 10V**	**4**
Unipolar	**0 ~ 1V**	**5**
Unipolar	**0 ~ 0.1V**	**6**
Unipolar	**0 ~ 0.01V**	**7**
Bipolar	**+/- 10V**	**8**
Bipolar	**+/- 1V**	**9**
Bipolar	**+/- 0.1V**	**10**
Bipolar	**+/- 0.01V**	**11**

2. DECLARATIONS & DEMO

Please refer to user manual "CallDLL.pdf".

For Windows 95/98:

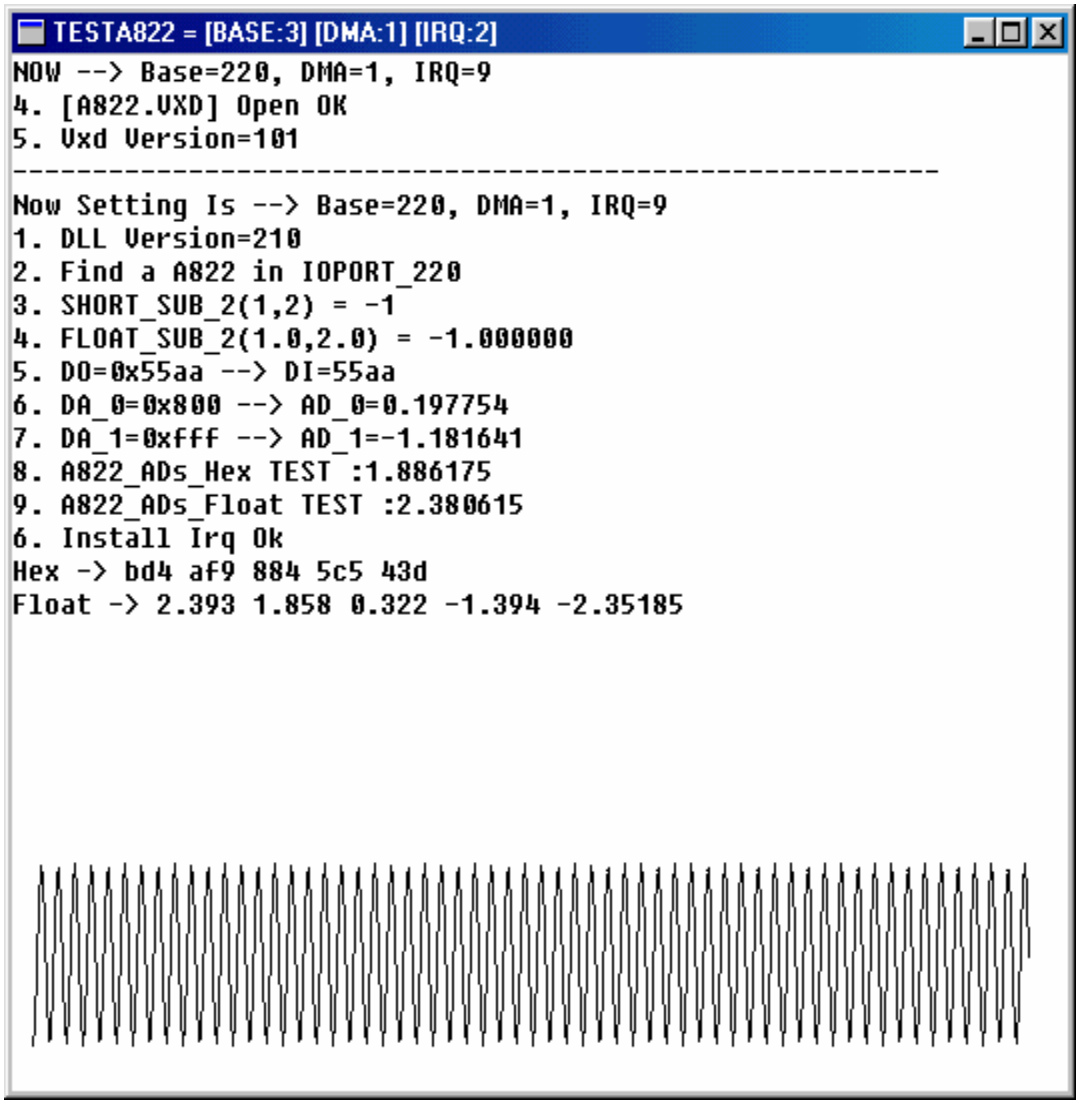
```
|--\Driver
    |--\A822.DLL      ← Dynamic Linking Library
    |--\A822.Vxd      ← Device driver for OME-A822PG
    |
    |--\BCB           ← For Borland C++ Builder
    |    |--\A822.H   ← Header file
    |    +--\A822.Lib ← Import Library for BCB only
    |
    |--\Delphi        ← For Delphi
    |    +--\A822.pas ← Declaration file
    |
    |--\VB            ← For Visual Basic
    |    +--\A822.bas ← Declaration file
    |
    +--\VC            ← For Visual C++
         |--\A822.H   ← Header file
         +--\A822.Lib ← Import Library for VC only
```

For Windows NT:

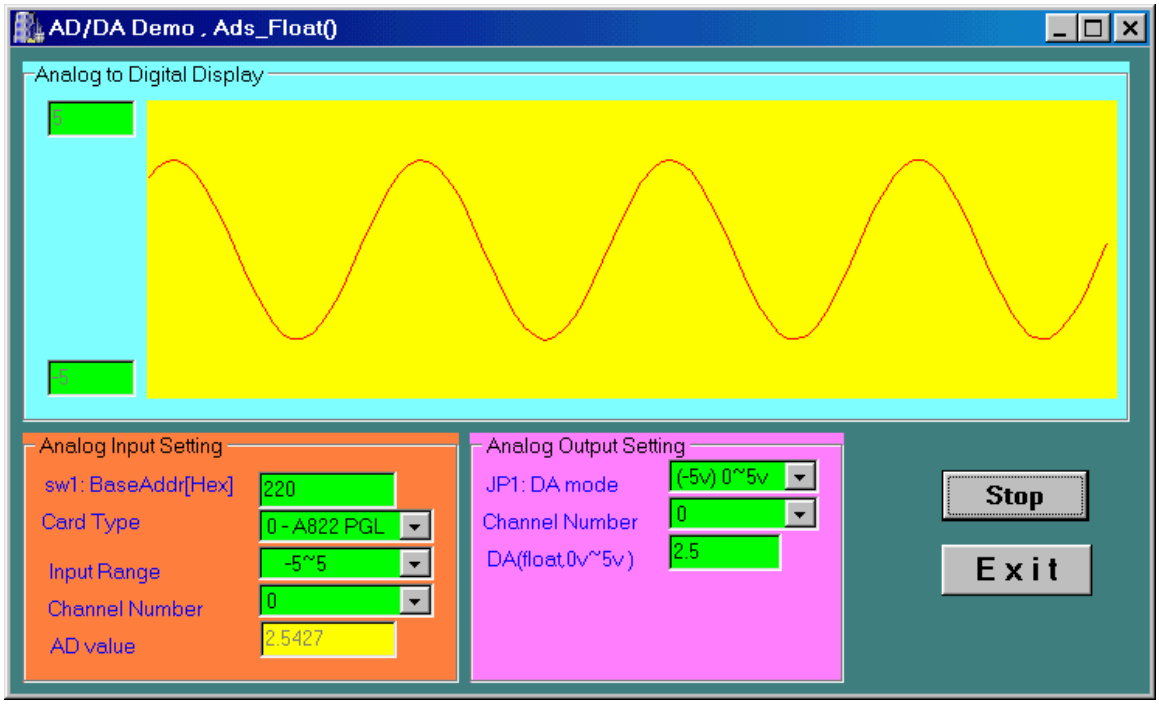
```
|--\Driver
    |--\A822.DLL      ← Dynamic Linking Library
    |--\A822.sys      ← device driver
    |--\Napwnt.sys    ← device driver
    |
    |--\BCB           ← For Borland C++ Builder
    |    |--\A822.H   ← Header file
    |    +--\A822.Lib ← Import Library for BCB only
    |
    |--\Delphi        ← For Delphi
    |    +--\A822.pas ← Declaration file
    |
    |--\VB            ← For Visual Basic
    |    +--\A822.bas ← Declaration file
    |
    +--\VC            ← For Visual C++
         |--\A822.H   ← Header file
         +--\A822.Lib ← Import Library for VC only
```

2.1 USING VC++ & BC++BUILDER

2.1.1 THE VC++ DEMO RESULT



2.1.2 BC++ BUILDER DEMO RESULT



2.1.3 A822.H (FOR WIN 95/98)

```
#ifdef __cplusplus
    #define EXPORTS extern "C" __declspec (dllimport)
#else
    #define EXPORTS
#endif

/***************** DEFINE A822 RELATIVE ADDRESS *****************/
#define A822_TIMER0             0x00
#define A822_TIMER1             0x01
#define A822_TIMER2             0x02
#define A822_TIMER_MODE         0x03
#define A822_AD_LO              0x04 // Analog to Digital, Low Byte
#define A822_AD_HI              0x05 // Analog to Digital, High Byte
#define A822_DA_CH0_LO          0x04 // Digit to Analog, CH 0
#define A822_DA_CH0_HI          0x05
#define A822_DA_CH1_LO          0x06 // Digit to Analog, CH 1
#define A822_DA_CH1_HI          0x07
#define A822_DI_LO              0x06 // Digit Input
#define A822_DO_LO              0x0D // Digit Output

#define A822_CLEAR_IRQ          0x08
#define A822_SET_GAIN           0x09
#define A822_SET_CH             0x0A
#define A822_SET_MODE           0x0B
#define A822_SOFT_TRIG          0x0C

#define A822_POLLING_MODE           1
#define A822_DMA_MODE               2
#define A822_INTERRUPT_MODE         6
```

```
/*** define the gain mode ***/
#define A822_BI_1          0
#define A822_BI_10         1
#define A822_BI_100        2
#define A822_BI_1000       3
#define A822_UNI_1         4
#define A822_UNI_10        5
#define A822_UNI_100       6
#define A822_UNI_1000      7
#define A822_BI_05         8
#define A822_BI_5          9
#define A822_BI_50         10
#define A822_BI_500        11

#define A822_BI_2          1
#define A822_BI_4          2
#define A822_BI_8          3
#define A822_UNI_2         5
#define A822_UNI_4         6
#define A822_UNI_8         7

#define A822PGL            0
#define A822PGH            1

#define A822_NoError                    0
#define A822_DriverOpenError            1
#define A822_DriverNoOpen               2
#define A822_GetDriverVersionError      3
#define A822_InstallIrqError            4
#define A822_ClearIntCountError         5
#define A822_GetIntCountError           6
#define A822_GetBufferError             7
#define A822_AdError1                   100
#define A822_AdError2                   -200.0
#define A822_InstallBufError            10
#define A822_AllocateMemoryError        11
#define A822_CardTypeError              12
#define A822_TimeoutError               13
#define A822_OtherError                 14
#define A822_ConfigCodeError            15
```

```
#define A822_IntStopError           16
#define A822_IntRemoveError         17
#define A822_IntInstallEventError   18
#define A822_BufferFull             19
#define A822_NoChannelToScan        20
#define A822_IntInstallChannelError 21
#define A822_IntInstallConfigError  22
#define A822_GetDmaStatusError      23

// Function of Driver
EXPORTS WORD   CALLBACK A822_DriverInit(void);
EXPORTS void   CALLBACK A822_DriverClose(void);
EXPORTS WORD   CALLBACK A822_DELAY
        (WORD wBase, WORD wDownCount);
EXPORTS WORD   CALLBACK A822_Check_Address(WORD wBase);
EXPORTS void   CALLBACK A822_SetTriggerMode(WORD wTriggerMode );

// Function of Test
EXPORTS short  CALLBACK A822_SHORT_SUB_2(short nA, short nB);
EXPORTS float  CALLBACK A822_FLOAT_SUB_2(float fA, float fB);
EXPORTS WORD   CALLBACK A822_Get_DLL_Version(void);
EXPORTS WORD   CALLBACK A822_GetDriverVersion
        (WORD *wDriverVersion);

// Function of Counter
EXPORTS void   CALLBACK A822_SetCounter
        ( WORD wBase, WORD wCounterNo,
          WORD bCounterMode, DWORD wCounterValue);
EXPORTS DWORD CALLBACK A822_ReadCounter
        (WORD wBase, WORD wCounterNo, WORD bCounterMode);

// Function of DI/DO
EXPORTS WORD   CALLBACK A822_DI(WORD wBase);
EXPORTS void   CALLBACK A822_DO(WORD wBase, WORD wHexValue);

EXPORTS void  CALLBACK A822_OutputByte
          (WORD wPortAddr, UCHAR bOutputVal);
EXPORTS void  CALLBACK A822_OutputWord
          (WORD wPortAddr, WORD wOutputVal);
EXPORTS WORD  CALLBACK A822_InputByte(WORD wPortAddr);
EXPORTS WORD  CALLBACK A822_InputWord(WORD wPortAddr);
```

```
// Function of AD
EXPORTS WORD  CALLBACK A822_SetChGain
        (WORD wBase, WORD wChannel, WORD wConfig, WORD wCardType);
EXPORTS WORD  CALLBACK A822_Fast_AD_Hex(WORD *wVal);
EXPORTS WORD  CALLBACK A822_Fast_AD_Float(float *fVal);

EXPORTS WORD  CALLBACK A822_AD_Hex
        (WORD wBase, WORD wChannel,
         WORD wConfig, WORD wCardType, WORD *wVal);
EXPORTS WORD  CALLBACK A822_AD_Float
        (WORD wBase, WORD wChannel,
         WORD wConfig, WORD wCardType, float *fVal);
EXPORTS WORD  CALLBACK A822_ADs_Hex
        (WORD wBase, WORD wChannel, WORD wConfig,
         WORD wType, WORD wBuf[], WORD wCount);
EXPORTS WORD  CALLBACK A822_ADs_Float
        (WORD wBase, WORD wChannel, WORD wConfig,
         WORD wType, float fBuf[], WORD wCount);
EXPORTS WORD  CALLBACK A822_Hex2Float(WORD wConfig,
         WORD wCardType, WORD wHex, float *fVal);

// Please uses the A822_AD_Float() function
EXPORTS float CALLBACK A822_AD(WORD wBase, WORD wChannel,
          WORD wConfig, WORD wType);

// Function of DA
EXPORTS void  CALLBACK A822_DA
          (WORD wBase, WORD wChannel, WORD wHexValue);
EXPORTS void  CALLBACK A822_Uni5_DA
          (WORD wBase, WORD wChannel, float fValue);
EXPORTS void  CALLBACK A822_Uni10_DA
          (WORD wBase, WORD wChannel, float fValue);

// Function of Interrupt
// Please uses the A822_Intxxxx series function set
EXPORTS WORD  CALLBACK A822_InstallIrq(WORD wBase,
          WORD wIrq, HANDLE *hEvent, DWORD dwCount);
EXPORTS WORD  CALLBACK A822_AD_INT_Start(WORD wCardType,
          WORD Ch, WORD Gain, WORD c1, WORD c2);
EXPORTS WORD  CALLBACK A822_AD_INT_Stop(void);
EXPORTS WORD  CALLBACK A822_GetIntCount(DWORD *dwVal);
EXPORTS WORD  CALLBACK A822_GetBuffer
          (DWORD dwNum, WORD wBuffer[]);
EXPORTS WORD  CALLBACK A822_GetFloatBuffer
          (DWORD dwNum, float fBuffer[]);
```

```
// Function of Interrupt
EXPORTS WORD  CALLBACK A822_IntInstall(WORD wBase,
          WORD wIrq, HANDLE *hEvent, DWORD dwCount);
EXPORTS WORD  CALLBACK A822_IntStart(WORD wCardType,
          WORD wChannel, WORD wGain, WORD c1, WORD c2);
EXPORTS WORD  CALLBACK A822_IntGetCount(DWORD *dwVal);
EXPORTS WORD  CALLBACK A822_IntGetHexBuf
          (DWORD dwNum, WORD wBuf[]);
EXPORTS WORD  CALLBACK A822_IntGetFloatBuf
          (DWORD dwNum, float  fBuf[]);
EXPORTS WORD  CALLBACK A822_IntStop(void);
EXPORTS WORD  CALLBACK A822_IntRemove(void);

// Function of DMA
EXPORTS WORD  CALLBACK A822_AD_DMA_InstallIrq
          (WORD wBase, WORD wIrq, WORD wDmaChan);
EXPORTS WORD  CALLBACK A822_AD_DMA_RemoveIrq(void);
EXPORTS WORD  CALLBACK A822_AD_DMA_Start
          (WORD wCardType, WORD Ch, WORD Gain,
          WORD c1,WORD c2, DWORD cnt, WORD wPassOut[]);
EXPORTS WORD  CALLBACK A822_AD_DMA_Stop(void);
EXPORTS WORD  CALLBACK A822_AD_DMA_IsNotFinished(void);
EXPORTS WORD  CALLBACK A822_AD_DMA_GetBuffer(WORD *wBuf);
EXPORTS WORD  CALLBACK A822_AD_DMA_GetFloatBuffer(float *fBuf);

// Function of Channel-Scan with Polling
EXPORTS void CALLBACK A822_ChScan_Clear(void);
EXPORTS WORD CALLBACK A822_ChScan_Add
        (WORD wChannel, WORD wConfig);
EXPORTS WORD CALLBACK A822_ChScan_Set
        (WORD wChannel[], WORD wConfig[], WORD wChNum);
EXPORTS WORD CALLBACK A822_ChScan_PollingHex
        (WORD wBase, WORD wCardType,
        WORD wBuf[], WORD wNumPerCh);
EXPORTS WORD CALLBACK A822_ChScan_PollingFloat
        (WORD wBase, WORD wCardType, float fBuf[], WORD wNumPerCh);
```

```
// Function of Channel-Scan with Interrupt
EXPORTS WORD CALLBACK A822_ChScan_IntInstall
        (WORD wBase, WORD wIrq, HANDLE *hEvent, DWORD dwNumPerCh);
EXPORTS WORD CALLBACK A822_ChScan_IntStart
         (WORD c1, WORD c2, WORD wCardType);
EXPORTS WORD CALLBACK A822_ChScan_IntGetCount(DWORD *dwVal);
EXPORTS WORD CALLBACK A822_ChScan_IntGetHexBuf(WORD wBuf[]);
EXPORTS WORD CALLBACK A822_ChScan_IntGetFloatBuf(float fBuf[]);
EXPORTS WORD CALLBACK A822_ChScan_IntStop(void);
EXPORTS WORD CALLBACK A822_ChScan_IntRemove(void);
```

