

SDK API 使用手册

Version 1.11

微目电子科技

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<http://www.vimu.top/>

升级记录

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初始版本

V1.1 (2023.5.22)

逻辑分析仪通道触发支持 s

V1.2 (2023.6.26)

增加 watchdog 开关

V1.3 (2023.8.19)

增加 MSO21 设备支持

增加 DDS ARB 和门控 API

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Linux 系统增加稳定性

DLLTest 支持重新拔插，自动连接并采集

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增加 MSO10 和 MSO21 V2 设备支持

Linux 读取 4MB 以上数据

V1.6 (2024.03.17)

DDS 增加 burst APIs

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增加示波器和 logic 触发位置读取 API

V1.8 (2024.07.15)

MSO41 系列支持

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MSO21 V3 和 MSO10 V2 支持

V1.10 (2024.11.21)

修复不是全通道采集，读取数据错位问题

修复 usb3.0 linux 系统 bug

V1.11 (2025.03.09)

增加系统稳定性

增加占空比计算

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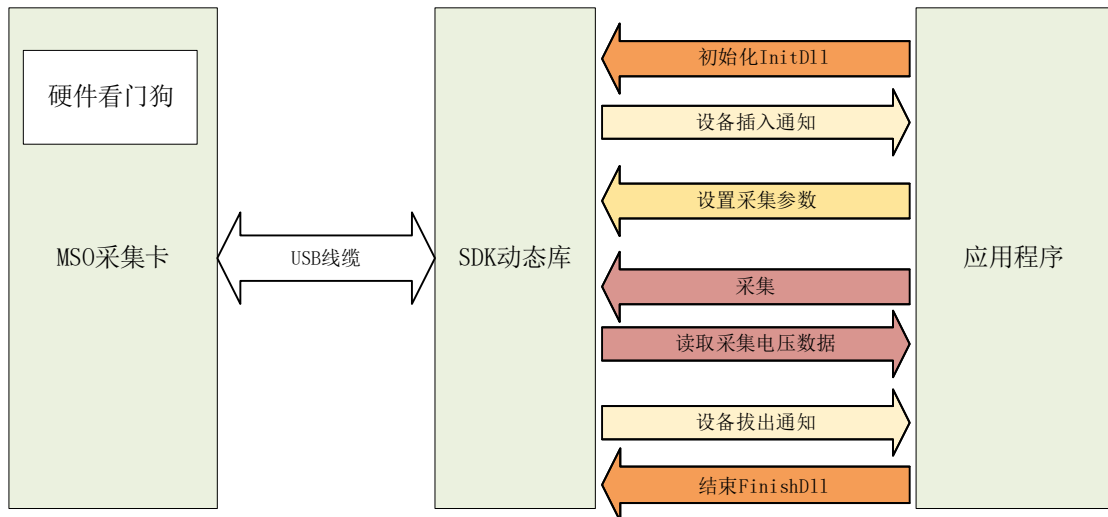
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1. 简介

作为 MOS 混合信号示波器配备的标准 DLL 接口，通过这个接口可以直接控制混合信号示波器。

该接口支持 windows 系统(X86, X64 和 ARM64)和 linux 系统(X64, ARM32 和 ARM64)。

2. 系统工作框图



MSO 采集卡：硬件采集卡部分，通过 USB 和主机通信

SDK 动态库：负责和硬件通信；将应用程序的参数传输给硬件卡，将硬件卡的采集数据返回给应用程序

应用程序：用户设计的程序。

说明：

- 1、InitDll 的参数 **watchdog enable** 可以启动采集卡的看门狗，最后交付的程序记得将看门狗启动。调试的时候，可以根据需要将看门狗关闭；
- 2、SDK 动态库线程是一个单独的线程。使用回调模式的时候，在回调函数中，不能处理复杂的任务。如果回调函数占用时间太长，超过看门狗的阈值时间，将会导致硬件采集卡重启。
- 3、采集卡的工作模式，大致可以分为“循环检测”和“回调函数”模式。开发应用的时候可以根据实际的需要来选择，也可以根据实际的需求混合使用。

