

# 安卓 SDK 使用手册

Version 1.1

微目电子科技

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# 升级记录

V1.0 (2023.9.20)

初始版本

V1.0 (2023.11.20)

增加 MSO10 和 MSO20 支持

增加 DDS API

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## 1. 简介

MSO 混合信号示波器配备的安卓 aar 接口，通过这个接口可以直接控制混合信号示波器。

该接口可以在支持 USB Host 的安卓系统上面使用。

## 2. 权限申请

AndroidManifest.xml 文件中添加如下信息：

### 2.1. USB 权限

```
<uses-feature
    android:name="android.hardware.usb.host"
    android:required="true" />

<uses-permission android:name="android.hardware.usb.host"/>
<uses-permission android:name="android.permission.HARDWARE_TEST"/>
<uses-permission android:name="android.permission.SYSTEM_ALERT_WINDOW"/>

<intent-filter>
    <action android:name="android.hardware.usb.action.USB_DEVICE_ATTACHED" />
</intent-filter>

<meta-data
    android:name="android.hardware.usb.action.USB_DEVICE_ATTACHED"
    android:resource="@xml/device_filter" />
```

将 device\_filter.xml 拷贝到 res/xml 目录下面。

### 2.2. 大堆栈权限

因为采集卡最大支持 32MB 存储深度，为了让 app 申请更多的内存，加入下面的内容。

```
android:largeHeap="true"
```

## 3. UsbDevMng

UsbDevMng 用来管理设备的插入和拔出检测，并通过 UsbDevMng.UsbDevDetectLister 接口来通知。

### 3.1. 创建和初始化

```
usbManger = new UsbDevMng(Activity activity, UsbDevDetectLister UsbDevDetectLister);
usbManger.intiDetect(Context context);
```

### 3.2. 设备状态改变通知处理

```
public void UsbDevDetectCallback(UsbDevMng.DEVICE_DETECT_STATE state, boolean
success, BasicUsbDev dev) {
    if (state == UsbDevMng.DEVICE_DETECT_STATE.DEVICE_ADD) {
        //设备插入处理
    }
    else if (state == UsbDevMng.DEVICE_DETECT_STATE.DEVICE_REMOVE) {
        //设备拔出处理
    }
}
```

```

else if (state == UsbDevMng.DEVICE_DETECT_STATE.NEED_PERMISSION) {
    //没有权限处理
}
}
}

```

## 4. OscDdsFactory

OscDdsFactory 用来根据 BasicUsbDev 设备，创建示波器、DDS 或其他对应功能的控制类。

CreateSbqCardWave 创建示波器的控制类

**BasicSbqUsbCardVer12 CreateSbqCardWave(BasicSbqUsbCardVer12.WaveReceiveLister callback, BasicUsbDev dev)**

Description: Create an oscilloscope's control class.

Input: **BasicSbqUsbCardVer12.WaveReceiveLister** Waveform update notification  
**BasicUsbDev** MSO USB device class

Output: **Return value** oscilloscope's control class

CreateDDSWave 创建 DDS 信号源的控制类

**BasicHsfUsbWaveV12 CreateDDSWave(BasicUsbDev dev)**

Description: Create an dds control class.

Input: **BasicUsbDev** MSO USB device class

Output: **Return value** DDS control class

## 5. 示波器

### 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。SDK 会根据设置的采集范围，自动的调整前级的增益放大器。

**int SetRange(int channel, double minv, double maxv);**

Description: Set the range of input signal.

Input: **channel** the set channel  
**0** channel 1  
**1** channel 2  
**minv** the minimum voltage of the input signal (V)  
**maxv** the maximum voltage of the input signal (V)

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。

### 5.2. 采样率

**int GetSampleNum();**

Description: Get the number of samples that the equipment support.

Input: -



**void SetTriggerMode(TRIGGER\_MODE mode);**

Description: Set the trigger mode.

Input: **mode** TRIGGER\_MODE

Output -

**TRIGGER\_STYLE GetTriggerStyle();**

Description: Get the trigger style.

Input: -

Output **Return value** TRIGGER\_STYLE

**void SetTriggerStyle(TRIGGER\_STYLE style);**

Description: Set the trigger style.

Input: **style** TRIGGER\_STYLE

Output -

**int GetTriggerPulseWidthNsMin();**

Description: Get the min time of pulse width.