2.1.4 A822.H (FOR WIN NT)

```
#ifdef __cplusplus
    #define EXPORTS extern "C" __declspec (dllimport)
#else
    #define EXPORTS
#endif

/***************** DEFINE A822 RELATIVE ADDRESS *****************/
#define A822_TIMER0             0x00
#define A822_TIMER1             0x01
#define A822_TIMER2             0x02
#define A822_TIMER_MODE         0x03
#define A822_AD_LO              0x04 // Analog to Digital, Low Byte
#define A822_AD_HI              0x05 // Analog to Digital, High Byte
#define A822_DA_CH0_LO          0x04 // Digit to Analog, CH 0
#define A822_DA_CH0_HI          0x05
#define A822_DA_CH1_LO          0x06 // Digit to Analog, CH 1
#define A822_DA_CH1_HI          0x07
#define A822_DI_LO              0x06 // Digit Input
#define A822_DO_LO              0x0D // Digit Output

#define A822_CLEAR_IRQ          0x08
#define A822_SET_GAIN           0x09
#define A822_SET_CH             0x0A
#define A822_SET_MODE           0x0B
#define A822_SOFT_TRIG          0x0C

#define A822_POLLING_MODE           1
#define A822_DMA_MODE               2
#define A822_INTERRUPT_MODE         6
```

```
/*** define the gain mode ***/
#define A822_BI_1          0
#define A822_BI_10         1
#define A822_BI_100        2
#define A822_BI_1000       3
#define A822_UNI_1         4
#define A822_UNI_10        5
#define A822_UNI_100       6
#define A822_UNI_1000      7
#define A822_BI_05         8
#define A822_BI_5          9
#define A822_BI_50         10
#define A822_BI_500        11

#define A822_BI_2          1
#define A822_BI_4          2
#define A822_BI_8          3
#define A822_UNI_2         5
#define A822_UNI_4         6
#define A822_UNI_8         7

#define A822PGL            0
#define A822PGH            1

#define A822_NoError                    0
#define A822_DriverOpenError            1
#define A822_DriverNoOpen               2
#define A822_GetDriverVersionError      3
#define A822_InstallIrqError            4
#define A822_ClearIntCountError         5
#define A822_GetIntCountError           6
#define A822_GetBufferError             7
#define A822_AdError1                   100
#define A822_AdError2                   -200.0
#define A822_InstallBufError            10
#define A822_AllocateMemoryError        11
#define A822_CardTypeError              12
#define A822_TimeoutError               13
#define A822_OtherError                 14
#define A822_ConfigCodeError            15
```

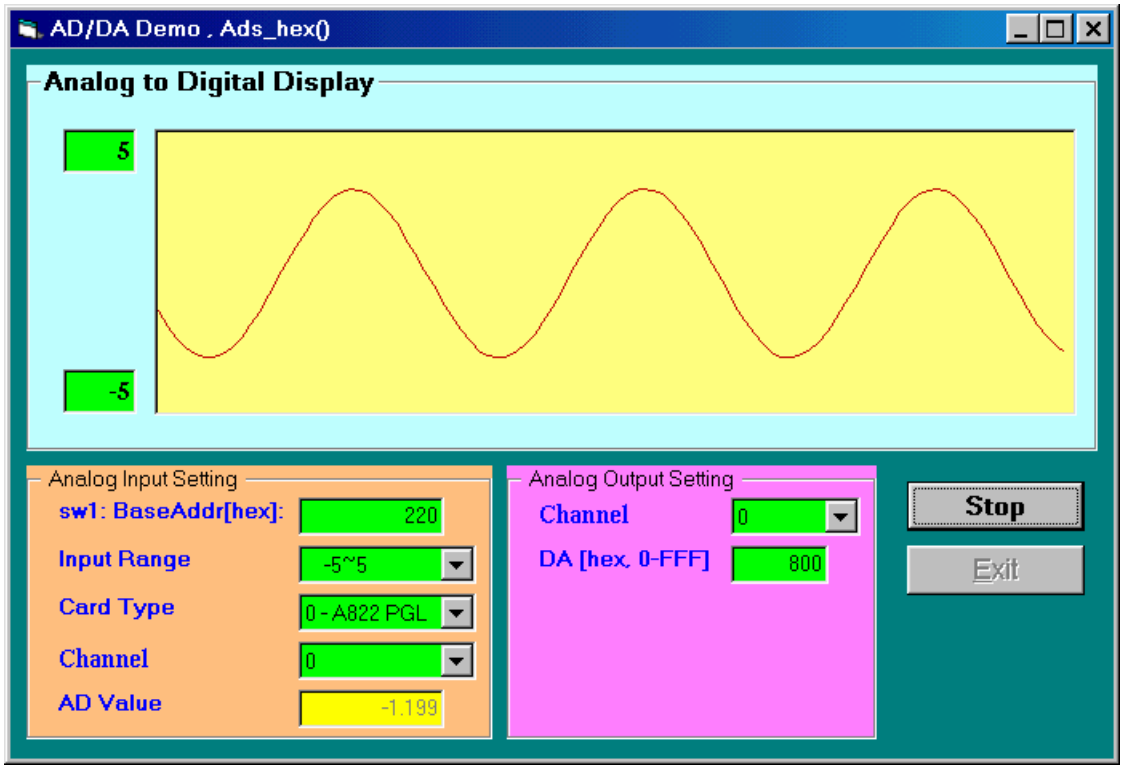
```
#define A822_IntStopError               16
#define A822_IntRemoveError             17
#define A822_IntInstallEventError       18
#define A822_BufferFull                 19
#define A822_NoChannelToScan            20
#define A822_IntInstallChannelError     21
#define A822_IntInstallConfigError      22


// Function of Driver
EXPORTS WORD   CALLBACK A822_DriverInit(void);
EXPORTS void       CALLBACK A822_DriverClose(void);
EXPORTS WORD   CALLBACK A822_DELAY
        (WORD wBase, WORD wDownCount);
EXPORTS WORD   CALLBACK A822_Check_Address(WORD wBase);
EXPORTS void       CALLBACK A822_SetTriggerMode(WORD wTriggerMode );

// Function of Test
EXPORTS short      CALLBACK A822_SHORT_SUB_2(short nA, short nB);
EXPORTS float      CALLBACK A822_FLOAT_SUB_2(float fA, float fB);
EXPORTS WORD   CALLBACK A822_Get_DLL_Version(void);
EXPORTS WORD   CALLBACK A822_GetDriverVersion
        (WORD *wDriverVersion);

// Function of Counter
EXPORTS void       CALLBACK A822_SetCounter
        ( WORD wBase, WORD wCounterNo,
          WORD bCounterMode, DWORD wCounterValue);
EXPORTS DWORD CALLBACK A822_ReadCounter
        (WORD wBase, WORD wCounterNo,
         WORD bCounterMode);

// Function of DI/DO
EXPORTS WORD   CALLBACK A822_DI(WORD wBase);
EXPORTS void       CALLBACK A822_DO(WORD wBase, WORD wHexValue);

EXPORTS void       CALLBACK A822_OutputByte
          (WORD wPortAddr, UCHAR bOutputVal);
EXPORTS void       CALLBACK A822_OutputWord
          (WORD wPortAddr, WORD wOutputVal);
EXPORTS WORD  CALLBACK A822_InputByte(WORD wPortAddr);
EXPORTS WORD  CALLBACK A822_InputWord(WORD wPortAddr);
```

```
// Function of AD
EXPORTS WORD  CALLBACK A822_SetChGain(WORD wBase,
        WORD wChannel, WORD wConfig, WORD wCardType);
EXPORTS WORD  CALLBACK A822_Fast_AD_Hex(WORD *wVal);
EXPORTS WORD  CALLBACK A822_Fast_AD_Float(float *fVal);

EXPORTS WORD  CALLBACK A822_AD_Hex
        (WORD wBase, WORD wChannel,
         WORD wConfig, WORD wCardType, WORD *wVal);
EXPORTS WORD  CALLBACK A822_AD_Float
        (WORD wBase, WORD wChannel,
         WORD wConfig, WORD wCardType, float *fVal);
EXPORTS WORD  CALLBACK A822_ADs_Hex
         (WORD wBase, WORD wChannel, WORD wConfig,
          WORD wType, WORD wBuf[], WORD wCount);
EXPORTS WORD  CALLBACK A822_ADs_Float
         (WORD wBase, WORD wChannel, WORD wConfig,
          WORD wType, float fBuf[], WORD wCount);
EXPORTS WORD  CALLBACK A822_Hex2Float(WORD wConfig,
           WORD wCardType, WORD wHex, float *fVal);

// Please uses the A822_AD_Float() function
EXPORTS float CALLBACK A822_AD(WORD wBase, WORD wChannel,
           WORD wConfig, WORD wType);

// Function of DA
EXPORTS void  CALLBACK A822_DA
           (WORD wBase, WORD wChannel, WORD wHexValue);
EXPORTS void  CALLBACK A822_Uni5_DA
           (WORD wBase, WORD wChannel, float fValue);
EXPORTS void  CALLBACK A822_Uni10_DA
           (WORD wBase, WORD wChannel, float fValue);

// Function of Interrupt
// Please uses the A822_Intxxxx series function set
EXPORTS WORD   CALLBACK A822_InstallIrq(WORD wBase,
           WORD wIrq, HANDLE *hEvent, DWORD dwCount);
EXPORTS WORD   CALLBACK A822_AD_INT_Start(WORD wCardType,
           WORD Ch, WORD Gain, WORD c1, WORD c2);
EXPORTS WORD   CALLBACK A822_AD_INT_Stop(void);
EXPORTS WORD   CALLBACK A822_GetIntCount(DWORD *dwVal);
EXPORTS WORD   CALLBACK A822_GetBuffer
           (DWORD dwNum, WORD wBuffer[]);
EXPORTS WORD   CALLBACK A822_GetFloatBuffer
           (DWORD dwNum, float fBuffer[]);
```

```
// Function of Interrupt
EXPORTS WORD   CALLBACK A822_IntInstall(WORD wBase,
          WORD wIrq, HANDLE *hEvent, DWORD dwCount);
EXPORTS WORD   CALLBACK A822_IntStart(WORD wCardType,
          WORD wChannel, WORD wGain, WORD c1, WORD c2);
EXPORTS WORD   CALLBACK A822_IntGetCount(DWORD *dwVal);
EXPORTS WORD   CALLBACK A822_IntGetHexBuf
          (DWORD dwNum, WORD wBuf[]);
EXPORTS WORD   CALLBACK A822_IntGetFloatBuf
          (DWORD dwNum, float  fBuf[]);
EXPORTS WORD   CALLBACK A822_IntStop(void);
EXPORTS WORD   CALLBACK A822_IntRemove(void);

// Function of Channel-Scan with Polling
EXPORTS void       CALLBACK A822_ChScan_Clear(void);
EXPORTS WORD   CALLBACK A822_ChScan_Add
        (WORD wChannel, WORD wConfig);
EXPORTS WORD   CALLBACK A822_ChScan_Set
        (WORD wChannel[], WORD wConfig[], WORD wChNum);
EXPORTS WORD   CALLBACK A822_ChScan_PollingHex (WORD wBase,
        WORD wCardType, WORD wBuf[], WORD wNumPerCh);
EXPORTS WORD   CALLBACK A822_ChScan_PollingFloat
         (WORD wBase, WORD wCardType, float fBuf[], WORD wNumPerCh);

// Function of Channel-Scan with Interrupt
EXPORTS WORD   CALLBACK A822_ChScan_IntInstall(WORD wBase,
        WORD wIrq, HANDLE *hEvent, DWORD dwNumPerCh);
EXPORTS WORD   CALLBACK A822_ChScan_IntStart
          (WORD c1, WORD c2, WORD wCardType);
EXPORTS WORD   CALLBACK A822_ChScan_IntGetCount(DWORD *dwVal);
EXPORTS WORD   CALLBACK A822_ChScan_IntGetHexBuf(WORD wBuf[]);
EXPORTS WORD   CALLBACK A822_ChScan_IntGetFloatBuf(float fBuf[]);
EXPORTS WORD   CALLBACK A822_ChScan_IntStop(void);
EXPORTS WORD   CALLBACK A822_ChScan_IntRemove(void);
```

