# Videotek® VSG-4CSD

## Clock System Driver



The Videotek® VSG4-CSD is part of the Imagine Communications Reference Sync and Timing platform and is a ½RU wide, 1RU tall and 12 inches deep clock system driver. The unit is small in size, with redundant power supply inputs, and is low in power consumption and light in weight, making it a perfect fit for all broadcast television and post production environments and anywhere else accurate time and date is required for IP networks and clock displays.

## Features

- Genlocks to color black (black burst) meeting NTSC SMPTE ST 170M and PAL ITU R BT. 4705 specifications
- Genlocks to tri level sync meeting SMPTE ST 240M/274M/296M standards
- Support for various time code formats and time code user bit formats, including SMPTE/EBU drop frame or non drop frame time code formats
- GPS support via 10 MHz, PPS and RS-232 interfaces
- NTP support and IEEE-1588 PTP via a network connection
- VITC support from color black input
- LTC support
- GPI inputs and outputs
- Redundant external power supply
- Optional auxiliary input and output breakout
- Two LTC outputs
- Support for DARS or word clock
- One color black reference output

### Processing Features

- Configurable DST (daylight savings time) and leap second change
- Auto detection for input sources
- User-defined scheduled call outs to time reference sources, such as GPS receivers
- User-programmable delays for input and output, offsets, time code offsets, output phasing, and input and output jam syncs
- Display of current local time and date

## Details

An internal timing engine processes the incoming reference information, makes appropriate conversions to different time bases and maintains a consistent time base, which is used to drive the unit's outputs. Using a combination of parameters such as leap second information, DST (Daylight Savings Time) rules, and offset values, the VSG4-CSD can be configured to convert incoming International Atomic Time (TAI) to other time bases. This time is then distributed to the module's outputs as time and date information, one color black video reference signals and DARS (Digital Audio Reference Signal) or word clock.

The optional GPS-3904 is recommended for use with the VSG-4CSD for GPS locked time and date, and as a highly stable master temperature-controlled oscillator source for the for the video, audio and time code reference outputs.

If only GPS locked time and date are required (no video or audio reference), the optional GPS-3903-2 with PPS and serial data time and date outputs is recommended.

The VSG-4CSD has multiple timing inputs that include GPS (Global Positioning System) sourced time and date with 10 MHz, PPS (Pulse Per Second) and serial data time and date inputs, LTC (Linear Time Code), NTP (Network Time Protocol), VITC (Vertical Interval Time Code), D-VITC (Digital Vertical Interval Time Code), ATC (ancillary time code) support and support for IEEE-1588 PTP (Precision Time Protocol). The video reference input supports NTSC, PAL, SD, HD and 3G formats of video source sync signals including color black (black burst) or tri level sync.

The VSG-4CSD has one output that can can be user-selected for color black or tri level sync with individual offsets and formats. This provides for multiple format timing from a single reference source. The VSG-4CSD also provides outputs that include NTP master, PTP master, VITC, and LTC outputs with individual offsets on all outputs, as well as DARS (Digital Audio Reference Signal) or word clock output.

The easy-to-use front panel and web user interface allow for instantaneous status on any source or output including date, time and lock information.

The VSG-4CSD provides for daylight savings time and time zone offsets, with an auto changeover function for source failures with primary and secondary source selection for maintaining the uninterruptable status that is required by the most stringent systems. The unit has dual power supply capabilities and includes two external 110/220 universal AC adapters providing the required DC power input.

## Specifications

*Specifications and designs are subject to change without notice*

| VSG-4CSD CLOCK SYSTEM DRIVER | STABILITY OVER TIME | PPS (PULSE PER SECOND) ACCURACY | 10 MHZ ACCURACY | APPLICATIONS |
|---|---|---|---|---|
| Standalone (no GPS option) | 4PPM (0.34s/day) | Not Applicable | Not Applicable | Time will vary ~2 minutes per year, see below for recommendations |
| GPS-3903-2 | Not Applicable | 1 PPS (static) $\pm$50 nanoseconds | Not Applicable | Recommended for date/time-of-day and time code only reference |
| GPS-3904 | Not Applicable | UTC 15 nanoseconds (one sigma) | $1.16 \times 10^{-12}$ (one day average) | Recommended for date and time-of-day and video/audio/time code reference |