Input: -

Output Return min time value of pulse width(ns)

**int GetTriggerPulseWidthNsMax();**

Description: Get the max time of pulse width.

Input: -

Output Return max time value of pulse width(ns)

**int GetTriggerPulseWidthDownNs();**

Description: Get the down time of pulse width.

Input: -

Output Return down time value of pulse width(ns)

**int GetTriggerPulseWidthUpNs();**

Description: 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: Set the up time of pulse width.

Input: **down\_ns**

**up\_ns** up time value of pulse width(ns)

Output -

**TRIGGER\_SOURCE GetTriggerSource();**

Description: Get the trigger source.

Input: -

Output **Return value**

```
TRIGGER_SOURCE.CH1 0x0000000000000001L //CH1
TRIGGER_SOURCE.CH2 0x0000000000000002L //CH2
TRIGGER_SOURCE.D0 0x0000000000010000L //Logic 0
TRIGGER_SOURCE.D1 0x0000000000020000L //Logic 1
TRIGGER_SOURCE.D2 0x0000000000040000L //Logic 2
TRIGGER_SOURCE.D3 0x0000000000080000L //Logic 3
TRIGGER_SOURCE.D4 0x0000000000100000L //Logic 4
TRIGGER_SOURCE.D5 0x0000000000200000L //Logic 5
TRIGGER_SOURCE.D6 0x0000000000400000L //Logic 6
TRIGGER_SOURCE.D7 0x0000000000800000L //Logic 7
```

**void SetTriggerSource(TRIGGER\_SOURCE source);**

Description: Set the trigger source.

Input: **source**

```
TRIGGER_SOURCE.CH1 0x0000000000000001L //CH1
TRIGGER_SOURCE.CH2 0x0000000000000002L //CH2
TRIGGER_SOURCE.D0 0x0000000000010000L //Logic 0
TRIGGER_SOURCE.D1 0x0000000000020000L //Logic 1
TRIGGER_SOURCE.D2 0x0000000000040000L //Logic 2
TRIGGER_SOURCE.D3 0x0000000000080000L //Logic 3
TRIGGER_SOURCE.D4 0x0000000000100000L //Logic 4
TRIGGER_SOURCE.D5 0x0000000000200000L //Logic 5
TRIGGER_SOURCE.D6 0x0000000000400000L //Logic 6
TRIGGER_SOURCE.D7 0x0000000000800000L //Logic 7
```

Output -

注意：如果逻辑分析仪和 IO 是复用的（例如 MSO10、MSO20、MSO21），需要将对应的 IO 打开，并设置为输入状态。

**int GetTriggerLevel();**

Description: Get the trigger level.

Input: -

Output **Return value** level (V)

**void SetTriggerLevel(int level);**

Description: Set the trigger level.

Input: level (V)

Output -

**int IsSupportTriggerSense();**

Description: Get the equipment support trigger sense or not.

Input: -

**Return value** 1 support  
0 not support



### **int GetTriggerSenseDiv();**

Description: Get the trigger sense.

Input: -

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

### **void SetTriggerSenseDiv(int sense, double y\_interval\_v);**

Description: Set the trigger sense.

Input: Sense (0-1 div)

Interval(V)

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。

### **boolean IsSupportPreTriggerPercent();**

Description: Get the equipment support Pre-trigger Percent or not .

Input: -

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

### **int GetPreTriggerPercent();**

Description: Get the Pre-trigger Percent.

Input: -

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

### **void SetPreTriggerPercent(int front);**

Description: Set the Pre-trigger Percent.

Input: Percent (5-95)

Output -

### **int IsSupportTriggerForce();**

Description: Get the equipment support trigger force or not.

Input: -

**Return value** 1 support  
0 not support

### **void TriggerForce();**

Description: Force capture once.

Input: -

Output: -

## **5.4. AC/DC**

### **int IsSupportAcDc(int channel);**

Description: Get the device support AC/DC switch or not.