2.2 USING VISUAL BASIC

2.2.1 THE VB DEMO RESULT



2.2.2 A822.BAS (FOR WIN 95/98)

```
Attribute VB_Name = "A822"

'***************** DEFINE A822 RELATIVE ADDRESS *****************/
Global Const A822_TIMER0            = &H0
Global Const A822_Timer1            = &H1
Global Const A822_TIMER2            = &H2
Global Const A822_TIMER_MODE        = &H3
Global Const A822_AD_LO             = &H4  ' Analog to Digital, Low Byte
Global Const A822_AD_HI             = &H5  ' Analog to Digital, High Byte
Global Const A822_DA_CH0_LO         = &H4  ' Digit to Analog, CH 0
Global Const A822_DA_CH0_HI         = &H5
Global Const A822_DA_CH1_LO         = &H6  ' Digit to Analog, CH 1
Global Const A822_DA_CH1_HI         = &H7
Global Const A822_DI_LO             = &H6  ' Digit Input
Global Const A822_DO_LO             = &HD  ' Digit Output

Global Const A822_CLEAR_IRQ         = &H8
Global Const A822_SET_GAIN          = &H9
Global Const A822_SET_CH            = &HA
Global Const A822_SET_MODE          = &HB
Global Const A822_SOFT_TRIG         = &HC

Global Const A822_POLLING_MODE          = 1
Global Const A822_DMA_MODE              = 2
Global Const A822_INTERRUPT_MODE        = 6

'*** define the gain mode ***/
Global Const A822_BI_1          = 0
Global Const A822_BI_10         = 1
Global Const A822_BI_100        = 2
Global Const A822_BI_1000       = 3
Global Const A822_UNI_1         = 4
Global Const A822_UNI_10        = 5
Global Const A822_UNI_100       = 6
Global Const A822_UNI_1000      = 7
Global Const A822_BI_05         = 8
Global Const A822_BI_5          = 9
Global Const A822_BI_50         = 10
Global Const A822_BI_500        = 11
```

```
Global Const A822_BI_2          = 1
Global Const A822_BI_4          = 2
Global Const A822_BI_8          = 3
Global Const A822_UNI_2         = 5
Global Const A822_UNI_4         = 6
Global Const A822_UNI_8         = 7

Global Const A822PGL     = 0
Global Const A822PGH     = 1

Global Const A822_NoError                    = 0
Global Const A822_DriverOpenError            = 1
Global Const A822_DriverNoOpen               = 2
Global Const A822_GetDriverVersionError      = 3
Global Const A822_InstallIrqError            = 4
Global Const A822_ClearIntCountError         = 5
Global Const A822_GetIntCountError           = 6
Global Const A822_GetBufferError             = 7
Global Const A822_AdError1                   = 100
Global Const A822_AdError2                   = -200#
Global Const A822_InstallBufError            = 10
Global Const A822_AllocateMemoryError        = 11
Global Const A822_CardTypeError              = 12
Global Const A822_TimeoutError               = 13
Global Const A822_OtherError                 = 14
Global Const A822_ConfigCodeError            = 15

Global Const A822_IntStopError               = 16
Global Const A822_IntRemoveError             = 17
Global Const A822_IntInstallEventError       = 18
Global Const A822_BufferFull                 = 19
Global Const A822_NoChannelToScan            = 20
Global Const A822_IntInstallChannelError     = 21
Global Const A822_IntInstallConfigError      = 22
Global Const A822_GetDmaStatusError          = 23

'******* Driver Functions ***********
Declare Function A822_DriverInit Lib "A822.DLL" () As Integer
Declare Sub A822_DriverClose Lib "A822.DLL" ()
Declare Function A822_DELAY Lib "A822.DLL" (ByVal wBase As Integer, _
      ByVal wDownCount As Integer) As Integer
Declare Function A822_Check_Address Lib "A822.DLL" _
      (ByVal wBase As Integer) As Integer
Declare Sub A822_SetTriggerMode Lib "A822.DLL" _
      (ByVal wTriggerMode As Integer)
```

```
'******* Test Functions ***********
Declare Function A822_SHORT_SUB_2 Lib "A822.DLL" _
      (ByVal nA As Integer, ByVal nB As Integer) As Integer
Declare Function A822_FLOAT_SUB_2 Lib "A822.DLL" _
      (ByVal fA As Single, ByVal fB As Single) As Single
Declare Function A822_Get_DLL_Version Lib "A822.DLL" () As Integer
Declare Function A822_GetDriverVersion Lib "A822.DLL" _
      (wDriverVersion As Integer) As Integer

'********* Counter Functions ***********
Declare Sub A822_SetCounter Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wCounterNo As Integer, _
       ByVal bCounterMode As Integer, ByVal wCounterValue As Long)
Declare Function A822_ReadCounter Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wCounterNo As Integer, _
       ByVal bCounterMode As Integer) As Long

'******* DI/DO Functions ***********
Declare Function A822_DI Lib "A822.DLL" (ByVal wBase As Integer) As Integer
Declare Sub A822_DO Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wHexValue As Integer)

Declare Sub A822_OutputByte Lib "A822.DLL" _
      (ByVal wPortAddr As Integer, ByVal bOutputVal As Byte)
Declare Sub A822_OutputWord Lib "A822.DLL" _
      (ByVal wPortAddr As Integer, ByVal wOutputVal As Integer)
Declare Function A822_InputByte Lib "A822.DLL" _
      (ByVal wPortAddr As Integer) As Integer
Declare Function A822_InputWord Lib "A822.DLL" _
      (ByVal wPortAddr As Integer) As Integer

'******* AD Functions ***********
Declare Function A822_SetChGain Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wChannel As Integer, _
       ByVal wConfig As Integer, ByVal wCardType As Integer) As Integer
Declare Function A822_Fast_AD_Hex Lib "A822.DLL" _
      (wVal As Integer) As Integer
Declare Function A822_Fast_AD_Float Lib "A822.DLL" _
      (fVal As Single) As Integer
```

```
Declare Function A822_AD_Hex Lib "A822.DLL" (ByVal wBase As Integer, _
       ByVal wChannel As Integer, ByVal wConfig As Integer, _
       ByVal wCardType As Integer, wVal As Integer) As Integer
Declare Function A822_AD_Float Lib "A822.DLL" (ByVal wBase As Integer, _
       ByVal wChannel As Integer, ByVal wConfig As Integer, _
       ByVal wCardType As Integer, fVal As Single) As Integer
Declare Function A822_Hex2Float Lib "A822.DLL" _
       (ByVal wConfig As Integer, ByVal wCardType As Integer, _
        ByVal wHex As Integer, fVal As Single) As Integer
Declare Function A822_ADs_Hex Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal wConfig As Integer, ByVal wType As Integer, _
        wBuf As Integer, ByVal wCount As Integer) As Integer
Declare Function A822_ADs_Float Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal wConfig As Integer, ByVal wType As Integer, _
        fbuf As Single, ByVal wCount As Integer) As Integer

' Please uses the A822_AD_Float() function
Declare Function A822_AD Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal wConfig As Integer, ByVal wType As Integer) As Single

'******* DA Functions ***********
Declare Sub A822_DA Lib "A822.DLL" (ByVal wBase As Integer, _
       ByVal wChannel As Integer, ByVal wHexValue As Integer)
Declare Sub A822_Uni5_DA Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal fValue As Single)
Declare Sub A822_Uni10_DA Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal fValue As Single)
```

```
'******* Interrupt Functions ***********
' Please uses the A822_Intxxxx series function set
Declare Function A822_InstallIrq Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        hEvent As Long, ByVal dwCount As Integer) As Integer
Declare Function A822_AD_INT_Start Lib "A822.DLL" _
       (ByVal wCardType As Integer, ByVal Ch As Integer, _
        ByVal Gain As Integer, ByVal c1 As Integer, _
        ByVal c2 As Integer) As Integer
Declare Function A822_AD_INT_Stop Lib "A822.DLL" () As Integer
Declare Function A822_GetIntCount Lib "A822.DLL" (dwVal As Long) As Integer
Declare Function A822_GetBuffer Lib "A822.DLL" _
       (ByVal dwNum As Long, wBuffer As Integer) As Integer
Declare Function A822_GetFloatBuffer Lib "A822.DLL" _
       (ByVal dwNum As Integer, fbuffer As Single) As Integer

'******* Interrupt Functions ***********
Declare Function A822_IntInstall Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        hEvent As Long, ByVal dwCount As Integer) As Integer
Declare Function A822_IntStart Lib "A822.DLL" _
       (ByVal wCardType As Integer, ByVal Ch As Integer, _
        ByVal Gain As Integer, ByVal c1 As Integer, _
        ByVal c2 As Integer) As Integer
Declare Function A822_IntGetCount Lib "A822.DLL" (dwVal As Long) As Integer
Declare Function A822_IntGetHexBuf Lib "A822.DLL" _
       (ByVal dwNum As Long, wBuffer As Integer) As Integer
Declare Function A822_IntGetFloatBuf Lib "A822.DLL" _
       (ByVal dwNum As Integer, fbuffer As Single) As Integer
Declare Function A822_IntStop Lib "A822.DLL" () As Integer
Declare Function A822_IntRemove Lib "A822.DLL" () As Integer
```

```
'******* DMA Functions ***********
Declare Function A822_AD_DMA_InstallIrq Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        ByVal wDmaChan As Integer) As Integer
Declare Function A822_AD_DMA_RemoveIrq Lib "A822.DLL" () As Integer
Declare Function A822_AD_DMA_Start Lib "A822.DLL" _
       (ByVal wCardType As Integer, ByVal Ch As Integer, _
        ByVal Gain As Integer, ByVal c1 As Integer, ByVal c2 As Integer, _
        ByVal cnt As Integer, wPassOut As Integer) As Integer
Declare Function A822_AD_DMA_Stop Lib "A822.DLL" () As Integer
Declare Function A822_AD_DMA_IsNotFinished Lib "A822.DLL" () As Integer
Declare Function A822_AD_DMA_GetBuffer Lib "A822.DLL" _
       (data As Integer) As Integer
Declare Function A822_AD_DMA_GetFloatBuffer Lib "A822.DLL" _
       (fbuf As Single) As Integer

' Function of Channel-Scan with Polling
Declare Sub A822_ChScan_Clear Lib "A822.DLL" ()
Declare Function A822_ChScan_Add Lib "A822.DLL" _
       (ByVal wChannel As Integer, ByVal wConfig As Integer) As Integer
Declare Function A822_ChScan_Set Lib "A822.DLL" _
       (wChannel As Integer, wConfig As Integer, _
        ByVal wChNum As Integer) As Integer
Declare Function A822_ChScan_PollingHex Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wCardType As Integer, _
        wBuf As Integer, ByVal wNumPerCh As Integer) As Integer
Declare Function A822_ChScan_PollingFloat Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wCardType As Integer, _
        fBuf As Single, ByVal wNumPerCh As Integer) As Integer

' Function of Channel-Scan with Interrupt
Declare Function A822_ChScan_IntInstall Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        hEvent As Long, ByVal dwNumPerCh As Long) As Integer
Declare Function A822_ChScan_IntStart Lib "A822.DLL" _
       (ByVal c1 As Integer, ByVal c2 As Integer, _
        ByVal wCardType As Integer) As Integer
Declare Function A822_ChScan_IntGetCount Lib "A822.DLL" _
       (dwVal As Long) As Integer
Declare Function A822_ChScan_IntGetHexBuf Lib "A822.DLL" _
       (wBuf As Integer) As Integer
Declare Function A822_ChScan_IntGetFloatBuf Lib "A822.DLL" _
       (fBuf As Single) As Integer
Declare Function A822_ChScan_IntStop Lib "A822.DLL" () As Integer
Declare Function A822_ChScan_IntRemove Lib "A822.DLL" () As Integer
```

2.2.3 A822.BAS (FOR WIN NT)

```
Attribute VB_Name = "A822"

'***************** DEFINE A822 RELATIVE ADDRESS *****************/
Global Const A822_TIMER0              = &H0
Global Const A822_Timer1              = &H1
Global Const A822_TIMER2              = &H2
Global Const A822_TIMER_MODE          = &H3
Global Const A822_AD_LO               = &H4  ' Analog to Digital, Low Byte
Global Const A822_AD_HI               = &H5  ' Analog to Digital, High Byte
Global Const A822_DA_CH0_LO           = &H4  ' Digit to Analog, CH 0
Global Const A822_DA_CH0_HI           = &H5
Global Const A822_DA_CH1_LO           = &H6  ' Digit to Analog, CH 1
Global Const A822_DA_CH1_HI           = &H7
Global Const A822_DI_LO               = &H6  ' Digit Input
Global Const A822_DO_LO               = &HD  ' Digit Output

Global Const A822_CLEAR_IRQ = &H8
Global Const A822_SET_GAIN  = &H9
Global Const A822_SET_CH    = &HA
Global Const A822_SET_MODE  = &HB
Global Const A822_SOFT_TRIG = &HC

Global Const A822_POLLING_MODE          = 1
Global Const A822_DMA_MODE              = 2
Global Const A822_INTERRUPT_MODE        = 6

'*** define the gain mode ***/
Global Const A822_BI_1          = 0
Global Const A822_BI_10         = 1
Global Const A822_BI_100        = 2
Global Const A822_BI_1000       = 3
Global Const A822_UNI_1         = 4
Global Const A822_UNI_10        = 5
Global Const A822_UNI_100       = 6
Global Const A822_UNI_1000      = 7
Global Const A822_BI_05         = 8
Global Const A822_BI_5          = 9
Global Const A822_BI_50         = 10
Global Const A822_BI_500        = 11
```

```
Global Const A822_BI_2   = 1
Global Const A822_BI_4   = 2
Global Const A822_BI_8   = 3
Global Const A822_UNI_2 = 5
Global Const A822_UNI_4 = 6
Global Const A822_UNI_8 = 7

Global Const A822PGL     = 0
Global Const A822PGH     = 1

Global Const A822_NoError                    = 0
Global Const A822_DriverOpenError            = 1
Global Const A822_DriverNoOpen               = 2
Global Const A822_GetDriverVersionError      = 3
Global Const A822_InstallIrqError            = 4
Global Const A822_ClearIntCountError         = 5
Global Const A822_GetIntCountError           = 6
Global Const A822_GetBufferError             = 7
Global Const A822_AdError1                   = 100
Global Const A822_AdError2                   = -200#
Global Const A822_InstallBufError            = 10
Global Const A822_AllocateMemoryError        = 11
Global Const A822_CardTypeError              = 12
Global Const A822_TimeoutError               = 13
Global Const A822_OtherError                 = 14
Global Const A822_ConfigCodeError            = 15

Global Const A822_IntStopError               = 16
Global Const A822_IntRemoveError             = 17
Global Const A822_IntInstallEventError       = 18
Global Const A822_BufferFull                 = 19
Global Const A822_NoChannelToScan            = 20
Global Const A822_IntInstallChannelError     = 21
Global Const A822_IntInstallConfigError      = 22

'******* Driver Functions ***********
Declare Function A822_DriverInit Lib "A822.DLL" () As Integer
Declare Sub A822_DriverClose Lib "A822.DLL" ()
Declare Function A822_DELAY Lib "A822.DLL" (ByVal wBase As Integer, _
      ByVal wDownCount As Integer) As Integer
Declare Function A822_Check_Address Lib "A822.DLL" _
      (ByVal wBase As Integer) As Integer
Declare Sub A822_SetTriggerMode Lib "A822.DLL" _
      (ByVal wTriggerMode As Integer)
```

```
'******* Test Functions ***********
Declare Function A822_SHORT_SUB_2 Lib "A822.DLL" _
      (ByVal nA As Integer, ByVal nB As Integer) As Integer
Declare Function A822_FLOAT_SUB_2 Lib "A822.DLL" _
      (ByVal fA As Single, ByVal fB As Single) As Single
Declare Function A822_Get_DLL_Version Lib "A822.DLL" () As Integer
Declare Function A822_GetDriverVersion Lib "A822.DLL" _
      (wDriverVersion As Integer) As Integer

'********* Counter Functions ***********
Declare Sub A822_SetCounter Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wCounterNo As Integer, _
       ByVal bCounterMode As Integer, ByVal wCounterValue As Long)
Declare Function A822_ReadCounter Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wCounterNo As Integer, _
       ByVal bCounterMode As Integer) As Long

'******* DI/DO Functions ***********
Declare Function A822_DI Lib "A822.DLL" (ByVal wBase As Integer) As Integer
Declare Sub A822_DO Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wHexValue As Integer)

Declare Sub A822_OutputByte Lib "A822.DLL" _
      (ByVal wPortAddr As Integer, ByVal bOutputVal As Byte)
Declare Sub A822_OutputWord Lib "A822.DLL" _
      (ByVal wPortAddr As Integer, ByVal wOutputVal As Integer)
Declare Function A822_InputByte Lib "A822.DLL" _
      (ByVal wPortAddr As Integer) As Integer
Declare Function A822_InputWord Lib "A822.DLL" _
      (ByVal wPortAddr As Integer) As Integer

'******* AD Functions ***********
Declare Function A822_SetChGain Lib "A822.DLL" _
      (ByVal wBase As Integer, ByVal wChannel As Integer, _
       ByVal wConfig As Integer, ByVal wCardType As Integer) As Integer
Declare Function A822_Fast_AD_Hex Lib "A822.DLL" _
      (wVal As Integer) As Integer
Declare Function A822_Fast_AD_Float Lib "A822.DLL" _
      (fVal As Single) As Integer
```

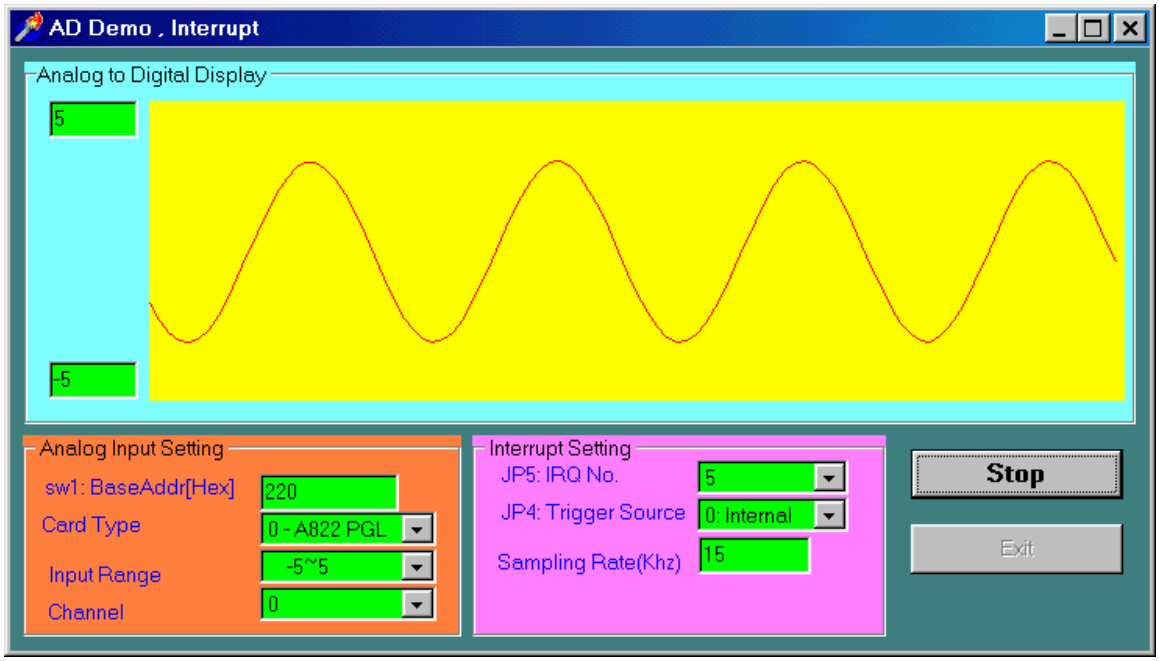
```
Declare Function A822_AD_Hex Lib "A822.DLL" (ByVal wBase As Integer, _
       ByVal wChannel As Integer, ByVal wConfig As Integer, _
       ByVal wCardType As Integer, wVal As Integer) As Integer
Declare Function A822_AD_Float Lib "A822.DLL" (ByVal wBase As Integer, _
       ByVal wChannel As Integer, ByVal wConfig As Integer, _
       ByVal wCardType As Integer, fVal As Single) As Integer
Declare Function A822_Hex2Float Lib "A822.DLL" _
       (ByVal wConfig As Integer, ByVal wCardType As Integer, _
        ByVal wHex As Integer, fVal As Single) As Integer
Declare Function A822_ADs_Hex Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal wConfig As Integer, ByVal wType As Integer, _
        wBuf As Integer, ByVal wCount As Integer) As Integer
Declare Function A822_ADs_Float Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal wConfig As Integer, ByVal wType As Integer, _
        fbuf As Single, ByVal wCount As Integer) As Integer

' Please uses the A822_AD_Float() function
Declare Function A822_AD Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal wConfig As Integer, ByVal wType As Integer) As Single

'******* DA Functions ***********
Declare Sub A822_DA Lib "A822.DLL" (ByVal wBase As Integer, _
       ByVal wChannel As Integer, ByVal wHexValue As Integer)
Declare Sub A822_Uni5_DA Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal fValue As Single)
Declare Sub A822_Uni10_DA Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wChannel As Integer, _
        ByVal fValue As Single)
```

```
'******* Interrupt Functions ***********
' Please use the A822_Intxxxx series function set
Declare Function A822_InstallIrq Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        hEvent As Long, ByVal dwCount As Integer) As Integer
Declare Function A822_AD_INT_Start Lib "A822.DLL" _
       (ByVal wCardType As Integer, ByVal Ch As Integer, _
        ByVal Gain As Integer, ByVal c1 As Integer, _
        ByVal c2 As Integer) As Integer
Declare Function A822_AD_INT_Stop Lib "A822.DLL" () As Integer
Declare Function A822_GetIntCount Lib "A822.DLL" (dwVal As Long) As Integer
Declare Function A822_GetBuffer Lib "A822.DLL" _
       (ByVal dwNum As Long, wBuffer As Integer) As Integer
Declare Function A822_GetFloatBuffer Lib "A822.DLL" _
       (ByVal dwNum As Integer, fbuffer As Single) As Integer

'******* Interrupt Functions ***********
Declare Function A822_IntInstall Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        hEvent As Long, ByVal dwCount As Integer) As Integer
Declare Function A822_IntStart Lib "A822.DLL" _
       (ByVal wCardType As Integer, ByVal Ch As Integer, _
        ByVal Gain As Integer, ByVal c1 As Integer, _
        ByVal c2 As Integer) As Integer
Declare Function A822_IntGetCount Lib "A822.DLL" (dwVal As Long) As Integer
Declare Function A822_IntGetHexBuf Lib "A822.DLL" _
       (ByVal dwNum As Long, wBuffer As Integer) As Integer
Declare Function A822_IntGetFloatBuf Lib "A822.DLL" _
       (ByVal dwNum As Integer, fbuffer As Single) As Integer
Declare Function A822_IntStop Lib "A822.DLL" () As Integer
Declare Function A822_IntRemove Lib "A822.DLL" () As Integer
```

```
' Function of Channel-Scan with Polling
Declare Sub A822_ChScan_Clear Lib "A822.DLL" ()
Declare Function A822_ChScan_Add Lib "A822.DLL" _
       (ByVal wChannel As Integer, ByVal wConfig As Integer) As Integer
Declare Function A822_ChScan_Set Lib "A822.DLL" _
       (wChannel As Integer, wConfig As Integer, _
        ByVal wChNum As Integer) As Integer
Declare Function A822_ChScan_PollingHex Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wCardType As Integer, _
        wBuf As Integer, ByVal wNumPerCh As Integer) As Integer
Declare Function A822_ChScan_PollingFloat Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wCardType As Integer, _
        fBuf As Single, ByVal wNumPerCh As Integer) As Integer

' Function of Channel-Scan with Interrupt
Declare Function A822_ChScan_IntInstall Lib "A822.DLL" _
       (ByVal wBase As Integer, ByVal wIrq As Integer, _
        hEvent As Long, ByVal dwNumPerCh As Long) As Integer
Declare Function A822_ChScan_IntStart Lib "A822.DLL" _
       (ByVal c1 As Integer, ByVal c2 As Integer, _
        ByVal wCardType As Integer) As Integer
Declare Function A822_ChScan_IntGetCount Lib "A822.DLL" _
       (dwVal As Long) As Integer
Declare Function A822_ChScan_IntGetHexBuf Lib "A822.DLL" _
       (wBuf As Integer) As Integer
Declare Function A822_ChScan_IntGetFloatBuf Lib "A822.DLL" _
       (fBuf As Single) As Integer
Declare Function A822_ChScan_IntStop Lib "A822.DLL" () As Integer
Declare Function A822_ChScan_IntRemove Lib "A822.DLL" () As Integer
```

