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Talon Instruments™ 2108

VXI Serial Bus Emulator

The Talon Instruments™ 2108 Serial Bus Simulator/Analyzer can be programmed to simulate a wide range of serial buses for both automated test and research & development environments.

When used in the automated test environment, the 2108 goes beyond simple bus emulation with its unique ability to impose a range of impairments on the data, clock, and even control lines associated with the Serial Bus Under Test (SBUT) for margin/limit testing.

You also receive a set of interactive tools for the development and analysis of new serial buses (or for the modification of standard buses).

Key Features

- **4 transmit and/or receive channels per VXI slot for analysis of serial buses up to 200 MHz and 15 V**
- **Test/simulate transmit & receive characteristics of serial buses**
- **Emulate SONET, T1/DS1, 422/485, USB, IEEE-1394, ethernet, custom, or modified serial buses**
- **Development environment GUI included**
- **Serial bus logic analyzer application included**
- **Dual 4 Meg ping-pong buffers for real-time operation**

Product Information

The 2108 provides standard encoding and formatting schemes which allow the user to quickly emulate and analyze the most common serial buses. 2108 transmit and receive modules are coupled to the front panel via UUT I/O modules (TX and RX modules). These modules can be specified to support multiple signal types or, alternatively, one signal type such as LVDS or RS-485. Custom interconnect modules can be developed to meet emerging user physical interface requirements.

Modular Design

The 2108 is a register-based VXI module which provides fast communications between the unit and the VXI controller. This allows data to be transferred in continuous mode via a 4 Meg ping-pong buffer. The 2108 baseboard houses 1-4 serial channels and associated UUT I/O interconnect modules. Each channel may be a transmitter or receiver and is addressed as an independent instrument. Adjacent transmitters and receivers may be linked and operated as bi-directional buses.

Clock Recovery

Clock recovery is important when serial schemes embed the master clock within the serial data stream. When there is no clock available to a serial data stream, one of two clock recovery methods are used to recover the clock in real-time from the serial data stream input to the 2108 receiver. Low Frequency Clock Recovery (LF-CR) mode uses a 6x over-sampling method to recover a clock from input data streams at transition rates up to 35 Mbps (Megabits per second). High Frequency Clock Recovery (HF-CR) mode employs a PLL to lock onto the incoming data stream for transition rates from 32 to 200 Mbps.

Bi-directional Mode

When 2108 receive and transmit modules are used in pairs, they are linked together and can be used in tandem for bi-directional functionality. This is important when testing a serial device which transmits data with the expectation of a response from the party receiving the data or for the simulation of multi-drop architectures. The 2108 implements this by:

- Using the receiver's ability to compare incoming data to any of up to 16 pre-programmed comparison words.
- Sending a trigger signal to the linked transmitter upon receipt of data that meets specific criteria.
- Sending an appropriate response message upon receipt of the trigger.
- Operating in synchronization with the receiver's clock so that the return message can be synchronized with the clock of the external device.

Developer's Toolkit

The 2108 comes with a VXI*plug&play* compatible driver installation based on the

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Product Information
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Microsoft Win32® application programming interface and a Developer's Toolkit for the development of driver-compatible projects.

This set of graphical utilities allows the user to configure the instrument, download and upload data, and to interactively execute test routines. The project and data files generated may be saved for download and execution by any program using tools provided by the instrument driver. In particular, the 2108 Developer's Toolkit includes the utilities needed to graphically define the 2108 "transmit" and "receive" properties for the bus to be simulated.

To set up transmit properties, the Transmitter Panel (Figure 1, see below) allows the user to define the general properties of serial bus transmission. This panel allows the user to define the clock source, clock delay, the playback mode of the Control Memory Tables (CMTs, tables for defining transmit data) including gap time and parity, the data format (see Figure 11 for a list), operation of the marker, sync, and handshake signals, and any required offsets and delays.

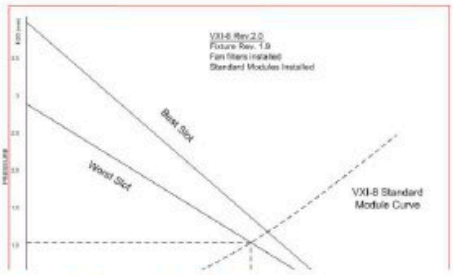


Figure 1: Transmitter Panel

An important part of transmitter setup is the definition of signal edge placements and polarity relative to serial data signal itself. This is specified using the Offset Panel as shown in Figure 2.

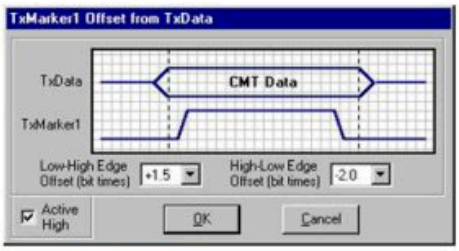


Figure 2: Offset Panel

The transmitter driver module (e.g., TX01) also needs to be configured to match the required physical interface. The Drive Module Panel (Figure 3) allows the user to specify the output type (bipolar or differential), the rise/fall times, the clock source and termination, the output voltages and the termination of the output. It also allows the transmit channel to be slaved to a receive channel for bi-directional mode.

