Preliminary
TECHNICAL DATASHEET #TDAX141570

6 Port Gigabit Automotive Ethernet Switch

100 Mbps or 1 Gbps (Single Pair) Automotive Ethernet
Remote Web Server or RS-232 Interface
P/N: AX141570

Features

- 12V, 24Vdc input power (nominal) for connection to a battery
- 6 gigabit/standard Automotive Ethernet ports (100 Mbps or 1000 Mbps)
- Power Enable signal to power up the device (when it is constantly connected to the battery)
- Configuration via remote web server or RS-232 interface
- Power, Link, Activity, and Speed LED indicators
- Surge/transient and reverse polarity protection
- 1 M12 5-pin and 6 M12 4-pin connectors
- IP67

Applications

- Off-highway equipment
- Mining equipment
- Industrial trucks

Ordering Part Number

6 Port Gigabit Automotive Ethernet Switch - P/N: **AX141570**
The switch can be purchase together with its mating cables under P/N: **AX141570K** (includes AX141570 converter, one AX070169 cable, and six AX070168 cables).

Accessories:
Cable 5 m (16.4 ft.), 5-Pin M12 A-Coded Connector, Unterminated Leads - P/N: **AX070169**
Cable 2 m (6.5 ft.), 4-Pin M12 D-Coded Connector, Unterminated Leads - P/N: **AX070168**

Description

The 6 Port Automotive Gigabit Ethernet Switch AX141570 is designed for industrial and automotive applications requiring high performance 100/1000BASE-T1 Ethernet switch functionality. Each switch port can be individually configured to support Master or Slave mode with 1 Gbit/s or 100 Mbit/s communication speed according to IEEE 802.3bp and IEEE 802.3bw standards. The Ethernet part of the switch is not configurable, resulting in unmanaged switch functionality.

An embedded web server on Port #1 allows users to configure switch ports, monitor the device performance and update application firmware. In addition, the web server interface contains a virtual cable tester that allows users to check integrity of the switch cabling and to perform basic Ethernet cable troubleshooting. An auxiliary RS-232 port can be used as a local alternative to the remote web server interface. A separate Power Enable digital signal is used to power-up the device in applications where the switch is constantly connected to the battery. An internal state of the switch is displayed by LEDs on the front panel of the housing.

IEEE 802.3bp standard (also known as 1000BASE-T1) is a 1000 Mbps Automotive Ethernet standard aimed at increasing data throughput, meeting strong automotive emissions standards, and reducing cabling weight and cost in automotive networking. Automotive Ethernet networks use a single 2 wire, unshielded, twisted pair (UTP) cable.

