CV-35CAK

12G/6G/3G/HD-SDI to HDMI 2.0 Converter with USB-C 10Gbps Video Capture & Audio Extractor

User Manual

INTRODUCTION

The **CV-35CAK 12G/6G/3G/HD-SDI to HDMI 2.0 Converter with USB-C 10Gbps Video Capture & Audio Extractor** offers a cost-effective solution for converting 12G/6G/3G/HD-SDI signals to HDMI 2.0 compliant format. The conversion from SDI to HDMI is entirely digital, ensuring no loss in transformation for both audio and video. The CV-35CAK includes a low-jitter SDI local loop-out and high-quality analog stereo output, providing users with flexibility.

Furthermore, the device features a video capture function, allowing users to capture and display original uncompressed SDI video with more realistic color rendition. It utilizes the USB 3.2 Gen 2 Type-C (USB 3.2) interface for high-speed transmission. The CV-35CAK also incorporates large volume image buffer technology, effectively preventing video tearing. With a high sampling rate and accuracy, the captured videos exhibit high sharpness, rich details, and fewer color edges.

FEATURES

- Supports SDI input & loopout resolution:
  720p@50,720p@59.94, 720p@60, 1080i@50, 1080i@59.94, 1080i@60, 1080p@23.97, 1080p@24, 1080p@25, 1080p@29.97, 1080p@30, 1080p@50, 1080p@59.94, 1080p@60, 4K2K@23.98, 4K2K@24, 4K2K@25, 4K2K@29.97, 4K2K@30, 4K2K@50, 4K2K@59.94, 4K2K@60,
  Bit Rate: 11.88 Gbps, 11.88/1.001 Gbps, 5.94 Gbps, 5.94/1.001 Gbps, 2.97 Gbps, 2.97/1.001 Gbps, 1.485 Gbps, 1.485/1.001 Gbps, 270 Mbps
- Auto 12G/6G/3G/HD-SDI detection
- Supports HDMI up to 4K2K@60
- SDI video and audio streams over USB 3.2 Gen 2 Type-C
- Supports UVC1.0/1.1/1.5
- Supports video resolution up to 4K2K@60/1080P@120 (Video stream over USB-C)*
- Supports scaler
- Supports SDI audio extraction
- Auto-detection on video format to ensure plug-play operations
- Recording Video Format: Software Compression
- Works on multiple operating system platforms (Windows 7/8.1/10,/11 Mac and Linux OS)
- Compatible with most 3rd party software such as OBS Studio and AMCap
- Supports USB 3.2 Gen 2 (RGB/YUY2/NV12/I420/MJPEG) (capture up to 4K2K@60) and USB 2.0 (YUY2/NV12/I420/MJPEG) (capture up to 1080@60)
- Low Latency (4 frame at 4K60)
- USB-C reversible
- System Requirements (Recommended)
  - PC or Notebook Basic Interface Requirements: USB 3.2 Gen 2x1 Type C or Type A; HDMI 2.0
  - Windows Operating System: Windows® 10 x64 or above**
    1) USB must support UVC protocol, meet 4Kp30 protocol requirements; HDMI must support 4Kp60 HDR
    2) Intel® Core™ i3-8XXX or above
    3) Either NVIDIA® GeForce® GTX 1060 or Radeon™ RX560 or above
    4) 16 GB RAM (*dual-channel)
  - Mac Operating System: MacOS High Sierra 10.13 or above
    1) USB must support UVC protocol, meet 4Kp30 protocol requirements; HDMI must support 4Kp60 HDR
    2) iMac:
       a) 3.6GHz Quad-Core Intel Core i7
       b) Radeon Pro 555 (2GB of VRAM)
       c) 16GB 2400MHz DDR4 Memory
    3) MacBook Pro:
       a) 2.8GHz Quad-Core Intel Core i7
       b) Radeon Pro 555X (2GB GDDR5 Memory)
       c) 16GB 2400MHz DDR4 Memory

(!) 1. Video quality is apparently related to the capability of computer and software setting.
2. Please use the included USB 3.2 cable in the box to protect the device and avoid further compatible issues.
3. Video resolution change may require to restart software.
4. Video output format is related to the software limitation. For example, the AMCap software does not support NV12 format.

For 12G/6G/3G/HD-SDI inputs
(!) 1. ONLY supports format converter. NOT support frame rate conversion & scaling.
2. ONLY supports two-sample interleave sampling scheme. NOT support Square Division method.
3. NOT support SD-SDI
4. NOT support 3G-SDI level B

(!) * 2560x1440@120 ONLY support on NV12/I420/MJPEG format; 4K2K@60 ONLY support on NV12/I420/MJPEG format
** If the computer's CPU (Multi Core) scores lower than 270 pts (CINEBENCH 2024) or 5000 pts (CINEBENCH R23) or 2600 pts (CPU-Z), it is recommended to add a discrete graphics card (either NVIDIA® GeForce® GTX 1060 or Radeon™ RX560 or above).