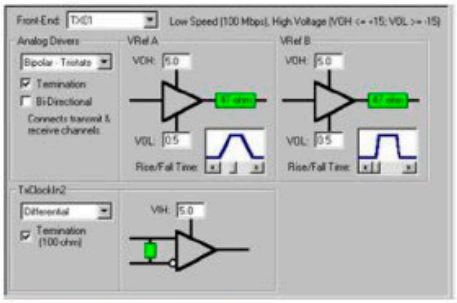


Figure 3: Drive Module Panel

The 2108 Development Environment also includes a powerful tool for the development of serial waveforms. The CMT Panel allows the user to string together serial data, pseudo-random data, special waveforms, inter-message gaps, and transmitter gap information. This allows the user to fully define and edit serial strings and associated marker signal data. Data types are selectable from pull-down menus for ease of use.

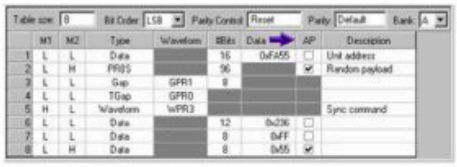


Figure 4: CMT Panel

The Test Sequence Panel (Figure 5) allows you to define one or more steps that coordinate CMT execution, looping, and conditional branching. Each step has a set of parameters that control its output, type, and behavior. Each line of a sequence developed in the Test Sequence panel is defined and edited using pop-up windows that step you through the process of specifying output conditions, conditional jumps, calls to "subroutines," loops, triggered subroutines, and interrupts.

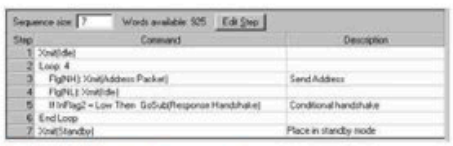


Figure 5: Test Sequence Panel

The Receiver Setup Panel (Figure 6) allows the user to define the timing and formatting for a receive channel's serial input signal. The receive data is selected from an external input or from an internal link to a companion transmit channel. The receive clock is derived from the receive data stream, selected from a companion

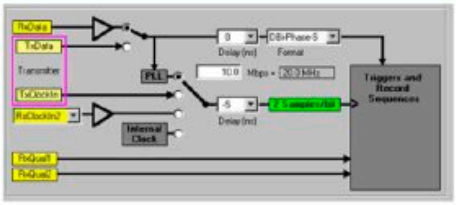


Figure 6: Receiver Panel

transmit channel, from one of two external clock inputs, or from an internal clock. Both receive data and clock have timing delay parameters that may be assigned using this panel.

The Receive Module Panel (Figure 7) allows the user to define the characteristics of the receiver data, clock, and qualifier signals. The installed UUT I/O module for the receive channel is configured to set the input voltage range and clock rate. The channel timing and data format can also be selected.

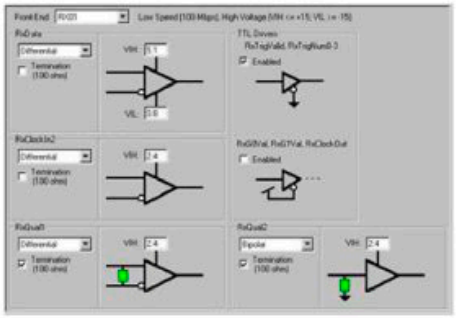


Figure 7: Receive Module Panel

The Record Sequences Panel (Figure 8) allows the user to define triggers and record sequences used to capture serial receive data with the simplicity of the setting of trigger conditions on a logic analyzer. Controls are provided for the selection of the number of triggers and the number of record sequence steps.

