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www.dewesoft.com
1 Key features

The DS-CAM-600 is a high-speed Gigabit-Ethernet camera with following key data:

- 600fps @ VGA (640x480)
- Full HD resolution 1920x1080
- Real-time data streaming with full resolution
- Monochrome
- Power-over-Ethernet (PoE)
- Real-time JPEG compression
- Sync (Triggered and free-run mode)
- Adjustable shutter time
- Standard C-Mount
- Small compact form factor
- Ruggedized (high-shock and vibration resistant, aluminium housing)

The camera supports the high-performance industrial standard “GigE Vision”. The standard introduced in 2006 provides a framework for transmitting high-speed video and related control over Ethernet networks.

The benefits are: high speed data transfer rates up to 1Gbit/s (based on 1000Base-T) connectible to every standard GigE Ethernet port and cable lengths up to 100m.

Dewesoft uses Smartek GigE SDK for communication with cameras that support GigE Vision standard.

<table>
<thead>
<tr>
<th>IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>For best performance we recommend using a Core i5 CPU or better, 4 GB RAM and SSD for storing data.</td>
</tr>
</tbody>
</table>

1.1 System Requirements

- 1 Gigabit-Ethernet port
- Good PC performance (Core i5 CPU or better recommended, 4 GB RAM)
- DEWESoft X or 7.1
- Smartek GigE Vision SDK 2.6.2
- DEWESoft GigE driver (cdv) 2.0

1.2 Naming

For simplification the camera is called “DS-CAM-600” in this document. The correct name is “DS-CAM GigE1-600”.

www.dewesoft.com
2 Technical data

2.1 Specifications

2.1.1 Electrical

Power

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Power-over-Ethernet (42-57V)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>6 W</td>
</tr>
</tbody>
</table>

Digital I/O*

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended input voltage</td>
<td>0 to 3,3 VDC</td>
</tr>
<tr>
<td>Voltage level representing logical 0</td>
<td>0 to +0,8 VDC</td>
</tr>
<tr>
<td>Undefined state between 0 and 1</td>
<td>&gt; +0,8 VDC to +2,0 VDC</td>
</tr>
<tr>
<td>Voltage level representing logical 1</td>
<td>&gt; +2,0 VDC to 3,3 VDC</td>
</tr>
<tr>
<td>Absolute maximum voltage (above → damage!)</td>
<td>+/- 24 VDC</td>
</tr>
</tbody>
</table>

* for detailed internal circuit diagrams look into Optomotive Velociraptor manual (a) page 25 + 26

2.1.2 Optical

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image sensor</td>
<td>CMOSIS CMV2000 2E5M1PP</td>
</tr>
<tr>
<td>Sensor type</td>
<td>CMOS</td>
</tr>
<tr>
<td>Sensor resolution (H x W)</td>
<td>2048 x 1088</td>
</tr>
<tr>
<td>Optical size</td>
<td>Diagonal 12.7 mm (2/3”)</td>
</tr>
<tr>
<td>Pixel size (in μm)</td>
<td>5.5 x 5.5</td>
</tr>
<tr>
<td>Pixel data format</td>
<td>JPEG</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>60 dB</td>
</tr>
<tr>
<td>Shutter</td>
<td>Electronic Global Shutter</td>
</tr>
<tr>
<td>Shutter time</td>
<td>210 ns – 90 s</td>
</tr>
<tr>
<td>Exposure</td>
<td>Linear, 3Slope High Dynamic Range</td>
</tr>
<tr>
<td>Scanning system</td>
<td>Progressive</td>
</tr>
<tr>
<td>Max. frame rate (at 640x480)</td>
<td>specified for 600 (in fact 748 are possible)</td>
</tr>
<tr>
<td>ADC bit depth</td>
<td>10 bit</td>
</tr>
</tbody>
</table>
### 2.1.3 Mechanical

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>External dimensions (H x W x L)</td>
<td>94 x 54 x 58 [mm] incl. C-Mount lens holder</td>
</tr>
<tr>
<td>Housing</td>
<td>Black anodized aluminum case</td>
</tr>
<tr>
<td>Weight</td>
<td>290g</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0°C .. +50°C</td>
</tr>
<tr>
<td>Protection</td>
<td>Up to IP67 with housing</td>
</tr>
<tr>
<td>Fixing holes</td>
<td>2 x M6</td>
</tr>
<tr>
<td>Lens mount</td>
<td>C-mount (1” 32G thread)</td>
</tr>
<tr>
<td>Connectors</td>
<td>Ethernet: RJ45; Sync: 4 pin LEMO EGG.00.304.CLL</td>
</tr>
<tr>
<td>Conformity</td>
<td>CE, EN55022, class A; EN61000-4-2; EN61000-4-3; EN61000-4-4; EN61000-4-6; FCC Part 15, class A, RoHS, GigE Vision 1.2</td>
</tr>
</tbody>
</table>

*Illustration 1: Mechanical Drawing*
2.2 Connections

2.2.1 Connectors and pinout

On the backside of the camera there are two connectors. For the trigger input there is a 4 pin Lemo 00 (called “IO connector”), for the data transfer an Ethernet connector. The pinout of the Ethernet connector is according to the standard.