PACKAGE CONTENTS

- 1x CV-35CAK
- 1x USB 3.2 C to C Cable (host to device)
- 1x 5V power adapter
- 1x User Manual

SPECIFICATIONS

| Model Name	CV-35CAK
Technical	
Role of usage	SDI to HDMI Converter
Input/loopout Video bandwidth	[SDI][11.88 Gbps, 11.88/1.001 Gbps]
Output bandwidth	Up to 10 Gbps (USB-C)
Video support(USB-C)	Up to 4K2K@60/1080P@120
Video support(Loopout)	Up to 4K2K@60
Input Video Support	[12G-SDI] 4K2K @50/59.94/60Hz [6G-SDI] 4K2K @23.98/24, 25, 29.97, 30Hz [3G-SDI] 1080p50/59.94/60 [HD-SDI] – 720p @50/59.94/60Hz,1080i @50/59.94/60Hz, 1080p @23.98/24/25/29.97/30Hz
Audio Input	SDI Embedded Audio
Audio Support	HDMI output/ SDI loopout up to 7.1ch Stereo audio up to 2ch
Recording Mode	Software Compression
Recording Video Format	RGB/YUY2/NV12/I420/MJPEG (USB 3.2 Gen 2), YUY2/NV12/I420/MJPEG (USB2.0)
ESD protection	Human body model — ±15kV [air-gap discharge] & ±8kV [contact discharge]
PCB stack-up	6-layer board [impedance control — differential 100Ω; single 50Ω]
Cable equalization	[12G-SDI] up to 70m [6G-SDI] up to 100m [3G-SDI] up to 200m
Firmware update	Feasible via USB-C Port
Input	1x BNC(SDI)
Output	1x USB-C + 1x HDMI+ 1x BNC(SDI) + 1x 3.5mm
HDMI connector	Type A [19-pin female]
USB connector	USB 3.2 Type C (SuperSpeed USB)
Software compatibility (not complete list)	OBS Studio (Windows, Linux, MAC), AMCap (Windows), Potplayer (Windows) , VLC (OS X, Linux), XSplit Broadcaster (Windows), Skype (Windows, OS X), Zoom (Windows), Hangout (Windows), TeamViewer (Windows)
OS Support	Windows 7 /8.1 /10/11, Mac and Linux OS
Mechanical		
Housing		Metal enclosure
Dimensions [L x W x H]	Model	
	Package	
	Carton	
Weight	Model	
	Package	
Power supply		5V DC
Power consumption		8 Watts [max]
Operation temperature		0~40°C [32~104°F]
Storage temperature		-20~60°C [-4~140°F]
Relative humidity		20~90% RH [no condensation]

PANEL DESCRIPTIONS
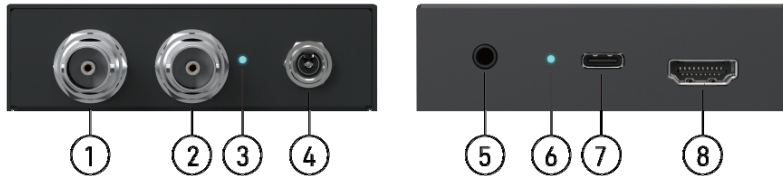
1. **SDI IN:** 12G/6G/3G/HD-SDI Input

2. **SDI LOOPOUT:** 12G/6G/3G/HD-SDI loopout

3. **LED INDICATOR:** SDI input signal indicator LED

   [Blue] Device power on (no input signal)

   [Green] Input detects SDI signal

4. **+5V DC:** 5V DC power jack

5. **STEREO AUDIO OUT:** Audio extracts from SDI input

6. **LED INDICATOR:** USB-C signal indicator LED

   [Red]* Connect the device to the USB 2.0 port on the host

   [Blue] Connect the device to the USB 3.1 port on the host

   [Green] Connect the device to the USB 3.2 port on the host

7. **USB-C OUT:** Connect to a USB host (PC, NB, MAC...)

8. **HDMI OUT:** Connect to a HDMI display

> ⚠ *If you plug the capture device into the USB 3.0 port on the host, but the LED indicator lights up red, it means that the current device is working according to the USB 2.0 specification. It could be an issue with the USB cable or USB Port.

