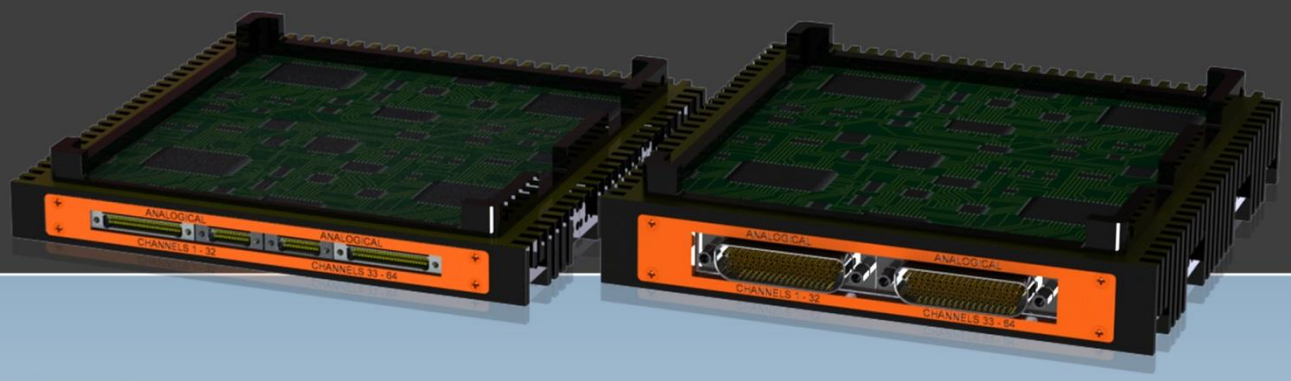
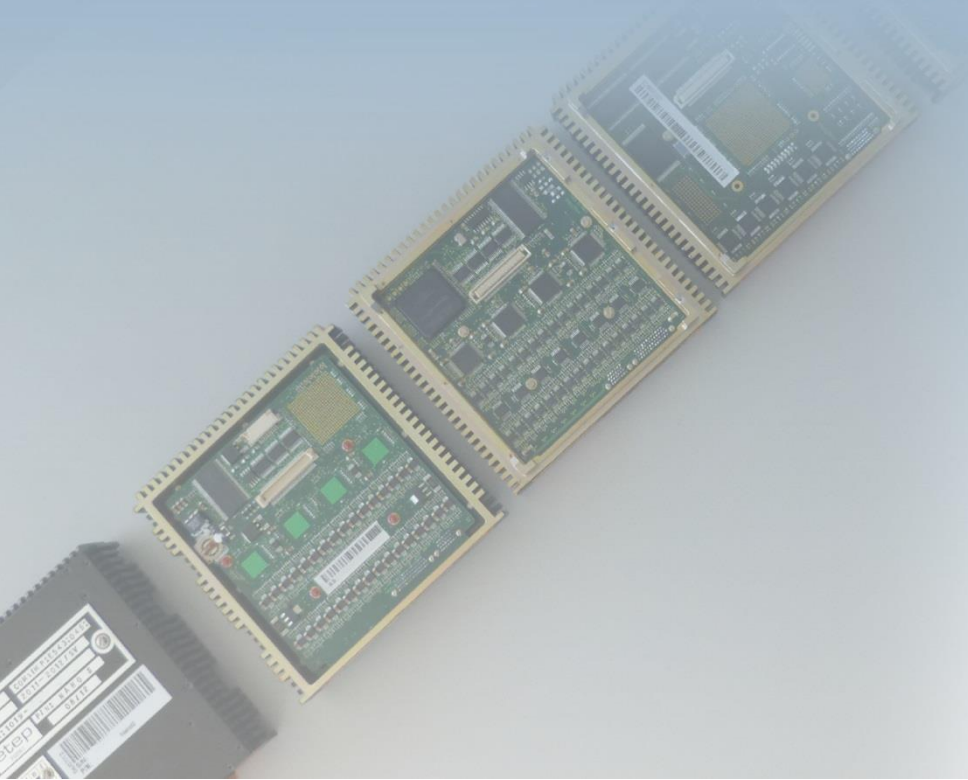
2015

NanoS (2)

Data Acquisition Modules





etep D.T.MUX™ RECORDER SYSTEM TECHNOLOGY

www.etep.com

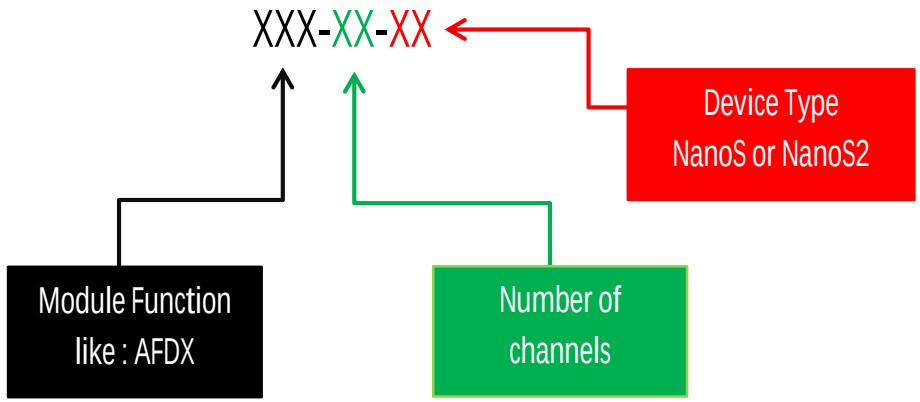
Summary

ETEP is an ISO 9001:2008 certified company/ NCAGE: F9281 – Version September 2014

Overview

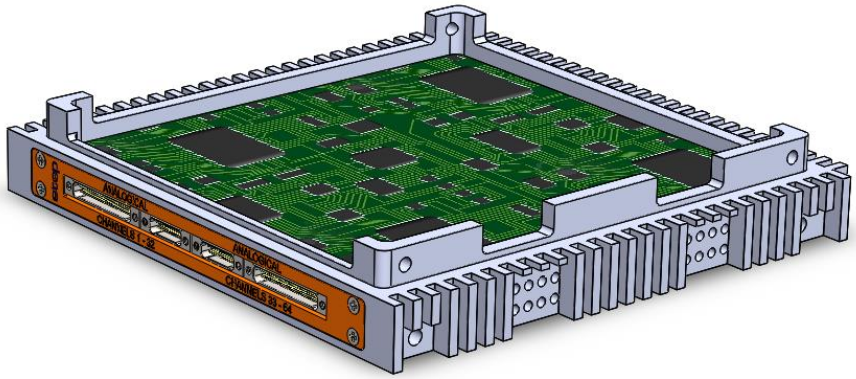
The NanoS modules are available in two forms, depending of type of connector desired and space available for your aircraft installation.