3. 循环检测模式

循环检测模式，就是通过 api 轮询来查询采集卡的状态，然后相应的做出处理。

DllTest-Polling 就是一个循环检测的例子。代码如下：

```
int main()
{
    std::cout << "Vdso Test..." << std::endl;
    InitDll(1, 1);
    std::this_thread::sleep_for(std::chrono::milliseconds(500));

    while (true)
    {
```

```

//device connection is successful?
if(!devAvailable)
{
    devAvailable = IsDevAvailable();

    //init functions
    if(devAvailable)
    {
        std::cout << "devAvailable start init" << std::endl;
        initFunction();
    }
    else
        std::this_thread::sleep_for(std::chrono::milliseconds(500));
}

if(devAvailable)
{
    if (IsDataReady())
    {
        ReadDatas();
        NextCapture();
    }
    else if(IsIOReadStateReady())
    {
        std::cout << "io state " << std::hex << GetIOInState() <<" \n";
    }
    else
    {
        //test device is active
        devAvailable = IsDevAvailable();
        if(!devAvailable)
            std::cout << "devAvailable is false" << std::endl;

        std::this_thread::sleep_for(std::chrono::milliseconds(200));
    }
}
};
FinishDll();
std::cout << "...Vdso Test" << std::endl;
return 0;
}

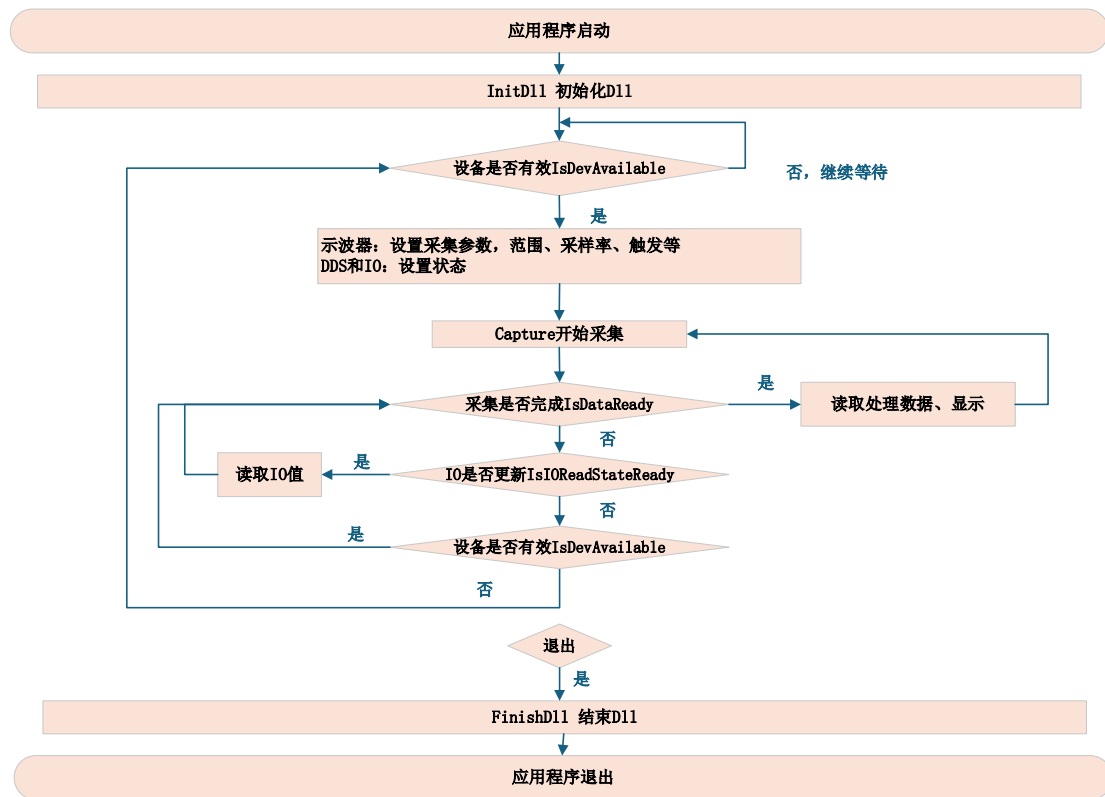
```

开始，先检测设备是否插入，如果没有插入，线程休眠 500ms，然后重新检测；检测到设备插入就开始各个功能的初始化，并调用 `Capture` 开始采集数据。

然后，开始轮询检测是不是示波器是否采集完成，IO 是否有更新。如果都没有更新，

顺便检测一下设备是否还在插入状态。

示波器或者 IO 有更新了，就读取数据做相应的处理工作，然后进行下一次采集。如果检测到设备拔出，就重新进入设备检测轮询。



4. 回调函数模式

回调函数模式，就是通过注册回调函数来获取采集卡的状态，然后相应的做出处理。回调函数模式，涉及到采集卡线程和 UI 线程的同步，开发程序的时候需要根据实际的情况来处理线程间的同步问题。