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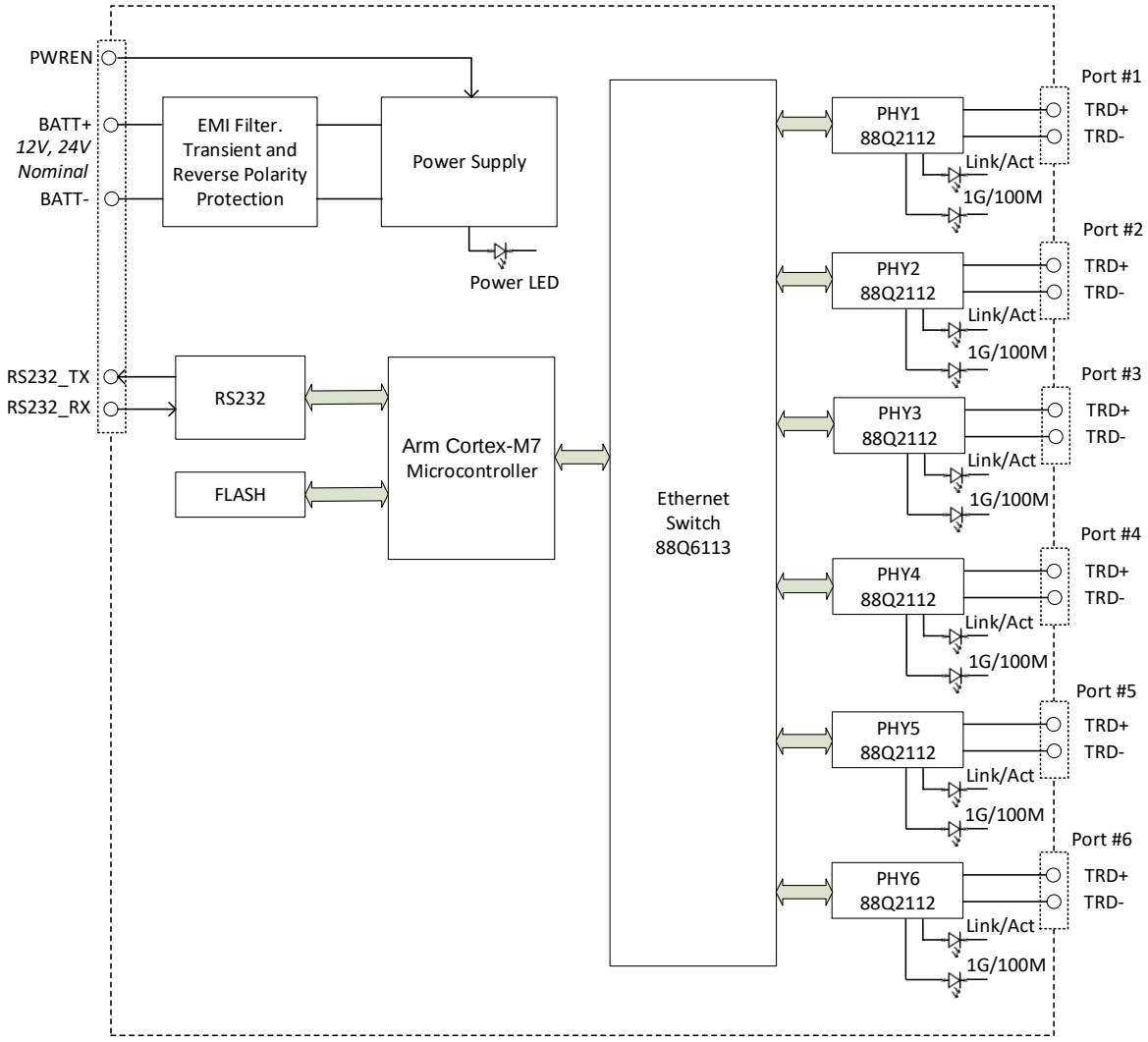
Block Diagram



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 Limitations & Return Materials Process as described on https://www.axiomatic.com/service/.

All specifications are typical at nominal input voltage and 25°C unless otherwise specified.

Power Supply

Parameter	Value	Remarks
Supply Voltage	9 to 36 Vdc	12 V, 24 V – nominal
Supply Current[1]	400 mA	12 V – typical
	200 mA	24 V – typical
Quiescent Current[2]	0.1 mA	12 V – typical
	0.2 mA	24 V – typical
Power Enable Input	On, if V_{PWREN} > 6 V	Can be connected to Battery +
	Off, if V_{PWREN} < 0.5 V	Can be left open or connected to Battery -
	R_{PWREN} >> 10 kΩ	High impedance input
LED Indicator	Power ON	Green LED
Protection	Reverse Polarity, Transients/Surge	

[1]All Ethernet ports and RS232 port are disconnected.
[2]Power supply is disabled. Power Enable input is left open.

Automotive Ethernet Switch Parameters

Parameter	Value	Remarks
Number of Ports	6	Individually configurable
Switch Type	Unmanaged	Based on Marvell 88Q6113, with individually configurable PHYs, based on Marvell 88Q2112
Switching Capacity	12 Gbps	
Forwarding Rate	8.93 Mpps	
MAC Address Table	16K	
Packet Buffer Memory	2 Mbit	
Jumbo Frame	10236/10240 bit	Tagged/Untagged frames
QoS	8 Priority Queues	
	802.1p/DSCP QoS	
Port Type	1000BASE-T1	IEEE 802.3bp-2016
	100BASE-T1	IEEE 802.3bw-2015
Port Speed	1 Gbps / 100 Mbps	Individually configurable per port
Port Mode	Master/Slave	Individually configurable per port
Port LED Indicators	Yellow - Link/Activity	One set per port
	Green - Speed	
Communication Protocols	Ethernet IEEE 802.3, IP, ICMP, ARP, UDP, TCP, DHCP, HTTP, Proprietary[1]	For internal web server and proprietary discovery protocol on Port #1
Web server	On Port #1 only	Used for the switch configuration, diagnostics, and flashing application firmware. Can be disabled through the RS-232 port.
Internal Diagnostics	Health Status	Available from the web server or RS-232 port user interface
RS-232 Port	3-wire	Local alternative to the web server. Menu based text user interface[2].