About Part-numbering

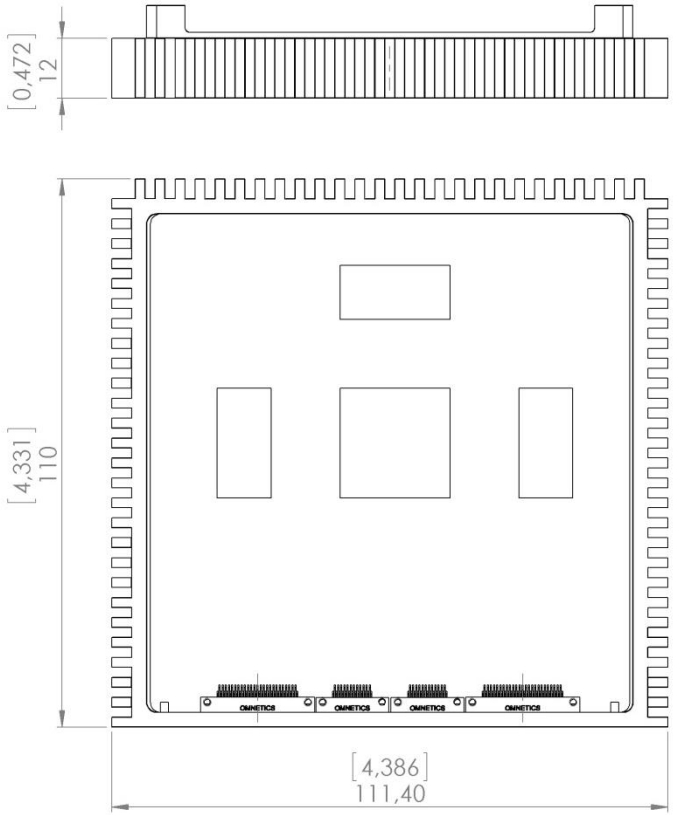


NanoS- Module type

If you look for the compact size of NanoS, the connector used will be NANO D (MIL-DTL-32139) for a module of 12 mm [0.472 inch] of height.



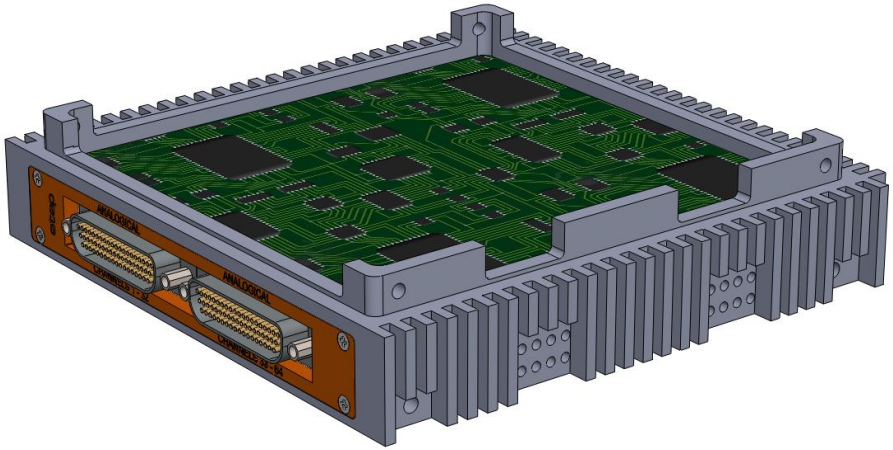
Outline Drawing



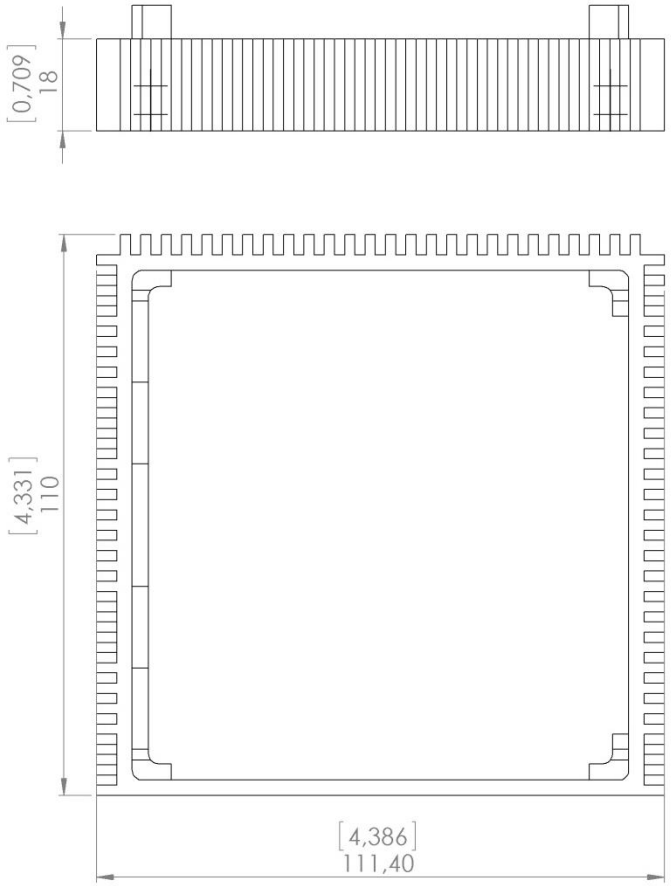
[Inch] mm

NanoS²- Module type

If you look for the NanoS², the connector used will be MICRO D (MIL-DLT-83513), the height of this module is 18mm [0.708 inch].



