



Sync Com™ Product Information / Specifications



NEW!

Sync Com™ USB to Synchronous Serial Interface

Synchronous Communication at Unsurpassed Speed!



Up to 70Mbits/s

Sync Com™ is the fastest USB to synchronous communications adapter in the world. Featuring unsurpassed speed and rugged packaging, Sync Com™ is designed and manufactured by Fastcom®, the industry leader in synchronous communication solutions. Use our innovative “building block” style case and transform the way you design your systems. Join an international community that is powered by the innovations of the Sync Com™ adapter.

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Sync Com™ Product Information / Specifications

Technology by Engineers for Engineers

The Sync Com adapter features maximum throughput and compatibility with all current and future USB 2.0, 3.0 systems in the global market. Engineers that choose our Fastcom® Sync Com™ products will create revolutionary systems that are sustainable, upgradeable and environmentally responsible.



Sync Com™ Models

The Sync Com™ is available in three different models: **RS-422/RS-485**, **RS-232**, or **LVDS**. Because it never hurts to review the basics, refer to Wikipedia for descriptions of RS-422, RS-232, and LVDS.



SYNC COM 422/485



SYNC COM LVDS



SYNC COM 232

Price and Availability

Refer to our website www.fastcomproducts.com .

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Sync Com™ Speed

Sync Com Model	Part Number	Speed*
Sync Com™ RS-422/RS-485	51082003	50 Mbit/s
Sync Com™ LVDS	51083003	70 Mbit/s
Sync Com™ RS-232	51081003	1 MBd

The Sync Com™ USB interface is an industrial / commercial / scientific device. Engineering skills are required for use.

*In a lab environment, we have tested the Sync Com at higher data speeds than these. Factors like cable length/quality, environmental noise, and cable connections impact speed. Also, the USB interface has a lot of software overhead associated with it and affects data throughput.



Sync Com™ Product Information / Specifications

Durable, Stackable, Expandable, Never Obsolete!



Durable, Stackable

The metal Sync Com case is *milled* from a solid piece of billet 6061-T6 aluminum -- making it very precise and very strong. The Sync Com exclusive “building block” feature uses guide pins on top and indentations on the bottom to align each case when stacked. This saves space, organizes cables, improves aesthetics and keeps units from sliding.

Connect multiple Sync Com units to a single computer – all of the same model or mix models to create a custom group (even with Async Com™ models). Non-hub USB ports are preferred.

Staying Up to Date is Important

One of the important features of our Sync Com interface is the ability for the customer to update the firmware in the Sync Com directly through the USB connection. This will only be necessary when there are bug fixes or performance improvements available. Notification can be found at www.fastcomproducts.com under the *Software* tab. The Sync Com update program (on the enclosed Fastcom jump drive) cannot be used until you have downloaded a valid firmware update. Refer to the instructions on our website.









Sync Com™ Product Information / Specifications

Fastcom® is READY.

Hot, Dirty, Wet, Fast, Cheap, and Rugged

Of course, these are descriptive words that you most frequently associate with Commercial/Industrial environments and the Fastcom® product line.

-  ***Hot.*** *Damn hot.* Commercial / Industrial environments expect a device to operate normally, without performance degradation, at 113° Fahrenheit (and up to 185° Fahrenheit optionally). Fastcom® is READY.
-  ***Dirty.*** Dusty, grimy places. Fastcom® is READY.
-  ***Wet.*** Optional conformal coating protects Fastcom boards from moisture and other containments.
-  ***Fast.*** Fully programmable baud rate generator and fastest data rates. Period.
-  ***Cheap.*** Not. When a project is your responsibility and has to be done right, Fastcom® is READY.
-  ***Rugged.*** Our Sync Com™ and Async Com™ products are framed in solid milled aluminum for a lifetime of service

So, for **Factory Automation, Heavy Transportation, Test and Measurement** or other tough environments -- you need hardware that's ready to be *hot, dirty, wet, fast, and rugged* – Fastcom® products.



