# Nutaq ADACSync

Multichannel. GPS-disciplined, precision clock generator **PRODUCT SHEET** 







# Nutaq ADACSync

#### **AT A GLANCE**

- Five, independent programmable clock outputs
- Output range from 31.25 MHz to 350.00 MHz
- Less than 0.1 ppm, onboard VCxO, GPS-matched, precision reference
- Distribution buffer with eight frequency-aligned channels (programmable CLKO)
- Four, independently buffered outputs (programmable CLK1-CLK4)

- Reference clocks—External, onboard, or GPS
- Drives 50  $\Omega$ , single-ended loads
- Reference clock and 1 pps GPS outputs
- GPS time/position-stamp at GPIO-32 output
- Stand-alone configuration through onboard EEPROM
- Easy-to-use programming application
- Plug and Play with Nutaq ADC/DAC boards

The ADACSync is a 6U, cPCI (PXI compatible), GPS-disciplined, precision, low-jitter clock generator featuring:

- 12 buffered output channels
- Five programmable clocks
- The possibility of an external or onboard reference clock
- A high-precision GPS reference clock option

These features make the ADACSync perfect in synchronizing multichannel system clocks.

The first programmable clock of the ADACSync (CLKO) is buffered and distributed to eight synchronous output channels, which allows synchronizing several digitizer boards or daisy chaining ADACSyncs for even more channels (with an external input clock). The four other programmable clocks (CLK1-CLK4) are independent, single-channel buffered outputs. CLK4's delay can also be tuned to perform precise adjustments.

The ADACSync is also equipped of a GPS module, providing a 10 MHz reference clock. An optional control-loop logic core allows the onboard 10 MHz VCxO to continuously and precisely match the GPS reference. This ensures very-low-jitter clock distribution and tight alignment to the GPS reference allowing, for example, several remote acquisition systems to be synchronized (such as Nutag VHS-ADCs and VHS-DACs).

GPS position and time information can also be published through the GPIO-32 or cPCI interfaces for DAQ time/position-stamping applications, which perfectly matches Nutaq's multichannel acquisition boards—the VHS-ADC, VHS-ADC, and **ADACMaster III**.

#### **APPLICATIONS**

The following are only a few of the applications where the ADACSync truly shines:

- Generation of sample rates for ADC/DAC boards
- Synchronization of system clocks
- Synchronization of multichannel acquisition systems such as MIMO, OTH radar, and medical imaging systems
- Integration to clock distribution systems and data acquisition systems
- Synchronization of remote systems through a common GPS reference clock

## **SOFTWARE TOOLS**

The ADACSync comes with an application used to configure and control the platform's parameters, as well as obtain GPS information from the cPCI and GPIO-32 interfaces.

When all the platform's parameters are configured, a programming interface allows you to save the configuration setup in the EEPROM. The platform is thus able to boot itself, without any intervention from the PCI, making it completely stand-alone and independent from operating systems.

A thoroughly documented API also comes with the platform for you to develop your custom control interfaces. Developers working on Linux and VxWorks can also easily port the existing Microsoft Windows-based drivers with the simple, memory-map configurable registers.