Outline Drawing



[Inch] mm

III

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Accelerometer/ICP Sensors	16	ICP-16-S	ICP-16-S2	4
Thermocouple (J, K, W, T, E) conditioner	8	THERMO-8-S	THERMO-8-S2	5
Thermocouple (J, K, W, T, E) conditioner	16	THERMO-16-S	THERMO-16-S2	5
Thermocouple (J, K, W, T, E) conditioner	32	THERMO-32-S	THERMO-32-S2	5
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Thermistor (PT100)	16	THERMI-16-S	THERMI-16-S2	5
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Single/Differential Ended Voltage Modules

NanoS VOLT-16-S/ VOLT-32-S / VOLT-64-S
NanoS² VOLT-16-S2/ VOLT-32-S2/ VOLT-64-S2

This module is available in three forms, 1 to 16 channels, 1 to 32 channels or 1 to 64 channels for NanoS & NanoS² chassis. These modules permit the synchronous acquisition of each channel independently

ANA-16-S/ ANA-16-S2

ANA-32-S/ ANA-32-S2

ANA-64-S/ ANA-64-S2

Quantity of channels
1 to 16 differential or single ended.
1 to 32 differential or single ended.
1 to 64 differential or single ended.

Sample rate per channel:
62.5, 31.25, 15.6, 7.8, 3.9, 1.95 K sample/s
(Bandwidth is 2.2, ratio).
The sampling frequency chosen, is the same for all the channels

Bandwidth (-3db)
0-28 KHz, 0-14 KHz, 0- 7 KHz,
0-3.5 KHz, 0-1.75 KHz, 0- 0.85 KHz

Resolution by channel:
24 bits (16 bits stored)
SNR ≥90 dB for 16 bits

Ripple in 80 % of the bandwidth:
0.01 dB

Sampling clock Accuracy
(Fs x 2^{32}) / 50 MHz
50 ppm

Accuracy (AC,PC)
< 0.2% full scale range

Programmable input range:
± 10 V, ± 5 V, ± 1 V, ± 0.1 V p. to p.

Input impedance
1MΩ (ON) ; 500KΩ (OFF)

Input protection level
± 40V

Filter
2nd order Analog Anti-aliasing filter
+ digital filter
Type FIR : $BW = \frac{\text{Sample rate}}{2.2}$

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

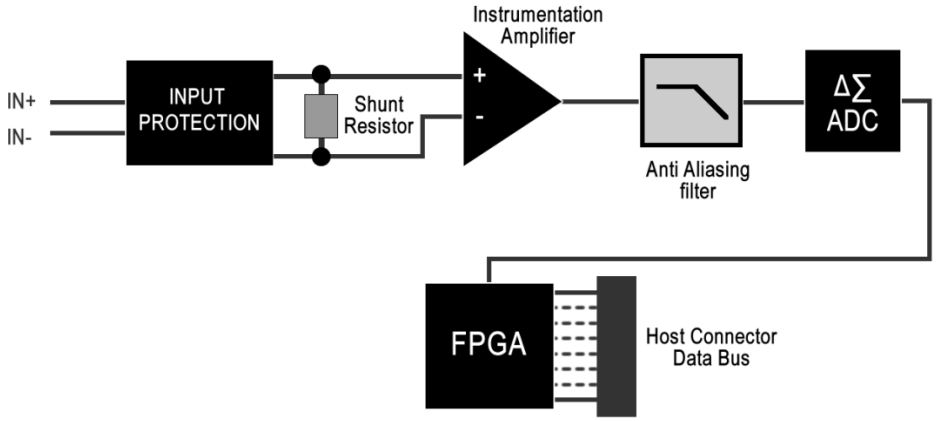
Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Current Measurements module

NanoS CURR-16-S / CURR-32-S
NanoS² CURR-16-S / CURR-32-S2

The CURR-XX-SX is able to digitalize until 32 differential ended current channels.

- The input range is ± 20 mA and the sampling frequency is user selectable.
- All Channels are sampled simultaneously.
- The Anti-aliasing filter is automatically selected depending of the sampling frequency.



Quantity of channels
1 to 16 differential ended.
1 to 32 differential ended.

Sample rate per channel:
62.5, 31.25, 15.6, 7.8, 3.9, 1.95 K sample/s
(Bandwidth is 2.2, ratio).
The sampling frequency chosen, is the same for all the channels

Bandwidth (-3db)
0-28 KHz, 0-14 KHz, 0- 7 KHz,
0-3.5 KHz, 0-1.75 KHz, 0- 0.85 KHz

Resolution by channel:
24 bits (16 bits stored)
SNR ≥90 dB for 16 bits

Ripple in 80 % of the bandwidth:
0.01 dB

Sampling clock Accuracy
(Fs x 2^{32}) / 50 MHz
50 ppm

Accuracy (AC,PC)
< 0.2% full scale range

Programmable input range:
± 20 mA

Input impedance
250MΩ

Input protection level
± 40V

Filter
2nd order Analog Anti-aliasing filter
+ digital filter
Type FIR : $BW = \frac{\text{Sample rate}}{2.2}$

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Accelerometer/ ICP Sensors Modules

NanoS ICP-8-S/ ICP-16-S
NanoS² ICP-8-S2/ ICP-16-S2

This modules support 8 or 16 voltage or ICP inputs. With one analog to digital converter (delta sigma type) for each channel, the entire channels are simultaneously sampled. The maximum sampling frequency is 200 KHz per channel with a resolution of 24 bits (only the 16 MSB are stored). With a very large input range this modules can support a width variety of input signal (Dynamic pressure, force, strain, or acceleration). Two acquisitions modes are available continuous or with trigger.

