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Avionics Databus Solutions

ANET1553-x

Single or Dual Stream MIL-STD-1553A/B Test & Simulation Module for Standard Ethernet

Data Sheet

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ANET1553-x

General Features

The ▶ **ANET1553-x** is a member of AIM's new line of Ethernet based modules for analysing, simulating, monitoring and testing ▶ **MIL-STD-1553A/B** databuses. The ANET1553-x concurrently acts as Bus Controller, Multiple Remote Terminals (31) and Chronological/Mailbox Bus Monitor. Versions with reduced functionality (Single Function or Simulator Only) are available.

All ANET1553-x modules have the capability to handle 8 General Purpose Discrete I/O (GPIO) signals and also offer Trigger I/O. A full range of MIL-STD-1553 protocol errors can be injected/detected. The ANET1553-x modules can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy. The ANET1553-x offers an interface for 1 or 2 dual redundant bus streams.

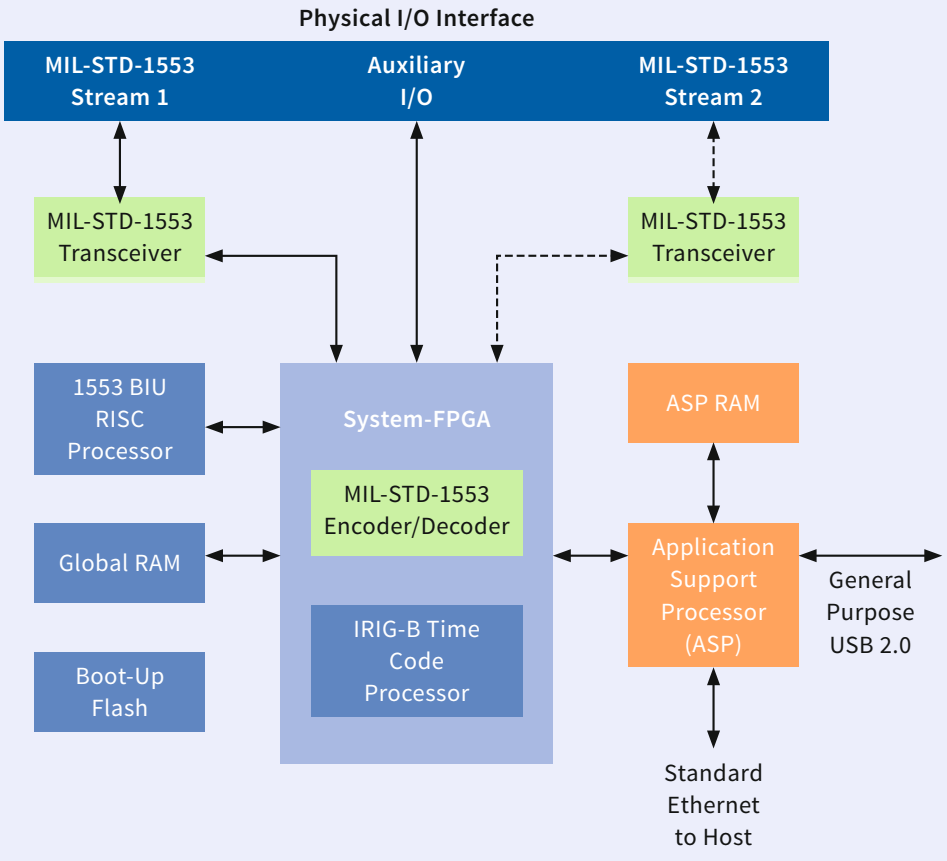
The ANET1553-x modules use AIM's 'Common Core' hardware design utilising 2 RISC processors with 128MB of Global RAM and 256MB of ASP RAM. The onboard ASP (Application Support Processor) which is based on a SoC (System On Chip) hardware device is running under LINUX OS. This offers a scalable and flexible 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. 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. An onboard IRIG-B time encoder/decoder is included with sinusoidal output and free-wheeling mode for time tag synchronization on system level using one or more ANET1553-x modules. The physical bus interface provides programmable bus coupling modes and variable output amplitude to the MIL-STD-1553A/B bus.

Full function software support for application development on Windows and LINUX hosts is delivered with the ANET1553-x modules in comprehensive Board Software Packages (BSP's). The execution of customer written Python Scripts on the Application Support Processor of the ANET1553 is supported per default.

The standard PBA.pro™ Databus Test and Analysis Tool for Windows or Linux based hosts can be optionally purchased for use with ANET1553-x modules.