# **SPECIFICATIONS**

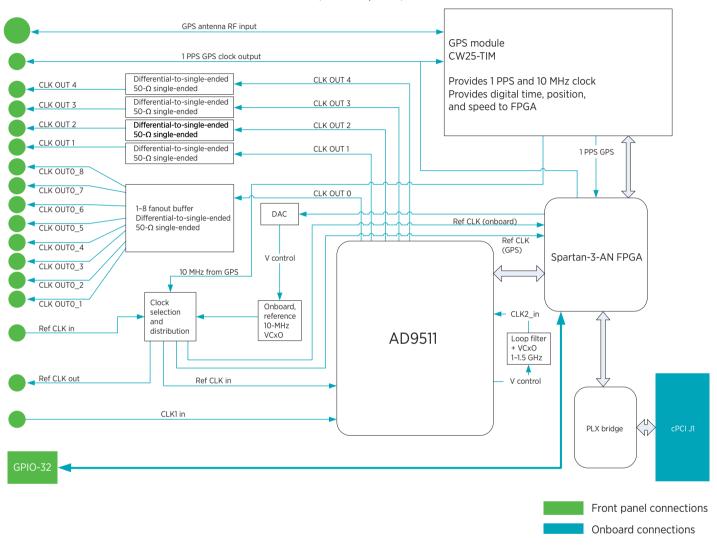
Buffered phased-aligned clocks   B     Independent programmable clocks   5     Output impedance   50 Ω     Output type   Single-ended LVCMOS     Clock generation range   From 3125 MHz to 350.00 MHz     Clock generation range   The ministry of the mini		Buffered output clocks	12
OUTPUT CLOCKS    Independent programmable clocks   5 0 \( \text{Q} \)   Output type   Single-ended LVCMOS     Connectors   MMCX     Clock generation resolution   1-0 to 1.5 GHz (in states of 100 kHz)     1-2 to 3.25 MHz to 350,00 MHz     Clock generation resolution   1-0 to 1.5 GHz (in states of 100 kHz)     1-2 to 4.25 winders (in states of 100 kHz)	OUTPUT CLOCKS		
OUTPUT CLOCKS  Output type Connectors Clock generation range Clock generation resolution Input reference clock options Input reference clock options Onboard VCxO Onboard VCxO frequency Onboard VCxO precision  INPUT/OUTPUT REFERENCE CLOCK Onboard VCxO precision Onboard VCxO precision  INPUT/OUTPUT REFERENCE CLOCK Onboard VCxO phase noise Onboard VCxO phase noise Onboard VCxO phase noise Onboard VCxO phase noise Output reference clock impedance Input/Output reference clock impedance Input/Output reference clock impedance Input/Output reference clock range Input/Output reference clock range Input external clock range Input external clock type Input external clock range Input external			
Output type         Single-ended LVCMOS           Connectors         MMCX           Clock generation range         From 3125 MHz to 350,00 MHz           Clock generation resolution         1,0 to 15 GHz (in steps of 100 kHz)           Input reference clock options         - Onboard VCX or continuously matched with GPS           External         - Onboard VCXO frequency         10 MHz           Onboard VCXO precision         - Matched to GPS reference: < 0,1 ppm			
Connectors			
Clock generation range   From 31.25 MHz to 350.00 MHz			
Clock generation resolution  Input reference clock options  Input reference clock options  Input reference clock options  Onboard VCXO frequency  Onboard VCXO precision  Onboard VCXO precision  Price running: 25 ppm  INPUT/OUTPUT REFERENCE CLOCK  Onboard VCXO phase noise  Output reference clock  Input/output reference clock  Input/Output reference clock impedance  Input/Output reference clock type  Input/Output reference clock type  Input/Output reference clock connectors  Input/Output reference clock range  Input/Output reference clock range  Input/Output reference clock range  Input external clock type  Input external clock range  Input			
Input reference clock options   1-32 dividers (in steps of 1)   1-32 dividers (in steps of		Clock generation range	
Input reference clock options   Onboard VCxO centinuously matched with GPS   External		Clock generation resolution	
Onboard VCxO precision   Matched to GPS reference: < 0.1 ppm	INPUT/OUTPUT REFERENCE CLOCK	Input reference clock options	Onboard VCxO continuously matched with GPS
INPUT/OUTPUT REFERENCE CLOCK  Onboard VCXO phase noise  Onboard VCXO phase noise  Onboard VCXO phase noise  IN Hz: -83 dBc/Hz -10 Hz: -15 dBc/Hz -10 Hz: -15 dBc/Hz -10 Hz: -15 dBc/Hz -10 Hz: -140 dBc/Hz -1		Onboard VCxO frequency	10 MHz
Input   NPUT/OUTPUT REFERENCE CLOCK   Onboard VCxO phase noise   1   100   Hz - IIs dBc/Hz   10 kHz - 135 dBc/Hz   10 kHz - 140 d		Onboard VCxO precision	
Input/Output reference clock impedance   50 Ω		Onboard VCxO phase noise	<ul><li>100 Hz: -115 dBc/Hz</li><li>1 kHz: -135 dBc/Hz</li></ul>
Input/Output reference clock type Input/Output reference clock connectors Input/Output reference clock connectors Input/Output reference clock range Input external clock type Input external clock type Input external clock type Input external clock impedance Input external clock connectors Input external clock range Input external clock connectors Input external clock range Input external clock connectors Input external clock range Input external clock connectors Input exter		Output reference clock	Same as selected reference clock
Input/Output reference clock connectors   MMCX		Input/Output reference clock impedance	50 Ω
Input/Output reference clock range		Input/Output reference clock type	Single-ended LVCMOS (10 dBm)
INPUT EXTERNAL CLOCKS  Input external clock type Input external clock impedance Input/output external clock connectors Input external clock connectors Input external clock range  Antenna localization Antenna localization Antenna input connector Antenna input impedance  PPS output connector PPS output impedance  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  Input external clock type Input external clock impedance Input external clock connectors Induction Induction Input external clock connectors Induction I		Input/Output reference clock connectors	MMCX
Input external clock impedance   50 Ω		Input/Output reference clock range	From 1 MHz to 250 MHz
Input/output external clock connectors  Input external clock range  Antenna localization  Antenna localization  Required antenna specifications  Antenna input connector  Antenna input impedance  PPS output connector  PPS output impedance  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  Input/output external clock connectors  Input external clock range  From 1 MHz to 1 GHz  Near a window (installation dependant)  Outdoors  SMA  Antenna input impedance  50 Ω  UTC time UTC day Latitude Longitude Altitude Longitude Altitude Speed over ground Course over ground Course over ground Interface  Interface  Interface  FRONT PANEL GPIO-32 INTERFACE  Connector  Connector  Antenna localization  NACX  NACX  SMA  LUC time UTC time UTC day Latitude Speed over ground Course over ground  Interface  FRONT PANEL GPIO-32 INTERFACE	INPUT EXTERNAL CLOCKS	Input external clock type	Single-ended LVCMOS (10 dBm)