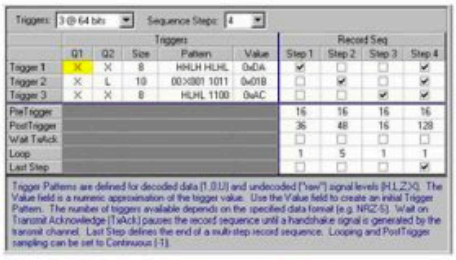


Figure 8: Record Sequences Panel

Trinary Modes of Operation

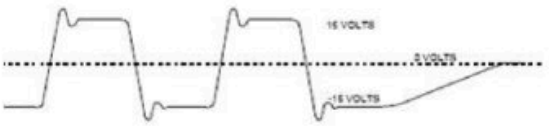
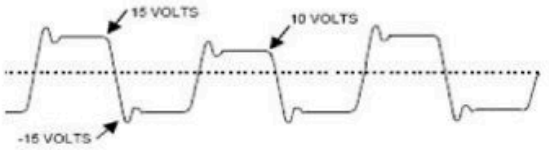
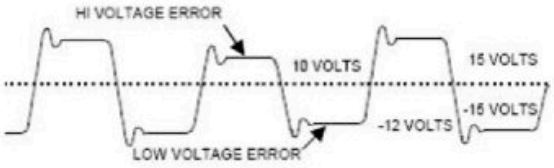
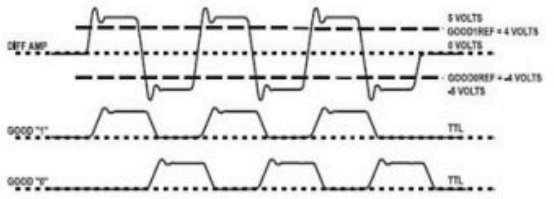
The 2108 is not limited to binary serial bus schemes but may also output data in one of its trinary modes of operation with TX01/RX01 and TX02/RX02 transmitter/ receiver pairs as summarized in Table 1 (see next page).

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Product Information

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Table 1: Trinary Transmit/Receive Modes

Trinary Transmit Modes	Mode Description	Mode Diagram
Binary plus tri-state (Note: Tri-stating may be used in combination with the other transmit modes)	A "one" and "zero" state are defined as usual, with a third state being defined as tri-state. This mode is useful for bi-directional serial buses.	
Binary plus user-defined state	A "one" and "zero" state are defined as usual, with a third state being defined as a user-defined voltage level.	
Binary plus error state	A "one" and "zero" state are defined as usual, with a third state being defined as an erroneous "one" and/or "zero" state.	
Trinary Receive Mode	**Mode Description**	**Mode Diagram**
Good "ones" and "zeros" plus "bad levels"	Programmable high and low thresholds detect "good ones" and "good zeroes" and undefined logic levels that meet neither criteria appear as gaps where no good ones and zeroes have been recorded.	

Bit Error Rate Test

If Bit Error Rate (BERT) analysis is required, existing post-processing tools such as the BERToolTM GUI from The Mathworks (MatlabTM toolbox) can be used. Alternatively, you can do your own analysis using Microsoft Excel® spreadsheet software or a programming language such as LabVIEW™. Measurement data from the 2108 can be accumulated and used for this type of analysis.

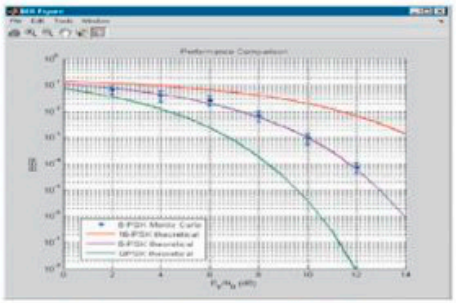


Figure 9: BERT Screen in MatLabTM

2108TX Transmitter

The 2108TX Transmitter features data rates from 5 kbps to 200 Mbps using internal or external clocks. It has software selectable data formats that are commonly used like NRZ, Biphase or AMI format (see Figure 10). In addition, users may program the 2108TX to inject errors, parity, or PRBS data. The two 4 Mbit memories may be used in a ping-pong scheme to continually output data while reloading new data from the VXI controller.

2108RX Receiver

The 2108RX receiver records data at rates from 5 kbps to 200 Mbps using internal or external clocks. It features clock recovery logic to sync to external clocks or data. Data capture or transmitter triggering may be initiated using 16 levels of 32-bit trigger patterns. Trigger compare logic provides for operations such as command/response or pre & post data capture based on the received data. The VXI controller may continually offload recorded data using the two 4 Megabit memories in a ping-pong operation.

Data Formatting

The 2108 transmitter allows the user to format CMT data by selecting output word parity, waveform type, inter-message and transmitter gaps, pseudo-random bit streams, and serial data words (see Table 2 on next page). Data encoding is supported as shown in Figure 10.