Number of voltage or ICP channels
1 to 8 or 1 to 16 channels

Sample rate per channel
(software selection per channel):
62.5, 31.25, 15.6, 7.8, 3.9, 1.95 K sample/s
(bandwidth is 2.2 ratio).

Bandwidth (-3db)
0-28 KHz, 0-14 KHz, 0- 7 KHz,
0-3.5 KHz, 0-1.75 KHz, 0- 0.85 KHz

ICP mode
1 mA to 5mA programmable (other need, precise to us).

Sensors
ICP©, Deltatron©, Isotron©, Piezotron©

Accuracy (AC,PC)
< 0.2% full scale range

Input Impedance
100K (ON and OFF)

Filter
2nd order Analog Anti-aliasing filter
+ digital filter
Type FIR : $BW = \frac{\text{Sample rate}}{2.2}$

Channel resolution
24 bits conversion ,16 bits stored
SNR ≥ 85 dB for 16 bits

Ripple in 80% of bandwidth
0.01db

Sampling clock Accuracy
(Fs x 2^{32}) / 50 MHz
50 ppm

Acquisition mode
Trigged with PRE and POST trigger or continuous

Input level, configurable
±100 mV, ±1 V, ± 5 V, ±10V

Input protection level
± 40V

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Thermocouple/Thermistor conditioner Modules

NanoS THERMO-8-S/ THERMO-16-S/ THERMO-32-S
NanoS² THERMO-8-S2/ THERMO-16-S2/ THERMO-32-S2

NanoS THERMI-8-S/ THERMI-16-S
NanoS² THERMI-8-S2/ THERMI-16-S2

One to sixteen independent inputs Synchro channels module for NanoS Airborne data acquisition unit. Synchro to digital converter module for each channel in same time. Thermocouple acquisition capability on each channel.

Channels
1 to 8 independent Synchro input channels
1 to 16 independent Synchro input channels
1 to 32 independent Synchro input channels

Resolution (ΔΣ)
24 bits linear with 16 bits recording.
Simultaneous sample rate on all channels

Anti-aliasing filter
2nd order Analog Anti-aliasing filter
+ digital filter
FIR (2.5 of the sample frequency)

Sample rate by channel
300 HZ, 150 Hz, 75 Hz, 37 Hz, 18 Hz,
9.3 Hz, 4.7 Hz
(max 15.625 KHz for RTD)
Digital filter adapted at the sample rate

Linearization table
65 536 values

Purpose
Acquisition of Temperature sensor

Dynamic
96 dB

Input Resolution
1MΩ (ON), 500KΩ (OFF)

SNR
88 dB

Phase max between Channel
Lower than 1°

Distortion
0.01% max (in the band pass)

Over voltage protection
± 40 Volts

Support 2 or 3 wires mode.

Measurement accuracy (AC,DC)
≤0.5 % full scale range

Thermocouple sensors type
T, K, J, E, C, D, G, conditioner
(programmable temperature range)
Cold junction compensation

Cold Junction for Thermocouple
Compensation by measurement of cold junction temperature and polynomial processing connection

Thermistor sensors type
RTD (PT 100 or others)
2 mA, excitation

Programmable
API/Ethernet to configure module

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Strain gauges/Bridge Signal Conditioner Modules

NanoS	GAUGE-8-S / GAUGE-16-S	BRIDGE-8-S/ BRIDGE-16-S
NanoS²	GAUGE-8-S2 / GAUGE-16-S2	BRIDGE-8-S2 / BRIDGE-16-S2

This Module receives 8 or 16 channels for strain gauges sensor or Bridge Signal (Quarter Bridge, half bridge, or full bridge), gauge excitation (0 to 10 V) and the electronic for serial communication with central unit.

8 or 16 full, ½ bridges or ¼ bridges input channels.

- Bipolar excitation with sense input for each channel.
- Programmable sample rate.
- Programmable excitation (0 to 10 V) for each channel.
- Up to 62.5K samples per second by channel.
- All channels are sample simultaneously
- Sense compensation includes
- Auto Balancing function

Channels number
1 to 8 independent Synchro input channels
1 to 16 independent Synchro input channels

Sample frequency
62.5KHz, 31.25KHz, 15.625KHz, 7.81KHz, 3.9KHz / second / channel
(Each channel can be sampled at different sampling rate) (software selection per channel)

Input impedance (ON/OFF)
Greater than 10MΩ (Full-Bridge)

Gauge Type
120, 350 Ω

Excitation
Max 10V adjustable
Max 15 mA adjustable.

Bandwidth
28.4 KHz, 12.9 KHz, 5.86 KHz, 2.66 KHz, 1.2 KHz

Precision
ADC 24 bits (16 bits recording)

Clock stability
(Fs x 2^{32}) / 50 MHz
50 ppm

Dynamic
96 dB

SNR:
85 dB

Offset adjustment
Manual or Auto

Support 2 or 3 wires mode (Quarter bridge)

Input level
± 100 mV; ± 400 mV; ±1V; ±4V (programmable on each channel, by software)

Filter
2nd order Analog Anti-aliasing filter
+ digital filter
Type FIR : $BW = \frac{\text{Sample rate}}{2.2}$

Type of bridge
Quarter bridge, Half bridge or full bridge

Gauge factor
Programmable by software

Over voltage protection
± 40V

Common mode rejection ratio
>80 dB
Common mode voltage
±10V

Accuracy (AC, DC)
< 0,2 % full scale

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Charge amplifier (Piezo) Modules

NanoS PIEZO -8-S/ PIEZO -16-S
NanoS² PIEZO -8-S2 / PIEZO -16-S2

This module is available in two forms, 1 to 16 channels and 1 to 32 channels for NanoS & NanoS² chassis. These modules permit the synchronous acquisition of each channel independently

Quantity of channels
1 to 8differential or single ended.
1 to 16 differential or single ended

Sample rate per channel:
62.5, 31.25, 15.6, 7.8, 3.9, 1.95 K sample/s
(Bandwidth is 2.2, ratio).
The sampling frequency chosen, is the same for all the channels