Input/output external clock connectors  Input external clock range  Antenna localization  Antenna localization  Required antenna specifications  Antenna input connector  Antenna input impedance  PPS output connector  MMCX  PPS output impedance  FON 1 MHz to 1 GHz  Near a window (installation dependant)  Outdoors  SMA  Antenna input connector  MMCX  PPS output connector  MMCX  PPS output impedance  FON 2  UTC time  UTC time  UTC day  Latitude  Latitude  Longitude  Altitude  Altitude  Speed over ground  Course over ground  Tours over ground  Interface  Interface  Interface  Connectors  Connectors  Tours over ground  2 x 17 header		Input external clock impedance	50 Ω
Antenna localization  • Near a window (installation dependant) • Outdoors  Required antenna specifications  Antenna input connector  Antenna input impedance  PPS output connector  PPS output impedance  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  FRONT PANEL GPIO-32 INTERFACE  Antenna input impedance  • Near a window (installation dependant) • Outdoors  SMA  50 Ω  UTC time • UTC time • UTC day • Latitude • Altitude • Altitude • Speed over ground • Course over ground • Course over ground • 16 bits/32 bits  Interface  FRONT PANEL GPIO-32 INTERFACE  Coppositor  • 2 x 17 header		Input/output external clock connectors	MMCX
Required antenna specifications  Antenna input connector  Antenna input impedance  PPS output connector  PPS output impedance  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  Interface  Interface  PRONT PANEL GPIO-32 INTERFACE  Required antenna specifications  3.3 V active antenna  SMA  Antenna input impedance  50 Ω  UTC time  UTC day  Latitude  Longitude  Altitude  Speed over ground  Course over ground  16 bits/32 bits  18 bits/32 bits  18 LVCMOS  18 LVCMOS  2 x 17 header		Input external clock range	From 1 MHz to 1 GHz
Antenna input connector SMA  Antenna input impedance 50 $\Omega$ PPS output connector MMCX  PPS output impedance 50 $\Omega$ Output impedance 50 $\Omega$ PPS output impedance 50 $\Omega$ UTC time UTC day Latitude UTC day Latitude UTC day Connector Altitude Speed over ground Course over ground Course over ground UTC time UTC day Latitude Speed over ground Latitude Speed over ground Course over ground UTC time UTC day Latitude Speed over ground Latitude Speed over ground Course over ground UTC time UTC day Latitude Speed over ground Latitude Speed over ground UTC time UTC day Latitude Latitude Speed over ground Course over ground UTC time UTC day Latitude Latitude Speed over ground UTC time UTC day Latitude Speed over ground Latitude Speed over ground UTC time UTC day Latitude Latitude Speed over ground UTC time UTC day Latitude Latitude Speed over ground UTC time UTC day Latitude Latitude Speed over ground UTC time UTC day Latitude Latitude Speed over ground UTC time UTC day Latitude Speed over ground UTC time UTC time UTC day Latitude Speed over ground UTC time	GPS	Antenna localization	
Antenna input impedance  PPS output connector  PPS output impedance  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  Interface  Antenna input impedance  50 Ω  UTC time  UTC day  Latitude  Longitude  Altitude  Speed over ground  Course over ground  Tourse over ground  Interface  Interface  Interface  Connector  Connector  Connector  Connector  - 2 x 17 header		Required antenna specifications	3.3 V active antenna
GPS         PPS output connector       MMCX         PPS output impedance       50 Ω         • UTC time         • UTC day       • Latitude         • Longitude       • Altitude         • Speed over ground       • Course over ground         • Course over ground       • 16 bits/32 bits         FRONT PANEL GPIO-32 INTERFACE         Interface       • 3.3 V         • LVCMOS       • 2 x 17 header		Antenna input connector	SMA
GPS         PPS output impedance       50 Ω         • UTC day         • Latitude       • Longitude         • Altitude       • Speed over ground         • Course over ground       • Course over ground         • The proof of the		Antenna input impedance	50 Ω
PPS output impedance  GPS readout information (GPIO-32/cPCI)  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  CPCI (PXI compatible)  Interface  Interface  Connector  Connector  FRONT PANEL GPIO-32 INTERFACE  FRONT PANEL GPIO-32 INTERFACE  Connector  Connector  Connector  1 UTC time  UTC day  Latitude  Latitude  Longitude  Altitude  Speed over ground  Course over ground  The bits/32 bits  Interface  2 x 17 header		PPS output connector	MMCX
GPS readout information (GPIO-32/cPCI)  GPS readout information (GPIO-32/cPCI)  HOST PROGRAMMING INTERFACE  CPCI (PXI compatible)  PRONT PANEL GPIO-32 INTERFACE  Interface  Connector  Connector  - UTC day  - Latitude - Longitude - Altitude - Altitude - Speed over ground - Course over ground - 33 MHz/66 MHz - 16 bits/32 bits - 3.3 V - LVCMOS - 2 x 17 header		PPS output impedance	50 Ω
FRONT PANEL GPIO-32 INTERFACE  Interface  FRONT PANEL GPIO-32 INTERFACE  Connector  Connector  Connector  - 16 bits/32 bits  - 3.3 V  - LVCMOS  - 2 x 17 header		GPS readout information (GPIO-32/cPCI)	<ul><li>UTC day</li><li>Latitude</li><li>Longitude</li><li>Altitude</li><li>Speed over ground</li></ul>
FRONT PANEL GPIO-32 INTERFACE  • LVCMOS  • 2 x 17 header	HOST PROGRAMMING INTERFACE	cPCI (PXI compatible)	
• 2 x 17 header	FRONT PANEL GPIO-32 INTERFACE	Interface	
		Connector	