2.3 USING DELPHI

2.3.1 DELPHI DEMO RESULT



2.3.2 A822.PAS (FOR WIN 95/98)

```
unit A822;

interface

type PSingle=^Single;
    PWord=^Word;
    PInteger=^Integer;

Const
//***************** DEFINE A822 RELATIVE ADDRESS *****************/
 A822_TIMER0            =  $00;
 A822_TIMER1            =  $01;
 A822_TIMER2            =  $02;
 A822_TIMER_MODE        =  $03;
 A822_AD_LO             =  $04;   //* Analog to Digital, Low Byte */
 A822_AD_HI             =  $05;   //* Analog to Digital, High Byte */
 A822_DA_CH0_LO         =  $04;   //* Digit to Analog, CH 0 */
 A822_DA_CH0_HI         =  $05;
 A822_DA_CH1_LO         =  $06;   //* Digit to Analog, CH 1 */
 A822_DA_CH1_HI         =  $07;
 A822_DI_LO             =  $06;   //* Digit Input */
 A822_DO_LO             =  $0D;    //* Digit Output */

 A822_CLEAR_IRQ         =  $08;
 A822_SET_GAIN          =  $09;
 A822_SET_CH            =  $0A;
 A822_SET_MODE          =  $0B;
 A822_SOFT_TRIG         =  $0C;

 A822_POLLING_MODE          =  1;
 A822_DMA_MODE              =  2;
 A822_INTERRUPT_MODE        =  6;
```

```
//*** define the gain mode ***/
 A822_A822_BI_1          =  0;
 A822_A822_BI_10         =  1;
 A822_A822_BI_100        =  2;
 A822_A822_BI_1000       =  3;
 A822_A822_UNI_1         =  4;
 A822_A822_UNI_10        =  5;
 A822_A822_UNI_100       =  6;
 A822_A822_UNI_1000      =  7;
 A822_A822_BI_05         =  8;
 A822_A822_BI_5          =  9;
 A822_A822_BI_50         =  10;
 A822_A822_BI_500        =  11;

 A822_A822_BI_2          =  1;
 A822_A822_BI_4          =  2;
 A822_A822_BI_8          =  3;
 A822_A822_UNI_2         =  5;
 A822_A822_UNI_4         =  6;
 A822_A822_UNI_8         =  7;

 A822PGL           =  0;
 A822PGH           =  1;

 A822_NoError                    = 0;
 A822_DriverOpenError            = 1;
 A822_DriverNoOpen               = 2;
 A822_GetDriverVersionError      = 3;
 A822_InstallIrqError            = 4;
 A822_ClearIntCountError         = 5;
 A822_GetIntCountError           = 6;
 A822_GetBufferError             = 7;
 A822_AdError1                   = 100;
 A822_AdError2                   = -200;
 A822_InstallBufError            = 10;
 A822_AllocateMemoryError        = 11;
 A822_CardTypeError              = 12;
 A822_TimeoutError               = 13;
 A822_OtherError                 = 14;
 A822_ConfigCodeError            = 15;
```

```
 A822_IntStopError              = 16;
 A822_IntRemoveError            = 17;
 A822_IntInstallEventError      = 18;
 A822_BufferFull                = 19;
 A822_NoChannelToScan           = 20;
 A822_IntInstallChannelError    = 21;
 A822_IntInstallConfigError     = 22;
 A822_GetDmaStatusError         = 23;

// Function of Driver
Function  A822_DELAY(wBase,wDownCount:WORD):WORD; StdCall;
Function  A822_Check_Address(wBase:WORD):WORD; StdCall;
Function  A822_DriverInit:WORD; StdCall;
Procedure A822_DriverClose; StdCall;
Procedure A822_SetTriggerMode( wTriggerMode:WORD ); StdCall;

// Function of Test
Function  A822_SHORT_SUB_2(nA, nB : SmallInt):SmallInt; StdCall;
Function  A822_FLOAT_SUB_2(fA, fB : Single):Single; StdCall;
Function  A822_Get_DLL_Version:WORD; StdCall;
Function  A822_GetDriverVersion
        (var wDriverVersion:WORD):Word; StdCall;

// Function of Counter
Procedure A822_SetCounter( wBase:WORD;       wCounterNo:WORD;
        bCounterMode:WORD; wCounterValue:LongInt); StdCall;
Function  A822_ReadCounter( wBase:WORD;       wCounterNo:WORD;
              bCounterMode:WORD ):LongInt; StdCall;

// Function of DI/DO
Procedure A822_DO(wBase, wHexValue:Word); StdCall;
Function  A822_DI(wBase:Word):Word; StdCall;

Procedure A822_OutputByte
        (wPortAddr:WORD; bOutputVal:Byte); StdCall;
Procedure A822_OutputWord
        (wPortAddr:WORD; wOutputVal:WORD); StdCall;
Function  A822_InputByte(wPortAddr:WORD):WORD; StdCall;
Function  A822_InputWord(wPortAddr:WORD):WORD; StdCall;
```

```
// Function of AD/DA
Function  A822_SetChGain(wBase:WORD; wChannel:WORD;
        wConfig:WORD; wCardType:WORD):Word; StdCall;
Function  A822_Fast_AD_Hex(var wVal:WORD):Word; StdCall;
Function  A822_Fast_AD_Float(var fVal:Single):Word; StdCall;

Function  A822_AD_Hex(wBase:WORD; wChannel:WORD; wConfig:WORD;
        wCardType:WORD; var wVal:WORD):Word; StdCall;
Function  A822_AD_Float( wBase:WORD; wChannel:WORD; wConfig:WORD;
        wCardType:WORD; var fVal:Single):Word; StdCall;
Function  A822_Hex2Float(wConfig:WORD; wCardType:WORD;
        wHex:WORD; var fVal:Single):Word; StdCall;
Function  A822_ADs_Hex(  wBase,wChannel,wConfig,wType:WORD;
        wBuf:PInteger; wCount:WORD):WORD; StdCall;
Function  A822_ADs_Float(wBase,wChannel,wConfig,wType:WORD;
        fBuf:PSingle; wCount:WORD):WORD; StdCall;

// Please uses the A822_AD_Float() function
Function  A822_AD(wBase, wChannel, wConfig, wType:WORD)
        :Single; StdCall;

// Function of DA
Procedure A822_DA(wBase, wChannel, wHexValue:WORD); StdCall;
Procedure A822_Uni5_DA
        (wBase, wChannel:Word; fValue:Single); StdCall;
Procedure A822_Uni10_DA
        (wBase, wChannel:Word; fValue:Single); StdCall;

// Function of Interrupt
// Please uses the A822_Intxxxx series function set
Function  A822_InstallIrq(wBase, wIrq:WORD; var hEvent:LongInt;
        dwCount:LongInt):WORD; StdCall;
Function  A822_GetBuffer
        (dwNum:LongInt; wBuffer:PInteger):WORD; StdCall;
Function  A822_GetFloatBuffer
        (dwNum:LongInt; fBuffer:PSingle):WORD; StdCall;
Function  A822_GetIntCount(var dwVal:LongInt):WORD; StdCall;
Function  A822_AD_INT_Start
        (wCardType,Ch,Gain,c1,c2:WORD):WORD; StdCall;
Function  A822_AD_INT_Stop:WORD; StdCall;
```

```
// Function of Interrupt
Function  A822_IntInstall(wBase, wIrq:WORD;
        var hEvent:LongInt; dwCount:LongInt):WORD; StdCall;
Function  A822_IntStart
        (wCardType,Ch,Gain,c1,c2:WORD):WORD; StdCall;
Function  A822_IntGetCount(var dwVal:LongInt):WORD; StdCall;
Function  A822_IntGetHexBuf
        (dwNum:LongInt; wBuffer:PInteger):WORD; StdCall;
Function  A822_IntGetFloatBuf
        (dwNum:LongInt; fBuffer:PSingle):WORD; StdCall;
Function  A822_IntStop:WORD; StdCall;
Function  A822_IntRemove:WORD; StdCall;

// Function of DMA
Function  A822_AD_DMA_InstallIrq
        (wBase,wIrq,wDmaChan:WORD):WORD; StdCall;
Function  A822_AD_DMA_RemoveIrq:WORD; StdCall;
Function  A822_AD_DMA_Start(wCardType,Ch,Gain:WORD; c1,c2:WORD;
        cnt:integer; wPassOut:PInteger):WORD; StdCall;
Function  A822_AD_DMA_Stop:WORD; StdCall;
Function  A822_AD_DMA_IsNotFinished:WORD; StdCall;
Function  A822_AD_DMA_GetBuffer(wData:PWORD):WORD; StdCall;
Function  A822_AD_DMA_GetFloatBuffer
        (fBuf:PSingle):WORD; StdCall;

// Function of Channel-Scan with Polling
procedure A822_ChScan_Clear; StdCall;
Function  A822_ChScan_Add
        ( wChannel:WORD; wConfig:WORD):WORD; StdCall;
Function  A822_ChScan_Set(wChannel:PWord; wConfig:PWord;
        wChNum:WORD):WORD; StdCall;
Function  A822_ChScan_PollingHex(wBase:WORD; wCardType:WORD;
        wBuf:PWord; wNumPerCh:WORD):WORD; StdCall;
Function  A822_ChScan_PollingFloat(wBase:WORD; wCardType:WORD;
        fBuf:PSingle; wNumPerCh:WORD):WORD; StdCall;

// Function of Channel-Scan with Interrupt
Function  A822_ChScan_IntInstall(wBase:WORD; wIrq:WORD;
        var hEvent:LongInt; dwNumPerCh:LongInt):WORD; StdCall;
Function  A822_ChScan_IntStart
        (c1:WORD; c2:WORD; wCardType:WORD):WORD; StdCall;
Function  A822_ChScan_IntGetCount(var dwVal:LongInt):WORD; StdCall;
Function  A822_ChScan_IntGetHexBuf(wBuf:PWord):WORD; StdCall;
Function  A822_ChScan_IntGetFloatBuf(fBuf:PSingle):WORD; StdCall;
Function  A822_ChScan_IntStop:WORD; StdCall;
Function  A822_ChScan_IntRemove:WORD; StdCall;
```

```
implementation

// Function of Driver
Function  A822_DriverInit;                  external 'A822.DLL'
   name 'A822_DriverInit';
Procedure A822_DriverClose;                 external 'A822.DLL'
   name 'A822_DriverClose';
Function  A822_DELAY;                       external 'A822.DLL'
   name 'A822_DELAY';
Function  A822_Check_Address;               external 'A822.DLL'
   name 'A822_Check_Address';
Procedure A822_SetTriggerMode;              external 'A822.DLL'
   name 'A822_SetTriggerMode';

// Function of Test
Function  A822_SHORT_SUB_2;                 external 'A822.DLL'
   name 'A822_SHORT_SUB_2';
Function  A822_FLOAT_SUB_2;                 external 'A822.DLL'
   name 'A822_FLOAT_SUB_2';
Function  A822_Get_DLL_Version;             external 'A822.DLL'
   name 'A822_Get_DLL_Version';
Function  A822_GetDriverVersion;            external 'A822.DLL'
   name 'A822_GetDriverVersion';

// Function of Counter
Procedure A822_SetCounter;                  external 'A822.DLL'
   name 'A822_SetCounter';
Function  A822_ReadCounter;                 external 'A822.DLL'
   name 'A822_ReadCounter';

// Function of DI/O
Procedure A822_DO;                          external 'A822.DLL'
   name 'A822_DO';
Function  A822_DI;                          external 'A822.DLL'
   name 'A822_DI';

Procedure A822_OutputByte;                  external 'A822.DLL'
   name 'A822_OutputByte';
Procedure A822_OutputWord;                  external 'A822.DLL'
   name 'A822_OutputWord';
Function  A822_InputByte;                   external 'A822.DLL'
   name 'A822_InputByte';
Function  A822_InputWord;                   external 'A822.DLL'
   name 'A822_InputWord';
```

```
// Function of AD
Function  A822_SetChGain;                    external 'A822.DLL'
   name 'A822_SetChGain';
Function  A822_Fast_AD_Hex;                  external 'A822.DLL'
   name 'A822_Fast_AD_Hex';
Function  A822_Fast_AD_Float;                external 'A822.DLL'
   name 'A822_Fast_AD_Float';

Function  A822_AD_Hex;                       external 'A822.DLL'
   name 'A822_AD_Hex';
Function  A822_AD_Float;                     external 'A822.DLL'
   name 'A822_AD_Float';
Function  A822_Hex2Float;                    external 'A822.DLL'
   name 'A822_Hex2Float';
Function  A822_ADs_Hex;                      external 'A822.DLL'
   name 'A822_ADs_Hex';
Function  A822_ADs_Float;                    external 'A822.DLL'
   name 'A822_ADs_Float';

// Please uses the A822_AD_Float() function
Function  A822_AD;                           external 'A822.DLL'
   name 'A822_AD';

// Function of DA
Procedure A822_DA;                           external 'A822.DLL'
   name 'A822_DA';
Procedure A822_Uni5_DA;                      external 'A822.DLL'
   name 'A822_Uni5_DA';
Procedure A822_Uni10_DA;                     external 'A822.DLL'
   name 'A822_Uni10_DA';

// Function of Interrupt
// Please uses the A822_Intxxxx series function set
Function  A822_InstallIrq;                   external 'A822.DLL'
   name 'A822_InstallIrq';
Function  A822_AD_INT_Start;                 external 'A822.DLL'
   name 'A822_AD_INT_Start';
Function  A822_AD_INT_Stop;                  external 'A822.DLL'
   name 'A822_AD_INT_Stop';
Function  A822_GetIntCount;                  external 'A822.DLL'
   name 'A822_GetIntCount';
Function  A822_GetBuffer;                    external 'A822.DLL'
   name 'A822_GetBuffer';
Function  A822_GetFloatBuffer;               external 'A822.DLL'
   name 'A822_GetFloatBuffer';
```

```
// Function of Interrupt
Function  A822_IntInstall;                external 'A822.DLL'
   name 'A822_IntInstall';
Function  A822_IntStart;                  external 'A822.DLL'
   name 'A822_IntStart';
Function  A822_IntGetCount;               external 'A822.DLL'
   name 'A822_IntGetCount';
Function  A822_IntGetHexBuf;              external 'A822.DLL'
   name 'A822_IntGetHexBuf';
Function  A822_IntGetFloatBuf;            external 'A822.DLL'
   name 'A822_IntGetFloatBuf';
Function  A822_IntStop;                   external 'A822.DLL'
   name 'A822_IntStop';
Function  A822_IntRemove;                 external 'A822.DLL'
   name 'A822_IntRemove';

// Function of DMA
Function  A822_AD_DMA_InstallIrq;             external 'A822.DLL'
   name 'A822_AD_DMA_InstallIrq';
Function  A822_AD_DMA_RemoveIrq;              external 'A822.DLL'
   name 'A822_AD_DMA_RemoveIrq';
Function  A822_AD_DMA_Start;                  external 'A822.DLL'
   name 'A822_AD_DMA_Start';
Function  A822_AD_DMA_Stop;                   external 'A822.DLL'
   name 'A822_AD_DMA_Stop';
Function  A822_AD_DMA_IsNotFinished;          external 'A822.DLL'
   name 'A822_AD_DMA_IsNotFinished';
Function  A822_AD_DMA_GetBuffer;              external 'A822.DLL'
   name 'A822_AD_DMA_GetBuffer';
Function  A822_AD_DMA_GetFloatBuffer;         external 'A822.DLL'
   name 'A822_AD_DMA_GetFloatBuffer';

// Function of Channel-Scan with Polling
procedure A822_ChScan_Clear;              external 'A822.DLL'
   name 'A822_ChScan_Clear';
Function  A822_ChScan_Add;                external 'A822.DLL'
   name 'A822_ChScan_Add';
Function  A822_ChScan_Set;                external 'A822.DLL'
   name 'A822_ChScan_Set';
Function  A822_ChScan_PollingHex;         external 'A822.DLL'
   name 'A822_ChScan_PollingHex';
Function  A822_ChScan_PollingFloat;       external 'A822.DLL'
   name 'A822_ChScan_PollingFloat';
```

```
// Function of Channel-Scan with Interrupt
Function  A822_ChScan_IntInstall;              external 'A822.DLL'
   name 'A822_ChScan_IntInstall';
Function  A822_ChScan_IntStart;                external 'A822.DLL'
   name 'A822_ChScan_IntStart';
Function  A822_ChScan_IntGetCount;             external 'A822.DLL'
   name 'A822_ChScan_IntGetCount';
Function  A822_ChScan_IntGetHexBuf;            external 'A822.DLL'
   name 'A822_ChScan_IntGetHexBuf';
Function  A822_ChScan_IntGetFloatBuf;          external 'A822.DLL'
   name 'A822_ChScan_IntGetFloatBuf';
Function  A822_ChScan_IntStop;                 external 'A822.DLL'
   name 'A822_ChScan_IntStop';
Function  A822_ChScan_IntRemove;               external 'A822.DLL'
   name 'A822_ChScan_IntRemove';

end.
```