DllTest-Callback 就是一个回调函数的例子。代码如下：

```
int main()
{
    std::cout << "Vdso Test..." << std::endl;

    InitDll(1, 1);
    std::this_thread::sleep_for(std::chrono::milliseconds(500));

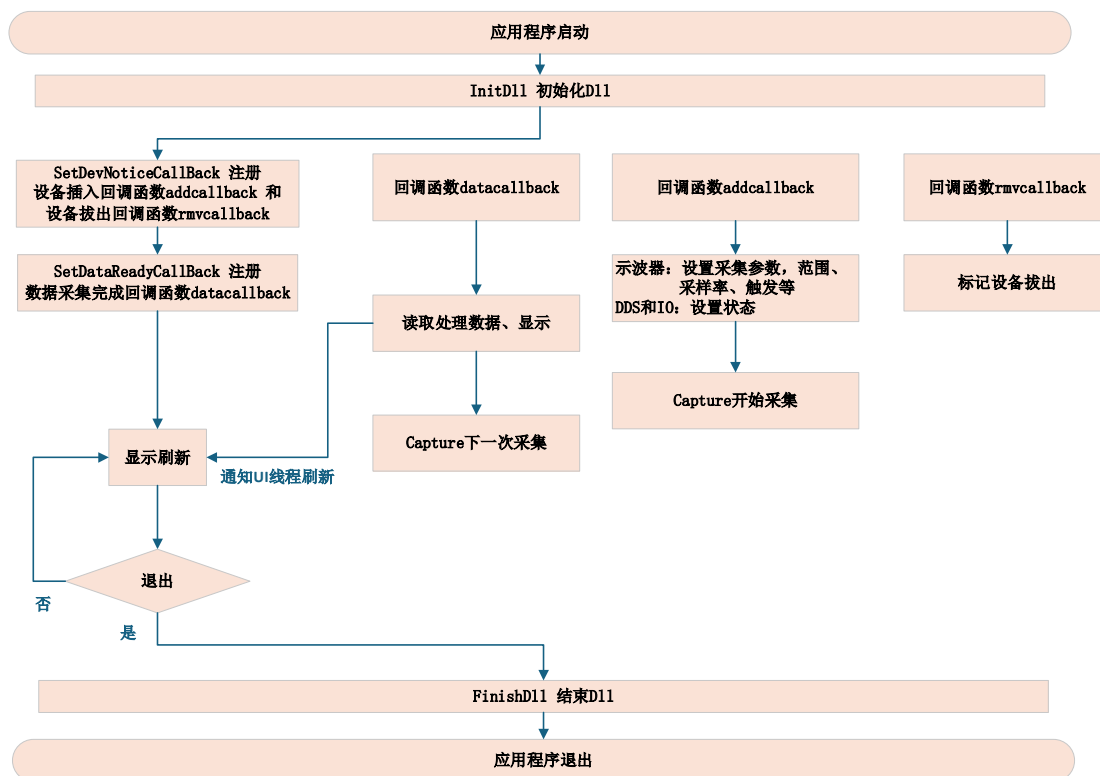
    //OSC
    SetDevNoticeCallBack(NULL, DevNoticeAddCallBack, DevNoticeRemoveCallBack);
    SetDataReadyCallBack(NULL, DevDataReadyCallBack);

    while (true)
    {
        std::this_thread::sleep_for(std::chrono::milliseconds(100));
    }
};
```

```

FinishDll();
std::cout << "...Vdso Test" << std::endl;
return 0;
}

```



回调函数 addcallback: 负责设备插入后各个功能的初始化，然后开始采集。

回调函数 rmcallback: 负责设备拔出后的标记和及状态处理。

回调函数 datacallback: 负责采集数据的读取，然后进行下一次采集。

5. API 说明

5.1. 初始化和结束

调用InitDll()来完成动态库的初始化，初始化的时候会分配内存和资源用于设备监测和数据读取用。

int InitDll(unsigned int en_log , unsigned int en_hard_watchdog);

Description Dll initialization

Input: **log enable** 1 Enable Log
0 Not Enable Log

watchdog enable 1 Enable hard watchdog
0 Not Enable hard watchdog

Output: **Init Status**

Return value 1 Success
0 Failed

调用FinishDll()来完成动态库的结束，结束的时候，会时释放初始化中申请的内存和相关资源。

int FinishDll(void);

Description Dll finished

Input: -

Output: **-Finished Status**

Return value 1 Success

0 Failed

5.2. 设备 ID

每个设备都有一个 64 位的 ID 码。

int GetOnlyId0(void);

Description This routines return device id(0-31)

Input: -

Output: **- Device ID(0-31)**

int GetOnlyId1(void);

Description This routines return device id(32-63)

Input: -

Output: **- Device ID(32-63)**

5.3. 设备复位

int ResetDevice(void);

Description This routines reset device

Input: -

Output: **- Return value** 1 success

0 failed

5.4. 设备监测

当 DLL 检测到有设备接入时，有 3 种方式通知主程序，回掉函数、触发 Event 和主程序循环检测。

5.4.1. 回调函数

当检测到设备插入时，如果主程序注册了回掉函数"**addcallback**"，它就会被调用；当检测到设备拔出时，如果主程序注册了回掉函数"**rmvcallback**"，它就会被调用。Dll 有一个函数专门用于设置这个 2 个回掉函数

void SetDevNoticeCallBack(void* ppara, AddCallBack addcallback, RemoveCallBack rmvcallback);

Description This routines sets the callback function of equipment status changed.

Input: **ppara** the parameter of the callback function

addcallback a pointer to a function with the following prototype:
void AddCallBack(void * **ppara**)

rmvcallback a pointer to a function with the following prototype:
Void RemoveCallBack(void * **ppara**)

Output -

5.4.2. Event

当检测到设备插入时，如果主程序注册了 Event 句柄"**addevent**"，它就会被设置；当检

测到设备拔出时，如果主程序注册了回调函数"**rmvevent**"，它就会被设置。需要注意的是，主程序检测到 Event 后，需要将 Event 复位。Dll 有一个函数专门用于设置这 2 个 Event 句柄

void SetDevNoticeEvent(HANDLE addevent, HANDLE rmvevent);

Description This routines set the event handle, these will be set, when equipment status changed.