Bandwidth
0-28 KHz, 0-14 KHz, 0- 7 KHz,
0-3.5 KHz, 0-1.75 KHz, 0- 0.85 KHz

Resolution by channel
24 bits (16 bits stored)
SNR ≥90 dB for 16 bits

Ripple in all the bandwidth:
0.01 dB

Sampling clock Accuracy
(Fs x 2^{32}) / 50 MHz
50 ppm

Programmable input range
±500pc to ± 20000pc

Input protected level
600 W during 1 ms max.
(by Transil diode)

Control output range impedance
50 Ω

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

LVDT/RVDT Converter Modules

NanoS LVRV-8-S/ LVRV-16-S
NanoS² LVRV-8-S2/ LVRV-16-S2

This board is formed of 8 channels identical. Each channel receives the potentiometer input and generates an isolated power supply (5 volts), channels potentiometer or differential-ended (Strain gauge …)

Channels number
1 to 8 or 1 to 16 channels

Sample frequency per channel
50 KHz, 25 KHz, 12.5 KHz, 6.25 KHz (On each synchronous channel, same sample frequency)

Band pass maximum
20 KHz

Resolution on each channel
16 bits
Signal/noise ratio: 72 dB
Resolution ≤1.5 mV

Measurement
0 à 100 %, ΔR/R

Common mode rejection
>76 dB

Potentiometer resistor
450 Ω ≤ R ≤ 3 KΩ

Clock stability
(Fs x 2^{32}) / 50 MHz
50 ppm

Inputs mode
Common mode voltage > ± 5 V
Isolated inputs, 4 wires individual and isolated (short circuit protected)
Full, half, quarter bridge

External excitation and offset adjust
0 to 5 Volts

Inputs impedance
> 10 MΩ in operating.
> 100 KΩ if the power is switch off.

Low pass filter programmable on each input
1.25 KHz, 2.5 KHz, 5 KHz, 10 KHz and 20 KHz
24 dB / Oct. Butterworth

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Pressure/Temperature Scanner Modules

NanoS SCAN-2-S
NanoS² SCAN-2-S2

This Module permit to receive two multiplexed analog signal from any standard temperature scanner or pressure scanner (like ESP…/ MPS32/ZOC33…).Analog inputs corresponding address lines of 64 channels from pressure/temperature scanner

Input Channels
2 channels (Differential ended)
Number of address 2x6 bits for 64 channels

Programmable input/output range
± 5V , ± 2.5V, ± 1V, ± 100mV

Sample rate per channel
62.5 KHz, 31.25 KHz, 15.6 KHz, 3.9 KHz, 1.95 KHz
Bandwidth is 2.2 ratio

Resolution
24 bits (16bits stored)
SNR ≥ 90dB 16 bits

Ripple in the bandwidth
0.01db

Inputs impedance
Inputs protected

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Synchro Resolver modules

NanoS SYNC-8-S
NanoS² SYNC-8-S2

This module is formed of 2 boards identical. The motherboard with a serial digital active communication with the central unit, and daughter board, connected to the mother for to give the output of the angular result of each channels.

Channels number
1 to 8

Sample frequency per channel
1,2,3,4,6,8,16,32,64,128,256,512,1024
Hz / second (On each synchronous channel, same sample frequency)

Band pass maximum
500 Hz

Resolution on each channel
16 bits
Signal/noise ratio: 72 dB.
Resolution: ≤ ± 10 '
Precision: ≤ ± 20 '

Measure
0 - 360° or ± 180°, configurable channel by channel.

Common mode rejection
>76 dB

Reference Inputs
115 V /400 Hz or 26 V /400 Hz

Clock stability
(Fs x 2^{32}) / 50 MHz
50 ppm

Inputs mode
Isolated inputs 5 wires.

Synchro inputs
Voltage between phase: 90 V or 11.8 Volts

Inputs impedance
> 1 MΩ in operating.
> 200 KΩ if the power switches off.

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Power Monitor Module

NanoS POWER-3-S
NanoS² POWER-3-S2

This Module is able to monitor three phase of power lines.

- Six Voltage channels are available, three for the voltage measurement of each phase (Via transformer) and three for current measurement (via current sensor).
- The Bandwidth of each channel is 1KHz
- The maximum referral rate for parameters is 30 Hz
- Parameters available are:
  - Maximum
  - Minimum
  - Pic to Pic Amplitude
  - RMS Value
  - Active and
  - Period and apparent power
  - Phase
- Average function for each parameter

Number of channels
Three voltage Single Ended
Three current Single Ended

Input Range
±10V, ±5V, ±2V, ±1V

Input Impedance
10MΩ (ON) / 1 MΩ (OFF)

Parameters
Maximum, Minimum, Pic to Pic Amplitude, RMS, Value, Active and Period and apparent power, Phase

Input protection
±40V

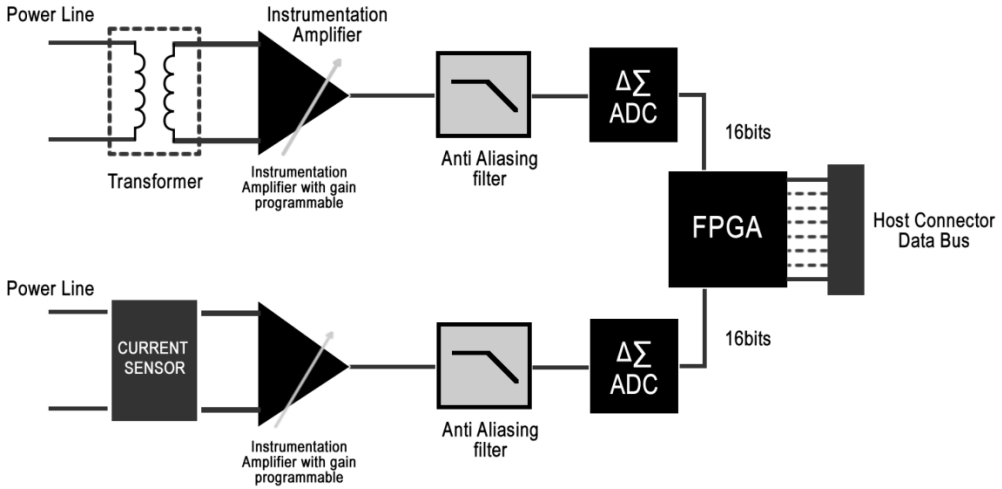
Resolution
16-bits

Accuracy
0.2% FSR

Bandwidth
5 to 1KHz

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)