Input: **channel** 0 :channel 1







**void UpdateArbBuffer(int channel\_index, short[] arb\_buffer, int arb\_buffer\_length);**

Description: 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 SetPinlv(int pinlv);**

Description: Set frequency

Input: **pinlv** frequency

Output: -

**void SetDutyCycle(int cycle);**

Description: Set duty cycle

Input: **cycle** duty cycle

Output: -

**int GetCurBoxingAmplitudeMv(BOXING\_STYLE boxing);**

Description: Get DDS amplitude of wave

Input: **boxing** BX\_SINE~BX\_ARB

Output: Return the amplitude(mV) of wave

**void SetAmplitudeMv(int channel\_index, int amplitude);**

Description: Set DDS amplitude(mV)

Input: **channel\_index** 0 :channel 1  
1 :channel 2

**amplitude** amplitude(mV)

Output: -

**int GetAmplitudeMv(int channel\_index);**

Description: Get DDS amplitude(mV)

Input: **channel\_index** 0 :channel 1  
1 :channel 2

Output: return amplitude(mV)

**int GetCurBoxingBiasMvMin(BOXING\_STYLE boxing);**

**int GetCurBoxingBiasMvMax(BOXING\_STYLE boxing);**

Description: Get DDS bias of wave

Input: **boxing** BX\_SINE~BX\_ARB

Output: Return the bias(mV) range of wave

**void SetBiasMv(int channel\_index, int bias);**

Description: Set DDS bias(mV)  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
**bias** bias(mV)  
Output: -

**int GetBiasMv(int channel\_index);**

Description: Get DDS bias(mV)  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
Output: Return the bias(mV) of wave

**void SetSweepStartFreq(int channel\_index, double freq);**

Description: Set DDS sweep start freq  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
**freq**  
Output: -

**double GetSweepStartFreq(int channel\_index);**

Description: Get DDS sweep start freq  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
Output: **freq**

**void SetSweepStopFreq(int channel\_index, double freq);**

Description: Set DDS sweep stop freq  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
**freq**  
Output: -

**double GetSweepStopFreq(int channel\_index);**

Description: Get dds sweep stop freq  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
Output: **freq**

**void SetSweepTime(int channel\_index, long time\_ns);**

Description: Set DDS sweep time  
Input: **channel\_index** 0 :channel 1  
1 :channel 2  
**time/ns**  
Output: -

**long GetSweepTime(int channel\_index);**

Description: Get DDS sweep time

Input: **channel\_index** 0 :channel 1  
1 :channel 2

Output: **time/ns**

**void SetTriggerSource(int channel\_index, DDS\_TRIGGER\_SOURCE src);**

Description: Set DDS trigger source

Input: **channel\_index** 0 : channel 1  
1: channel 1  
**src** 0: internal 2  
0: INTERNAL  
1: EXTERNAL  
2: MANUAL

Output: -

**int GetTriggerSource(int 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 SetTriggerSourceIo(int channel\_index, int io);**

Description: 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

**int GetTriggerSourceIo(int channel\_index);**

Description: Get DDS trigger source io

Input: **channel\_index** 0 : channel 1  
1 : channel 2  
Output: **trigger source io** 0 : DIO0  
.....  
7 : DIO7

**void SetTriggerSourceEnge(int channel\_index, DDS\_ENGE enge);**

Description: Set DDS trigger source enge

Input:       **channel\_index**     0 : channel 1  
                                  1 : channel 2  
              **enge**            0 : rising  
                                  1 : falling  
Output:       -

**int GetTriggerSourceEnge(int channel\_index);**

Description:  Get DDS trigger enge

Input:       **channel\_index**     0 : channel 1  
                                  1 : channel 2  
Output:       **enge**            0 : rising  
                                  1 : falling

**void SetOutputGateEnge(int channel\_index, DDS\_OUTPUT\_ENGE enge);**

Description:  Set DDS output gate enge

Input:       **channel\_index**     0 : channel 1  
                                  1 : channel 2  
              **enge**            0 : close  
                                  1 : rising  
                                  2 : falling

Output:       -

**int GetOutputGateEnge(int channel\_index);**

Description:  Get DDS output gate enge

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

**void ManualTrigger(int channel\_index);**

Description:  Manual trigger DDS

Input:       **channel\_index**     0 : channel 1  
                                  1 : channel 2

Output:       -

**void ChannelStart (int channel\_index);**

Description:  Enable DDS output or not

Input:       **channel\_index**     0 : channel 1  
                                  1 : channel 2

Output:       -

**boolean ChannelIsStart (int channel\_index);**

Description:  Get DDS output enable or not



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