Input: **addevent** the event handle
 rmvevent the event handle

Output -

5.4.3. 循环检测

int IsDevAvailable();

Description This routines return the device is available or not.

Input: -

Output **Return value** 1 available
 0 not available

说明：3 方式只要使用其中的一种就可以了，回调函数和 Event 都是异步的处理方式，更加的高效；循环检测需要主程序过一定时间就检测设备是否插入或者拔出。

5.5. 示波器

5.5.1. 采集范围设置

设备的前级带有程控增益放大器，当采集的信号小于 AD 量程的时候，增益放大器可以把信号放大，更多的利用 AD 的位数，提高采集信号的质量。Dll 会根据设置的采集范围，自动的调整前级的增益放大器。

int SetOscChannelRange(int channel, int minmv, int maxmv);

Description This routines set the range of input signal.

Input: **channel** the set channel
 0 channel 1
 1 channel 2
 minmv the minimum voltage of the input signal (mV)
 maxmv the maximum voltage of the input signal (mV)

Output **Return value** 1 Success
 0 Failed

说明：最大的采集范围为探头 X1 的时候，示波器可以采集的最大电压。比如 MSO20 为 [-12000mV,12000mV]。

注意：为了达到更好波形效果，一定要根据自己被测波形的幅度，设置采集范围。必要时，可以动态变化采集范围。

5.5.2. 采样率

int GetOscSupportSampleNum();

Description This routines get the number of samples that the equipment support.

Input: -

Output **Return value** the support sample number

int GetOscSupportSamples(unsigned int* sample, int maxnum);

Description This routines get support samples of equipment.

Input: **sample** the array store the support samples of the equipment
 maxnum the length of the array

Output **Return value** the sample number of array stored

int SetOscSample(unsigned int sample);

Description This routines set the sample.

Input: **sample** the set sample

Output **Return value** 0 Failed
 other value new sample

unsigned int GetOscSample();

Description This routines get the sample.

Input: -

Output **Return value** sample

5.5.3. 触发

该功能需要设备硬件触发支持。硬件触发的触发点都是采集数据的最中间，比如采集 128K 数据，触发点就是第 64K 的点。

触发模式

```
#define TRIGGER_MODE_AUTO 0
```

```
#define TRIGGER_MODE_LIANXU 1
```

触发条件

```
#define TRIGGER_STYLE_NONE 0x0000           //not trigger
```

```
#define TRIGGER_STYLE_RISE_EDGE 0x0001   //Rising edge
```

```
#define TRIGGER_STYLE_FALL_EDGE 0x0002   //Falling edge
```

```
#define TRIGGER_STYLE_EDGE 0x0004        //Edge
```

```
#define TRIGGER_STYLE_P_MORE 0x0008       //Positive Pulse width(>)
```

```
#define TRIGGER_STYLE_P_LESS 0x0010       //Positive Pulse width(>)
```

```
#define TRIGGER_STYLE_P       0x0020       //Positive Pulse width(<=)
```

```
#define TRIGGER_STYLE_N_MORE 0x0040       //Negative Pulse width(>)
```

```
#define TRIGGER_STYLE_N_LESS 0x0080       //Negative Pulse width(>)
```

```
#define TRIGGER_STYLE_N       0x0100       //Negative Pulse width(<=)
```

int IsSupportHardTrigger();

Description This routines get the equipment support hardware trigger or not .

Input: -

Output **Return value** 1 support hardware trigger
 0 not support hardware trigger

unsigned int GetTriggerMode();

Description This routines get the trigger mode.

Input: -

Output **Return value** TRIGGER_MODE_AUTO

TRIGGER_MODE_LIANXU

void SetTriggerMode(unsigned int mode);

Description This routines set the trigger mode.

Input: **mode** TRIGGER_MODE_AUTO
 TRIGGER_MODE_LIANXU

Output -

unsigned int GetTriggerStyle();

Description This routines get the trigger style.

Input: -

Output **Return value** TRIGGER_STYLE_NONE
 TRIGGER_STYLE_RISE_EDGE
 TRIGGER_STYLE_FALL_EDGE
 TRIGGER_STYLE_EDGE
 TRIGGER_STYLE_P_MORE
 TRIGGER_STYLE_P_LESS
 TRIGGER_STYLE_P
 TRIGGER_STYLE_N_MORE
 TRIGGER_STYLE_N_LESS
 TRIGGER_STYLE_N

void SetTriggerStyle(unsigned int style);

Description This routines set the trigger style.

Input: **style** TRIGGER_STYLE_NONE
 TRIGGER_STYLE_RISE_EDGE
 TRIGGER_STYLE_FALL_EDGE
 TRIGGER_STYLE_EDGE
 TRIGGER_STYLE_P_MORE
 TRIGGER_STYLE_P_LESS
 TRIGGER_STYLE_P
 TRIGGER_STYLE_N_MORE
 TRIGGER_STYLE_N_LESS
 TRIGGER_STYLE_N

Output -

int GetTriggerPulseWidthNsMin();

Description This routines get the min time of pulse width.

Input: -

Output Return min time value of pulse width(ns)

int GetTriggerPulseWidthNsMax();

Description This routines get the max time of pulse width.