CONNECTION DIAGRAM
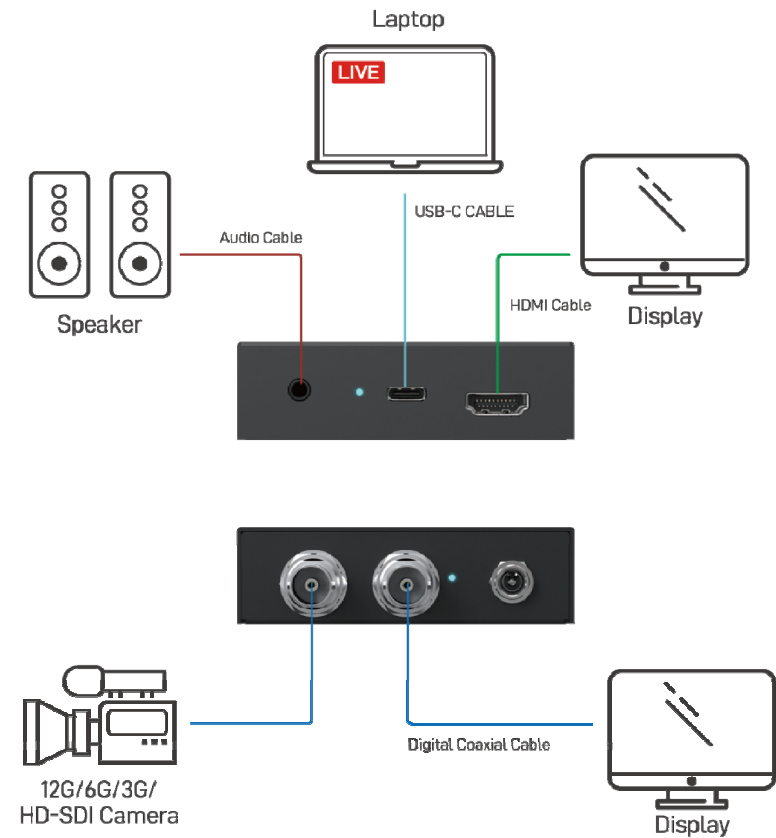
Supported Resolutions

12G-SDI Output	
4K2K @50/59.94/60Hz	SMPTE ST-2082
6G-SDI Output	
4K2K @23.98/24, 25, 29.97, 30Hz	SMPTE ST-2081
3G-SDI Output	
1080p @ 50/ 59.94 / 60Hz	SMPTE 424M, SMPTE 425M
HD-SDI Output	
720p @ 50Hz	SMPTE 296M -3
720p @ 60 / 59.94Hz	SMPTE 296M -1, -2
1080i @ 50Hz	SMPTE 274M -6
1080i @ 60 / 59.94Hz	SMPTE 274M -4, -5
1080p @ 24 / 23.98Hz	SMPTE 274M -10, -11
1080p @ 25Hz	SMPTE 274M -9
1080p @ 30 / 29.97Hz	SMPTE 274M -7, -8

VIDEO STREAMING

Create a Video Streaming

Users can create video streams on the streaming service platform. The below steps show how to complete the video streaming settings from Twitch and YouTube.

Twitch

1. Browse the Twitch website (https://www.twitch.tv/) and log in, then select **"Creator Dashboard"** from your account drop-down menu at the top right of the screen.
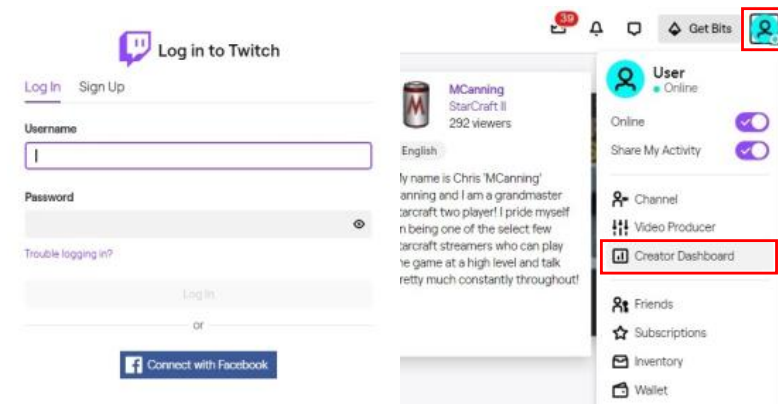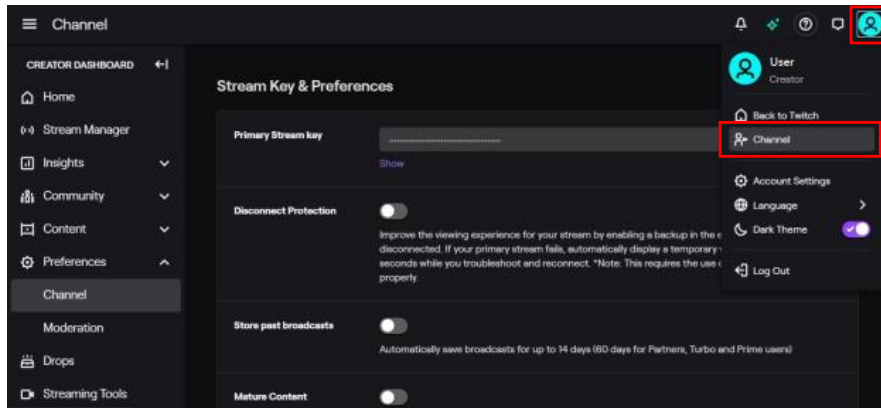