[1] Proprietary discovery protocol is supported by Axiomatic `AxioDisc.exe` Windows console application and *CAN-ENET Software Support Package* (SSP), P/N AX140910, v3.0.0+.
[2] Use any terminal emulation software. TeraTerm is preferred.

LED Indicators

Link/Activity (LINK/ACT) LED	
LED	**Description**
Off	No Link
Yellow	Link On
Blinking Yellow	Link On Transmit or Receive Activity on the Link

Speed (1G/100M) LED	
LED	**Description**
Off	Link On at 100 Mbps or No Link
Green	Link On at 1 Gbps

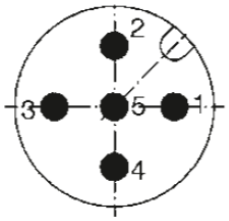
RS-232 Port

Parameter	Value	Remarks
Bit Rate	115200 bps	
Data	8-bit	
Parity	None	
Stop	1 bit	
Flow Control	Xon/Xoff	For flashing new application firmware only

Power Connector

M12 socket, 5-pin, A coded, male connector, BINDER, P/N: 09-3441-126-05.
Use A-coded mating connectors compliant with IEC 61076-2-101:2012.
A mating cable is available from Axiomatic under P/N: AX070169 (Cable 5 m (16.4 ft.), 5-pin M12 A-coded, Unterminated Leads)

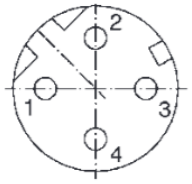
PIN #	Description
1	Power Enable[1]
2	Battery +
3	Battery - (RS-232 Ground[2])
4	RS-232 TX
5	RS-232 RX



[1] Connect to Battery +, if not used.
[2] RS-232 Ground is connected to Battery -.

Automotive Ethernet Connector

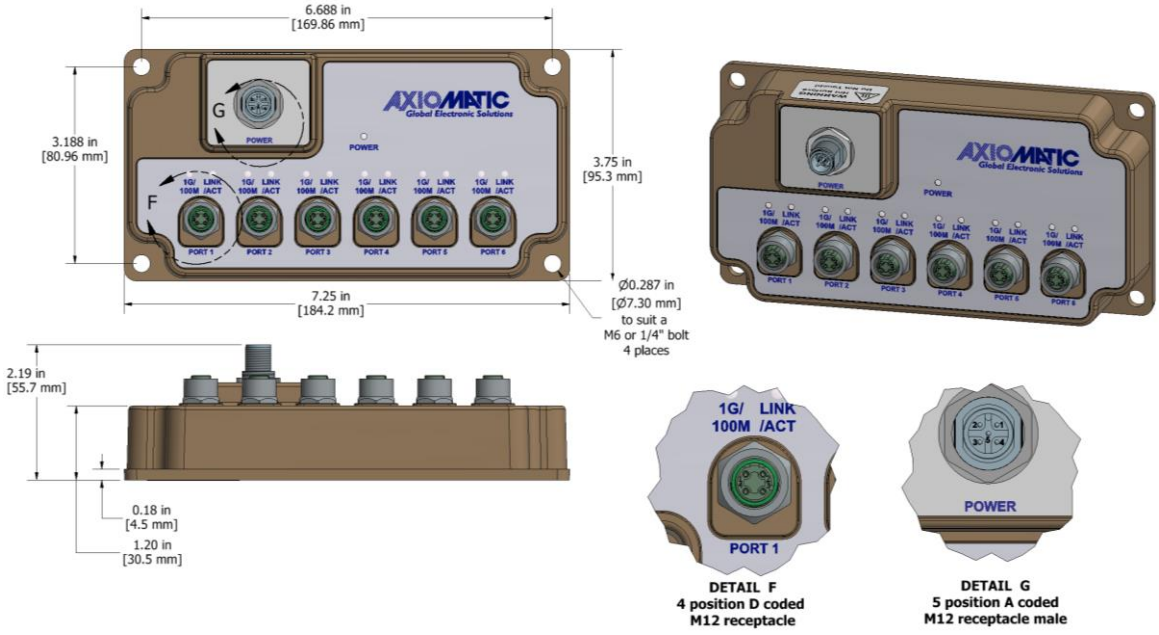
M12 socket, 4-pin, D-coded, female connector, BINDER, P/N: 99-3732-201-04.
Use D-coded mating connectors compliant with IEC 61076-2-101:2012.
A mating cable is available from Axiomatic under P/N: AX070168 (Cable 2 m (6.5 ft.), 4-pin M12 D-coded, Unterminated Leads)