### GENLOCK INPUT

| | |
|---|---|
| Input Connector Type | BNC female, passive looping |
| Input Impedance | Hi-Z |
| Blackburst Input Amplitude (External reference) | NTSC: Sync and burst 286 mV nominal<br>PAL: Sync and burst 300 mV nominal |
| Blackburst Input Amplitude Tolerance | $\pm$6 dB |
| Black Burst Subcarrier Jitter | <1 ns (pk-pk) over 1 horizontal line |
| Tri-level Sync Amplitude | 600 mV pk-pk nominal |
| Tri-level Sync Amplitude Tolerance | $\pm$3 dB |
| Return Loss | <-40 dB |

### 10 MHZ INPUT

| | |
|---|---|
| Input Connector type | BNC connector |
| Input Impedance | 75 ohms |
| Level | 2 V pk-pk $\pm$3 dB |

### PPS INPUT

| | |
|---|---|
| Input Connector Type | BNC connector |
| Input Impedance | 75 ohms |
| Level | TTL; Vih=2.0 V min, Vil=0.8V max |
| Edge Transition | 20 ns max |
| Return Loss | <45 dB to 20 MHz |

### LTC INPUT

| | |
|---|---|
| Input Connector Type | 3 pin Weidmuller or BNC (Differential balanced or unbalanced) |
| Nominal Input Amplitude | 2 volts pk-pk |
| Minimum Input Amplitude | 0.5 volts pk-pk |
| Maximum Input Amplitude | 4.5 volts pk-pk |

## DIFFERENTIAL BALANCED

| | |
|---|---|
| Format | SMPTE/EBU LTC 24/25/30 drop/non-drop auto-sensing |
| Impedance | Hi-Z (>30 k ohms) or 600 ohms, selectable with switches |
| Input Sensitivity | 500 mV pk-pk |

## UNBALANCED

| | |
|---|---|
| Format | SMPTE/EBU LTC 24/25/30 drop/non-drop auto-sensing |
| Impedance | Hi-Z (>30k ohms) |
| Input sensitivity | 500 mV pk-pk |

## SYNC OUTPUTS

| | |
|---|---|
| Output Connector Type | 5 BNC |
| Blackburst Signal Level | NTSC: sync and burst 286 mV, nominal<br>PAL: sync and burst 300 mV, nominal |
| Blackburst Subcarrier Jitter | <1 ns (pk-pk) over one horizontal line |
| SC/H Phase | 0° ±10° |
| Tri-Level Signal Level | 600 mV pk-pk |
| DC Offset | 0 V ±0.5 V |
| Reference to Output Timing | ±100 ns |

## DAR/WORD CLOCK OUTPUT (SHARED DARS/WORD CLOCK)

| | |
|---|---|
| Audio Formats | AES/EBU |
| Output Connector Type | BNC |
| Output Impedance | 75 ohms nominal |
| DARS Output Level | 1 V pk-pk |
| Jitter | ≤0.25 UI |
| Output Sample Rate | 48 kHz |
| Word Clock Output Level | 5 V TTL level |

## LTC OUTPUT

| | |
|---|---|
| Electrical | Differential balanced |
| Format | SMPTE/EBU LTC 24/25/30 (frame per seconds) drop/non-drop support |
| Impedance | Low-Z (<25 ohms per side) |
| Level | 3.9 V pk-pk nominal into 1 k ohms (Low-Z output) |
| Level | 2.5 V pk-pk nominal into 1 k ohms (600 ohms output) |
| Transition Time | 40 µs + 4 µs measured at 10% and 90% amplitude |
| Electrical | Unbalanced |
| Format | SMPTE/EBU LTC 24/25/30 (frame per seconds) drop/non-drop support |
| Impedance | Low-Z (<25 ohms per side) or 600 ohms, selectable with switches on optional break-out board |
| Level | 2 V pk-pk nominal into 1 k ohms |
| Transition Time | 40 µs ±4 µs measured at 10% and 90% amplitude |
| Display | 256×64 OLED display for device configuration |

| Communication Interfaces | 1 Ethernet port RJ-45 10/100 Base-T (web browser control, PTP and NTP interfaces)<br>GPIO connector 26 female pin D-sub<br>Nominal Input Amplitude 2 volts pk-pk<br>Minimum Input Amplitude 0.5 volts pk-pk<br>Maximum Input Amplitude 4.5 volts pk-pk |
| --- | --- |