2.3.3 A822.PAS (FOR WIN NT)

```
unit A822;

interface

type PSingle=^Single;
    PWord=^Word;
    PInteger=^Integer;

Const
//***************** DEFINE A822 RELATIVE ADDRESS *****************/
 A822_TIMER0            =  $00;
 A822_TIMER1            =  $01;
 A822_TIMER2            =  $02;
 A822_TIMER_MODE        =  $03;
 A822_AD_LO             =  $04;   //* Analog to Digital, Low Byte */
 A822_AD_HI             =  $05;   //* Analog to Digital, High Byte */
 A822_DA_CH0_LO         =  $04;   //* Digit to Analog, CH 0 */
 A822_DA_CH0_HI         =  $05;
 A822_DA_CH1_LO         =  $06;   //* Digit to Analog, CH 1 */
 A822_DA_CH1_HI         =  $07;
 A822_DI_LO             =  $06;   //* Digit Input */
 A822_DO_LO             =  $0D;    //* Digit Output */

 A822_CLEAR_IRQ         =  $08;
 A822_SET_GAIN          =  $09;
 A822_SET_CH            =  $0A;
 A822_SET_MODE          =  $0B;
 A822_SOFT_TRIG         =  $0C;

 A822_POLLING_MODE          =  1;
 A822_DMA_MODE              =  2;
 A822_INTERRUPT_MODE        =  6;
```

```
//*** define the gain mode ***/
 A822_A822_BI_1          =  0;
 A822_A822_BI_10         =  1;
 A822_A822_BI_100        =  2;
 A822_A822_BI_1000       =  3;
 A822_A822_UNI_1         =  4;
 A822_A822_UNI_10        =  5;
 A822_A822_UNI_100       =  6;
 A822_A822_UNI_1000      =  7;
 A822_A822_BI_05         =  8;
 A822_A822_BI_5          =  9;
 A822_A822_BI_50         =  10;
 A822_A822_BI_500        =  11;

 A822_A822_BI_2          =  1;
 A822_A822_BI_4          =  2;
 A822_A822_BI_8          =  3;
 A822_A822_UNI_2         =  5;
 A822_A822_UNI_4         =  6;
 A822_A822_UNI_8         =  7;

 A822PGL     =  0;
 A822PGH     =  1;

 A822_NoError                    = 0;
 A822_DriverOpenError            = 1;
 A822_DriverNoOpen               = 2;
 A822_GetDriverVersionError      = 3;
 A822_InstallIrqError            = 4;
 A822_ClearIntCountError         = 5;
 A822_GetIntCountError           = 6;
 A822_GetBufferError             = 7;
 A822_AdError1                   = 100;
 A822_AdError2                   = -200;
 A822_InstallBufError            = 10;
 A822_AllocateMemoryError        = 11;
 A822_CardTypeError              = 12;
 A822_TimeoutError               = 13;
 A822_OtherError                 = 14;
 A822_ConfigCodeError            = 15;
```

```
 A822_IntStopError              = 16;
 A822_IntRemoveError            = 17;
 A822_IntInstallEventError      = 18;
 A822_BufferFull                = 19;
 A822_NoChannelToScan           = 20;
 A822_IntInstallChannelError    = 21;
 A822_IntInstallConfigError     = 22;

// Function of Driver
Function      A822_DELAY(wBase,wDownCount:WORD):WORD; StdCall;
Function      A822_Check_Address(wBase:WORD):WORD; StdCall;
Function      A822_DriverInit:WORD; StdCall;
Procedure     A822_DriverClose; StdCall;
Procedure     A822_SetTriggerMode( wTriggerMode:WORD ); StdCall;

// Function of Test
Function      A822_SHORT_SUB_2(nA, nB : SmallInt):SmallInt; StdCall;
Function      A822_FLOAT_SUB_2(fA, fB : Single):Single; StdCall;
Function      A822_Get_DLL_Version:WORD; StdCall;
Function      A822_GetDriverVersion
        (var wDriverVersion:WORD):Word; StdCall;

// Function of Counter
Procedure     A822_SetCounter( wBase:WORD;       wCounterNo:WORD;
        bCounterMode:WORD; wCounterValue:LongInt); StdCall;
Function      A822_ReadCounter( wBase:WORD;       wCounterNo:WORD;
          bCounterMode:WORD ):LongInt; StdCall;

// Function of DI/DO
Procedure     A822_DO(wBase, wHexValue:Word); StdCall;
Function      A822_DI(wBase:Word):Word; StdCall;

Procedure     A822_OutputByte
        (wPortAddr:WORD; bOutputVal:Byte); StdCall;
Procedure     A822_OutputWord
        (wPortAddr:WORD; wOutputVal:WORD); StdCall;
Function      A822_InputByte(wPortAddr:WORD):WORD; StdCall;
Function      A822_InputWord(wPortAddr:WORD):WORD; StdCall;
```

```
// Function of AD/DA
Function        A822_SetChGain(wBase:WORD; wChannel:WORD;
        wConfig:WORD; wCardType:WORD):Word; StdCall;
Function        A822_Fast_AD_Hex(var wVal:WORD):Word; StdCall;
Function        A822_Fast_AD_Float(var fVal:Single):Word; StdCall;

Function  A822_AD_Hex(wBase:WORD; wChannel:WORD; wConfig:WORD;
        wCardType:WORD; var wVal:WORD):Word; StdCall;
Function  A822_AD_Float( wBase:WORD; wChannel:WORD; wConfig:WORD;
        wCardType:WORD; var fVal:Single):Word; StdCall;
Function  A822_Hex2Float(wConfig:WORD; wCardType:WORD;
        wHex:WORD; var fVal:Single):Word; StdCall;
Function  A822_ADs_Hex(  wBase,wChannel,wConfig,wType:WORD;
        wBuf:PInteger; wCount:WORD):WORD; StdCall;
Function  A822_ADs_Float(wBase,wChannel,wConfig,wType:WORD;
        fBuf:PSingle; wCount:WORD):WORD; StdCall;

// Please uses the A822_AD_Float() function
Function  A822_AD(wBase, wChannel, wConfig, wType:WORD)
        :Single; StdCall;

// Function of DA
Procedure A822_DA(wBase, wChannel, wHexValue:WORD); StdCall;
Procedure A822_Uni5_DA
        (wBase, wChannel:Word; fValue:Single); StdCall;
Procedure A822_Uni10_DA
        (wBase, wChannel:Word; fValue:Single); StdCall;

// Function of Interrupt
// Please uses the A822_Intxxxx series function set
Function  A822_InstallIrq(wBase, wIrq:WORD; var hEvent:LongInt;
        dwCount:LongInt):WORD; StdCall;
Function  A822_GetBuffer
        (dwNum:LongInt; wBuffer:PInteger):WORD; StdCall;
Function  A822_GetFloatBuffer
        (dwNum:LongInt; fBuffer:PSingle):WORD; StdCall;
Function  A822_GetIntCount(var dwVal:LongInt):WORD; StdCall;
Function  A822_AD_INT_Start
        (wCardType,Ch,Gain,c1,c2:WORD):WORD; StdCall;
Function  A822_AD_INT_Stop:WORD; StdCall;
```

```
// Function of Interrupt
Function  A822_IntInstall(wBase, wIrq:WORD;
        var hEvent:LongInt; dwCount:LongInt):WORD; StdCall;
Function  A822_IntStart
        (wCardType,Ch,Gain,c1,c2:WORD):WORD; StdCall;
Function  A822_IntGetCount(var dwVal:LongInt):WORD; StdCall;
Function  A822_IntGetHexBuf
        (dwNum:LongInt; wBuffer:PInteger):WORD; StdCall;
Function  A822_IntGetFloatBuf
        (dwNum:LongInt; fBuffer:PSingle):WORD; StdCall;
Function  A822_IntStop:WORD; StdCall;
Function  A822_IntRemove:WORD; StdCall;

// Function of Channel-Scan with Polling
procedure A822_ChScan_Clear; StdCall;
Function  A822_ChScan_Add
        ( wChannel:WORD; wConfig:WORD):WORD; StdCall;
Function  A822_ChScan_Set(wChannel:PWord; wConfig:PWord;
        wChNum:WORD):WORD; StdCall;
Function  A822_ChScan_PollingHex(wBase:WORD; wCardType:WORD;
        wBuf:PWord; wNumPerCh:WORD):WORD; StdCall;
Function  A822_ChScan_PollingFloat(wBase:WORD; wCardType:WORD;
        fBuf:PSingle; wNumPerCh:WORD):WORD; StdCall;

// Function of Channel-Scan with Interrupt
Function  A822_ChScan_IntInstall(wBase:WORD; wIrq:WORD;
        var hEvent:LongInt; dwNumPerCh:LongInt):WORD; StdCall;
Function  A822_ChScan_IntStart
        (c1:WORD; c2:WORD; wCardType:WORD):WORD; StdCall;
Function  A822_ChScan_IntGetCount(var dwVal:LongInt):WORD; StdCall;
Function  A822_ChScan_IntGetHexBuf(wBuf:PWord):WORD; StdCall;
Function  A822_ChScan_IntGetFloatBuf(fBuf:PSingle):WORD; StdCall;
Function  A822_ChScan_IntStop:WORD; StdCall;
Function  A822_ChScan_IntRemove:WORD; StdCall;
```

```
implementation

// Function of Driver
Function  A822_DriverInit;                  external 'A822.DLL'
   name 'A822_DriverInit';
Procedure A822_DriverClose;                 external 'A822.DLL'
   name 'A822_DriverClose';
Function  A822_DELAY;                       external 'A822.DLL'
   name 'A822_DELAY';
Function  A822_Check_Address;               external 'A822.DLL'
   name 'A822_Check_Address';
Procedure A822_SetTriggerMode;              external 'A822.DLL'
   name 'A822_SetTriggerMode';

// Function of Test
Function  A822_SHORT_SUB_2;                 external 'A822.DLL'
   name 'A822_SHORT_SUB_2';
Function  A822_FLOAT_SUB_2;                 external 'A822.DLL'
   name 'A822_FLOAT_SUB_2';
Function  A822_Get_DLL_Version;             external 'A822.DLL'
   name 'A822_Get_DLL_Version';
Function  A822_GetDriverVersion;            external 'A822.DLL'
   name 'A822_GetDriverVersion';

// Function of Counter
Procedure A822_SetCounter;                  external 'A822.DLL'
   name 'A822_SetCounter';
Function  A822_ReadCounter;                 external 'A822.DLL'
   name 'A822_ReadCounter';

// Function of DI/O
Procedure A822_DO;                          external 'A822.DLL'
   name 'A822_DO';
Function  A822_DI;                          external 'A822.DLL'
   name 'A822_DI';

Procedure A822_OutputByte;                  external 'A822.DLL'
   name 'A822_OutputByte';
Procedure A822_OutputWord;                  external 'A822.DLL'
   name 'A822_OutputWord';
Function  A822_InputByte;                   external 'A822.DLL'
   name 'A822_InputByte';
Function  A822_InputWord;                   external 'A822.DLL'
   name 'A822_InputWord';
```

```
// Function of AD
Function  A822_SetChGain;                    external 'A822.DLL'
   name 'A822_SetChGain';
Function  A822_Fast_AD_Hex;                  external 'A822.DLL'
   name 'A822_Fast_AD_Hex';
Function  A822_Fast_AD_Float;                external 'A822.DLL'
   name 'A822_Fast_AD_Float';

Function  A822_AD_Hex;                       external 'A822.DLL'
   name 'A822_AD_Hex';
Function  A822_AD_Float;                     external 'A822.DLL'
   name 'A822_AD_Float';
Function  A822_Hex2Float;                    external 'A822.DLL'
   name 'A822_Hex2Float';
Function  A822_ADs_Hex;                      external 'A822.DLL'
   name 'A822_ADs_Hex';
Function  A822_ADs_Float;                    external 'A822.DLL'
   name 'A822_ADs_Float';

// Please uses the A822_AD_Float() function
Function  A822_AD;                           external 'A822.DLL'
   name 'A822_AD';

// Function of DA
Procedure A822_DA;                           external 'A822.DLL'
   name 'A822_DA';
Procedure A822_Uni5_DA;                      external 'A822.DLL'
   name 'A822_Uni5_DA';
Procedure A822_Uni10_DA;                     external 'A822.DLL'
   name 'A822_Uni10_DA';

// Function of Interrupt
// Please uses the A822_Intxxxx series function set
Function  A822_InstallIrq;                   external 'A822.DLL'
   name 'A822_InstallIrq';
Function  A822_AD_INT_Start;                 external 'A822.DLL'
   name 'A822_AD_INT_Start';
Function  A822_AD_INT_Stop;                  external 'A822.DLL'
   name 'A822_AD_INT_Stop';
Function  A822_GetIntCount;                  external 'A822.DLL'
   name 'A822_GetIntCount';
Function  A822_GetBuffer;                    external 'A822.DLL'
   name 'A822_GetBuffer';
Function  A822_GetFloatBuffer;               external 'A822.DLL'
   name 'A822_GetFloatBuffer';
```

```
// Function of Interrupt
Function  A822_IntInstall;                    external 'A822.DLL'
   name 'A822_IntInstall';
Function  A822_IntStart;                      external 'A822.DLL'
   name 'A822_IntStart';
Function  A822_IntGetCount;                   external 'A822.DLL'
   name 'A822_IntGetCount';
Function  A822_IntGetHexBuf;                  external 'A822.DLL'
   name 'A822_IntGetHexBuf';
Function  A822_IntGetFloatBuf;                external 'A822.DLL'
   name 'A822_IntGetFloatBuf';
Function  A822_IntStop;                       external 'A822.DLL'
   name 'A822_IntStop';
Function  A822_IntRemove;                     external 'A822.DLL'
   name 'A822_IntRemove';

// Function of Channel-Scan with Polling
procedure A822_ChScan_Clear;                  external 'A822.DLL'
   name 'A822_ChScan_Clear';
Function  A822_ChScan_Add;                    external 'A822.DLL'
   name 'A822_ChScan_Add';
Function  A822_ChScan_Set;                    external 'A822.DLL'
   name 'A822_ChScan_Set';
Function  A822_ChScan_PollingHex;             external 'A822.DLL'
   name 'A822_ChScan_PollingHex';
Function  A822_ChScan_PollingFloat;           external 'A822.DLL'
   name 'A822_ChScan_PollingFloat';

// Function of Channel-Scan with Interrupt
Function  A822_ChScan_IntInstall;             external 'A822.DLL'
   name 'A822_ChScan_IntInstall';
Function  A822_ChScan_IntStart;               external 'A822.DLL'
   name 'A822_ChScan_IntStart';
Function  A822_ChScan_IntGetCount;            external 'A822.DLL'
   name 'A822_ChScan_IntGetCount';
Function  A822_ChScan_IntGetHexBuf;           external 'A822.DLL'
   name 'A822_ChScan_IntGetHexBuf';
Function  A822_ChScan_IntGetFloatBuf;         external 'A822.DLL'
   name 'A822_ChScan_IntGetFloatBuf';
Function  A822_ChScan_IntStop;                external 'A822.DLL'
   name 'A822_ChScan_IntStop';
Function  A822_ChScan_IntRemove;              external 'A822.DLL'
   name 'A822_ChScan_IntRemove';

end.
```

3. FUNCTION DESCRIPTION

The functions in the DLL are divided into several groups as follows:

1. Not supported functions
2. The Driver functions
3. The Test functions
4. The Counter functions
5. The DI/O functions
6. The DA functions
7. The AD Polling functions
8. The AD Interrupt functions
9. The AD DMA functions
10. The AD Channel-Scan Polling functions
11. The AD Channel-Scan Interrupt functions

(The DMA functions supported under Windows 95/98 only)

In this chapter, we use some keywords to indicate the attribute of Parameters.

