AIM
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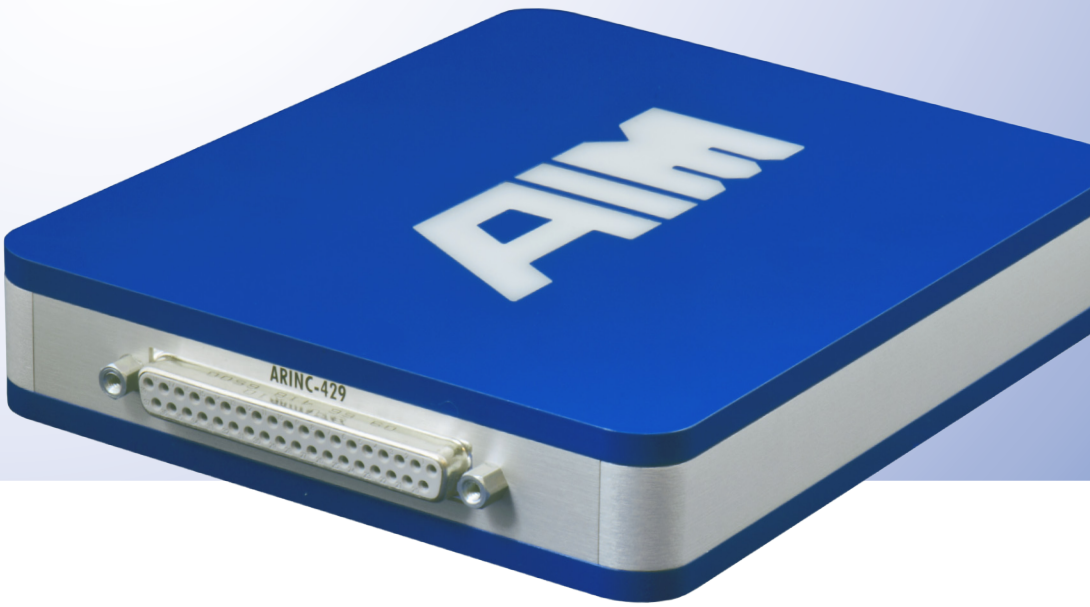
Avionics Databus Solutions

ANET429-x

4, 8 and 16 Channel ARINC429 Test & Simulation Module for Standard Ethernet

Data Sheet



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ANET429-x

General Features

The ANET429-x is a member of AIM's new line of Ethernet based modules for analysing, simulating, monitoring and testing ARINC429 channels.

4 channels are available on the ANET429-4, 8 channels on the ANET429-8 and 16 channels on the ANET429-16 module. All channels are software programmable for Receive (Rx) or Transmit (Tx) mode. All transmitters have fixed output amplitude.

ANET429-4 and ANET429-8 versions provide separate Transmit (Tx) and Receive (Rx) pins on all channels. Dockable versions for use in the ADock Docking Station are available as well.

All ANET429-x modules have the capability to handle 8 General Purpose Discrete I/O (GPIO) signals which can be monitored or generated. Also 3 Trigger Inputs and Outputs are offered.

The ANET429-x modules use AIM's 'Common Core' hardware design utilising 2 RISC processors with 128MB of Global RAM and 256MB of ASP RAM.

The onboard ASP (Application Support Processor) which is based on a SOC (System On Chip) hardware device is running under LINUX OS. This offers a scalable and flexible platform for hosting various onboard applications.

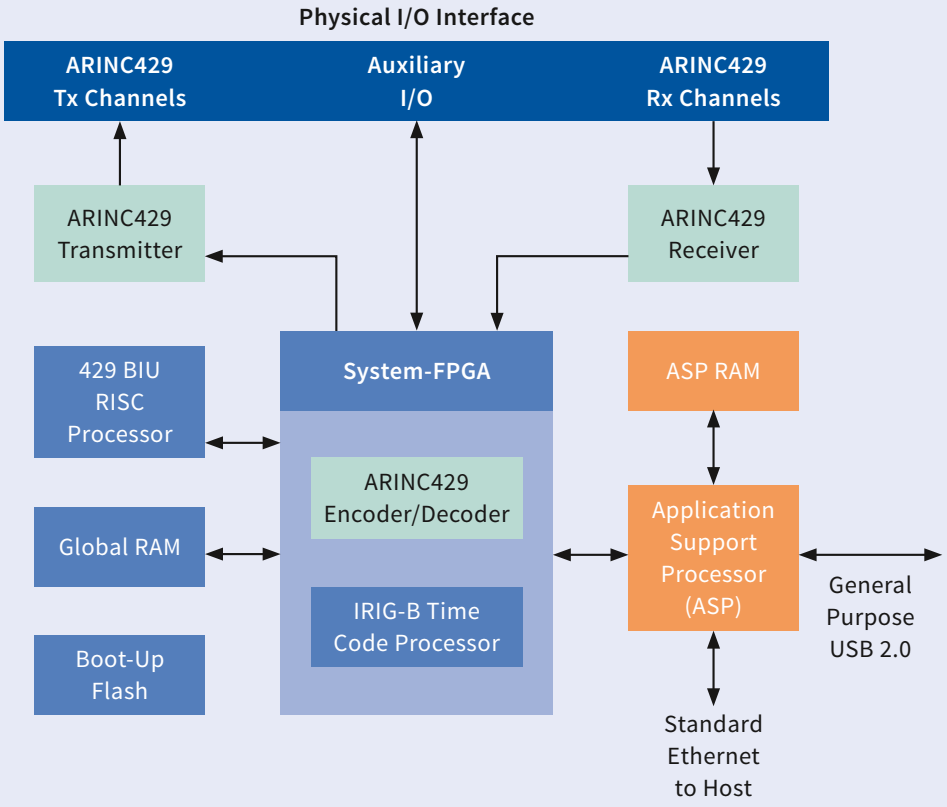
Per default, the ASP executes the AIM Network Sever (ANS) for use by customer applications via the Standard AIM Application Programming Interface. ASP Application Software development is supported via the Standard Ethernet Interface.