## POWER

Power connector barrel type with screw lock. AC Adapter Included

| Power Input | 12 VDC ±1.2 VDC |
| --- | --- |
| Power Consumption | <20 W nominal |
| Non-resetting Fuse | 2.5 A, 16 VDC |

## MECHANICAL

| Mechanical (H x W x D) | 1.74 x 8.46 x 13.21 in. (4.42 x 21.49 x 33.32 cm) |
| --- | --- |
| Weight | 2.65 lbs (1.2 kg) |

## ENVIRONMENTAL

| Operating Temperature | 32° to 122° F (0° to 50° C) |
| --- | --- |
| Storage Temperature | -22° to 149° F (-30° to 65° C) |
| Humidity (non-condensing) | Operating: 20% to 80%; Non-operating: 5% to 90% |
| Altitude Operating | 6562 ft (2000 m) |

## Ordering Information

| VSG-4SYS-C | VSG-4CSD system, includes 2 VSG-4CSD clock system drivers, 1 VSX-11-3G multiformat sync changeover unit, 1 DRT-5 and 1 RMT-U1 rack mount trays, and 2 VSG-4-BRK-1 breakout panels |
| --- | --- |
| VSG-4CSD | Clock System Driver supporting NTP, LTC, VITC, and GPS with one video reference output, IEEE-1588 PTP capability, includes two PSU-12-1 power adaptors for redundancy, optional GPS-3903-2 antenna and receiver, DRT-5 dual rack mount tray and BLK-5 blank filler panel |

## OPTIONS

| VSG-4-BRK-1 | Breakout panel and 5 ft cable with HD26 pin DSUB male to female connectors for the VSG-4xxx series and DL-870 |
| --- | --- |
| DRT-5 | Dual rack mount tray for VSG-4 series and DL-870, BLK-5 blank front filler available (DRT-ADP-1 DRT adaptor required for installing DRT-4 products in the DRT-5 rack tray (CMN-41, CMN-MV, LLM-1770, VSG-401)) |
| BLK-5 | Blank panel for left or right side of DRT-4A or DRT-5 |
| PSU-12-1 | Spare or replacement power supply for Videotek VSG-4xxx and Selenio DL-870, 12 VDC output with threaded coupling ring, input 90 to 264 VAC |
| RMT-U1 | Rack mount tray universal, holds up to 8 VSG-4 series power supplies or a combination of items |

## OPTIONAL GPS ANTENNA AND RECEIVER

| GPS-3904 | GPS antenna and receiver kit, 110-240 VAC operation, serial data, 10 MHz and PPS outputs, includes AC power supply, RG-59 antenna cable (23m/75ft), for use with VSG-4MTG, VSG-4CSD, VSG-4TSG and VSG-4TCG for time/date and video, audio and timecode applications |
| --- | --- |
| GPS-3903-2 | GPS antenna and receiver kit, 110-240 VAC operation, serial data and PPS outputs, includes AC power supply, RG-59 antenna cable (23m/75ft) and RS-232/PPS adapter cable for VSG-4CSD for time/date and VSG-4TCG for time code applications |
| GPS-3902-RM | Rack mount kit, holds up to 2 GPS-3903-2, GPS-3904 receivers |