Input: -

Output Return max time value of pulse width(ns)

int GetTriggerPulseWidthDownNs();

Description This routines get the down time of pulse width.

Input: -

Output Return down time value of pulse width(ns)

int GetTriggerPulseWidthUpNs();

Description This routines set the down time of pulse width.

Input: down time value of pulse width(ns)

Output -

void SetTriggerPulseWidthNs(int down_ns, int up_ns);

Description This routines set the up time of pulse width.

Input: up time value of pulse width(ns)

Output _

unsigned int GetTriggerSource();

Description This routines get the trigger source.

Input: -

Output **Return value** TRIGGER_SOURCE_CH1 0 //CH1
 TRIGGER_SOURCE_CH2 1 //CH2
 TRIGGER_SOURCE_LOGIC0 16 //Logic 0
 TRIGGER_SOURCE_LOGIC1 17 //Logic 1
 TRIGGER_SOURCE_LOGIC2 18 //Logic 2
 TRIGGER_SOURCE_LOGIC3 19 //Logic 3
 TRIGGER_SOURCE_LOGIC4 20 //Logic 4
 TRIGGER_SOURCE_LOGIC5 21 //Logic 5
 TRIGGER_SOURCE_LOGIC6 22 //Logic 6
 TRIGGER_SOURCE_LOGIC7 23 //Logic 7

void SetTriggerSource(unsigned int source);

Description This routines set the trigger source.

Input: **source** TRIGGER_SOURCE_CH1 0 //CH1
 TRIGGER_SOURCE_CH2 1 //CH2
 TRIGGER_SOURCE_LOGIC0 16 //Logic 0
 TRIGGER_SOURCE_LOGIC1 17 //Logic 1
 TRIGGER_SOURCE_LOGIC2 18 //Logic 2
 TRIGGER_SOURCE_LOGIC3 19 //Logic 3
 TRIGGER_SOURCE_LOGIC4 20 //Logic 4
 TRIGGER_SOURCE_LOGIC5 21 //Logic 5
 TRIGGER_SOURCE_LOGIC6 22 //Logic 6
 TRIGGER_SOURCE_LOGIC7 23 //Logic 7

Output -

注意：如果逻辑分析仪和 IO 是复用的（例如 MSO20、MSO21），需要将对应的 IO 打开，并设置为输入状态。

int GetTriggerLevel();

Description This routines get the trigger level.

Input: -

Output **Return value** level (mV)

void SetTriggerLevel(int level);

Description This routines set the trigger level.

Input: level (mV)

Output -

int IsSupportTriggerSense();

Description This routines get the equipment support trigger sense or not.

Input: -

Return value 1 support
0 not support

int GetTriggerSenseDiv();

Description This routines get the trigger sense.

Input: -

Output **Return value** Sense (0-1 div)

void SetTriggerSenseDiv(int sense);

Description This routines set the trigger sense.

Input: Sense (0-1 div)

Output -

说明：触发灵敏度的范围为 0.1 Div-1.0 Div。1 Div =(采集范围设置最大值-采集范围设置最小值)/10.0。比如你设置的采集范围为[-1000,1000]，1Div =(1000--1000)/10.0=200mV。

bool IsSupportPreTriggerPercent();

Description This routines get the equipment support Pre-trigger Percent or not .

Input: -

Output **Return value** 1 support
0 not support

int GetPreTriggerPercent();

Description This routines get the Pre-trigger Percent.

Input: -

Output **Return value** Percent (5-95)

void SetPreTriggerPercent(int front);

Description This routines set the Pre-trigger Percent.

Input: Percent (5-95)
Output -

int IsSupportTriggerForce();

Description This routines get the equipment support trigger force or not.

Input: -

Return value 1 support
0 not support

void TriggerForce();

Description This routines force capture once.

Input: -

Output: -

5.5.4. AC/DC

int IsSupportAcDc(unsigned int channel);

Description This routines get the device support AC/DC switch or not.

Input: channel 0 :channel 1
1 :channel 2

Output **Return value** 0 : not support AC/DC switch
1 : support AC/DC switch

void SetAcDc(unsigned int channel, int ac);

Description This routines set the device AC coupling.

Input: channel 0 :channel 1
1 :channel 2
ac 1 : set AC coupling
0 : set DC coupling

Output -

int GetAcDc(unsigned int channel,);

Description This routines get the device AC coupling.

Input: channel 0 :channel 1
1 :channel 2

Output **Return value** 1 : AC coupling
0 : DC coupling

5.5.5. 采集

调用**Capture**函数开始采集数据，**length**就是你想要采集的长度，以K为单位，比如**length=10**,就是10K 10240个点。对于采样率的大于等于存储深度的采集长度，取**length**和存储深度的最小值；对于采样率小于存储深度，取**length**和1秒采集数据的最小值。函数会返回实际采集数据的长度。**force_length**可以强制取消只能采集1秒的限制。

int Capture(int length, unsigned short capture_channel, char force_length);

Description This routines set the capture length and start capture.