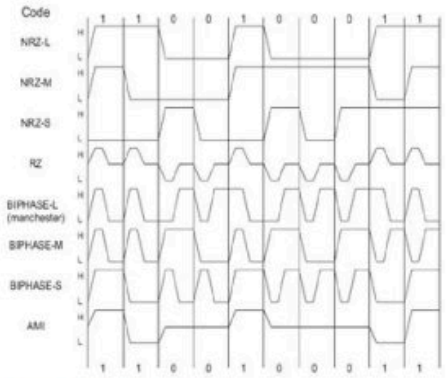


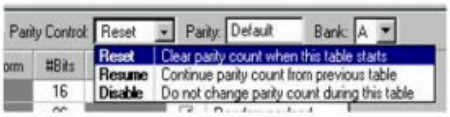
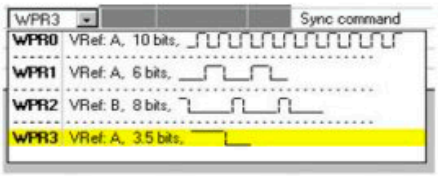
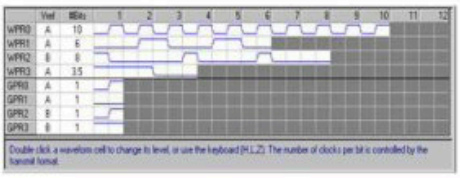
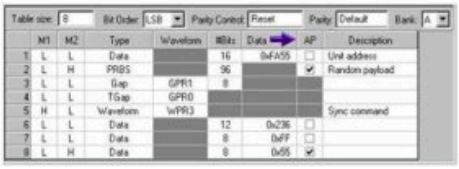
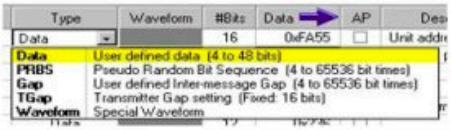
Figure 10: Data Formats

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Table 2: 2108 Data Formatting

Format	Description	Range	Diagram
Parity	Parity is calculated on-the-fly for 8-bit words sent to the transmitter.	None, Odd, Even, Invert	
Waveform	Pre-defined custom waveform patterns of variable length for packet synchronization or inter-message gaps	Up to 4 each of gap and custom waveform definitions	
Gap	Inter-message gaps or fixed transmitter gaps	4 to 64 k bit times	
PRBS	Pseudo-random bit stream	4 to 64 k bit times	
Data	Definition of a data word	4 to 48 bits	

Transmitter I/O Modules

The transmitter I/O modules provide the user with drivers to meet the electrical requirements of the UUT. Variable voltage drivers may be programmed to meet a wide range of signal levels from ECL to ±15 V in 20 mV increments. In addition, drivers may be programmed as bi-polar, differential, or trinary. Custom modules are available if off-the-shelf modules do not meet your requirements.

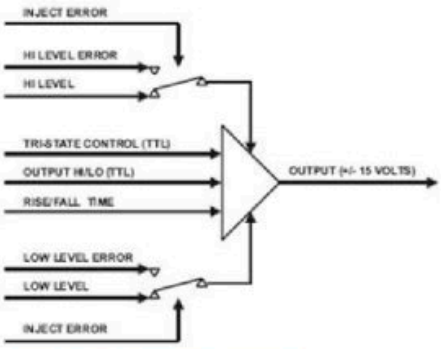


Figure 11: TX01 Driver Diagram (Bipolar Tri-State Mode)

Receiver I/O Modules

The Receiver I/O modules provide the user with receivers to meet the electrical requirements of the UUT. Variable voltage drivers may be programmed to meet a wide range of signal levels from ECL to ±15 V in 20 mV increments. In addition, drivers may be programmed as bipolar, differential, or trinary. Custom modules are available if off-the-shelf modules do not meet your requirements.

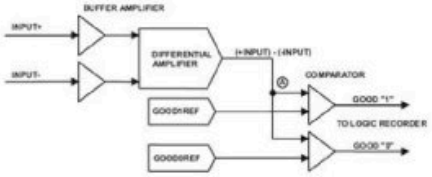


Figure 12: RX01 Receiver Diagram

Execution Manager

The 2108 Execution Manager is one of the components of the 2108 Development System. The Execution Manager handles load, execution, and reports for project files created with the 2108 Development Environment. The Execution Manager is used with the 2108 Development System during debug and it also runs standalone for production testing.



Figure 13: Execution Manager

Test Sequences

Test Sequences can be defined to coordinate Control Memory Table (CMT) execution, looping and conditional branching. Each step has a set of parameters that control its output, type and behavior. The Test Sequence Panel includes controls

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for sequence size, available words, step editing, and subroutine activation.

Serial Logic Analyzer

A Serial Logic Analyzer application is included which is used to view recorded data. It allows the user to search for events by trigger counts or by pattern. You may define templates to align, read, and display data streams. This tool can be used as a design and debug tool for simulating new designs of custom or modified buses in the development lab.

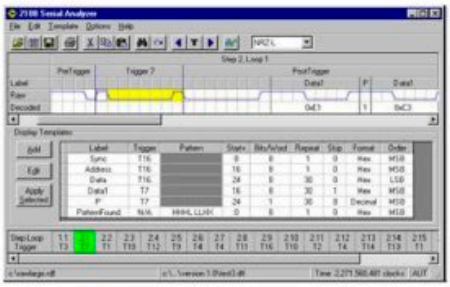


Figure 14: Serial Logic Analyzer

Margin Testing

Every communications system operates within a certain margin from the threshold of failure. The 2108 allows design and test engineers to characterize and probe these limits for new and existing communications channels.