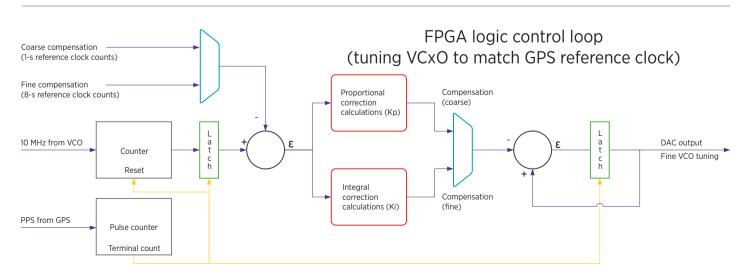
# **OPTIONAL ACCESSORIES**

The ADACSync can be purchased with or without a GPS antenna (and associated cabling). Discuss it with one of our specialists.

### **BLOCK DIAGRAMS**

## 6U cPCI (PXI comptible)

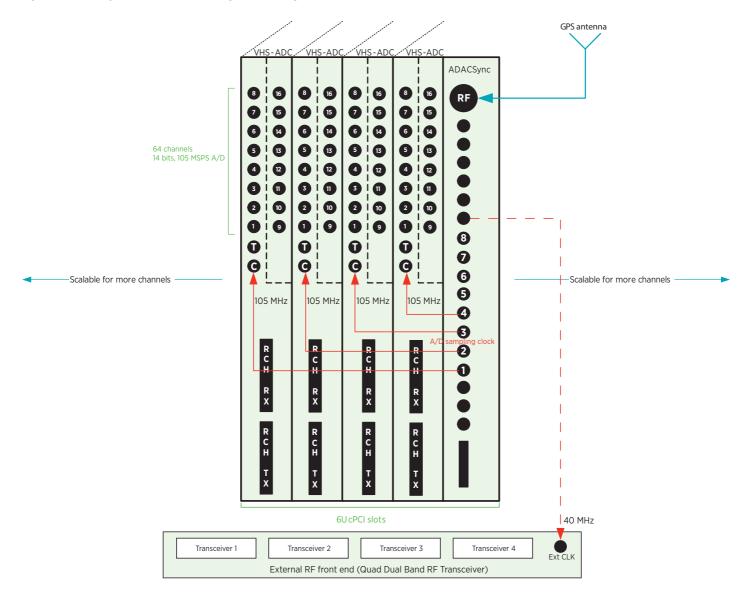




# Nutaq ADACSync

# TYPICAL NUTAQ SYSTEM CONFIGURATION EXAMPLE

Synchronous, multichannel acquisition system





With over 25 years of experience delivering advanced digital signal processing solutions to companies worldwide, Nutaq serves customers across the Americas, Asia, and Europe. Nutaq offers a full range of DSP-FPGA development platforms, as well as product development services. Nutaq works in partnership with such industry leaders as Texas Instruments, The MathWorks, and Xilinx to deliver unsurpassed quality and support to its large OEM customer base, which includes many prestigious names of the consumer electronics, telecommunications, aerospace, and defense fields. In a world where digital signal processing technology is vital to network and wireless communications, audio and video processing, as well as electronic systems in all fields of technology, Nutaq is an ideal partner.

Nutaq products are constantly being improved; therefore, Nutaq reserves itself the right to modify the information herein at any time and without notice.