Input: **length** capture length(KB)

capture_channel

ch1=0x0001 ch2=0x0002 ch3=0x0004 ch4=0x0008 logic=0x0100
ch1+ch2 0x0003
ch1+ch2+ch3 0x0007
ch1+logic 0x0101

force_length 1: force using the length, no longer limits the max collection
1 seconds

Output **Return value** the real capture length(KB)

使用正常触发模式（TRIGGER_MODE_LIANXU）的时候。发送了采集命令，还没有收到采集完成数据通知。现在，想要停止软件。

1、推荐方式：你把触发模式改成TRIGGER_MODE_AUTO，等待收到采集完成数据通知，再停止软件。

2、使用 **AbortCapture**。

DLL_API int WINAPI AbortCapture();

Description This routines set the abort capture

Input:

Output Return value 1:success 0:failed

unsigned int GetMemoryLength();

Description This routines get memory depth of equipment (KB).

Input: -

Output memory depth of equipment(KB)

Roll Mode: 该模式下，采样率被固定的设置为最小采样率，采集长度也是固定的设置为 1 秒采集数据长度。正常的调用 **Capture**，把每次采集的数据连接在一起显示就是完整的波形。

int IsSupportRollMode();

Description This routines get the equipment support roll mode or not .

Input: -

Output **Return value** 1 support roll mode
0 not support roll mode

int SetRollMode(unsigned int en);

Description This routines enable or disenable the equipment into roll mode.

Input: -

Output **Return value** 1 success
0 failed

5.5.6. 采集完成通知

当数据采集完成时，有 3 种方式通知主程序，回掉函数、触发 Event 和主程序循环检测。

5.5.6.1. 回调函数

当数据采集完成时，如果主程序注册了回掉函数"**datacallback**"，它就会被调用。Dll 有一个函数专门用于设置这个回掉函数

void SetDataReadyCallBack(void* ppara, DataReadyCallBack datacallback);

Description This routines sets the callback function of capture complete.
 Input: **ppara** the parameter of the callback function
datacallback a pointer to a function with the following prototype:
 void **DataReadyCallBack** (void * **ppara**)

Output -

5.5.6.2. Event

当数据采集完成时，如果主程序注册了 Event 句柄"**dataevent**"，它就会被设置。需要注意的是，主程序检测到 Event 后，需要将 Event 复位。Dll 有一个函数专门用于设置这个 Event 句柄

void SetDevDataReadyEvent(HANDLE dataevent);

Description This routines set the event handle, these will be set, when capture complete

Input: **dataevent** the event handle

Output -

5.5.6.3. 循环检测

int IsDataReady();

Description This routines return the capture is complete or not.

Input: -

Output **Return value** 1 complete
 0 not complete

说明：3 方式只要使用其中的一种就可以了，回掉函数和 Event 都是异步的处理方式，更加的高效；循环检测需要主程序开始采集以后，过一定时间就检测是否采集完成。

5.5.7. 数据读取

unsigned int ReadVoltageDatas(char channel, double* buffer,unsigned int length);

Description This routines read the voltage datas. (V)

Input: **channel** **read channel** 0 :channel 1
 1 :channel 2
buffer the buffer to store voltage datas
length the buffer length

Output **Return value** the read length

unsigned int ReadVoltageDatasTriggerPoint();

Description This routines read the trigger location where the data collected

Input:

Output **Return value** the trigger points

int IsVoltageDatasOutOfRange(char channel);

Description This routines return the voltage datas is out range or not.

Input: **channel** **read channel** 0 :channel 1
 1 :channel 2

Output **Return value** 0 :not out range
 1 :out range

double GetVoltageResolution(char channel);

Input:	channel_index	0 :channel 1 1 :channel 2
Output	mode	DDS_OUT_MODE_CONTINUOUS 0x00 DDS_OUT_MODE_SWEEP 0x01 DDS_OUT_MODE_BURST 0x02

int GetDDSSupportBoxingStyle(int* style);

Description This routines get support wave styles

Input: **style** array to store support wave styles

Output **Return value** if style==NULL return number of support wave styles
 else store the styles to array, and return number of wave

styles

```
void SetDDSBoxingStyle(unsigned char channel_index, unsigned int boxing);
```

Description This routines set wave style

Input: channel_index 0 :channel 1
 1 :channel 2

Input: **boxing** W_SINE = 0x0001,
 W_SQUARE = 0x0002,
 W_RAMP = 0x0004,
 W_PULSE = 0x0008,
 W_NOISE = 0x0010,
 W_DC = 0x0020,
 W_ARB = 0x0040

Output: -

```
void UpdateDDSArbBuffer(unsigned char channel_index, unsigned short*
arb_buffer, uint32_t arb_buffer_length);
```

Description	This routines update arb buffer
-------------	---------------------------------

Input: **channel_index** 0 :channel 1
 1 :channel 2

arb_buffer the dac buffer

arb_buffer_length the dac buffer length need equal to the dds depth

Output: -

void SetDDSPinlv(unsigned char channel_index, unsigned int pinlv);

Description This routines set frequency

Input: **channel_index** 0 :channel 1
 1 :channel 2

Input: **pinlv** frequency

Output: -

void SetDDSDutyCycle(unsigned char channel_index, int cycle);