The 2108's TX01 and TX02 transmitters provide multiple kinds of impairments that can be added to signal transmissions to test the susceptibility of the receiver under test to variations in transmission parameters. Similarly, RX01 and RX02 receivers have threshold adjustments allowing a variable definition of "Good Ones" and "Good Zeroes" as well as the adjustment of timing relationships between clock and data. These impairments (summarized in Table 3) are tools for the identification of the various failure thresholds of receivers, transmitters and even transmission lines in a serial communications system. This can be informative both during system characterization and in final production test.

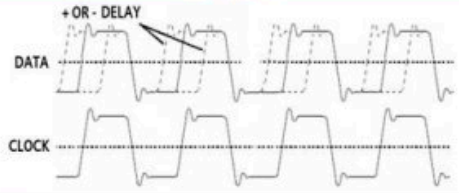
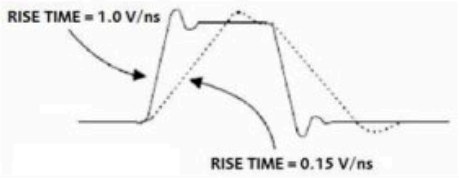
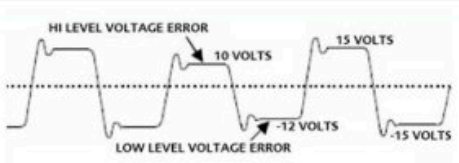
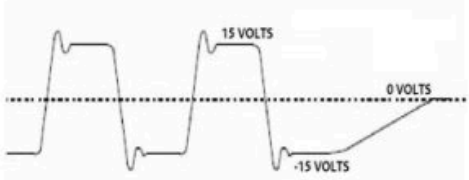
To do a margin test on a serial communications channel, the 2108 transmitters provide many dimensions of impairment control:

- Delay from clock for data, marker, etc. with one nanosecond resolution
- Slew rate control over a decade range
- Amplitude control over the full output range
- State control by allowing the user to add user-defined error states

Variation of these parameters during a margin test can provide an engineer with a deep understanding of the failure thresholds for a given system, whether testing for susceptibility to timing or amplitude/slew-related margins.

The 2108's RX01 and RX02 receiver channels measure how marginal a receive signal is by allowing the user to control input thresholds and storing undefined logic states and by allowing the user to adjust the clock-data timing relationship.

Table 3: 2108 Serial Bus Margin Testing

Dimension	Impairment	Transmit	Receive	Diagram
Time	Delay adjustment for skew injection or signal alignment (e.g., clock and data)	The transmit channel signals have programmable delays with 1 ns resolution and up to ±15 ns range	The receive data channel and clock have programmable delays with 1 ns resolution and up to ±15 ns range	
Slew Rate	Programmable slew rate impairment	0.15 V/ns to 1 V/ns	Input slew rates up to 1 V/ns	
Amplitude	Programmable amplitude impairment	-15 V to +15 V using TX01	Programmable Hi/ Lo thresholds detect "Good Ones" and "Good Zeroes"	
State	Third state can be defined (trinary)	Third state can be tri-state or user-defined	Good One and Good Zero states can be recorded as well as undefined logic levels that meet neither criteria	

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Specifications

Note: The Astronics Test Systems policy is one of continuous development and improvement. Consequently, the equipment may vary in detail from the description and specifications in this publication.

2108 Baseboard

Channels per card
- 1 to 4, transmit (output) or receive (input)

Internal Configuration for TX/RX
- Order: TX/RX/TX/RX (this allows transmit and receive channels to be coupled together logically for stimulus/response functionality)

2108TX (Transmit Module)

Bit Rate
- 5 kbps to 200 Mbps

Internal Clock
- 5 kHz to 200 MHz
- Accuracy: 50 ppm
- Resolution: 4 digits
- Jitter: 30 ps rms (typical)
- External Reference: 20 MHz

External Clock
- 5 kHz to 200 MHz
- Programmable Sync: Yes
- Error Insertion: Yes
- Delay Adjustment: ±10 ns in 1 ns steps (Data, Strobe, Clock out, Clock in, Markers, Sync, Error)

Auxiliary Signals
- 2 Marker or Envelope Signals (Out)
- Internal Clock (Out)
- Data Strobe (Out)
- 2 General Purpose Output Flags (Out): TTL
- 2 General Purpose Input Flags (In): TTL

Memory Depth per Channel
- Contiguous Buffer: 8 Mbits
- Ping-Pong Partitioning: Two 4 Mbit banks

2108RX (Receive Module)

Bit Rate
- 5 kbps to 200 Mbps

Internal Clock
- 5 kHz to 200 MHz
- Accuracy: 50 ppm
- Resolution: 4 Digits
- Jitter: 30 ps rms, typ
- External Reference: 20 MHz

External Clock
- 5 kHz to 200 MHz

Delay Adjustment
- ±10 ns in 1 ns Steps (Data, Clock)

Auxiliary Signals (Programmable)
- 2 Qualifier Signals (In)