Keyword	Parameter Set by user before calling this function ?	User Gets the data/value from this parameter after calling this function ?
[In]	Yes	No
[Out]	No	Yes
[In, Out]	Yes	Yes

Note: All of the parameters need space allocation by the user.

3.1 ERROR CODES

Error Code	Description
A822_NoError	OK!
A822_DriverOpenError	Failed to open the device driver. Please check if the card is installed properly in your computer and is the device driver installed. Or, please try to the card in the other slot after re-installing the device driver.
A822_DriverNoOpen	Users have to call the A822_DriverInit() function before calling other A822 functions.
A822_GetDriverVersionError	Failed to communication with device driver. Please check if the driver is installed? Or, try to re-install driver.
A822_InstallIrqError	Failed to install the ISR with the specified IRQ/DMA number. Please check if the driver is installed? Check does the IRQ/IO address and DMA resource conflicts with other devices? And check the system's resources and free some resources if necessary.
A822_ClearIntCountError	Failed to communication with device driver. Please check if the driver is installed? Or, try to re-install driver.
A822_GetIntCountError	Failed to communication with device driver. Please check if the driver is installed? Or, try to re-install driver.
A822_GetBufferError	Failed to communication with device driver. Please check if the driver is installed? Or, try to re-install driver.
A822_AllocateMemoryError	Fail to allocate memory for data buffer. Please check your system's resources and free some memory.

A822_CardTypeError	The CardType should be 0: A822PGL or 1:A822PGH
A822_TimeoutError	For A/D (Analog Input) functions, the DLL functions are waiting for A/D converter to complete the operation. The Max. waiting time is 500ms. It may always return the A822_TimeoutError, if the card is set for the Trigger-Mode to External-Trigger by jumper. (Thus, software-trigger will not function.) Please check your hardware settings of Base address. Try to install the card in other slot.
A822_ConfigCodeError	For valid configuration codes, please refer to Section "1.2 Range Configuration".
A822_IntStopError	Failed to communication with driver, or failed to stop the interrupt. Please check if the driver is installed? Or, try to re-install driver.
A822_IntRemoveError	Failed to communication with driver, or failed to remove the ISR/DMA. Please check if the driver is installed? Or, try to re-install driver.
A822_IntInstallEventError	Failed to install the event-object into device driver. Please check if the driver is installed? Check the system's resources and free some resources if necessary. Or, try to re-install driver.
A822_BufferFull	The buffer size of the Channel-Scan List is 100. Program can't add more than 100 channels.
A822_NoChannelToScan	Before calling the Channel-Scan Polling or Interrupt, users have to set the channels into the Channel-Scan List by calling related functions. Please refer to A822_ChScan_Clear(), A822_ChScan_Add() and A822_ChScan_Set() functions.

A822_IntInstallChannelError	Failed to copy the channels of Channel-Scan List into device driver. Please check if the driver is installed? Check the system's resources and free some resources if possible. Or, try to re-install driver.
A822_IntInstallConfigError	Failed to copy the configuration-code of Channel-Scan List into device driver. Please check if the driver is installed? Check the system's resources and free some resources if possible. Or, try to re-install driver.
A822_GetDmaStatusError	Failed to communication with driver, or failed to get the DMA completion status. Please check if the driver is installed? Or, try to re-install driver.

3.2 FUNCTIONS NOT SUPPORTED

The following functions are not supported:

Not Supported function	Descriptions
A822_AD()	Please refer to A822_AD_Float() function. This new function separates the error-code and A/D value.
A822_InstallIrq(), A822_AD_INT_Start(), A822_GetIntCount(), A822_GetBuffer(), A822_GetFloatBuffer(), A822_AD_INT_Stop()	Please refer to the following new functions… A822_IntInstall(), A822_IntStart(), A822_IntGetCount(), A822_IntGetHexBuf(), A822_IntGetFloatBuf(), A822_IntStop(), A822_IntRemove() These new function set has the better performance. User's program has to allocate the event-object and data buffer once.

3.3 DRIVER FUNCTIONS

3.3.1 A822_DriverInit

- **Description:**
  This subroutine will initialize the device driver and allocate the resources.

- **Syntax:**
  WORD A822_DriverInit(void);

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.3.2 A822_DriverClose

- **Description:**
  This subroutine will close the device driver and free the resources.

- **Syntax:**
  void A822_DriverClose(void);

- **Parameter:**
  None

- **Return:**
  None

3.3.3 A822_DELAY

- **Description:**
  This subroutine will delay **wDownCount** (machine independent timer).
  This function uses the Counter0 to implement delay and will be used by the A/D related functions. The unit of A822_DELAY() is 0.5uSeconds. (2MHz ➔ 2000K times/sec).
  For Example: A822_DELAY(2000); ➔ delays 1 mSeconds.

- **Syntax:**
  WORD A822_DELAY(WORD wBase, WORD wDownCount);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wDownCount : [In] Number of count that will be delay, 2 count = 1 uSeconds.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.3.4 A822_Check_Address

- **Description:**
  This subroutine will detect the OME-A-822PGH/L in I/O base address = **wBase**. This subroutine will perform one A/D conversion, if successful → found an OME-A-822PGH/L. This function will always return 0 if the user sets the trigger mode to external. Refer to the function "A822_SetTriggerMode".

- **Syntax:**
  WORD A822_Check_Address(WORD wBase);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.3.5 A822_SetTriggerMode

- **Description:**

  This subroutine will set the trigger mode to internal or external. The default value is set to internal trigger mode if the user does not use this function. The user has to call this function before calling any A/D function (include the function "A822_Check_Address") if the user uses external trigger mode.

  Please refer to the hardware manual to set the jumper JP4 (A/D Trigger Source Selection). The JP4 default setting is "INTTRG"(Internal-Trigger).

- **Syntax:**

  void A822_SetTriggerMode(WORD wTriggerMode)

- **Parameter:**

  wTriggerMode : [In] 0: Internal Trigger Mode
  1: External Trigger Mode

- **Return:**

  None

3.4 TEST FUNCTION

3.4.1 A822_SHORT_SUB_2

- **Description:**
  Compute C=A-B in **short** formats, **short = 16-bit signed integer.** This function is provided for testing purpose.

- **Syntax:**
  short A822_SHORT_SUB_2(short nA, short nB);

- **Parameter:**
  nA : [In] short integer
  nB : [In] short integer

- **Return:**
  return=nA-nB → short integer

3.4.2 A822_FLOAT_SUB_2

- **Description:**
  Compute A-B in **float** format, **float = 32-bit floating pointer number.** This function is provided for testing purpose.

- **Syntax:**
  float A822_FLOAT_SUB_2(float fA, float fB);

- **Parameter:**
  fA : [In] floating point value
  fB : [In] floating point value

- **Return:**
  return=fA-fB → floating point value

3.4.3 A822_Get_DLL_Version

- **Description:**
  Read the software version of the A822.DLL.

- **Syntax:**
  WORD A822_Get_DLL_Version(void) ;

- **Parameter:**
  None

- **Return:**
  Returns the DLL's version, for example 0x200 → Version 2.00
  (WORD = 16-bit unsigned integer)

3.4.4 A822_GetDriverVersion

- **Description:**
  This subroutine will get the version number for the device driver.

- **Syntax:**
  WORD A822_GetDriverVersion(WORD *wDriverVersion);

- **Parameter:**
  wDriverVersion :[Out] Returns driver's version.
  For example: wDriverVerion=0x210 → version 2.10

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.5 COUNTER FUNCTION

3.5.1 A822_SetCounter

- **Description:**
  This subroutine will set the 8254 counter mode and value.

- **Syntax:**
  void A822_SetCounter(WORD wBase, WORD wCounterNo,
  WORD bCounterMode, DWORD wCounterValue);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wCounterNo : [In] Counter Number 0 to 2 for the 8254
  wCounterMode : [In] Counter Mode 0 to 5 for the 8254
  wCounterValue : [In] Counter Value 0 to 65535 for the 8254

- **Return:**
  None

3.5.2 A822_ReadCounter

- **Description:**
  This subroutine will read the 8254 counter value.

- **Syntax:**
  DWORD A822_ReadCounter(WORD wBase, WORD wCounterNo,
  WORD bCounterMode);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wCounterNo : [In] Counter Number 0 to 2 for the 8254
  wCounterMode : [In] Counter Mode 0 to 5 for the 8254

- **Return:**
  Return the counter's value and only the lower WORD is valid.

3.6 DI/DO FUNCTION

3.6.1 A822_DI

- **Description:**
  This subroutine will read the 16-bit data from the digital input port.

- **Syntax:**
  WORD A822_DI(WORD wBase);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220

- **Return:**
  16-bit data read from the digital input port

3.6.2 A822_DO

- **Description:**
  This subroutine will send 16-bit data to digital output port.

- **Syntax:**
  void A822_DO(WORD wBase, WORD wHexValue);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wHexValue : [In] 16-bit data send to digital output port

- **Return:**
  None

3.6.3 A822_OutputByte

- **Description:**
  This subroutine will send the 8-bit data to the desired I/O port.

- **Syntax:**
  void A822_OutputByte(WORD wPortAddr, UCHAR bOutputVal);

- **Parameter:**
  wPortAddr : [In] I/O port address, for example, 0x220
  bOutputVal : [In] 8-bit data send to I/O port

- **Return:**
  None

3.6.4 A822_OutputWord

- **Description:**
  This subroutine will send the 16-bit data to the desired I/O port.

- **Syntax:**
  void A822_OutputByte(WORD wPortAddr, WORD wOutputVal);

- **Parameter:**
  wPortAddr : [In] I/O port address, for example, 0x220
  wOutputVal : [In] 16-bit data send to I/O port

- **Return:**
  None

3.6.5 A822_InputByte

- **Description:**
  This subroutine will input the 8-bit data from the desired I/O port.

- **Syntax:**
  WORD A822_InputByte(WORD wPortAddr);

- **Parameter:**
  wPortAddr : [In] I/O port address, for example, 0x220

- **Return:**
  16-bit data with the leading 8 bits all set to 0.

3.6.6 A822_InputWord

- **Description:**
  This subroutine will input the 16-bit data from the desired I/O port.

- **Syntax:**
  WORD DIO_InputWord(WORD wPortAddr);

- **Parameter:**
  wPortAddr : [In] I/O port address, for example, 0x220

- **Return:**
  16-bit data.

3.7 AD FUNCTIONS

3.7.1 A822_SetChGain

- **Description:**
  This subroutine will set the multiplexer to the specified channel, configuration-code and delays for the settling time.
  Users has to call this function before calling A822_Fast_AD_Hex() and/or A822_Fast_AD_Float() functions.

- **Syntax:**
  WORD A822_SetChGain(WORD wBase, WORD wChannel,
  WORD wConfig, WORD wCardType);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] A/D channel number,
  wConfig : [In] Configuration code,
  Refer to Section 1.2 for detailed information
  wCardType : [In] 0 → OME-A-822PGL, 1→ OME-A-822PGH

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.7.2 A822_Hex2Float

- **Description:**
  Compute the Hex(WORD) to floating value.

- **Syntax:**
  WORD A822_Hex2Float(WORD wConfig, WORD wCardType,
  WORD wHex, float *fVal);

- **Parameter:**
  wConfig : [In] Refer to Section "1.2 Range Configuration".
  wCardType : [In] 0 → OME-A-822PGL, 1→ OME-A-822PGH
  wVal : [In] The Hex(WORD) value input.
  fVal : [Out] Return the value in floating format.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.7.3 A822_Fast_AD_Hex

- **Description:**
  This subroutine will perform an A/D conversion by polling. The A/D converter is 12-bit for A822PGH/L.
  Users have to call the A822_SetChGain() function before calling this function. In fact,
  A822_AD_Hex() = A822_SetChGain() + A822_Fast_AD_Hex().

- **Syntax:**
  WORD A822_Fast_AD_Hex(WORD* wVal);

- **Parameter:**
  wVal : [Out] Returns the A/D value in WORD format.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.7.4 A822_Fast_AD_Float

- **Description:**
  This subroutine will perform an A/D conversion by polling. The A/D converter is 12-bit for A822PGH/L. This subroutine will compute the result according to the **configuration code**.
  Users have to call the A822_SetChGain() function before calling this function. In fact,
  A822_AD_Float() = A822_SetChGain() + A822_Fast_AD_Float().

- **Syntax:**
  WORD A822_Fast_AD_Float(float* fVal);

- **Parameter:**
  fVal : [Out] Returns the A/D value in floating format.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.7.5 A822_AD_Hex

- **Description:**
  This subroutine will perform an A/D conversion by polling. The A/D converter is 12-bit for A822PGH/L.

- **Syntax:**
  WORD A822_AD_Hex(WORD wBase, WORD wChannel, WORD wConfig,
  WORD wCardType, WORD* wVal);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] A/D channel number,
  wConfig : [In] Configuration code,
  Refer to Section 1.2 for detailed information
  wCardType : [In] 0 → OME-A-822PGL, 1→ OME-A-822PGH
  wVal : [Out] Returns the A/D value in WORD format.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.7.6 A822_AD_Float

- **Description:**
  This subroutine will perform an A/D conversion by polling. The A/D converter is 12-bit for A822PGH/L. This subroutine will compute the result according to the **configuration code**.

- **Syntax:**
  WORD A822_AD_Float(WORD wBase, WORD wChannel, WORD wConfig,
  WORD wCardType, float* fVal);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] A/D channel number,
  wConfig : [In] Configuration code,
  Refer to Section 1.2 for detailed information
  wCardType : [In] 0 → OME-A-822PGL, 1→ OME-A-822PGH
  fVal : [Out] Returns the A/D value in floating format.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.7.7 A822_ADs_Hex

- **Description:**

  This subroutine will perform a number of A/D conversions by polling. This subroutine is very similar to A822_AD except that this subroutine will perform wCount of conversions instead of just one conversion. The A/D conversion happens at the ISA bus's max speed. The sampling rate is about 90Ksamples/second tested under Pentium-133 CPU. After A/D conversion, the A/D data are stored in a buffer in Hex format. The **wBuf** is the starting address of this data buffer.

- **Syntax:**

  WORD A822_ADs_Hex(WORD wBase, WORD wChannel, WORD wConfig,
  WORD wType, WORD wBuf[], WORD wCount);

- **Parameter:**

  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] A/D channel number
  wConfig : [In] Configuration code,
  Refer to Section 1.2 for detailed information
  wType : [In] 0 → OME-A-822PGL, 1→ OME-A-822PGH
  wBuf : [Out] Data buffer stores the AD value (In WORD format)
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

  wCount : [In] Number of A/D conversions that will be performed

- **Return:**

  Refer to "Section 3.1 Error Codes".

3.7.8 A822_ADs_Float

- **Description:**

  This subroutine will perform a number of A/D conversions by polling. This subroutine is very similar to A822_AD except that this subroutine will perform wCount of conversions instead of just one conversion. The A/D conversion happens at the ISA bus's max speed. The sampling rate is about 90K samples/second tested under Pentium-133 CPU. Then the A/D data are stored in a data buffer in Float format. The **fBuf** is the starting address of this data buffer.

- **Syntax:**

  WORD A822_ADs_Float(WORD wBase, WORD wChannel, WORD wConfig,
  WORD wType, float fBuf[], WORD wCount);

- **Parameter:**

  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] A/D channel number
  wConfig : [In] Configuration codes, refer to 1.2 for detail information
  wType : [In] 0 → OME-A-822PGL, 1→ OME-A-822PGH
  fBuf : [Out] Data buffer stores the AD value (In float format)
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

  wCount : [In] Number of A/D conversions that will be performed

- **Return:**

  Refer to "Section 3.1 Error Codes".

3.8 DA FUNCTIONS

3.8.1 A822_DA

- **Description:**
  This subroutine will send the 12-bit data to D/A analog output. The output range of D/A maybe 0-5V or 0-10V **set by the hardware jumper, JP1.** The software **cannot detect** the output range of D/A converter. **For examples, if hardware is selected for -5V, the 0xfff will send out 5V. If hardware is selected for -10V, the 0xfff will send out 10V. The factory setting is selected for 0 - 5V D/A output range.**

- **Syntax:**
  void A822_DA(WORD wBase, WORD wChannel, WORD wHexValue);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] D/A channels number, valid range is 0 to 1
  wHexValue : [In] 12-bit data send to D/A converter

- **Return:**
  None

3.8.2 A822_Uni5_DA

- **Description:**
  This subroutine will send the 12-bit data to D/A analog output. The output range of D/A is **set by the hardware jumper, JP1 (-5V or –10V) , JP10/JP11 (Bipolar or Unipolar).** The software **cannot detect** the output range of D/A converter. This subroutine can be used only when the jumper's settings are: **Unipolar, -5V.** The **output range is between 0.0V and 5.0V.** Please refer to the hardware manual for setting the jumpers.