2. Find **"Preferences"** in the left menu, and click **"Channel"**, then you will see **"Primary Steam key"** on the screen. Copy the **"Primary Steam key"** and paste it into the **"Stream Key"** field in the OBS, then click **"Start Streaming"** in the software.
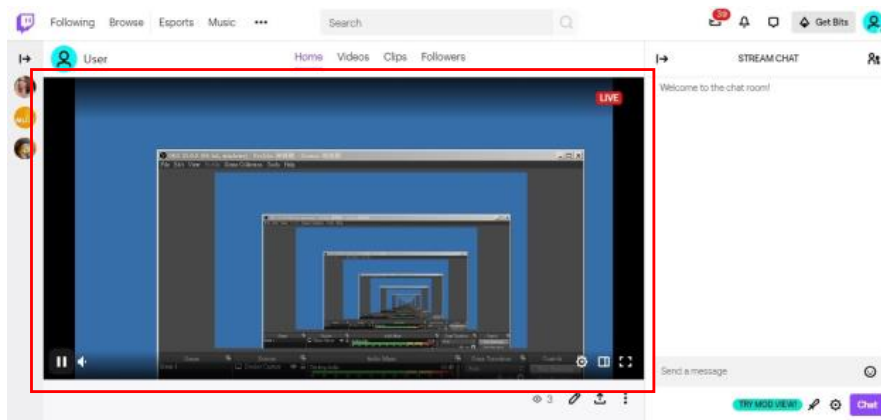
   * Please refer to steps 4-6 of the OBS software control program.
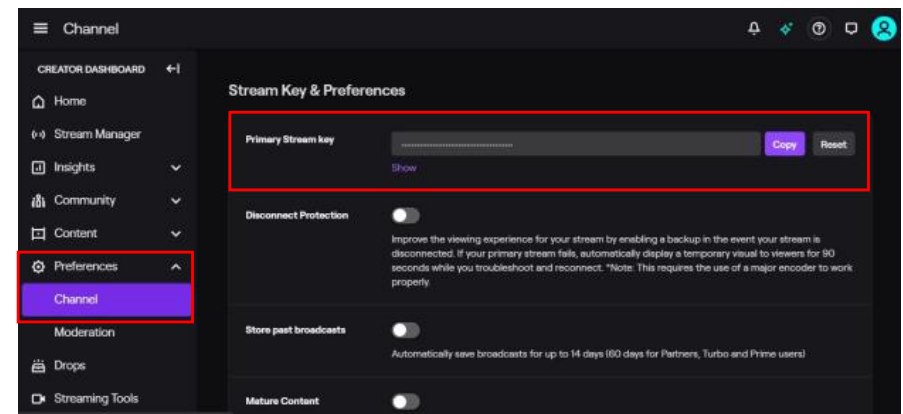
3. Go back to Twitch and select **"Channel"** from your account drop-down menu.

4. At this point, you will see the player start live streaming.

<u>YouTube</u>

1. Browse the YouTube website (https://www.youtube.com/) and log in, then lick **"Go live"** from the **"Create"** icon menu at the top right of the screen.

