

SDK API 使用手册

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升级记录

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初始版本

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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 widows 系统(X86, X64 和 arm64)和 linux 系统(X64, arm-linux-gnueabi, arm-linux-gnueabihf 和 aarch64-linux)。

2. 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);

Description Dll initialization

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

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

3. 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)**

4. 设备复位

int ResetDevice(void);

Description This routines reset device

Input: -

Output: **- Return value** 1 success
0 failed

5. 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。

5.1. 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 -

5.2. 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掉函数"**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 -

5.3. 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过一定时间就检测设备是否插入或者拔出。

6. 示波器

6.1. 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。

6.2. 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

6.3. 触发(硬件触发)

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** 0 :channel 1
1 :channel 2

void SetTriggerSource(unsigned int source);

Description This routines set the trigger source.

Input: **source** 0 :channel 1
1 :channel 2

Output -

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: -

6.4. AC/DC

int IsSupportAcDc();

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

Input: -

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

6.5. 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=0x0020 ch3=0x0040 ch4=0x0080 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 disable the equipment into roll mode.

Input: -

Output **Return value** 1 success
0 failed

6.6.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。

6.6.1.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 -

6.6.2.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 -

6.6.3.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。

6.7.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

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);

Description This routines return the current voltage resolution value

One ADC resolution for the voltage value:

Full scale is 1000mv

the ADC is 8 bits

voltage resolution value = 1000mV/256

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

1:channel 2

Output **Return value** voltage resolution value

unsigned int ReadLogicDatas(unsigned char* buffer, unsigned int length);

Description This routines read the logic data of mso.

Input:

 buffer the buffer to store logic datas

 length the buffer length

Output Return value the read length

7. DDS

int IsSupportDDSDevice();

Description This routines get support dds or not

Input: -

Output **Return value** support dds or not

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 SetDDSSupportBoxingStyle(unsigned int boxing);

Description This routines set wave style

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 SetDDSPinlv(unsigned int pinlv);

Description This routines set frequency

Input: **pinlv** frequency

Output: -

void SetDDSDutyCycle(int cycle);

Description This routines set duty cycle

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 WINAPI 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 DDSOutputEnable(int enable);

Description This routines enable dds output or not

Input: **enable** 1 enable

0 not enable

Output: -

int IsDDSOutputEnable();

Description This routines get dds output enable or not

Input: -
Output **Return value** dds enable or not

8. 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。

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

Description This routines set io enable or not

Input: **channel** channel number

enable not enable 0

enable 1

Output: -

unsigned char IsIOEnable(unsigned char channel);

Description This routines get io enable or not

Input: **channel** channel number

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** channel number

inout in 0
out 1

Output: -

unsigned char GetIOInOut(unsigned char channel);

Description This routines get io in or out

Input: **channel** channel number

Output: **return** in 0
out 1

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

Description This routines set io state

Input: **channel** channel number

state 0 or 1

Output: -

char GetIOInState(unsigned char channel);

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

Input: **channel** channel number

Output: **return** 0 state
1 state