- **Syntax:**
  void A822_Uni5_DA(WORD wBase, WORD wChannel, float fValue);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] D/A channels number, valid range is 0 to 1
  fValue : [In] 12-bit data send to D/A converter

- **Return:**
  None

3.8.3 A822_Uni10_DA

- **Description:**
  This subroutine will send the 12-bit data to D/A analog output. The output range of D/A is **set by the hardware jumper, JP1 (-5V or –10V) , JP10/JP11 (Bipolar or Unipolar).** The software **cannot detect** the output range of D/A converter. This subroutine can be used only when the jumper's settings are: **Unipolar, -10V.** The **output range is 0.0V to 10.0V.** Please refer to the hardware manual for setting the jumpers.

- **Syntax:**
  void A822_Uni10_DA(WORD wBase, WORD wChannel, float fValue);

- **Parameter:**
  wBase : [In] I/O port base address, for example, 0x220
  wChannel : [In] D/A channels number, valid range is 0 to 1
  fValue : [In] floating value send to D/A converter

- **Return:**
  None

3.9 AD WITH INTERRUPT

3.9.1 A822_IntInstall

- **Description:**
  This subroutine will install interrupt handler for a specific IRQ level n and allocate the data buffer in the device driver as required. For more detailed information of using interrupt please refer to "Section 3.9.8 Architecture of Interrupt Mode".

- **Syntax:**
  WORD A822_IntInstall(WORD wBase, WORD wIrq,
  HANDLE *hEvent,DWORD dwCount);

- **Parameter:**
  wBase : [In] the I/O port base address for A822 card.
  wIrq : [In] the IRQ level .
  hEvent : [In] a pointer point to a event-object that created by user.
  dwCount : [In] the desired A/D entries count for interrupt transfer.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.2 A822_IntGetCount

- **Description:**
  This subroutine will read the transferred count of interrupt.

- **Syntax:**
  WORD A822_IntGetCount(DWORD *dwVal)

- **Parameter:**
  dwVal : [Out] return the counter-value of the interrupt transferred.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.3 A822_IntStart

- **Description:**
  This subroutine will start the interrupt transfer for a specific A/D channel, program the gain code and sampling rate.

- **Syntax:**
  WORD A822_IntStart(WORD wCardType, WORD wChannel,
  WORD wGain, WORD c1, Word c2)

- **Parameter:**
  wCardType : [In] 0: for A822PGL, 1: for A822PGH
  wChannel : [In] the A/D channel. Valid range is 0 to 15.
  wGain : [In] the Gain-Code. Please refer to Section 1.2.
  c1,c2 : [In] the sampling rate is 2M/(c1*c2)
  c1➔ Counter1, c2➔ Counter2
  These values will be used only when the Trigger-Mode setting to Internal-Trigger. Please refer to the function "A822_SetTriggerMode".

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.4 A822_IntGetHexBuf

- **Description:**
  This subroutine will copy the transferred interrupted data into the user's buffer.

- **Syntax:**
  WORD A822_IntGetHexBuf(DWORD dwNum, WORD wBuffer[])

- **Parameter:**
  dwNum : [In] data number to copied.
  wBuffer : [Out] the address of wBuffer(In WORD format).
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.5 A822_IntGetFloatBuf

- **Description:**
  This subroutine will copy the transferred interrupted data into the user's buffer.

- **Syntax:**
  WORD A822_IntGetFloatBuf(DWORD dwNum, float fBuffer[])

- **Parameter:**
  dwNum : [In] data number to be copied
  fBuffer : [Out] the address of fBuffer(In float format).
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.6 A822_IntStop

- **Description:**
  This subroutine will stop the interrupt transfer.

- **Syntax:**
  WORD A822_IntStop(void)

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.7 A822_IntRemove

- **Description:**
  This subroutine will remove the installed interrupt handler and free the data buffer in the device driver. Thus, users have to get the data before the data buffer is freed.

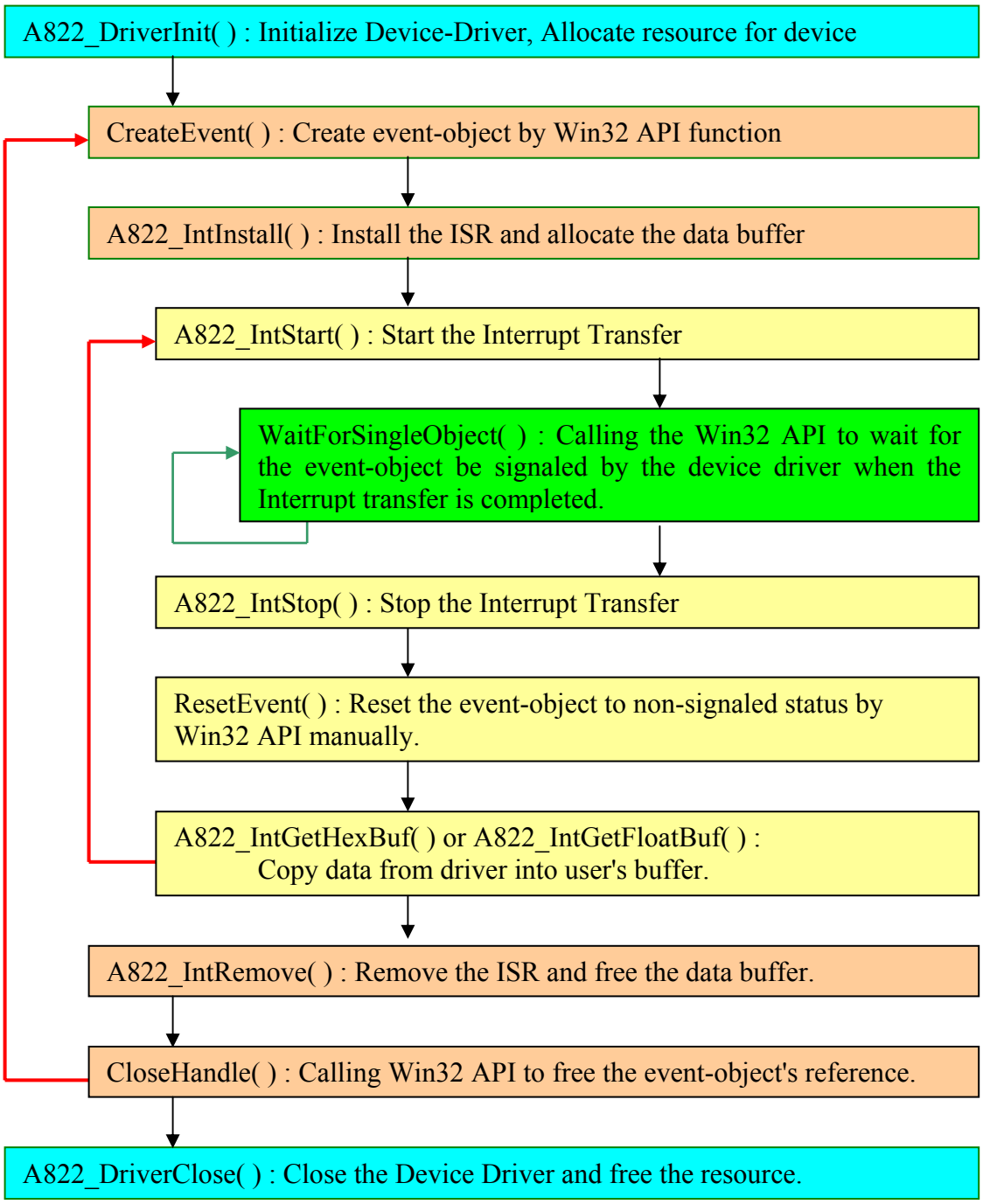
- **Syntax:**
  WORD A822_IntRemove(void)

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.9.8 Architecture of Interrupt mode

The 3.9.1 to 3.9.7 covers the functions to perform the A/D conversion with interrupt transfer. The flow chart to program these functions is given as follows:



3.10 AD DMA FUNCTION

These DMA functions are supported on Windows 95/98 only.

3.10.1 A822_AD_DMA_InstallIrq

- **Description:**
  This subroutine will install interrupt handler for a specific IRQ Level n and program a DMA controller(8227) to handle DMA transfer for DMA Channel n. Usually, when a DMA transfer finished, a associated IRQ level n occur. For more detail information for using DMA, please refer to "Section 3.10.8 Architecture of DMA mode".

- **Syntax:**
  WORD A822_AD_DMA_InstallIrq
  (WORD wBase, WORD wIrq, WORD wDmaChannel);

- **Parameter:**
  wBase : [In] the I/O port base address for A822 card.
  wIrq : [In] the IRQ level n.
  wDmaChannel : [In] the DMA channel (1 or 3).

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.10.2 A822_AD_DMA_IsNotFinished

- **Description:**
  This subroutine is to detect if the DMA have finished.

- **Syntax:**
  WORD A822_AD_DMA_IsNotFinished(void)

- **Parameter:**
  None

- **Return:**
  0: the DMA transfer is finish.
  1: the DMA transfer is proceeding.

3.10.3 A822_AD_DMA_Start

- **Description:**

  This subroutine will allocate a DMA buffer in the system area, program the gain code and sampling rate. Then it starts the DMA transfer for a specific A/D channel.

- **Syntax:**

  WORD A822_AD_DMA_Start(WORD wCardType, WORD Ch, WORD Gain,
  WORD c1, Word c2, DWORD Count, WORD wPassOut[ ])

- **Parameter:**

  wCardType : [In] 0: A822PGL 1: A822PGH
  Ch : [In] the A/D channel. Valid range is 0 to 15.
  Gain : [In] the Gain code. Please refer to Section 1.2.
  c1,c2 : [In] the DMA sampling rate is 2M/(c1*c2)
  c1➔ Counter1, c2➔ Counter2
  These values will be used only when the Trigger-Mode is set to Internal-Trigger. Please refer to the function "A822_SetTriggerMode".
  Count : [In] the desired A/D entries count for DMA transfer.
  wPassOut[] : [Out] Debug information, users have to allocate space for it.
  wPassOut[0] : [Out] 0 : successful in starting DMA transfer.
  Others: fail in starting DMA transfer.
  wPassOut[1] : [Out] system DMA buffer ID.
  wPassOut[2] : [Out] the I/O port base address.
  wPassOut[3] : [Out] the IRQ level for DMA.
  wPassOut[4] : [Out] the DMA channel no.
  wPassOut[5] : [Out] reserved.
  wPassOut[6] : [Out] reserved.
  wPassOut[7] : [Out] reserved.
  wPassOut[8] : [Out] the last 16 bits of physical address for DMA buffer in system area.
  wPassOut[9] : [Out] the first 16 bits of physical address for DMA buffer in system area.

- **Return:**

  Refer to "Section 3.1 Error Codes".

3.10.4 A822_AD_DMA_GetBuffer

- **Description:**
  This subroutine will copy the transferred DMA data into the user's buffer.

- **Syntax:**
  WORD A822_AD_DMA_GetBuffer(WORD wBuffer[])

- **Parameter:**
  wBuffer : [Out] the address of wBuffer(In WORD format).
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

- **Return:**
  Refer to Section "3.1 Error Codes".

3.10.5 A822_AD_DMA_GetFloatBuffer

- **Description:**
  This subroutine will copy the transferred DMA data into the user's buffer.

- **Syntax:**
  WORD A822_AD_DMA_GetFloatBuffer(float fBuffer[])

- **Parameter:**
  fBuffer : [Out] the address of fBuffer(In float format).
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.10.6 A822_AD_DMA_Stop

- **Description:**
  This subroutine will free the allocated DMA buffer that in system area.

- **Syntax:**
  WORD A822_AD_DMA_Stop(void)

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.10.7 A822_AD_DMA_RemoveIrq

- **Description:**
  This subroutine will remove the interrupt handler installed by A822_AD_DMA_InstallIrq(…).

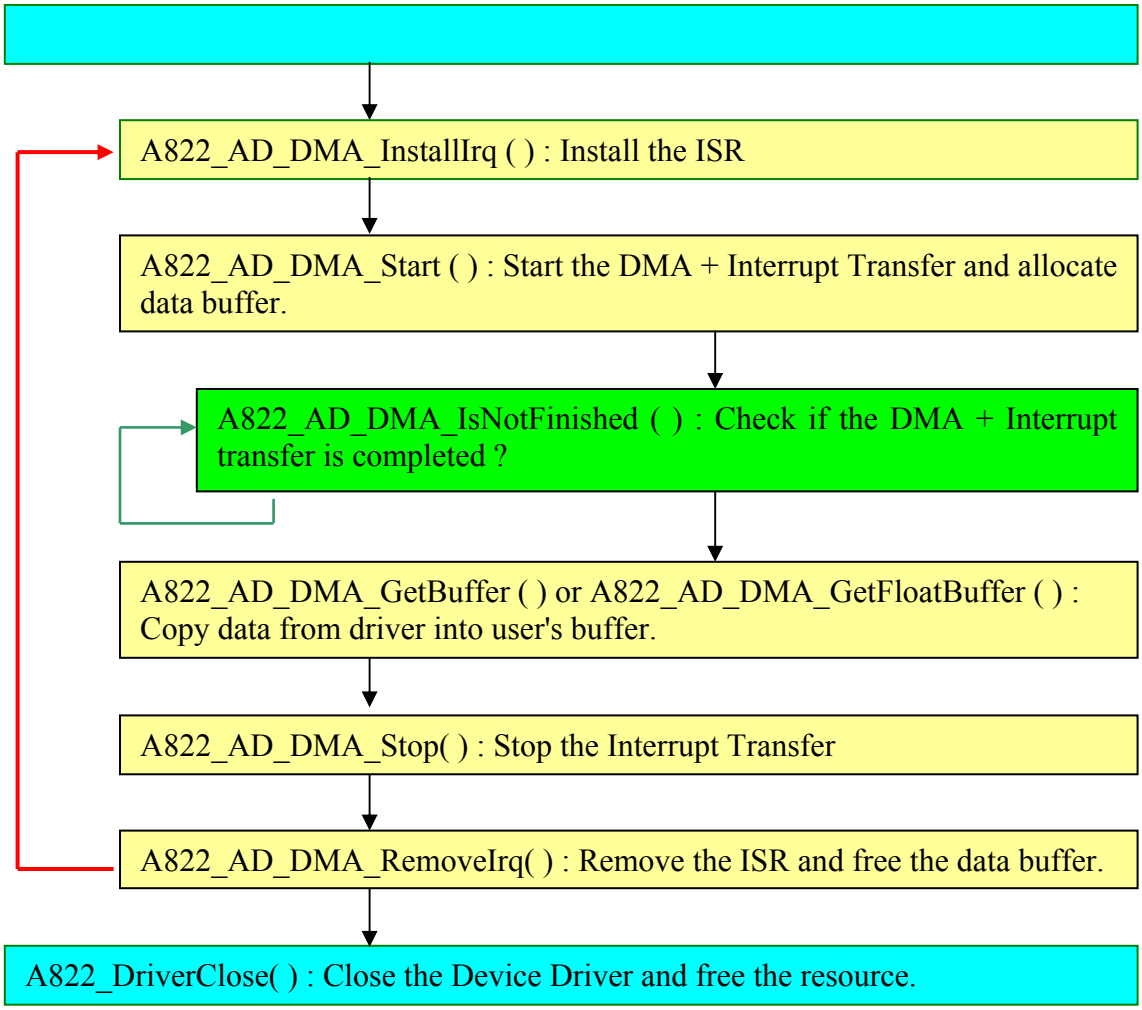
- **Syntax:**
  WORD A822_AD_DMA_RemoveIrq(void)

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.10.8 Architecture of DMA mode

The 3.10.1 to 3.10.7 covers the functions to perform the A/D conversion with DMA transfer. The flow chart to program these functions is given as follows:

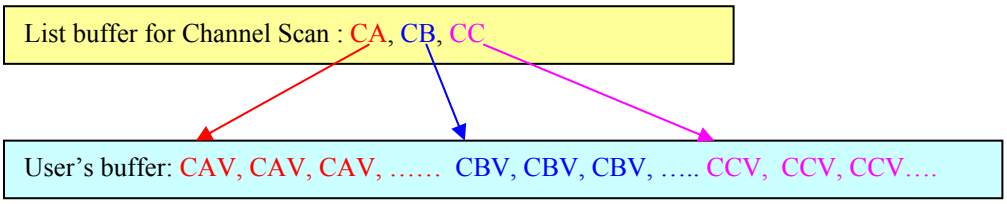


3.11 AD WITH CHANNEL SCAN

3.11.1 Introduction

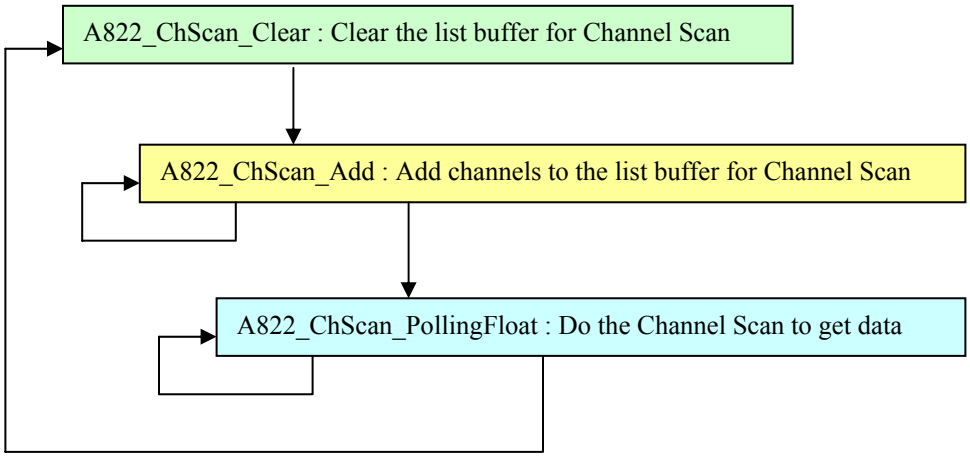
The user can specify channels into a list buffer. Other functions will do the ADC to get the data. And then read the list buffer to change to next channel and set to specific configuration code.