   * If your account is using YouTube for the first time to create a video stream, you need to wait 24 hours to enable the function.
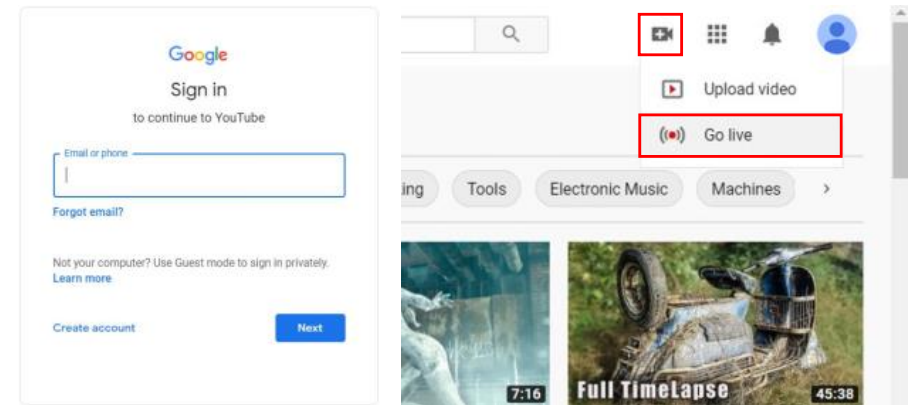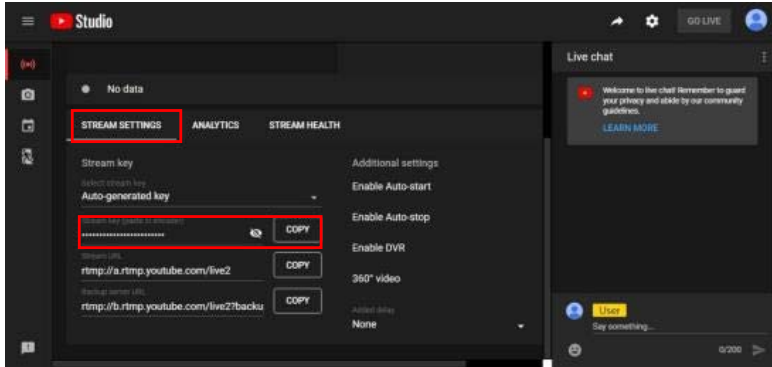

2. Click **"Stream"** in the left menu, and fill in the relevant information of the live video to create a new stream.
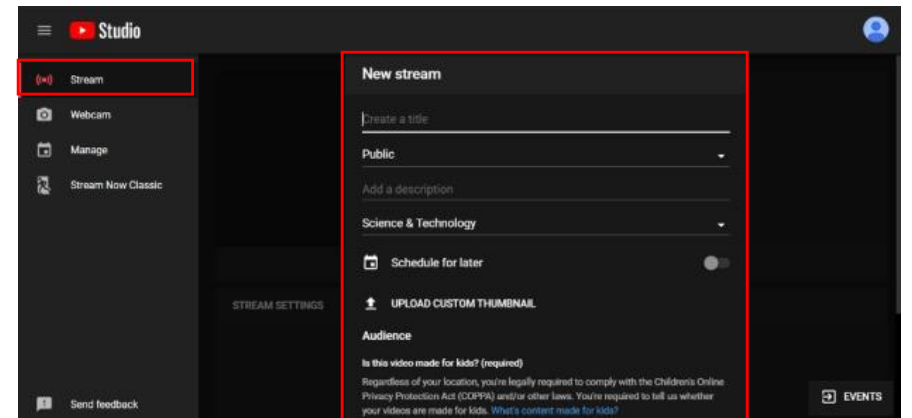
3. You will see **"Stream key"** from the **"STREAM SETTINGS"** below. Copy the **"Stream key"** and paste it into the **"Stream Key"** field in the OBS, then click **"Start Streaming"** in the software.
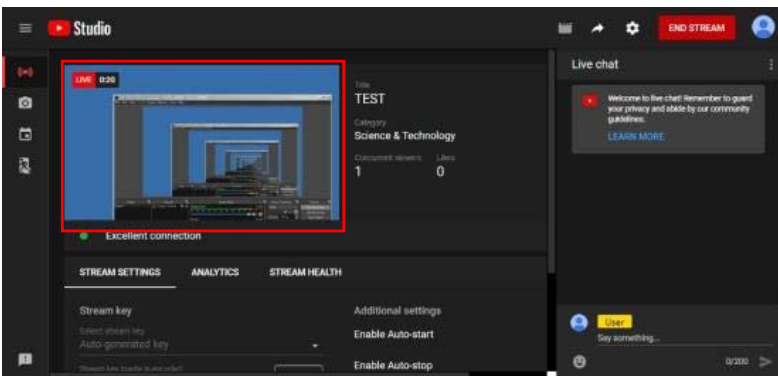   * Please refer to steps 4-6 of the OBS software control program.