![Illustration 2: Connectors](image1)

Note that pins 3 and 4 are used for clocking the camera. Pins 1 and 2 are reserved for synching multiple DEWESoft instruments!

![Illustration 3: IO connector pinout](image2)
2.2.2 SIRIUS connection example

In this picture you see a typical SIRIUS device consisting of a S-Box unit (integrated PC) on bottom and one SIRIUS slice on top (from rear side).

The camera is powered via PoE (Power over Ethernet, via LAN connector), therefore a Power injector is required (Gigabit-LAN port of computer → PoE injector → camera).

The second cable provides the trigger, connected to the SYNC port of the SIRIUS slice. The camera frames are now in perfect sync with the analog data acquired by DEWESoft™.

Note: Even if the camera is connected, synching to other SIRIUS devices is still possible, because there are different pins used on the Synch-Connector for triggering/synching (see also IO connector pinout).

Illustration 4: SIRIUS S-Box with one SIRIUS on top, connected to the DS-CAM-600 (PoE injector in between)
**2.2.3 Connecting to existing DEWETRON systems**

The DS-CAM-600 is also compatible to existing DEWETRON systems.

Please consider the system requirements:

- see 1.1. System requirements
- DEWETRON instrument must not have DI-ISO option (isolated inputs/outputs)! In this case clocking is not possible, only free-run (the CLK pin is not available on the connector).

Free-run operation (without clocking) is easy, just connect the camera over PoE injector to the GigE LAN port.

If you want to trigger the camera, you have to use a special cable for the trigger/clock line. Usually every DEWETRON instrument is equipped with a 37pin DSUB connector, please see DEWETRON manual for pinout, here for example is the pinout for the **Orion-1622-100** (see Reference List (b)).

- Connect EXT_CLK1 (pin 17) to CLK of the Lemo 00 connector of the camera (pin 3, see 2.2.1).
- Connect DGND (pin 37) to GND of the Lemo 00 connector (pin 4, see 2.2.1)
- Set the pin EXT_CLK1 to “Video” in DEWESoft hardware setup

![Illustration 5: DEWETRON Orion-1622-100 DSUB 37 pinout](image)

![Illustration 6: Clockout setup of EXT_CLK1 pin in DEWESoft](image)
### 2.3 Resolutions / Framerates

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>CMV2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active pixels</td>
<td>2048 x 1088</td>
</tr>
</tbody>
</table>

#### STANDARD RESOLUTIONS

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Active pixels</th>
<th>MAX. FRAME RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full frame 4.2M</td>
<td>2048 x 2048</td>
<td>N/A</td>
</tr>
<tr>
<td>Full frame 2.2M</td>
<td>2048 x 1088</td>
<td>333 FPS</td>
</tr>
<tr>
<td>2K</td>
<td>2048 x 1080</td>
<td>336 FPS</td>
</tr>
<tr>
<td>HD 1080</td>
<td>1920 x 1080</td>
<td>336 FPS</td>
</tr>
<tr>
<td>SXGA</td>
<td>1280 x 1024</td>
<td>355 FPS</td>
</tr>
<tr>
<td>XGA</td>
<td>1024 x 768</td>
<td>471 FPS</td>
</tr>
<tr>
<td>HD 720</td>
<td>1280 x 720</td>
<td>502 FPS</td>
</tr>
<tr>
<td>SVGA</td>
<td>800 x 600</td>
<td>600 FPS</td>
</tr>
<tr>
<td>PAL</td>
<td>768 x 576</td>
<td>625 FPS</td>
</tr>
<tr>
<td>WVGA</td>
<td>752 x 480</td>
<td>748 FPS</td>
</tr>
<tr>
<td>VGA</td>
<td>640 x 480</td>
<td>748 FPS</td>
</tr>
<tr>
<td>QVGA</td>
<td>320 x 240</td>
<td>1460 FPS</td>
</tr>
</tbody>
</table>

**HINT**

Results (FPS) should be considered only as approximate MAX values. It depends on the system performance (CPU, JPEG compression, harddisk). We recommend to test cameras with your setup at about 0.8*max FPS and higher to find where corrupted image, frame lost or buffer overrun will occur.
3 Installation

3.1 Installation – in DEWESoft X

For DEWESoft X all the drivers come with the Fullinstaller, if you select the option “GigE camera driver” during installation. To check if the drivers are installed, go to Settings → Hardware setup → Video and see if the checkbox “GigE” is visible. If not, execute the fullinstaller again and reinstall the option.