ANET1553-x
Block Diagram

Receive Channel Operation

The ► **ANET1553-x** modules provide real time Bus Controller functions on each independent, dual redundant ► **MIL-STD-1553A/B** Databus channel, concurrently with Multiple RT and Chronological Bus Monitor operation. One BIU RISC processor for up to 2 Dual Channel Bus Interface Units provides true simulation of BC operations without host computer interaction.
Key features of the Bus Controller Mode include:

- Autonomous Operation including Sequencing of Minor/Major Frames
- Acyclic Message Insertion/Deletion
- Programmable BC Retry without Host Interaction
- Full Error Injection down to Word and Bit Level
- Multi-Buffering with Real Time Data Buffer Updates
- Synchronization of BC Operation to external Trigger Inputs
- 4µs Intermessage Gaps
- Interrupt Generation on BC Transfer Events
- Start on external Trigger Input

Multiple Remote Terminal

The ANET1553-x modules simulate up to 31 Remote Terminals, including all sub addresses on each MIL-STD-1553 channel, concurrently with BC and Chronological Monitor operation. Alternatively each of the 31 RT's can operate in message oriented Mailbox Monitor Mode to monitor Non-Simulated RT's.
Key features of the Remote Terminal Simulation Mode include:

- Programmable RT Response Time down to 4µs for each simulated RT
- Programmable & Intelligent Response to Mode Codes
- Full Error Injection down to Word and Bit Level (AS4112 compliant)
- Multi-Buffering with Real Time Data Buffer Updates
- Mailbox Monitor Mode
- Interrupt Generation on RT Events (for use by embedded Applications)

Physical Bus Replay

The ANET1553-x modules can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy.
Record files can be selected for Bus Replay. The additional capability to disable any or all RT responses from the MIL-STD-1553A/B replay enables smart systems integration and test to be performed.

Physical Bus Interface

The physical bus interface provides transformer or direct coupling with software programmable variable output transceivers and a terminated bus network to enable the direct connection of a single BC or RT device. The coupling to the external bus is software programmable.

Chronological Bus Monitor

The ANET1553-x modules provide full bus monitoring and analysis with time tagging of all bus traffic with 1µs resolution including response time and gap time measurement down to 250ns concurrently with BC and Multi RT operation.
Key features of the Chronological Monitor include:

- 100% Data Capture on each Channel at full Bus Rates
- Single Shot, Continuous or Selective Capture Modes
- Autonomous Message Synchronization and Full Error Detection
- 2 Dynamic Complex Triggers with Sequencing
- Message Filter and Selection Capture
- Bus Activity Recording independent from Trigger and Capture Mode
- Time Tagging:
  - All Bus Traffic to 1µs
  - Intermessage Gaps & Response Time to 250ns
- External Trigger Input & Output
- Programmable Response Time-Out

IRIG-B Time Encoder/Decoder

ANET1553-x modules include an onboard IRIG-B time encoder/decoder with sinusoidal output and free-wheeling mode for time tag synchronization. This allows synchronization of multiple ANET1553-x modules and other AIM modules to one common IRIG-B time input source or to the onboard time code generator of one ANET1553-x module as the reference for correlation of data across multiple MIL-STD-1553A/B streams.

Trigger-/General Purpose Discrete I/O Signals

The Auxiliary I/O connector provides BC and BM Trigger Inputs and BC and BM Trigger Outputs. Additionally up to 8 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.

Driver Software Support

The Driver Software is supplied with the ANET1553-x module. A full function Application Programming Interface (API) is provided compatible with Windows and Linux. Host applications can be written in C, C++ and Python. A LabView/VI application interface driver is provided.

The ANET1553-x LINUX OS on the ASP is pre-configured 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 ANET1553-x is supported via a built-in Web based configuration application, accessible via any Standard Web Browser.

Technical Data

System Interface
10/100 IEEE802.3 Standard Ethernet Interface
Processors
1 RISC Processor for BIU
1 Application Support Processor (ASP)
Memory
128MB Global RAM (DDR-RAM),
256MB ASP RAM (DDR RAM)
Encoder/Decoder
Up to 2x MIL-STD-1553A/B Encoder/Decoder with full error injection and detection
Time Tagging
Sinusoidal 46-bit absolute IRIG-B time stamping with 1µs resolution
Trigger I/O
BC/BM Trigger Input and Output Lines, TTL compatible on Auxiliary connector
General Purpose Discretes
8 bi-directional Discrete I/O signals on Auxiliary connector
Physical Bus Interface
1 or 2 MIL-STD-1553A/B Transceiver with variable Output Amplitude, Programmable Bus Coupling modes with onboard terminated Bus Network
MIL-STD-1553 Connectors
Standard Twinax BJ77 male type connectors for each MIL-STD-1553 channel

Ethernet
RJ-45 female standard Ethernet connector
Auxiliary I/O
15-pin High-Density D-Sub connector for Discrete I/O, IRIG-B and Trigger signals
DC Power
Standard DC low voltage power jack connector
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
Weight
495g (ANET1553-2)
Power Consumption
ANET1553-1: Typical 3.5W @12VDC
ANET1553-2: Typical 4.3W @12VDC (@50% Busload)
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

ANET1553-1
Single Stream, Dual Redundant Standard Ethernet to MIL-STD-1553A/B Interface

ANET1553-2
Dual Stream, Dual Redundant Standard Ethernet to MIL-STD-1553A/B Interface

Common Features:
BC, Multi RT Simulator with Mailbox & Chronological Monitor;
IRIG-B Time Encoder/Decoder,
8 General Purpose Discrete I/O's,
BC/BM Trigger I/O; 128MB Global RAM, 256MB ASP RAM, 1x USB 2.0 General Purpose Port, preconfigured with ANS onboard application (default)

Simulator Only versions available:
BC, Multi RT Simulator with Mailbox Monitor

Single Function versions available:
Chronological & Mailbox Monitor or BC and Chronological & Mailbox Monitor or Multi-RT and Chronological & Mailbox Monitor

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