Auxiliary Signals (TTL)
- Selected Clock (Out)
- Sampled Data (Out)
- Waiting for Trigger Flag (Out)
- Receiver Busy Flag (Out)
- Trigger Valid (Out)
- Trigger Number (Out)

Input Triggering
- 16 Sequential Levels

Trigger Values
- Up to 64 bits

Active Trigger Conditions
- Up to 16

Clock Recovery
- 5 kHz to 200 MHz

Memory Depth per Channel
- Contiguous Buffer: 8 Mbits
- Ping-Pong Partitioning: Two 4 Mbit banks

UUT I/O Modules

- (UUT I/O modules provide the physical interfaces between transmitter/receiver modules and the UUT. Various options are available to support different serial bus requirements. Contact the factory if you have special requirements not met by any of the standard modules.)

TX01/TX02 (Variable Voltage Output Modules)

Output Characteristics (Data/Clock)
- Signal Type: Bipolar, Differential, Trinary
- Transmit Rate (TX01): 100 Mbps
- Transmit Rate (TX02): 200 Mbps

Clock & Data versus Voltage Swing

Swing	TX01 Data	TX02 Data
5 V	100 Mbps	200 Mbps
10 V	80 Mbps	175 Mbps
20 V	50 Mbps	

Swing	TX01 Clock	TX02 Clock
5 V	50 MHz	100 MHz
10 V	40 MHz	87.5 MHz
20 V	25 MHz	

High Level Voltage
- TX01: -15 V to +15 V
- TX02: -1 V to +8 V

Low Level Voltage
- TX01: -15 V to +15 V
- TX02: -3 V to +6 V

Source/Sink Current
- 50 mA

Voltage Swing
- TX01: 20 V max
- TX02: 9 V max

Output Impedance
- TX01: Selectable 15 or 50 Ω
- TX02: 50 Ω

Slew Rate
- TX01: Programmable 0.15 V/ns to 1 V/ns
- TX02: >1.5 V/ns

Threshold Characteristics
- Resolution: 20 mV
- Accuracy: 50 mV

External Clock 1
- TX01: ±15 V Bipolar/Differential (<50 MHz)
- TX02: ±10 V Bipolar/Differential (<100 MHz)

External Clock 2
- ECL (<200 MHz)
- TX03 (RS-485/422 Output Module)

Output Characteristics (Data/Clock/Marker/Flag)
- Signal Type: TIA-EIA-485/422
- Maximum Transmit Rate: 50 Mb/s
- Driver Output (no load): 5 V
- Driver Output (54 Ω termination): 1.5 V
- Output Impedance: 100 Ω

External Input Clock Characteristics
- Single-ended ECL: 51 Ω to -2V term
- Differential ECL: 51 Ω to -2V term
- ASTTL: 82 Ω to GND
- TIA-EIA-485/422
  - Common Mode Range: -7 V to +12 V
  - Input Impedance: 100 Ω
  - Frequency (max): 25 MHz
  - Hysteresis: 60 mV, typ
  - Threshold: ±0.2 V

Miscellaneous I/O
- TxFlagIn (2): ASTTL (unterminated)
- TxBusy, TxSync: ASTTL, 47 Ω Z_{out}

Front Panel Interface
- SMA: Single-ended ECL Clock In
- Amp 36 pin (2-178238-5): Data, clocks, markers, flags, sync, busy
- LED (Green): CMT TX in the RUN state

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Specifications
continued

TX04 (LVDS Output Module)

Output Characteristics (Data/Clock/ Marker/Flag)
- Signal Type: Differential LVDS
- Maximum Transmit Rate: 200 Mb/s
- Driver Output (100 Ω termination): 650 mV
- Driver Output (50 Ω termination): 350 mV
- Output Impedance: 100 Ω

External Input Clock Characteristics
- Single-ended ECL: 51 Ω to -2 V term
- Differential ECL: 51 Ω to -2 V term
- ASTTL: 82 Ω to GND
- LVDS: Z_{in} = 100 Ω

Miscellaneous I/O
- TxFlagIn (2): ASTTL (unterminated)
- TxBusy, TxSync: ASTTL, 47 Ω Z_{out}

Front Panel Interface
- SMA: Single-ended ECL Clock In
- Amp 36 pin (2-178238-5): Data, clocks, markers, flags, sync, busy
- LED (Green): CMT TX in the RUN state

RX01/RX02 (Variable Voltage Input Module)

Input Characteristics (Data/RxQual)
- Signal Type: Bipolar or Differential
- Receive Rate (RX01): 100 Mb/s
- Receive Rate (RX02): 200 Mb/s
- Input Impedance: 100 Ω or 10 k, selectable

Data Rate vs. Voltage Swing/Threshold*

Swing	Thresh-old	RX01	RX02 (Data Rate)
5 V	0 V	100	200 Mbps
5 V	±3 V	50	100 Mbps
8 V	0 V	-	200 Mbps
8 V	±4 V	-	100 Mbps
15 V	0 V	50 Mbps	-
15 V	±9 V	25 Mbps	-