The last DEWESoft X fullinstaller can be downloaded here: http://www.dewesoft.com/dewesoft7/developer-downloads
3.2 Installation – in DEWESoft 7.1

3.2.1 Required files

(a) GigECamera_v2_0_SDK_262 or newer
- Go to http://www.dewesoft.com/download/section/6 and download GigECamera_v2_0_SDK_262.zip.
- It includes the Smartek GigE SDK 2.6.2 and the DEWESoft driver GigEcamera 2.0.

(b) Dewesoft 7.1 b82 or newer
(Note that you need to be logged in to download beta software.)

3.2.2 Step-by-step instruction

1. Install Smartek_GigEVisionSDK
   Note that you must be administrator, not just user with admin rights! After installation be sure that “Smartek GigE Vision Filter Driver” is installed (picture 1) under Local area Connection Properties.

HINT
Note that “Filter Driver” filters out all packets that are not GigE on hardware level, so the camera will work much faster than without the filter.
2. Connect camera to PC via Ethernet cable and PoE Power Injector in between. See connection example shown in 2.2.2.

3. The DS-CAM-600 supports DHCP, so just set your computer's IP address to automatic and wait until the IP is assigned. To test if the camera is working you can run Smartek GigEVisionClient. By right-click on the camera you can also set IP to fix, if you prefer.

Illustration 9: OK, cameras can be used, close the GigEVisionClient and start DEWESoft.
4. To enable the camera in Dewesoft copy the file GigECamera.cdv into the Dewesoft Addons folder, usually located in Dewesoft7\Bin\V7_1\Addons

5. Copy and replace your existing DEWESoft.exe with the one downloaded.

6. Start DEWESoft and go to Settings > Hardware setup > Analog. For triggered mode (DEWESoft is clocking the camera), check if your device (such as DEWE-43 for example) is set to Standalone or Master:

   ![Illustration 10: Dewesoft > Settings > Hardware setup > Analog: Set device to Master or Standalone]

7. Go to the Video tab and check »GigE Vision« and »Use trigger«.

   ![Illustration 11: DEWESoft: Hardware setup > Video: finds GigE camera(s).]
“File types for storing” should be set to “DVI” which is uncompressed DEWESoft video format. The CPU will not have enough power to additionally do the “live” compression. Depending on the measurement duration, the video file can get very big.

For compression after the measurement set the appropriate compressor in “AVI file type for compression”. We recommend downloading the XVID codec.

In Analysis mode you can then select your datafile and click “AVI compress”.

![Illustration 12: AVI compress after measurement]

8. Go to Ch. Setup, click the Video button, click the Unused button to enable the video channel.

![Illustration 13: DEWESoft: Channel setup > Video]

**HINT**

Ensure the firmware version of SIRIUS hardware is at least 4.5.0.16, otherwise please update the firmware. This is done with the “USB Firmware Upgrade Tool” from [http://www.dewesoft.com/download/section/1](http://www.dewesoft.com/download/section/1). Also the Firmware File can be downloaded there. Close DEWESoft, start the Upgrade Tool, select “DEWESoft USB” interface and firmware file and Start. After finished, it is very important to unplug power and USB cable and reboot the SIRIUS device.
9. Enter the channel setup. By now, already a picture should be shown.

Please look up “FAQ” section, if you get a NO FRAMES RECEIVED error.

Illustration 14: DEWESoft: Video settings

- The shutter bar determines the light exposure duration (brightness).
- If the light is too dark, use the gain bar to increase brightness by software.
- The JPEG quality is invers to the compression. 80% means good quality, low compression.

Illustration 15: poor and good picture quality

- With the HDR option you are able to increase the dynamic from 60 up to 120dB if you have an image with low dynamic range (e.g. only light grey and dark grey shapes).
- To improve the performance if using the camera on an Ethernet switch, use “Optimize for switched network”
- Use the “Advanced Setup”, if you want to change specific parameters of the camera, such as the custom resolution and AOI, area of interest, for instance.

HINT

If you change the frame rate, after typing the value, the input field gets a yellow color; confirm the value by pressing the Enter key.
4 FAQ

GigE checkbox in hardware setup missing / Support for 64 bit Windows:

For 64-bit Windows all three Smartek GigE paths needs to be set to Win32_i86 in Environment variable PATH. Go to My Computer and click System properties > Advanced system settings > Advanced tab > Environment Variables > System variables > select Path > Edit.