A cross tool chain for ASP can be provided and also standard Linux debugging features like GDB are available. The use of onboard processing and large memory enables autonomous operation with minimal interaction with the host PC.
A general purpose USB 2.0 port is available e.g. for USB memory devices, USB WLAN, used by the onboard OS and onboard applications like customer specific programs or PBA.pro Engine.

An onboard IRIG-B time encoder/decoder is included with sinusoidal output and free-wheeling mode for time tag synchronisation on system level using one or more ANET429-x modules.

Full function software support for application development on Windows and LINUX hosts is delivered with the ANET429-x modules in comprehensive Board Software Packages (BSP's). The execution of customer written Python Scripts on the Application Support Processor of the ANET429 is supported per default. For the development and execution of onboard customer applications written in C/C++, an optional S/W tool set (ANET-ADK) is available.

The standard PBA.pro™ Databus Test & Analysis Tool for Windows or Linux based hosts can also be optionally purchased for use with ANET429-x modules.



ANET429-x
Block Diagram

Receive Channel Operation

ANET429-x modules provide real time monitoring of up to 16 ARINC429 Receiver Channels concurrently controlled by an onboard RISC Processor.

- Label Oriented Receive Mode (individual Buffers for each Label with Multi-Buffering and Real Time Updates)
- Chronological Receive Mode per Channel with 1µs Resolution Time Stamping
- Chronological Mode concurrent to label Oriented Receive Mode
- Local (one Buffer per Channel) or Global Monitoring (one Buffer all Channels)
- Continuous or Single Shot Capturing Modes
- Support of SDI Handling
- Interrupt Generation on Label Reception (configurable per Label/SDI)
- Complex Triggering and Filtering Functions
- Loop of received Data to configurable Transmit Channel with Label Data Modification Capability
- High Accuracy FPGA based Label Time Stamping

Transmit Channel Operation

ANET429-x modules provide real time simulation of up to 16 ARINC429 Transmitter Channels concurrently controlled by the onboard RISC Processor via instruction lists.

Transmission rates are selectable for each channel at 12.5kbit/s or 100kbit/s with the associated rise/fall time in accordance with the ARINC429 electrical specification.

- Cyclic/Acyclic Label Transmission and Channel Loop Mode
- Error Injection for each Label Transfer: Short Gap, Parity, Bit Count, Coding
- Programmable Gap between Labels: 0 to 255Bit
- Simulate Zero-Jitter Scenarios using Virtual Label Transfers
- Multi-Buffering with Real Time Update supported per individual Label Transfer
- Reconstruction of previously recorded ARINC429 Traffic physically to the Bus with excellent Timing Accuracy (Physical Replay)
- Interrupt Generation on Label Transmit (configurable per Label Transfer)

Physical Bus Interface

ANET429-x modules have integrated ARINC429 Line Transmitter/Receiver Channels and selectable transmission rate for each single channel independently.

Loop-back & Pollution Mode

Receive and Transmit Channels can be paired to form a ‘Loop-back’ couple.
Data received from the receiver channel are automatically transmitted on the selected transmitter channel with minimum delay.
A special receiver Function Block mode can be used to modify (pollute) the received label prior to its re-transmission.

Trigger-/General Purpose Discrete I/O Signals

The Auxiliary I/O connector provides 2 of the 3 Trigger Inputs and Trigger Outputs (the 3rd is located on the ARINC429 connector). Additionally up to eight user programmable General Purpose Discrete I/O signals can be accessed via the Auxiliary I/O connector. Voltage levels of all trigger signals and General Purpose Discrete I/O’s are TTL compatible whereas the General Purpose Discrete I/O's are designed to handle avionics level as well.