4. Next, go back to YouTube, and then wait for 30-60 seconds, the player will display the live preview. At the same time, the "GO LIVE" button at the top right will turn blue, please press this button.
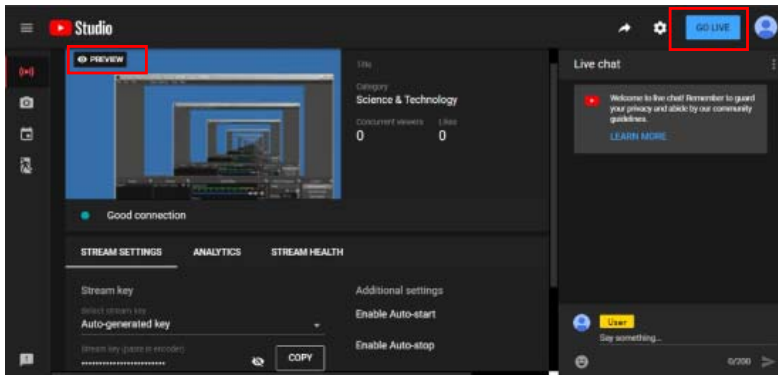
5. The player on YouTube will start live streaming.

Stream and record videos with OBS

OBS is popular USB capture freeware and has excellent compatibility. Please start with OBS if users are not familiar with USB capture device.
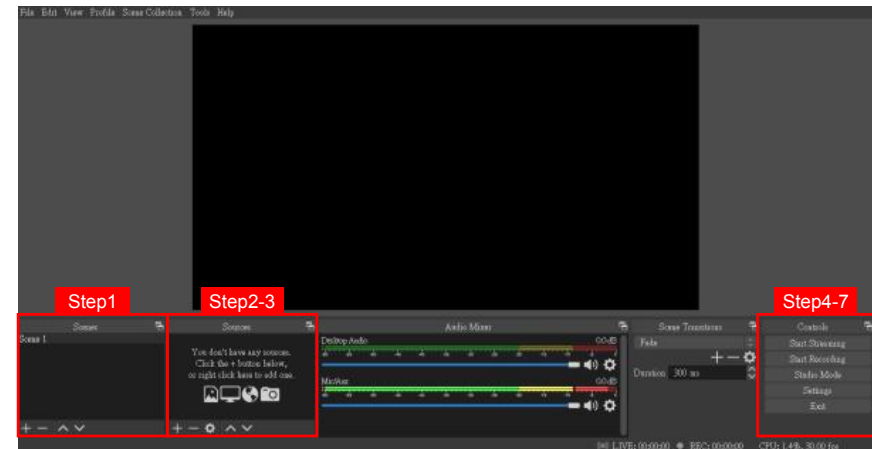
Download the software

Browse the download page of the OBS official website (https://obsproject.com/download), then select the suitable computer operating system and start downloading.
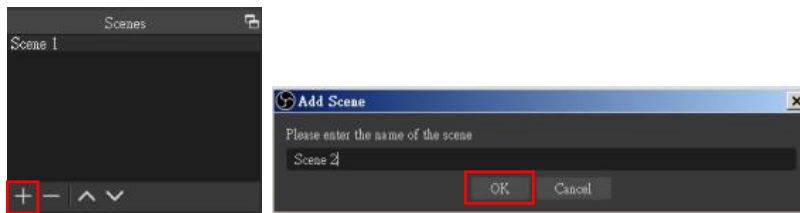


Start the software control program

After downloading the software, please open it and follow the below steps to complete the video streaming settings.

1. First, find the **"Scenes"** window, click **"+"** in the lower left corner, and then enter the name of the scene to create a new scene.