* for differential operation

Input Characteristics (ClkIn2)
- Signal Type: Bipolar or Differential
- Ext. Clock Rate (RX01): 50 MHz, max
- Ext. Clock Rate (RX02): 125 MHz, max
- Input Impedance: 100 Ω or 10 k, selectable

Threshold Characteristics (Data/Rx-Qual/ ClkIn2)
- Resolution: 20 mV
- Accuracy: 50 mV

Common Mode Voltage Detection Range
- RX01: ±15 V
- RX02: ±9 V

Bipolar Voltage Detection Range
- RX01: 0.8 V to 30 V
- RX02: 0.8 V to 20 V

Differerential Voltage Detection Range
- RX01: 0.4 V to 15 V
- RX02: 0.4 V to 10 V

External ECL Receive Clock Input
- Frequency (max): 200 MHz
- Input Impedance: 51 Ω to -2 V
- Signal Type: Bipolar ECL

RX03 (RS-485/422 Input Module)

Input Characteristics (Data/RxClkIn2)
- Signal Type: TIA-EIA-485/422 (75ALS-176BD)
- Receive Rate: 25 Mb/s
- Hysteresis: 60 mV
- Threshold (min/max): -0.2 V/+0.2 V
- Common Mode Range: -7 V to +12 V
- Input Impedance: 100 Ω

External Input Clock Characteristics
- Single-ended ECL: 51 Ω to -2 V term, 175 MHz
- Differential ECL: 51 Ω to -2 V term, 200 MHz
- LVTTL: 82 Ω to GND, 50 MHz

Miscellaneous I/O
- RxSig (2): ASTTL, 47 Ω Z_{out}
- RxTrig (5): ASTTL, 47 Ω Z_{out}
- RxGnVal (2): LVTTL, 47 Ω Z_{out}
- RxClkOut: LVTTL, 47 Ω Z_{out}

RX04 (LVDS Input Module)

Input Characteristics (Data/RxClkIn2)
- Signal Type: LVDS (SN65LVDM176D)
- Receive Rate: 200 Mb/s
- Hysteresis: 60 mV
- Threshold (min/max): -50 mV/+50 mV
- Common Mode Range: 50 mV to +2.5 V
- Input Impedance: 100 Ω

External Input Clock Characteristics
- Single-ended ECL: 51 Ω to -2 V term, 175 MHz
- Differential ECL: 51 Ω to -2 V term, 200 MHz
- LVTTL: 82 Ω to GND, 50 MHz

Miscellaneous I/O
- RxSig (2): ASTTL, 47 Ω Z_{out}
- RxTrig (5): ASTTL, 47 Ω Z_{out}
- RxGnVal (2): LVTTL, 47 Ω Z_{out}
- RxClkOut: LVTTL, 47 Ω Z_{out}

Interface
(Single slot, Register Based, VXIbus 1.4 Compliant)

Memory Modes Supported
- A16/D16/D16 Slave
- A24/A32 Memory: 4M/channel (switch select)

Status Lights
- Transmit LED (1 per TX module)
  - Off: Idle or standby CMT
  - Green: Outputting a user-defined CMT
  - Red: Drivers shut down due to error
- Receive LED (1 per RX module)
  - Amber: Waiting for a trigger
  - Green: Recording post-trigger data

Peak Current & Power Consumption
- Total Power: <58 Watts (-BFBF configuration)

	+24	+12	+5	-5.2	-12	-24
Base-board	0.05	0.0	3.1	0.1	0.05	0.05
2108TX	0.0	0.0	0.6	0.0	0.0	0.0
2108RX	0.0	0.0	1.0	0.0	0.0	0.0
TX01	0.055	0.0	0.55	0.15	0.0	0.055
TX02	0.03	0.15	0.5	0.15	0.15	0.05
RX01	0.2	0.0	0.425	0.15	0.0	0.2
RX02	0.2	0.35	0.3	0.45	0.4	0.0

Software

Drivers
- LabVIEW™, LabWindows™/CVI, VXI*plug&play* (based on Microsoft Win32®)

Serial Bus Developer's Toolkit
- 2108 Development Environment: Manages creating, editing and viewing of 2108 projects
- 2108 Execution Manager: Manages loading, executing and reporting test results for project
- 2108 Serial Analyzer: Interactively displays data recorded by the 2108 for viewing and analysis

Environmental

Temperature
- Operating: 0° C to 50° C
- Storage: -40° C to 70° C

Humidity (non-condensing)
- 11° C to 30° C: 95% ±5%
- 31° C to 40° C: 75% ±5%
- 41° C to 50° C: 45% ±5%

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Specifications
continued

Altitude
- Operating: 10,000 ft
- Storage: 40,000 ft

MTBF (ground benign)
- 50,000 hrs

EMC (Council Directive 89/336/EEC)
- Emission: EN61326-1: 1997+ A1:1998, Class B
- Immunity: EN61326-1:1997+ A1:1998, Table 1