IRIG-B Time Encoder/Decoder

ANET429-x modules include an onboard IRIG-B time encoder/decoder with sinusoidal output and free-wheeling mode for time tag synchronisation. This allows synchronisation of multiple ANET429-x modules and other AIM modules to one common IRIG-B time input source or to the onboard time code generator of one ANET429-x module as the reference for the correlation of data across multiple ARINC429 streams.

Physical Bus Replay

The ANET429-x can electrically reconstruct and replay previously recorded ARINC429 channels physically to the ARINC429 bus with excellent timing accuracy.
Record files can be selected for Bus Replay. The additional capability to disable any or all ARINC429 labels from the replay enables smart systems integration and test to be performed.

Software Support

The Driver Software is supplied with the ANET429-x module. A full function Application Programming Interface (API) is provided compatible with Windows 7/8/10 and Linux. Host applications can be written in C, C++ and Python. A LabView VI application interface is also provided (Windows only). The ANET429-x LINUX OS on the ASP is preconfigured for the support of Mass Data storage devices at the USB Port and with a Python Installation for the execution of Python Scripts. The configuration of the ANET429-x is supported via a built-in Web based configuration application, accessible via any Standard Web Browser.

Technical Data

System Interface
10/100Mbit/s IEEE802.3 standard Ethernet Interface

Processors
1x 400MHz RISC Processor for BIU and
1x 400MHz Application Support Processor (ASP)

Memory
128MB Global RAM (DDR-RAM),
8Mbit serial flash memory for the BIU,
64Mbit serial flash memory for LCA,
256MB RAM (LPDDR RAM) and
1GB flash memory for the ASP

Encoder/Decoder
Up to 16 ARINC429 Encoder/Decoder with full error injection and detection

Time Tagging
Sinusoidal 46-bit absolute IRIG-B time stamping with 1µs resolution

Trigger I/O
3 Trigger Input and Output Lines,
TTL compatible on Auxiliary connector and on the ARINC429 connector

General Purpose Discretes
8 bi-directional Discrete I/O signals on Auxiliary connector

Physical Bus Interface
Up to 16 ARINC429 Line Transmitter and 16 ARINC429 Line Receiver for a total of 16 channels; Channels are user programmable for Rx or Tx;
All Transmitter Channels with fixed output amplitude

ARINC429-Connectors
37-pin female D-Sub

Ethernet
RJ-45 female standard Ethernet connector

Auxiliary I/O
15-pin High-Density D-Sub connector (female) for Discrete I/O, IRIG-B and Trigger signals

DC Power
Standard DC low voltage power jack connector (2.5mm)

USB Port
1x general purpose USB 2.0 port via Type A connector

Power Supply
9-15VDC input (external power adaptor included 110V-240VAC, 50-60Hz)

Dimensions
120mm x 160mm x 26mm (without connectors)

Weight
~500g (ANET429-16)

Power Consumption
ANET429-4: 0.1W; 3.2W; 4W *
ANET429-8: 0.1W; 4W; 5W *
ANET429-16: 0.1W; 4.8W; 6W *
(* stand by; idle; work 'low speed with load', All measurements done with VIN=12VDC)

Operating Temperature Range
Standard Temperature Range:
0°C to 50°C
Extended Temperature Range:
-15°C to 60°C

Storage Temperature
-40°C to +85°C

Humidity
0 to 95% non-condensing

Ordering Information

ANET429-4
Standard Ethernet to 4 Channel ARINC429 Module

ANET429-8
Standard Ethernet to 8 Channel ARINC429 Module

ANET429-16
Standard Ethernet to 16 Channel ARINC429 Module

Common Features:
Software Programmable Receiver/ Transmitter Channels;
IRIG-B Time Encoder/Decoder, 8 General Purpose Discrete I/O's, Trigger I/O's;
128MB Global RAM, 256MB ASP RAM;
1x USB 2.0 General Purpose Port;
preconfigured with ANS onboard application (default), 37-pin D-Sub connector with separate TX and Rx pins for 4/8 channel and shared TX and RX pins for the 16 channel modules

ANET-USB-WIFI
USB Wifi Dongle, compatible to ANET Devices

ANET-ADK
ANET onboard Software Development Kit including Documentation, Samples and Tool Chain; Requires LINUX based development platform

Dockable Versions
(for use in ADock Docking Station) available upon request; please add –D to the part number.

For standalone use of dockable ANETs the ADock-1A adapter is available, offering connectors for Ethernet, USB and Auxiliary signals (IRIG-B, Discretes, Trigger I/O), equivalent to the standard ANETs.

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