Description This routines set duty cycle

Input: **channel_index** 0 :channel 1
 1 :channel 2

Input: **cycle** duty cycle

Output: -

int GetDDSCurBoxingAmplitudeMv(unsigned int boxing);

Description This routines get dds amplitude of wave

Input: **boxing** BX_SINE~BX_ARB

Output: Return the amplitude(mV) of wave

void SetDDSAmplitudeMv(unsigned char channel_index, int amplitude);

Description This routines set dds amplitude(mV)

Input: **channel_index** 0 :channel 1
 1 :channel 2

amplitude amplitude(mV)

Output: -

int GetDDSAmplitudeMv(unsigned char channel_index);

Description This routines get dds amplitude(mV)

Input: **channel_index** 0 :channel 1
 1 :channel 2

Output: return amplitude(mV)

int GetDDSCurBoxingBiasMvMin(unsigned int boxing);

int GetDDSCurBoxingBiasMvMax(unsigned int boxing);

Description This routines get dds bias of wave

Input: **boxing** BX_SINE~BX_ARB

Output: Return the bias(mV) range of wave

void SetDDSBiasMv(unsigned char channel_index, int bias);

Description This routines set dds bias(mV)

Input: **channel_index** 0 :channel 1
 1 :channel 2

bias bias(mV)

Output: -

int GetDDSBiasMv(unsigned char channel_index);

Description This routines get dds bias(mV)

Input: **channel_index** 0 :channel 1
 1 :channel 2

Output: Return the bias(mV) of wave

void SetDDSSweepStartFreq(unsigned char channel_index, double freq);

Description This routines set dds sweep start freq

Input: **channel_index** 0 :channel 1
1 :channel 2

freq

Output: -

double GetDDSSweepStartFreq(unsigned char channel_index);

Description This routines get dds sweep start freq

Input: **channel_index** 0 :channel 1
1 :channel 2

Output: **freq**

void SetDDSSweepStopFreq(unsigned char channel_index, double freq);

Description This routines set dds sweep stop freq

Input: **channel_index** 0 :channel 1
1 :channel 2

freq

Output: -

double GetDDSSweepStopFreq(unsigned char channel_index);

Description This routines get dds sweep stop freq

Input: **channel_index** 0 :channel 1
1 :channel 2

Output: **freq**

void SetDDSSweepTime(unsigned char channel_index, unsigned long long int time_ns);

Description This routines set dds sweep time

Input: **channel_index** 0 :channel 1
1 :channel 2

time/ns

Output: -

unsigned long long int GetDDSSweepTime(unsigned char channel_index);

Description This routines get dds sweep time

Input: **channel_index** 0 :channel 1
1 :channel 2

Output: **time/ns**

void SetDDSBurstStyle(unsigned char channel_index, int style);

Description This routines set dds burst style

Input: **channel_index** 0 :channel 1
1 :channel 2

style 0--n loops

1--gate
Output: -

int GetDDSBurstStyle(unsigned char channel_index);

Description This routines get dds burst style

Input: **s** 0 :channel 1
1 :channel 2

Output: **style** 0--n loops
1--gate

void SetDDSLoopsNum(unsigned char channel_index, unsigned long long int num);

Description This routines set dds loops num

Input: **channel_index** 0 :channel 1
1 :channel 2

num
Output: -

unsigned long long int GetDDSLoopsNum(unsigned char channel_index);

Description This routines get dds loops num

Input: **channel_index** 0 :channel 1
1 :channel 2

Output: **num**

void SetDDSLoopsNumInfinity(unsigned char channel_index, int en);

Description This routines set dds loops num infinity

Input: **channel_index** 0 :channel 1
1 :channel 2

en
Output: -

int GetDDSLoopsNumInfinity(unsigned char channel_index);

Description This routines get dds loops num infinity

Input: **channel_index** 0 :channel 1
1 :channel 2

Output: **loops num infinity**

void SetDDSBurstPeriodNs(unsigned char channel_index, unsigned long long int ns);

Description This routines set dds burst period(ns)

Input: **channel_index** 0 :channel 1
1 :channel 2

ns
Output: -

unsigned long long int GetDDSBurstPeriodNs(unsigned char channel_index);

Description This routines get dds burst period(ns)

Input: **channel_index** 0 :channel 1
 1 :channel 2

Output: **ns**

void SetDDSBurstDelayNs(unsigned char channel_index, unsigned long long int ns);

Description This routines set dds burst delay time(ns)

Input: **channel_index** 0 :channel 1
 1 :channel 2

ns

Output: -

unsigned long long int GetDDSBurstDelayNs(unsigned char channel_index);

Description This routines get dds burst delay time(ns)

Input: **channel_index** 0 :channel 1
 1 :channel 2

Output: **ns**

void SetDDSTriggerSource(unsigned char channel_index, unsigned int src);

Description This routines set dds trigger source

Input: **channel_index** 0 : channel 1
 1 : channel 2

 src 0 : internal
 1 : external
 2 : manual

Output: -

unsigned int GetDDSTriggerSource(unsigned char channel_index);