Safety (Low Voltage Directive 73/23/EEC)
- BS EN61010-1:1993/A2 1995

Mechanical

Weight
- 4 lbs (<1.8 kg)

Cooling (10° C Rise)
- 4.8 l/s @ 0.5 mm H_2O (-BFBF configuration)
- Power x 0.083 @ 0.5 mm H_2O (in general)

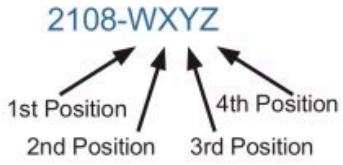
Ordering Information: Configured System

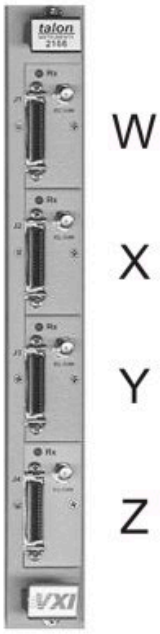
2108 : Talon Instruments™ 2108
Baseboard

2108TX : Talon Instruments™ 2108TX
Transmitter (Spare)

2108RX : Talon Instruments™ 2108RX
Receiver (Spare)

2108-WXYZ : Talon Instruments™ 2108
Configured Serial Bus Emulator Module





Directions: Construct the 2108 part number by filling in the required Model Code (A through J from the list above) at each position in the Carrier Module (to the right) as shown in the diagram below.

Model Code	Description	Spares Part Number
A	Blank Panel (covers vacant position)	30340
B	Transmitter 2108TX with TX01, Programmable Level, 100 Mbps	2108TX & TX01
C	Transmitter 2108TX with TX02, Programmable Level, 200 Mbps	2108TX & TX02
D	Transmitter 2108TX with TX03, RS422	2108TX & TX03
E	Transmitter 2108TX with TX04, LVDS	2108TX & TX04
F	Receiver 2108RX with RX01, Programmable Level, 100 Mbps	2108RX & RX01
G	Receiver 2108RX with RX02, Programmable Level, 200 Mbps	2108RX & RX02
H	Receiver 2108RX with RX03, RS422	2108RX & RX03
J	Receiver 2108RX with RX04, LVDS	2108RX & RX04

Note: Be sure to specify TX/RX pairs in the order "TX-RX-TX-RX" to insure the adjacency of TX and RX I/O modules. This guarantees that bi-directional operating mode will not be disabled.

Part Number Ordering Examples:

2108-BFCG	2108 with Tx01 (p/n B) in position W, Rx01 (p/n F) in position X, Tx02 (p/n C) in position Y, and Rx02 (p/n G) in position Z:
2108-BCDE	2108 with Tx01 (p/n B) in position W, Tx02 (p/n C) in position X, Tx03 (p/n D) in position Y, and Tx04 (p/n E) in position Z:

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Ordering Information
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Options:

TX01 : Output Module (programmable between -15 VDC to + VDC, data rates to 100 Mbps)
TX02 : Output Module (programmable between -13 VDC to +8 VDC, data rates to 200 Mbps)
TX03 : Output Module (RS422)
TX04 : Output Module (LVDS)
RX01 : Input Module (voltage detection range is -15 VDC to +15 VDC, data rates to 100 Mbps)
RX02 : Input Module (voltage detection range is 20 VDC, data rates to 200 Mbps)
RX03 : Input Module (RS422)
RX04 : Input Module (LVDS)

Accessories:

2108/001 : Product Development Software
2108/320-00X : Mating Cable X' long (36-Pin connector to open-ended), where X=1 to 6 (Compatible with RX01-RX04, TX01, TX02)
2108/321-00X : Mating Cable X' long (36-Pin connector to on both ends), where X=1 to 6 (Compatible with RX01-RX04, TX01, TX02)
2108/400-00X : Mating Cable X' long (36-Pin connector to open-ended), where X=1 to 6 (Compatible with TX03, TX04)
2108/401-00X : Mating Cable X' long (36-Pin connector to on both ends), where X=1 to 6 (Compatible with TX03, TX04)
2108/300 : Mating Cable, 3' long (36-Pin connector to open-ended) For reorder only
2108/300-1 : Mating Cable, 3' long (36-Pin connector both ends) For reorder only
2108/304 : Power Connector Cable 6' long (4-Pin connector to open-ended)
2108/T01 : Exercise/Breakout Pod (For TX01/02, RX01/02 only)
2108TX/301 : TX01/02/03/04 Connector Kit (includes 36-Pin connector, 4-Pin connector, and SMA connector)
2108RX/301 : RX01/02/03/04 Connector Kit (includes 36-Pin connector and SMA connector)


2108 Baseboard


2108TX


2108RX


TX01


TX02


TX03


RX01

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