Digital/Bus Modules	Inputs	Ref nanoS	Ref nanoS²	Page
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PCM Merger Modules	2	MERG-2-S	MERG-2-S2	14
MIL STD 1553 B, redundant	2	1553-2-S	1553-2-S2	15
MIL STD 1553 B, redundant	4	1553-4-S	1553-4-S2	15
AFDX ARINC 664	2	AFDX-2-S	AFDX-2-S2	16
AFDX ARINC 664	4	AFDX-4-S	AFDX-4-S2	16
Stanag 3910	1	3910-1-S	3910-1-S2	17
ARINC 429	4	AR429-4-S	AR429-4-S2	18
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PCM Acquisition Modules

NanoS PCM-4-S
NanoS² PCM-4-S2

Each of 4 channels receives PCM frame (electrically symmetrical RS422 format or TTL). Every signal (That has its own rhythm) is ordered, with a time stamping all 32.5 ms (accuracy 100 µs).

Quantity of channels
1 to 4

Minimum flow rate per channel
> 1 Kbps

Maximum flow rate per channel
20 Mbps /channel
(80 Mbps aggregate)

Acquisition mode
External with clock
Independent for each channel.

Sampling clock accuracy
(Fs x 2^{32}) / 50 MHz

Stability
50 ppm.

Types of signals recorded with a clock
NRZ L, bi-phase L or S,

Input level
RS 422 (differential) or TTL

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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PCM Merger Modules

NanoS MERG-1-S / MERG-2-S
NanoS² MERG-1-S2 / MERG-2-S2

This Module is a PCM decommutator, who can accept one or two independent PCM streams (depend of model MERG-1 or MERG-2).
The one or two PCM stream can be repackaged in one filtered PCM stream.
The decommutation of the one or two streams is configurable by simple software via CPU module (LAB DTMUX Software)

Inputs Channels
Clock and data TTL
Support 1 or 2 independent Synchro input channels decommutation

Type of signal
BIØ-L or NRZ-L codes

Bandwidth
Up to 20Mbps for NRZ-L
Up to 8Mbps for BIØ-L

Frame structure
Programmable Synchro word length: 8-64bits
Programmable word orientation,
Programmable length of the frame

Parity word
On LSB or MSB
Odd/even/none

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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MIL STD 1553 B Modules

NanoS 1553-2-S / 1553-4-S
NanoS² 1553-2-S2 / 1553-4-S2

2 dual redundant channels or 4 dual redundant channels receive a bus MIL STD 1553B electrically isolated. Every signal (to 1 Mbps) is ordered in the format, in 16 bits words, with a word of command heading and a time stamping (accuracy 100 µs)

Quantity of channels
2 (4) to 4 (8)

Flow rate per channel
1 Mbps

Sampling clock accuracy
(Fs x 2^{32}) / 50 MHz

Stability
50 ppm.

Electrical inputs
By transformer coupled.

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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AFDX ARINC 664 acquisition Modules

NanoS AFDX-2-S / AFDX-4-S
NanoS² AFDX-2-S2 / AFDX-4-S2

Avionics Full-Duplex Switched Ethernet, (AFDX) is a data network for safety-critical applications that utilizes dedicated bandwidth while providing deterministic quality of service (QoS). AFDX is based on Ethernet technology using commercial off-the-shelf (COTS) components. AFDX is a specific implementation of ARINC Specification 664 Part 7, a profiled version of an IEEE 802.3 network per parts 1 & 2, which defines how commercial off-the-shelf networking components will be used for future generation Aircraft Data Networks (ADN). The six primary aspects of AFDX include full duplex, redundancy, and deterministic, high speed performance, switched and profiled network.

Quantity of channels
1 to 2

Protocol
AFDX network
UDP 10/100Mbits

Standard
ARINC Specification 664 Part 7

Protocol
IEEE 802.3 normalised

Switch
Market product or consult us

Recording
IRIG 106 Chapter.10 or D.T MUX format

Aircraft data network supported
Arinc 429 (100Kbps)
MIL-STD 1553 (1 Mbps)
ARINC 629 (2 Mbps)

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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Stanag 3910/EN 3910 acquisition Modules (Fiber Optical)

NanoS 3910-1-S
NanoS² 3910-1-S2

STANAG 3910 Replaced by EN 3910 - 1Mbit/sec MIL-STD-1553B data bus augmented by a 20 Mbit/s, Optical or Electrical, High Speed (HS) channel. Optical version implemented (as EFA bus) on the Eurofighter Typhoon (EF2000) and electrical (as EN 3910) on Dassault Rafale.

Quantity of channels
1 redundant channel

Flow rate by channel
20 Mbit/second

Input types
Optical fiber

Time stamping preciseness
100 µsecond.

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
Fiber optical

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ARINC 429 acquisition Modules

NanoS AR429-4-S/ AR429-8-S/ AR429-16-S
NanoS² AR429-4-S2/ AR429-8-S2/ AR429-16-S2

ARINC 429,"Digital Information Transfer System (DITS)," is the technical standard for the predominant avionics data bus used on most higher-end commercial and transport aircraft. It defines the physical and electrical interfaces of a two-wire data bus and a data protocol to support an aircraft's avionics local area network.

Each channels, receives, data and clock, ARINC 429, 32 bits frames. These frames 32 bits are recorded with time stamping. After reading, in a file, each frame has a time stamped.

Quantity of channels
1 to 4independent Synchro input channels
1 to 8independent Synchro input channels
1 to 16independent Synchro input channels

Flow rate per channel
100 Kbps

Low speed flow rate by channel
12,5- 14,5 Kbps

Word size
32 bits

Acquisition mode
External Independent for each channel.