Description This routines get dds trigger source

Input: **channel_index** 0 : channel 1
 1 : channel 2

Output: **trigger source** 0 : internal
 1 : external
 2 : manual

void SetDDSTriggerSourceIo(unsigned char channel_index, uint32_t io);

Description This routines set dds trigger source io

Input: **channel_index** 0 : channel 1
 1 : channel 2

 io 0 : DIO0

 7 : DIO7

Output: -

Note: 需要使用DIO API，将对应的DIO设置为输入/输出状态

uint32_t GetDDSTriggerSourceIo(unsigned char channel_index);

Description This routines get dds trigger source io

Input: **channel_index** 0 : channel 1
1 : channel 2

Output: **trigger source io** 0 : DIO0
.....
7 : DIO7

void SetDDSTriggerSourceEnge(unsigned char channel_index, unsigned int enge);

Description This routines set dds trigger source enge

Input: **channel_index** 0 : channel 1
1 : channel 2
enge 0 : rising
1 : falling

Output: -

unsigned int GetDDSTriggerSourceEnge(unsigned char channel_index);

Description This routines get dds trigger enge

Input: **channel_index** 0 : channel 1
1 : channel 2
Output: **enge** 0 : rising
1 : falling

void SetDDSOutputGateEnge(unsigned char channel_index, unsigned int enge);

Description This routines set dds output gate enge

Input: **channel_index** 0 : channel 1
1 : channel 2
enge 0 : close
1 : rising
2 : falling

Output: -

unsigned int GetDDSOutputGateEnge(unsigned char channel_index);

Description This routines get dds output gate enge

Input: **channel_index** 0 : channel 1
1 : channel 2
Output: **enge** 0 : close
1 : rising
2 : falling

void DDSManualTrigger(unsigned char channel_index);

Description This routines manual trigger dds
 Input: **channel_index** 0 : channel 1
 1 : channel 2
 Output: -

void DDSOutputEnable(unsigned char channel_index , int enable);

Description This routines enable dds output or not
 Input: **channel_index** 0 : channel 1
 1 : channel 2
enable 1 enable
 0 not enable
 Output: -

int IsDDSOutputEnable(unsigned char channel_index);

Description This routines get dds output enable or not
 Input: **channel_index** 0 : channel 1
 1 : channel 2
 Output **Return value** dds enable or not

5.7. IO

int IsSupportIODevice();

Description This routines get support IO ctrl or not
 Input: -
 Output Return value support io ctrl or not

int GetSupportIoNumber();

Description This routines get support io nums of equipment.
 Output Return value the sample number of io nums

当 IO 设置为输入时，有 3 种方式读取 IO 状态，回掉函数、触发 Event 和主程序循环检测。

回调函数

SDK 会定时读取 IO 状态，如果主程序注册了回掉函数"**datacallback**"，它就会被调用。Dll 有一个函数专门用于设置这个回掉函数

void SetIOReadStateCallBack(void* ppara, IOReadStateCallBack callback);

Description This routines sets the callback function of read io status.
 Input: **ppara** the parameter of the callback function
callback a pointer to a function with the following prototype

Event

SDK 会定时读取 IO 状态，如果主程序注册了 Event 句柄"**dataevent**"，它就会被设置。需要注意的是，主程序检测到 Event 后，需要将 Event 复位。Dll 有一个函数专门用于设置这个 Event 句柄

void SetIOReadStateReadyEvent(HANDLE dataevent);

Description This routines set the event handle, these will be set, when capture complete

Input: **dataevent** the event handle

Output -

循环检测

int IsIOReadStateReady();

Description This routines return read io is complete or not.

Input: -

Output **Return value** 1 complete
0 not complete

说明：3 方式只要使用其中的一种就可以了，回调函数和 Event 都是异步的处理方式，更加的高效；循环检测需要主程序开始采集以后，过一定时间就检测是否采集完成。

void IOEnable(unsigned char channel, unsigned char enable);

Description This routines set io enable or not

Input: **channel** dio0 0

dio1 1

dio2 2

.....

enable not enable 0

enable 1

Output: -

unsigned char IsIOEnable(unsigned char channel);

Description This routines get io enable or not

Input: **channel** dio0 0

dio1 1

dio2 2

.....

Output: **return** not enable 0 or enable 1

void SetIOInOut(unsigned char channel, unsigned char inout);

Description This routines set io in or out

Input: **channel** dio0 0

dio1 1

dio2 2

.....

inout in 0

out 1

Output: -

unsigned char GetIOInOut(unsigned char channel);

Description This routines get io in or out

Input: **channel** dio0 0

dio1 1

dio2 2

.....

Output: **return** in 0

out 1

void SetIOOutState(unsigned char channel, unsigned char state);

Description This routines set io state

Input: **channel** dio0 0

dio1 1

dio2 2

.....

state 0--0

1--1

2--z

3--pulse

4—dds gate

Output: -

unsigned int GetIOInState();

Description This routines get io state

If the SetIOReadStateCallBack setting callback function is used, IOReadStateCallBack will directly notify the IO input status; If use SetIOReadStateReadyEvent and IsIOReadStateReady to read the query, you need to call GetIOState to get the IO input status

Output: **return** io state