Make the following changes:

```plaintext
%GIGE_VISION_SDK_PATH%in\Win32
%GENICAM_ROOT_V2_0%in\Win32_i86
%GENICAM_ROOT_V2_0%in\Win32_i86\GenApi\Generic
```

Save and reset Windows. Path correctness can be checked by GetEnvironmentVariable('PATH');

No picture shown, “No frames received” error:

If you receive the error “NO FRAMES RECEIVED”, check:

- Is the Trigger/Sync cable connected?
- Try decreasing the Shutter value
- Check in hardware setup if the DEWESoft USB device is set to Master or Standalone
- Disable Trigger in hardware setup and check if it’s working in free-run mode (cable problem?)

Camera not found (not in GigEVisionClient, not in DEWESoft)

- Check if status LED on camera is green, booting takes ABOUT 1 MINUTE!
- If using a GigE-Switch with PoE ports, ensure output power is sufficient, check status LED during operation
- Check Windows Firewall settings

Camera not found (not found in DEWESoft; yellow mark in GigEVisionClient)

Not able to use the cameras. Most probably the computer and the camera are not in the same subnet.

Illustration 16: IP address problem

(See also Illustration 8 for a working example.)
Change IP address of the camera

Illustration 17: Change IP address of the camera

If you manually change the IP address, please use the same subnet as the computer, example:

PC: 192.168.1.100, Subnet 255.255.255.0
Camera: 192.168.1.101, Subnet 255.255.255.0

The IP is ok, if the cameras are found with a red mark (see Illustration above), close GigEVisionClient and start DEWESoft.

GigEVision client does not start, error message when starting

You can get it working by doing the following: Check if the operating system of your computer is 32bit or 64bit.

Copy the 64-bit dll’s (otherwise take the ones from the 32bit directories) from
C:\Program Files\Smartek\GigEVisionSDK\bin\Win64
and
C:\Program Files\Smartek\GigEVisionSDK\GenICam\bin\Win64_x64
to
\Windows\system32 (respectively \Windows\SysWOW64)

Then start the GigEVisionClient from C:\Program Files\Smartek\GigEVisionSDK\bin\Win64

Cameras not working in DEWESoft

If you followed the step-by-step installation procedure, but still the camera is not working in DEWESoft, you can try to copy the used dll's manually:

Copy the 32-bit dll’s from
C:\Program Files\Smartek\GigEVisionSDK\bin\Win32
and
C:\Program Files\Smartek\GigEVisionSDK\GenICam\bin\Win32_i86
to
DEWESoft’s Addons folder.

Then restart DEWESoft.
Performance improvements (e.g. in case of frames lost or buffer overrun)

A loss of a few frames during a measurement is normal, due to collisions on the Ethernet network.

Here are some useful hints to improve the performance:

- Do not operate the camera in a fully loaded network (e.g. office computers). Just use direct connection or one switch (with no additional participants).
- Disable all anti-virus, firewall, indexing and synchronization programs running in background.
- Also check if you really have a Gigabit-Ethernet network card, not only 100Mbit/s.
- Check if the LAN cable is at least of CAT5 quality, if you have longer cable lengths it should be even better.
- For this camera, the main improvement can be done by using a powerful CPU.
- Try to decrease the JPEG compression (e.g. from 80 down to 50%)
- Use the Windows resource monitor (can be found in Task manager) to check for bottlenecks.
- For optimal performance we recommend to enable “Jumbo” frames on your PC network card. “Jumbo” frames are Ethernet packets larger than 1500 bytes. This way less CPU time is spent for data reception therefore increasing performance and minimizing data loss. (Control panel -> network and internet -> view network status and tasks (network and sharing center) -> change adapter settings -> right-mouse-click on LAN connection -> Properties -> Configure -> Advanced -> Jumbo Frame -> set to highest value (e.g. 9kB MTU))
- Also an overloaded DEWESoft setup (many displays, e.g. high resolution FFT instruments) will take system power. Try at first only with camera video instruments.
- Press <Ctrl>+<Shift>+<P> in DEWESoft Measure mode. On the right side the performance monitor will appear. Watch the Cam video buffer. It should stay stable at low values.

Illustration 18: DEWESoft performance monitor
5 Documentation Version

Revision number: 85
Last modified: Sat 23 Feb 2013, 14:43

<table>
<thead>
<tr>
<th>Doc-Version</th>
<th>Date [dd.mm.yy]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0.0</td>
<td>23.02.13</td>
<td>initial revision</td>
</tr>
</tbody>
</table>

5.1 Reference list

(a) Velociraptor HS User Guide v1.3
   http://www.optomotive.com/products/velociraptor

(b) Dewetron Orion AD board manual
   http://download.dewetron.com/.../dewe-orion-1622-10x_106ex.pdf

For support please contact support at dewesoft.com.