The data will be saved into the following style:



Note:
CA= Channel A; CB= Channel B; CC= Channel C
CAV= Channel A's value; CBV= Channel B's value;
CCV= Channel C's value

The user program's architecture will be as following:



3.11.2 A822_ChScan_Clear

- **Description:**
  This subroutine will clear the list buffer for the Channel Scan.

- **Syntax:**
  void A822_ChScan_Clear(void);

- **Parameter:**
  None

- **Return:**
  None

3.11.3 A822_ChScan_Add

- **Description:**
  This function will add the specified channel number and configuration-code into the list buffer for the Channel Scan. The max number of channels in the list buffer for the Channel Scan is 100.

- **Syntax:**
  WORD A822_ChScan_Add(WORD wChannel, WORD wConfig);

- **Parameter:**
  wChannel : [In] The channel to be scanned.
  WConfig : [In] Specify the configuration-code for this channel.
  Please refer to "Section 1.2 Range Configuration".

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.11.4 A822_ChScan_Set

- **Description:**
  This function will clear the list buffer and then copy the specified list of channel(s) and configuration-code(s) into the list buffer for the Channel Scan. The max number of channels in the list buffer for the Channel Scan is 100.

- **Syntax:**
  WORD A822_ChScan_Set
  (WORD wChannel[], WORD wConfig[], WORD wChNum);

- **Parameter:**
  wChannel : [In] The list of channel(s) to be scanned.
  WConfig : [In] The list of configuration-code(s) for channel(s).
  Please refer to Section 1.2.
  wChNum : [In] Total channels to be scanned.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.11.5 A822_ChScan_PollingHex

- **Description:**

  This subroutine will perform a number of A/D conversions by polling. And after get the channel's data, it will then read the list buffer for the Channel Scan to change to next channel and set to specified configuration code. The A/D conversion happens at the ISA bus's max speed. After A/D conversion, the A/D data are stored in a buffer in Hex format.

  Before calling this function, the user has to call the A822_ChScan_Clear() and A822_ChScan_Add() or A822_ChScan_Set() functions to setup the list buffer for Channel Scan. Please refer to the "Section 3.11.1 Introduction" for more information.

- **Syntax:**

  WORD A822_ChScan_PollingHex(WORD wBase, WORD wCardType,
  WORD wBuf[], WORD wNumPerCh);

- **Parameter:**

  wBase : [In] the I/O port base address for A822 card.
  WCardType : [In] 0: A-822L 1: A-822H
  wBuf : [Out] Starting address of the data buffer (WORD format)
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

  The buffer size
  = Total-Channels * wNumPerCh * sizeof(WORD)

  wNumPerCh : [In] Number of A/D conversions will be performed for every channel.

- **Return:**

  Refer to "Section 3.1 Error Codes".

3.11.6 A822_ChScan_PollingFloat

- **Description:**

  This subroutine will perform a number of A/D conversions by polling. After getting the channel's data, it will then read the list buffer for the Channel Scan to change to next channel and set to specified configuration code. The A/D conversion happens at the ISA bus's max speed. After A/D conversion, the A/D data is stored in a buffer in floating format.

  Before calling this function, the user has to call the A822_ChScan_Clear() and A822_ChScan_Add() or A822_ChScan_Set() functions to setup the list buffer for Channel Scan. Please refer to the "Section 3.11.1 Introduction" for more information.

- **Syntax:**

  WORD A822_ChScan_PollingFloat(WORD wBase, WORD wCardType,
  float fBuf[], WORD wNumPerCh);

- **Parameter:**

  wBase : [In] the I/O port base address for A822 card.
  WCardType : [In] 0: A-822L 1: A-822H
  fBuf : [Out] Starting address of the data buffer (floating format)
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.

  The buffer size
  = Total-Channels * wNumPerCh * sizeof(float)

  wNumPerCh : [In] Number of A/D conversions will be performed for every channel.

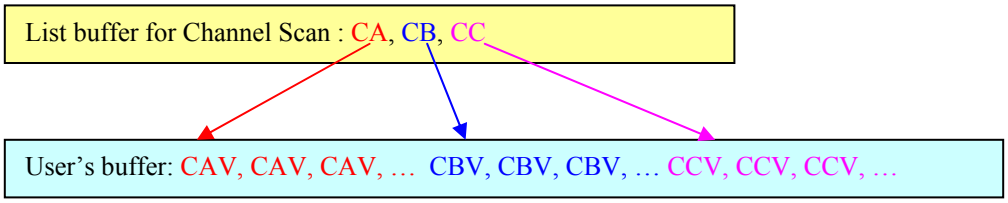
- **Return:**

  Refer to "Section 3.1 Error Codes".

3.12 AD INTERRUPT, CHANNEL SCAN FUNCTION

3.12.1 Introduction

The user can specify channels into a list buffer. The other functions will do the ADC to get the data. Then read the list buffer to change to next channel and set to specify configuration code.



The data will be saved into the following style:

Note:
CA= Channel A; CB= Channel B; CC= Channel C
CAV= Channel A's value; CBV= Channel B's value;
CCV= Channel C's value

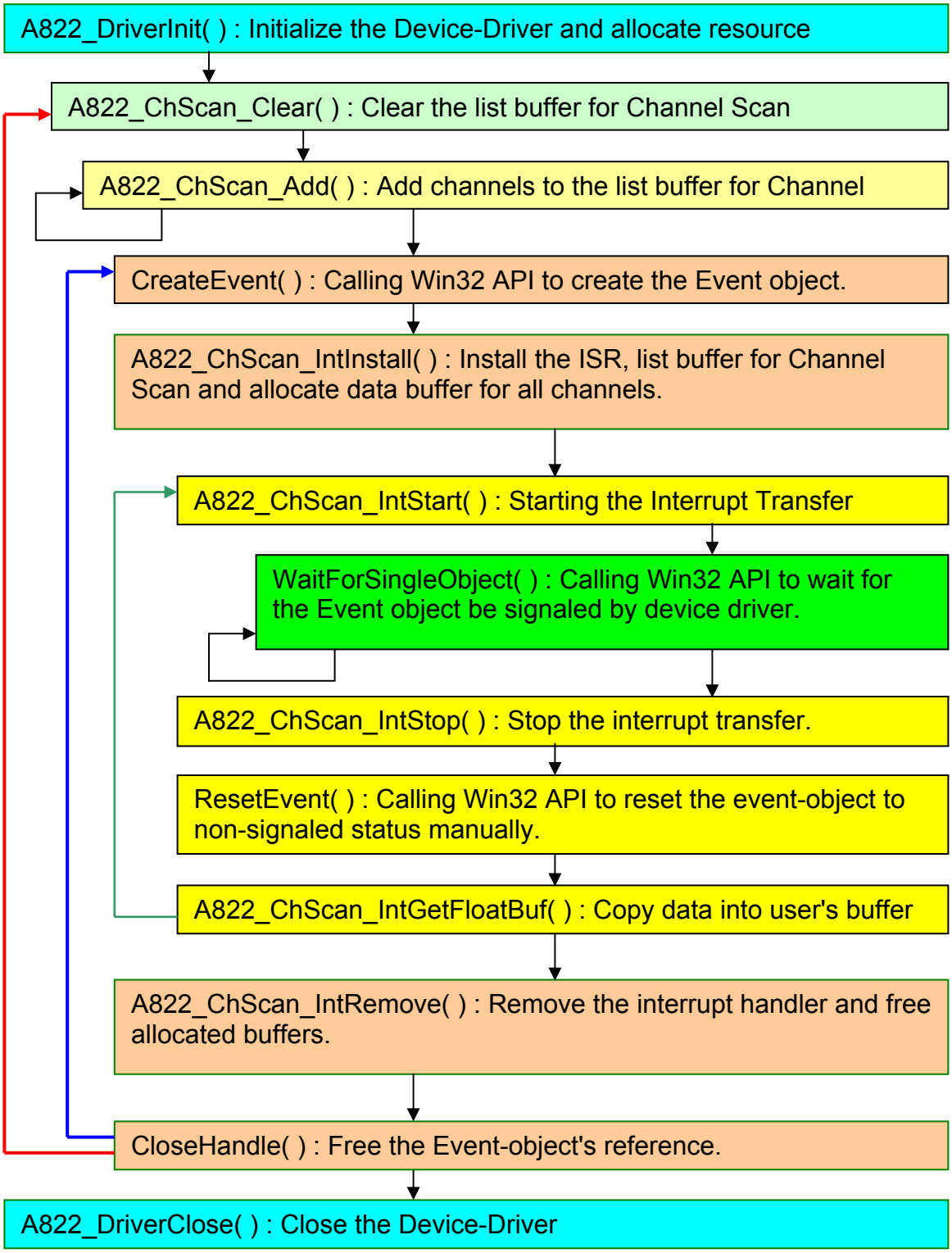
After setting to the next channel and specified configuration code, it has to delay for the settling time before next ADC. The interrupt service routinue doesn't delay allowing for the settling time. Thus, to get the correct ADC data, the user has to slow-down the sampling-rate of interrupt.

The sampling-rate is for all channels.

For example:

The list buffer for the Channel Scan is set to channel-2 and channel-0. The sampling-rate is setting to 10 KHz. In fact, the channel-2 has the sampling-rate of 5 KHz and the channel-0 also has the sampling-rate 5KHz.

The user program's architecture as following:



3.12.2 A822_ChScan_IntInstall

- **Description:**
  This subroutine will install interrupt handler, copy the list buffer for Channel Scan into kernel-mode driver and allocate buffers for every channels. Before installing the interrupt, the user has to call the "A822_ChScan_Clear()" and "A822_ChScan_Add()" or "A822_ChScan_Set() functions to setup the list buffer for Channel Scan. For more detail information of using interrupt please refer to "Section 3.12.1 Introduction".

- **Syntax:**
  WORD A822_ChScan_IntInstall(WORD wBase, WORD wIrq,
  HANDLE *hEvent, DWORD dwNumPerCh);

- **Parameter:**
  wBase : [In] the I/O port base address for A822 card.
  wIrq : [In] the IRQ level n.
  hEvent : [In] The Event handle that was created by the user.
  dwNumPerCh : [In] The desired A/D count for every channels to transfer.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.12.3 A822_ChScan_IntStart

- **Description:**
  This subroutine will clear the interrupt-counter and start the interrupt transfer for the specific A/D channels, program the gain code and sampling rate.

- **Syntax:**
  WORD A822_ChScan_IntStart(WORD c1, WORD c2, WORD wCardType);

- **Parameter:**
  c1,c2 : [In] the sampling rate is 2M/(c1*c2); c1=Counter1, c2=Counter2
  The counter's values are only used when the Trigger-Mode is set to Internal-Trigger. Please refer to the "A822_SetTriggerMode" function.
  wCardType : [In] 0: A-822L 1: A-822H

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.12.4 A822_ChScan_IntStop

- **Description:**
  This subroutine will stop the interrupt transfer.

- **Syntax:**
  WORD A822_ChScan_IntStop(void);

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.12.5 A822_ChScan_IntRemove

- **Description:**
  This subroutine will remove the interrupt handler and free the buffers.

- **Syntax:**
  WORD A822_ChScan_IntRemove(void);

- **Parameter:**
  None

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.12.6 A822_ChScan_IntGetCount

- **Description:**
  This subroutine will read the transferred count of interrupt.

- **Syntax:**
  WORD A822_Int_GetCount(DWORD *dwVal)

- **Parameter:**
  dwVal : [Out] Returns the interrupt transferred count.

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.12.7 A822_ChScan_IntGetHexBuf

- **Description:**
  This subroutine will copy the transferred interrupted data into the user's buffer.

- **Syntax:**
  WORD A822_ChScan_IntGetHexBuf(WORD wBuf[])

- **Parameter:**
  wBuf : [Out] The address of wBuf(WORD format).
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.
  Buffer size = Total-Channels * dwNumPerCh * sizeof(WORD)

- **Return:**
  Refer to "Section 3.1 Error Codes".

3.12.8 A822_ChScan_IntGetFloatBuf

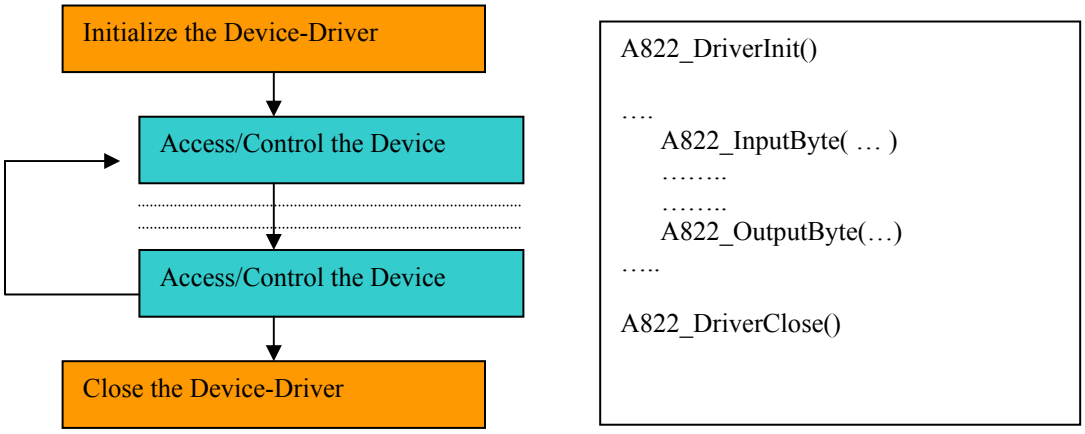
- **Description:**
  This subroutine will copy the transferred interrupted data into the user's buffer.

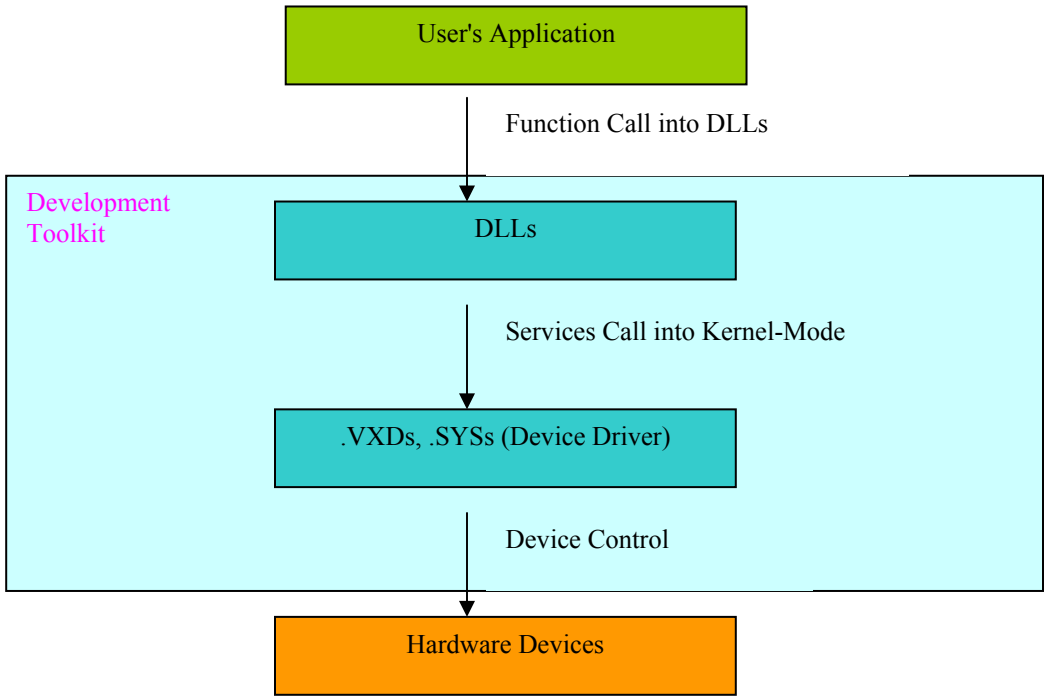
- **Syntax:**
  WORD A822_ChScan_IntGetFloatBuf(float fBuf[])

- **Parameter:**
  fBuf : [Out] The address of fBuf(float format).
  Users have to allocate spaces for this buffer and send the address into the function. This function will fill the data into this buffer. Users can analyze this data from the buffer after calling this function.
  Buffer size = Total-Channels * dwNumPerCh * sizeof(float)

- **Return:**
  Refer to "Section 3.1 Error Codes".

4. PROGRAM ARCHITECTURE





5. REPORT PROBLEMS

Technical support is available at no charge as described below. The best way to report problems is send electronic mail to **das@omega.com** on the Internet.

When reporting problems, please include the following information:

1) Is the problem reproducible? If so, how?

2) What kind and version of Operation Systems that you running? For example, Windows 3.1, Windows for Workgroups, Windows NT 4.0, etc.

3) What kinds of our products that you using? Please see the product's manual.

4) If a dialog box with an error message was displayed, please include the full text of the dialog box, including the text in the title bar.

5) If the problem involves other programs or hardware devices, what devices or version of the failing programs that you using?

6) Other comments relative to this problem or any Suggestions will be welcomed.

After we received your comments, we will take about two business days to testing the problems that you said. And then reply as soon as possible to you. Please check that we have received your comments? And please keeping contact with us.

E-mail: das@omega.com
Web-Site: http://www.omega.com

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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