Preliminary
TECHNICAL DATASHEET #TDAX141520

High Speed Automotive Ethernet/Ethernet Converter

P/N: AX141520

Features:

- 12V, 24Vdc input power (nominal) for connection to a battery
- 1 Automotive Ethernet port (1000 Mbps)
- 1 Ethernet port (1000 Mbps)
- Power, Link and Activity LED indicators
- Surge, reverse polarity, input overvoltage, and input undervoltage protection
- Configuration via CAN port for Master or Slave functionality
- IP67
- Compact, 2 M12 connectors
- CE marking
- Suitable for high vibration and shock environments

Applications:

- Off-highway equipment, mining equipment, industrial trucks

Ordering Part Number:

High Speed Automotive Ethernet Converter: **AX141520**

Accessories:
AX070502 Electronic Assistant

AX070535: Ethernet Cable X m (X ft.), 8-pin M12 A-coded, Ethernet Jack
AX070533: Cable 1.5 m (5 ft.), 12-pin M12 A-coded, Unterminated Leads

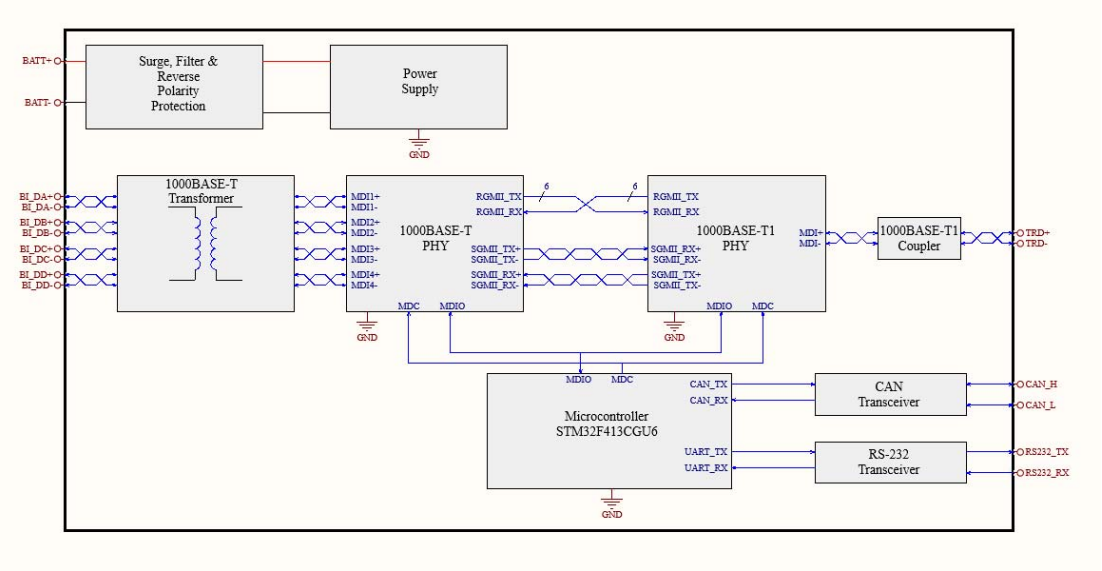
Description: The Axiomatic High Speed Automotive Ethernet to Ethernet Converter provides a purely physical, bi-directional conversion between Automotive Ethernet (1000BASE-T1), and Ethernet (1000BASE-TX) via PHY transceivers. No packets are stored or modified in this device. The converter supports a baud rate of 10, 100, and 1,000 Mbit/s. Status LEDs provide information on connection link, and communication. The converter is designed for the harsh environments of off-highway or industrial equipment. Automotive Ethernet networks use a 2 wire, unshielded, twisted pair (UTP) cable. Using Automotive Ethernet saves cabling costs for the machine builder.

The unit will be configured via the CAN (SAE J1939) port to act as a Master or Slave for Automotive Ethernet. The Master mode works if the connected device has its transceiver set to slave mode. The Slave mode works when the connected device has its transceiver set to master mode. Hard setting the master/slave relationship saves on setup-time costs and ensures that the Automotive Ethernet link is established quickly. As a comparison, regular Ethernet converters rely on auto-negotiation to determine master and slave.

In Europe:
Axiomatic Technologies Oy
Höytämöntie 6
33880 LEMPÄÄLÄ - Finland
Tel. +358 103 375 750
Fax. +358 3 3595 660
www.axiomatic.fi

In North America:
Axiomatic Technologies Corporation
5915 Wallace Street
Mississauga, ON Canada L4Z 1Z8
Tel. 1 905 602 9270
Fax. 1 905 602 9279
www.axiomatic.com

Functional Block Diagram



Technical Specifications:

Specifications are indicative and subject to change. Actual performance will vary depending on the application and operating conditions. Users should satisfy themselves that the product is suitable for use in the intended application. All our products carry a limited warranty against defects in material and workmanship. Please refer to our Warranty, Application Approvals/Limitations and Return Materials Process as described on www.axiomatic.com/service.html.