2. Find the **"Source"** window, click **"+"** in the lower left corner, and then select **"Display Capture"** or **"Video Capture Device"** to create a new source.
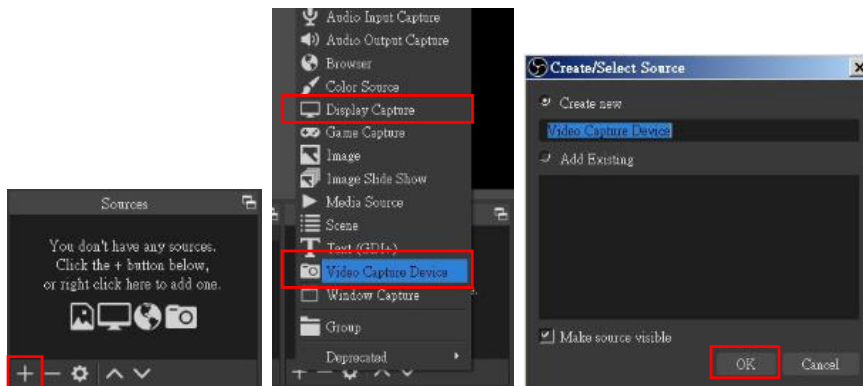
3. Next, you can set display capture properties. If you select **"Display Capture"** in step 2, you can select the primary monitor or other extended monitor as the display source. If you select **"Video Capture Device"** in step 2, you can select USB video device as the display source. After all settings are completed, click **"OK"**.
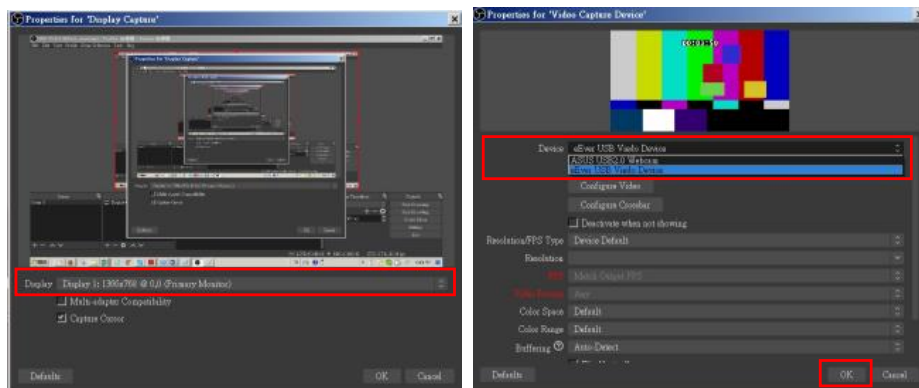
4. Click **"Settings"** and then select **"Stream"** to perform streaming settings. Users can choose service providers, including Twitch, YouTube, etc.
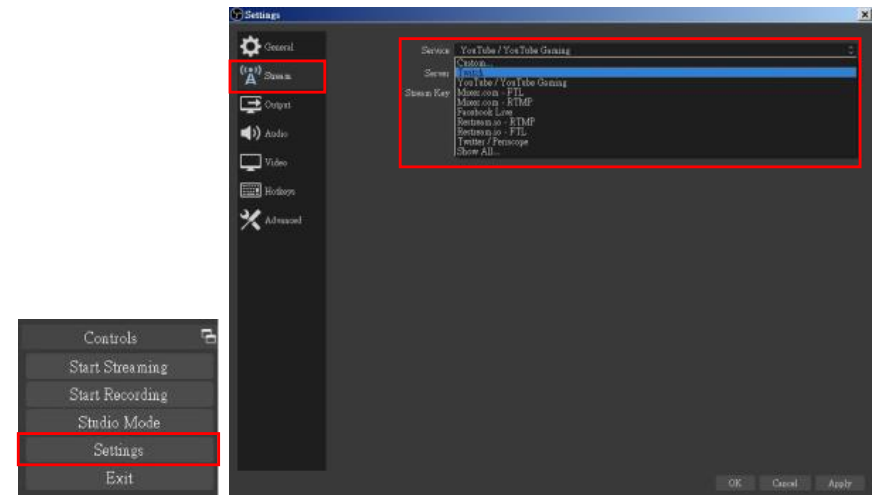
5. Paste the stream key provided by the service provider into the **"Stream Key"** field, then click **"Apply"** and **"OK"** after setting. In addition, users can lick **"Get Stream Key"** at this step to open the service provider website.

6. Please click **"Start Streaming"**. At this time, the screen after clicking **"Start Streaming"** will be displayed in the live video.
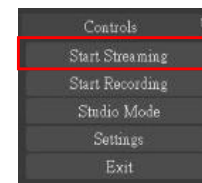
7. On the other hand, users can also click **"Start Recording"** to record videos with OBS. Besides, you can click **"Settings"** and then select **"Output"** to set **"Recording Path"** and **"Recording Format".**
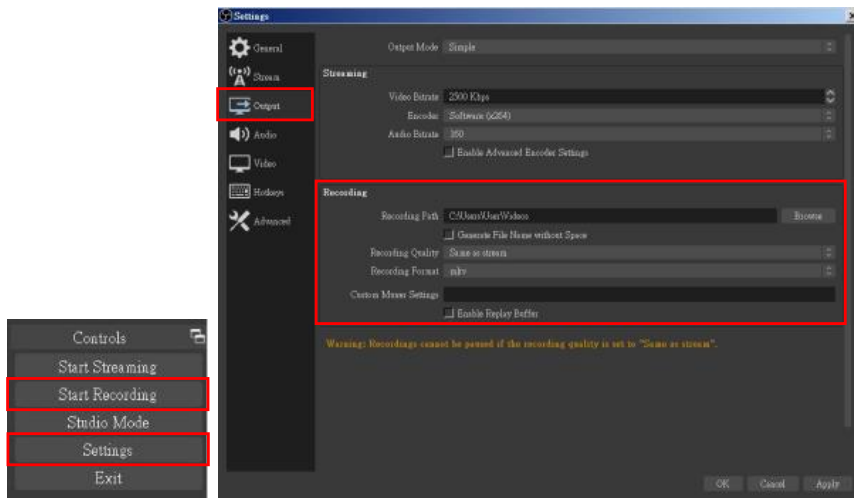