Input buffer
256 KB by channel

Sampling clock accuracy
(Fs x 2^{32}) / 50 MHz

Stability
50 ppm.

Bit encoding
Bipolar return to zero

Input levels
Differential (+ 5 V, - 5 V)

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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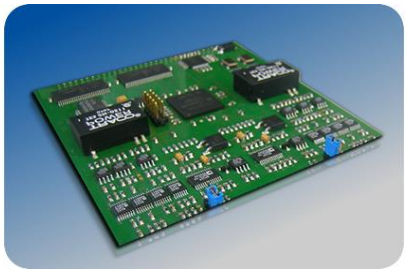
RS 422/485 acquisition Modules

NanoS RS422-4-S / RS422-8-S / RS422-16-S
NanoS² RS422-4-S2 / RS422-8-S2 / RS422-16-S2



Each of channels receives 2 differential inputs, 5 volts (EIA standard RS422). Receive bits constitute characters, following the protocol of asynchronous transmissions (7.8 bits, parity, stop, transmission speed). The board decodes the programmed protocol and orders characters received on every channel, working in its bit rate. Duration upper in time occupied by three bits, brings a time stamping which marks the beginning of the group of following bits (accuracy 100 µs).

Quantity of channels:
1 to 4independent Synchro input channels
1 to 8independent Synchro input channels
1 to 16independent Synchro input channels

Minimum bauds rate per channel:
75 bps

Maximum bauds rate per channel:
1 M bps /channel
(4 Mbps aggregate)

Sampling clock Accuracy:
(Fs x 2^{32}) / 50 MHz

Stability:
50 ppm.

Input level:
Differential TTL

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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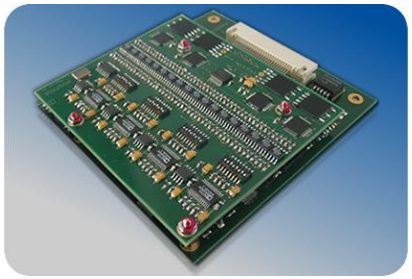
RS 232 acquisition Modules

NanoS RS232-4-S / RS232-8-S / RS232-16-S
NanoS² RS232-4-S2 / RS232-8-S2 / RS232-16-S2



Each of 4 channels receives 1 input: Receive (Rd) data. Receive bits constitute characters, following the protocol of asynchronous transmissions (7.8 bits, parity, stop, transmission speed). The board decodes the programmed protocol and orders characters received on every channel, working in its bit rate. Duration upper in time occupied by three bits, brings a time stamp which marks the beginning of the group of following bits (accuracy 100 µs).

Quantity of channels:
1 to 4independent Synchro input channels
1 to 8independent Synchro input channels
1 to 16independent Synchro input channels

Minimum bauds rate per channel:
75 bps

Maximum bauds rate per channel:
38 400 bps

Stop bit number:
1, 1.5, 2

Parity:
Even or odd

Data bits:
7, 8, or 9

Sampling clock accuracy:
(Fs x 2^{32}) / 50 MHz

Stability:
50 ppm.

Input levels:
RS 232 (+12 V – 12 V)

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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Ethernet Modules

TCP IP /UDP Modules

NanoS ETHER-2-S/ ETHER-4-S
NanoS² ETHER-2-S2 / ETHER-4-S2

Quantity of channels:
1 to 2 for TCP IP/UDP Modules
1 to 4 for TCP IP/UDP Modules

Protocol:
UDP or TCP/IP
Broadcast or multicast or uncast selectable

Data Rate:
UDP mode 240Mbit/s max
TCP/IP mode 15Mbit/s max

Supported Network speed:
10/100/1000 Mbits/s

Protocol:
IEEE 802.3 normalised

Recording
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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CAN data bus acquisition Modules

NanoS CAN-2-S / CAN-4-S
NanoS² CAN-2-S2 / CAN-4-S2

CAN bus (for controller area network) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.

CAN bus is a message-based protocol, designed specifically for automotive applications but now also used in other areas such as aerospace.

Quantity of channels:
1 to 2independent Synchro input channels
1 to 4independent Synchro input channels

Recording
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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Serial FPDP Fiber optical Modules

NanoS SFPDP-2-S
NanoS² SFPDP-2-s2

Serial Front Panel Data Port (Serial FPDP) is a high speed low latency data streaming serial communication protocol. It currently supports three distinct speeds, 1.0625 Gbits/s, 2.125 Gbits/s, 2.5 Gbits/s. Serial FPDP can operate over long distances, up to 10 kilometers (6.2 mi), using optical fiber cables, or shorter distances over copper cables. This protocol is also used to coupling master/slave unit in NanoS (2) infrastructure.

Quantity of channels
1 to 2 independent sFPDP fiber
Synchro input channels

Characteristics of sFPDP channels
Flow rate per channel: 2.5 Gbits/s
Type of transport: Double fiber channel 850 nm multimode

Types of signals recorded
sFPDP VITA 17.1

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Connectors
Fiber optical

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Digital to Analog converter Modules

NanoS DIGIANA-8-S
NanoS² DIGIANA-8-S2

Input Channels
Clock and data TTL
Support 1 independent Synchro input channels decommutation

Input Type of signal
BIØ-L or NRZ-L codes

Bandwidth
Up to 20Mbps for NRZ-L
Up to 8Mbps for BIØ-L

Output Channels
Support 8 analog independent channels
Max ± 5V

Word
Programmable Synchro word length (8 to 64 bits) per word,
Programmable word orientation,
Programmable length of frame: 64 to 16384 bits

Parity word
On LSB or MSB
Odd/even/none

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

Frame structure

Programmable Synchro word
16 bits to 33 bits
Programmable word orientation
Programmable length minor frame: 64 to16384 bits