## Images/Diagrams

### Back Panel
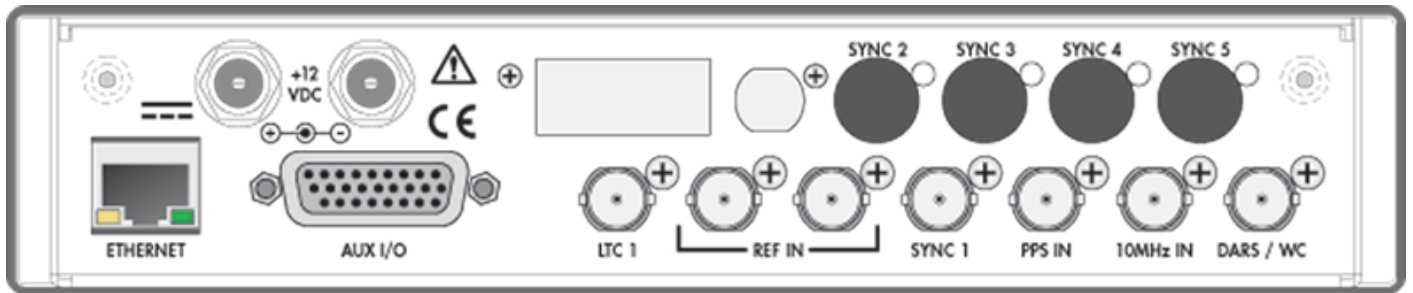


### Block Diagram
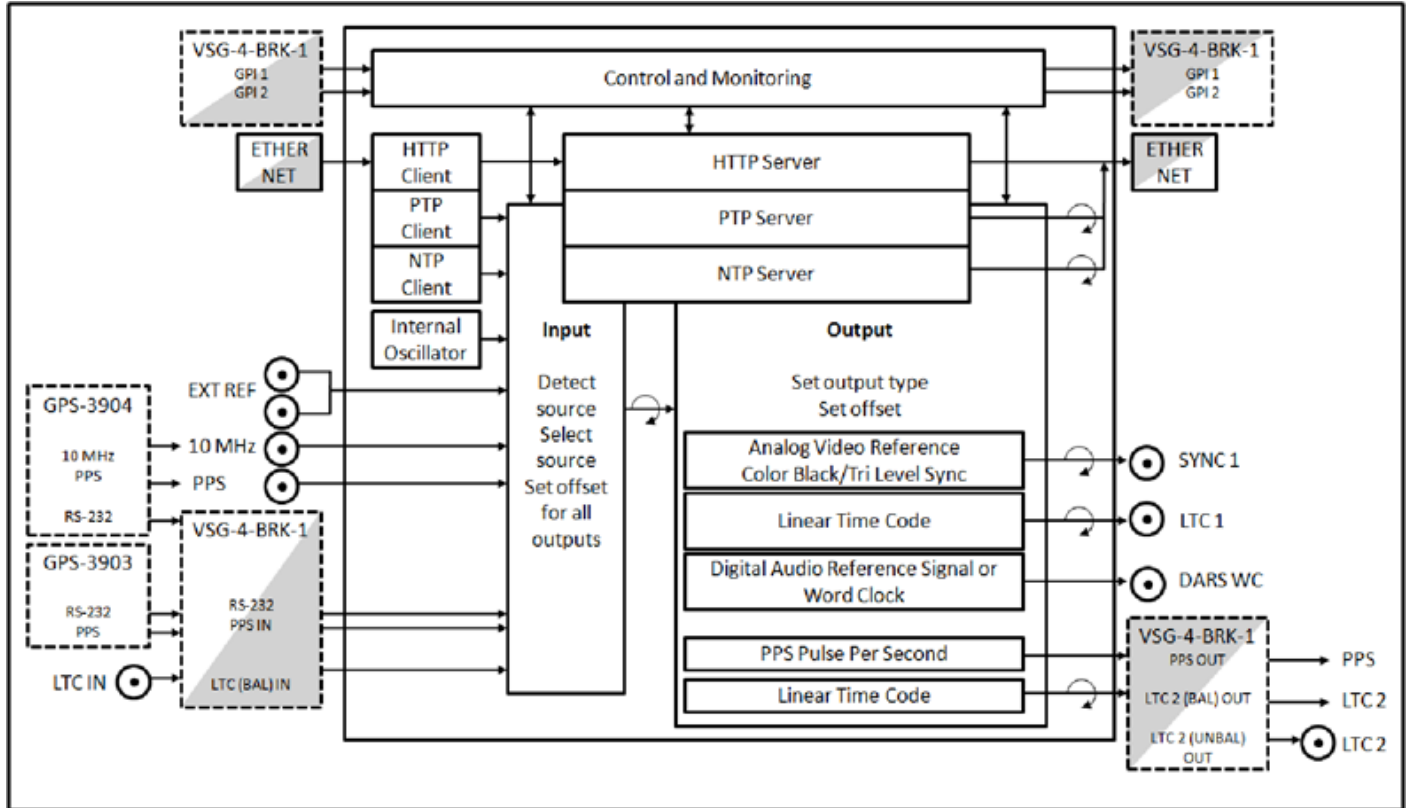


**The optional VSG-4BRK-1 breakout adaptor provides GPS PPS, RS-232, LTC and GPI inputs and output connections**