Input

Power Supply Input - Nominal	12V, 24Vdc nominal (9…36VDC power supply range)
Protections	Surge protection is provided. Reverse polarity protection up to -50V is provided. Input overvoltage (45V) and input undervoltage (6V) protection are provided. The unit is designed for 12Vdc based load dump.
Power Consumption	TBA mA @ 12 V; TBA mA@ 24V typical
Power LED	GREEN= Power ON

Automotive Ethernet

Port Type	1 port 1000BASE-T1 (IEEE 802.3 ab compliant) Automatic Polarity Correction Default configuration: Slave (Master mode is configurable via CAN.)
LED's	2 GREEN LEDs for Automotive Ethernet Automotive Ethernet LEDs: Activity: Receive/Transmit
Protection	ESD protection for signal lines
Protocol	Automotive Ethernet Ethernet IEEE 802.3bw for 100BASE-T1 Ethernet IEEE 802.3bp for 1000BASE-T1

	ON	BLINK	OFF
LED [0]: Link	Link		No Link
LED [1]: Activity		Activity	No Activity

Ethernet Port

Port Type	1 port 1000BASE-T (IEEE 802.3 bp compliant) Auto-Negotiation Automatic Polarity Correction
MDIX	Auto-MDI/MDIX (crossover)
Connections	

Connector pins	MDI	MDIX (Crossover)
6/4	BI_DA±	BI_DB±
5/8	BI_DB±	BI_DA±
1/7	BI_DC±	BI_DD±
2/3	BI_DD±	BI_DC±

Protocol	Ethernet IEEE 802.3
Protection	ESD protection for signal lines

Configuration Ports

CAN	1 CAN (SAE J1939) port
CAN User Interface	Electronic Assistant AX070502
RS-232	1 3-wire RS-232 port Maximum Baud Rate: 400 kBit/s ESD and EFT protection for signal lines
RS-232 User Interface	Any terminal emulator that supports serial communication.

General Specifications

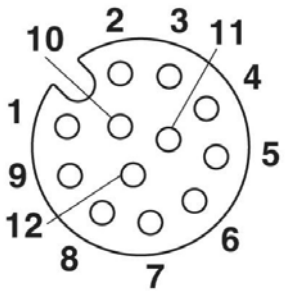
Functionality	Model AX141520 can be configured to acts as a master or a slave.
Microprocessor	STM32F413CGU6
Compliance	CE marking
Vibration	Random Vibration: Z-axis tracked vehicle profile (5 hr/axis in all 3 axes) Sinusoidal Component: 8.9 G Sine sweep, 2.5 hr/axis in all 3 axes
Shock	50 g, 5 impacts per test, 6-20 ms impact duration
Operating Conditions	-40 to 80°C (-40 to 176°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Protection	IP67
Weight	0.15 lb. (0.068 kg) preliminary
Installation	The typical maximum wire harness length for Automotive Ethernet cabling is 15 m.
Enclosure and Dimensions	See dimensional drawing, Figure 2.0 and 3.0. Nylon 6/6, 30% glass fill UL 94V-0 Ultrasonically welded

Figure 2.0. Dimensional Drawing – pending

<table>
<tr><td>Electrical Connections</td><td>

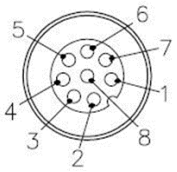
POWER/ Automotive Ethernet/ RS-232 / CAN Connector
1 Phoenix Contact M12 12-pin connector (A-coded), Female P/N: 1441833
(Connector J2 on the left hand side)

PIN#	Description
1	BATT-
2	BATT-
3	TRD_P
4	TRD_N
5	Not Used
6	RS-232_GND
7	RS-232 TX
8	RS-232 RX
9	BATT+
10	BATT+
11	CAN_L
12	CAN_H



Ethernet Power Connector
1 Phoenix Contact M12 8-pin connector (A-coded), Female, P/N: 1406117
(Connector J1 on the right hand side)

PIN#	Description
1	BI_DC_P
2	BI_DD_P
3	BI_DD_N
4	BI_DA_N
5	BI_DB_P
6	BI_DA_P
7	BI_DC_N
8	BI_DB_N



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<tr><td>Mating Connectors</td><td>Mating connectors should meet the following standard for M12 Connectors, IEC 61076-2-101:2012. They should be A-coded.</td></tr>
<tr><td>Mating Wire Harnesses</td><td>The following part numbers are available from Axiomatic.
AX070535: Ethernet Cable X m (X ft.), 8-pin M12 A-coded, Ethernet Jack
AX070533: Cable 1.5 m (5 ft.), 12-pin M12 A-coded, Unterminated Leads</td></tr>
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Form: TDAX141520-11/03/21