RETURN TO MODULES LIST ↑

Differential discrete Modules

NanoS DISCR-16-S/ DISCR-32-S
NanoS² DISCR-16-S2/ DISCR-32-S2

Channels number
1 to 16 or 1 to 32 channels
Opto-isolator or not

Sample frequency per channel
32Hz, 64Hz, 128Hz, 256Hz, 512Hz, 1024Hz, 2048Hz / second (On each synchronous channel, same sample frequency), configurable by software

Band pass maximum
500 Hz

Resolution on each channel
1 bit by channel

Clock stability
(Fs x 2^{32}) / 50 MHz
50 ppm

Inputs mode
Differential
Configurable: 28 Volts or 5 Volts.
Over voltage protection > 100 Volts

Edge detection
Rising of falling

Inputs level, Isolated mode :
In 28 Volts: Level 1 → > +10V ;level 0 → < +5V
+28V → 8 mA
+20V → 5,5 mA
+10V → 2,5 mA
+5V → 1 mA

In 5 Volts: Level 1 → > +2,6V ; Level 0 → < +2V
+28V → 8 mA
+20V → 5,5 mA
+10V → 2,5 mA
+5V → 1 mA

Inputs level, Non Isolated mode :
Two dynamic available +28V or +5V
(Can be programmed by software).

<u>Dynamic +28V :</u>
Level 1 → > +7V ; Level 0 → < +3
Differential Input impedance → 1 ,141 MΩ
Single ended Input impedance → 625 KΩ

<u>Dynamic +5V :</u>
Level 1 → > +2,6V ; Level 0 → < +0,6V
Differential Input impedance → 2 MΩ
Single ended Input impedance → 1 MΩ

Channel protection
Resistor and "transil" diodes

Counter and time tagging module
32 bits for each channel.

Processing possible
Frequency, counter period, events

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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Pulses Measure/Counter Modules, Frequency, Period

NanoS PULSE-8-S/ PULSE-16-S
NanoS² PULSE-8-S2/ PULSE-16-S2

This module receives 8 channels to count or measure impulsions
This module permits also, to command external function by TTL signal

Channels number
1 to 8 or 1 to16

Period resolution
1 µs

Max. count frequency
200 KHz

Count of pulses between 2 acquisitions
Count capacity: 16 bits.

Edge detection
Programmable; Rising/falling/Both

Time interval
Period Count of a pulse number of an internal clock, programmable (0.1 second to 5 second)

Internal time programmable
1, 2, 5, 10, 20, 40, 80, 160 or 320 µ second (or others if need)

Refresh rate of frequency
20 per second

Clock stability
(Fs x 2^{32}) / 50 MHz
50 ppm

Inputs mode
Differential, rectangular signals
Amplitude: 10 mV to 30V p.p.
Over voltage protection > 100 Volts

Level to trigger By configuration
0 to 10 Volts or ± 10 Volts on each channel on.

Inputs impedance
> 1 MΩ in operating
> 100 KΩ if the power is switch off.

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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Video/Audio Modules	Inputs	Ref nanoS	Ref nanoS²	Page
MJPEG 2000 module/Audio	2	MJPEG-2-S	MJPEG-2-S2	28
MJPEG 2000 module/Audio	4	MJPEG-4-S	MJPEG-4-S2	28
H.264 MPEG4 up to 1080p 30 fps/Audio	1	H264-1-S	H264-1-S2	29
H.264 MPEG4 up to 1080p 30 fps/Audio	2	H264-2-S	H264-2-S2	29

MJPEG 2000 module/Audio Modules

NanoS	MJPEG-2-S/MJPEG-4-S
NanoS²	MJPEG-2-S2/MJPEG-4-S2

Motion JPEG 2000 is defined in ISO/IEC 15444-3 and in ITU-T T.802.It specifies the use of the JPEG 2000 format for timed sequences of images (motion sequences), possibly combined with audio, and composed into an overall presentation.

Motion JPEG 2000 (often referenced as MJ2 or MJP2) also is under consideration as a digital archival format by the Library of Congress. It is an open ISO standard and an advanced update to MJPEG (or MJ), which was based on the legacy JPEG format. Unlike common video formats, such as MPEG-4 Part 2, WMV, and H.264, MJ2 does not employ temporal or inter-frame compression. Instead, each frame is an independent entity encoded by either a lossless variant of JPEG 2000. Its physical structure does not depend on time ordering, but it does employ a separate profile to complement the data. For audio, it supports LPCM encoding, as well as various MPEG-4 variants, as "raw" or complement data.

Quantity of channels
1 to 2independent video input channels
1 to 4independent video input channels

Minimum compression per channel
1 Mbits /second

Maximum compression per channel
20 Mbits/second

Input levels
RGB inputs or composite PAL,
NTSC (RS 170)

Time stamping preciseness
Picture by picture

Number of pictures by second
1, ½, ¼, of the frame frequency or one picture by second.

Audio channels
Input: 1 volt efficient
Band pass: 0 to 14.7 KHz
Input impedance: 1 MΩ

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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H.264 MPEG4 up to 1080p 30 fps/Audio Modules

NanoS H264-1-S/ H264-2-S
NanoS² H264-1-S2/ H264-2-S2

H.264/MPEG-4 Part 10 or AVC (Advanced Video Coding) is a standard for video compression, and is currently one of the most commonly used formats for the recording, compression, and distribution of high definition video. The final drafting work on the first version of the standard was completed in May 2003.

Quantity of channels
1 to 2Video/Audio channels

Video resolution available
1080p30, 1080i30,720p30, 720i30

Minimum compression per channel
1 Mbits /second

Maximum compression per channel
16 Mbits/second

Time Stamping
Incrustation frame by frame

Input levels
HD-SDI, SDI
RGB inputs or composite PAL, NTSC (RS 170)

Number of pictures by second
30fps

Audio channels
Input: 1 volt efficient
Band pass: 0 to 14.7 KHz
Input impedance: 1 MΩ

Recording/Multiplexing
IRIG 106 Chapter.10 or D.T MUX format

Input connector
NanoS: NANO D (MIL-DTL-32139)
NanoS² : MICRO D (MIL-DLT-83513)

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