PIN #	Description	
1	TRD +	
2	Not Used	
3	TRD -	
4	Not Used	

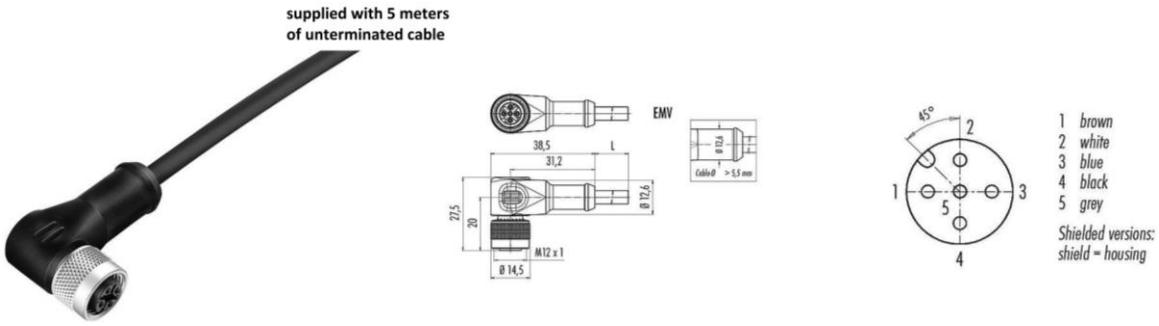
General Specifications

Parameter	Value	Remarks
Operating Temperature	-40 to 75 °C (-40 to 167 °F)	
Storage Temperature	-40 to 85 °C (-40 to 185 °F)	
Protection	IP67	IEC 60529. With mated connectors
Enclosure	Cast aluminum, anodized enclosure	Lexan overlay
Size	6.69 in x 3.19 in x 2.19 in (169.9 mm x 81.0 mm x 55.7 mm)	L x W x H excluding connectors See dimensional drawing
Weight	1.41 lbs. (0.64 kg)	
Compliance	RoHS	

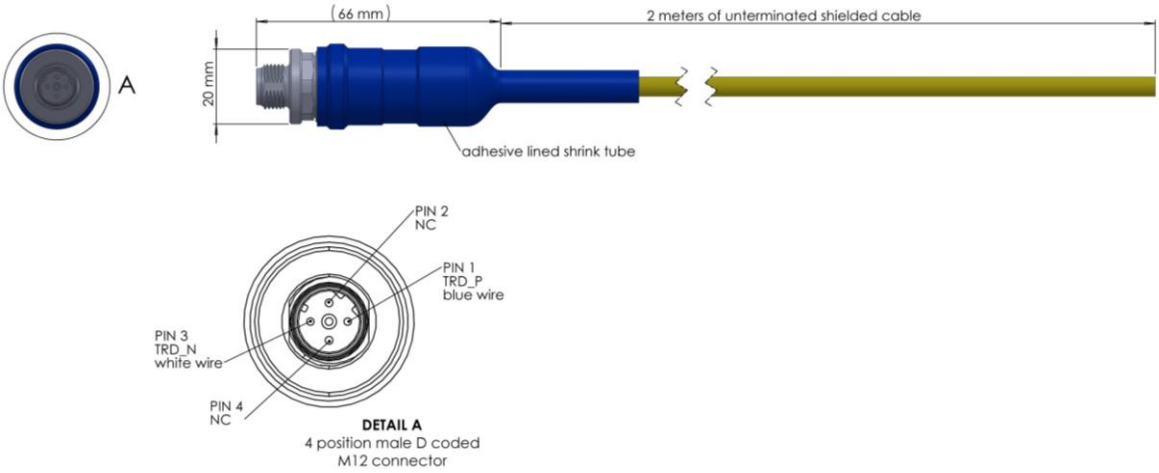
Dimensional Drawing



Dimensional Drawing of AX141570



Dimensional Drawing of AX070169



Dimensional Drawing of AX070168

Form: TDAX141570-12/04/2024