⚠ The procedures the manual demonstrates are based on the interface that each website provides at the time when the manual is written. The most recent way to make live streaming happen is supposed to be very likely as the above procedures but subject to change by the website interface update from the social media.

TROUBLESHOOTING

Our USB device has done comprehensive tests before shipment. Most of the incompatibilities we have experienced are not from the USB capture device itself, but from the sophisticated software and hardware combination of PC or laptop. Please follow the following suggestions to see any helps.

1. OBS is popular USB capture freeware and has excellent compatibility. Please download it and start with OBS if users are not familiar with USB capture device.

   https://obsproject.com/download

2. Due to the complexities of OS and computer hardware, different USB ports on PC or laptop may have different performance or limitation. Please try all USB ports to see if there are any differences.

3. Please must use the USB cable in box. We do not guarantee the overall performance when the USB capture box works with some other USB cables.

4. HDMI/SDI cable quality may also play an essential role when capturing. Please be sure of that HDMI/SDI cable can do 4K2K@60 HDMI/SDI signal transmission or better. Try different cables when the device is not able to work as expected.

5. If audio has noise when using the PotPlayer software, please adjust the audio renderer to WaveOut on the software. The setting path is:

   PotPlayer ▾ → Audio → Audio Output → Audio Renderer → WaveOut

6. If there are problems such as video flipping or wrong direction when using VLC software, please rotate, flip or transpose the video in the VLC software to correct the video. The setting path is:

   Tool → Effects & Filters → Video Effects → Geometry → Transform

USB PIN DEFINITION

USB TYPE-C PLUG #1			USB TYPE-C PLUG #2	
PIN	**SIGNAL NAME**		**PIN**	**SIGNAL NAME**
A1, B1, A12, B12	GND	⟷	A1, B1, A12, B12	GND
A4, B4, A9, B9	VBUS	⟷	A4, B4, A9, B9	VBUS
A5	CC	⟷	A5	CC
B5	VCONN	⟷	B5	VCONN
A6	Dp1	⟷	A6	Dp1
A7	Dn1	⟷	A7	Dn1
A2	TXp1	⟷	B11	RXp1
A3	TXn1	⟷	B10	RXn1
B11	RXp1	⟷	A2	TXp1
B10	RXn1	⟷	A3	TXn1
B2	TXp2	⟷	A11	RXp2
B3	TXn2	⟷	A10	RXn2
A11	RXp2	⟷	B2	TXp2
A10	RXn2	⟷	B3	TXn2
A8	SBU1	⟷	B8	SBU2
B8	SBU2	⟷	A8	SBU1

WARRANTY

The SELLER warrants the **CV-35CAK 12G/6G/3G/HD-SDI to HDMI 2.0 Converter with USB-C 10Gbps Video Capture & Audio Extractor** to be free from defects in the material and workmanship for 1 year from the date of purchase from the SELLER or an authorized dealer. Should this product fail to be in good working order within 1 year warranty period, The SELLER, at its option, repair or replace the unit, provided that the unit has not been subjected to accident, disaster, abuse or any unauthorized modifications including static discharge and power surges.

Unit that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for 90 days from the day of reshipment to the BUYER. If the unit is delivered by mail, customers agree to insure the unit or assume the risk of loss or damage in transit. Under no circumstances will a unit be accepted without a return authorization number.

The warranty is in lieu of all other warranties expressed or implied, including without limitations, any other implied warranty or fitness or merchantability for any particular purpose, all of which are expressly disclaimed.

Proof of sale may be required in order to claim warranty. Customers outside Taiwan are responsible for shipping charges to and from the SELLER. Cables are limited to a 30 day warranty and cable must be free from any markings, scratches, and neatly coiled.

The content of this manual has been carefully checked and is believed to be accurate. However, The SELLER assumes no responsibility for any inaccuracies that may be contained in this manual. The SELLER will NOT be liable for direct, indirect, incidental, special, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. **Also, the technical information contained herein regarding the CV-35CAK features and specifications is subject to change without further notice.**