Sync Com™ Product Information / Specifications

The *Hard* and *Soft* Facts

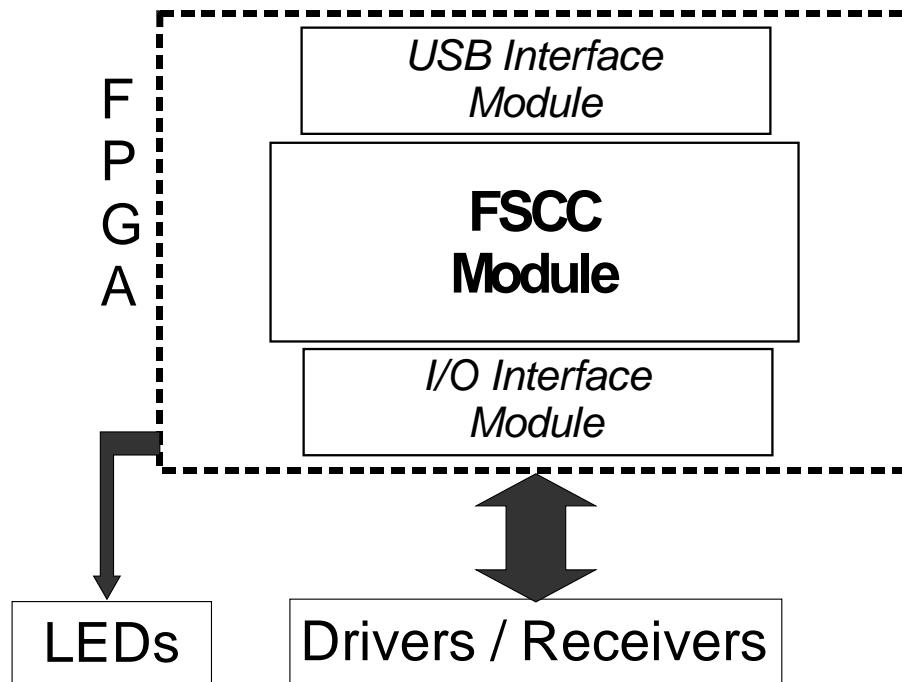
Before now, the only way to get the functions of a serial communication controller was in a “hard” IC package – inflexible and subject to obsolescence. The Fastcom® Sync Com incorporates the functions of the serial communications controller as part of our “soft” firmware. This enables the Sync Com to deliver improved features like firmware updates, new functions, custom configurations, higher throughput while virtually eliminating obsolescence.

The Heart of Fastcom®

We term the serial communications portion of our firmware the Fastcom Communications Controller (or FSCC). As illustrated below, there are other parts (or modules) that make up our firmware, including modules for bus interface and I/O interface. As a whole (with all of the modules included), we term our firmware the *F-Core*.

Our F-Core firmware is the heart of our Sync Com and FSCC line of Fastcom® PCI, PCIe, PCI-104 and PC-104+ communication adapters. For more than 10 years, our F-Core firmware development team has been (and continues to be) updating, customizing and improving our firmware guided by real world customer input.

F-Core Firmware Diagram



The FSCC module can be either a synchronous serial controller or an asynchronous UART. Multiple FSCC modules can be loaded into a single FPGA. The above illustration simplifies the F-Core firmware for the Fastcom[®] Sync Com.



Sync Com™ Product Information / Specifications

Never Obsolete, Really?

On too many occasions, large chip manufacturers have offered communication chips to system designers; then, at an unpredictable time, abandoned these chips with no substitute available. When this happens, stranded customers lose a fortune in time/money invested in system designs. Worse, these customers are driven into the “grey market”, forced to pay insane prices for used chips and opening themselves to the dangerous counterfeit chip market.

Utilizing a new generation Field Programmable Gate Array (FPGA) enabled us to design our own synchronous interface without the limiting factors of a “hard” chip. Now, bug fixes, performance improvements and product customization can be accomplished in the field *without* replacing the Sync Com unit. When the next generation FPGA replaces the current generation (and it will), our upwardly-compatible *FSCC* firmware can be transferred to the new part -- maintaining compatibility with previous generations while offering new features and ensuring many years of product stability.

Exclusive Fastcom® X-Sync Protocol™

Our *F-Core* firmware supports the basic synchronous protocols like HDLC and SDLC, but our advanced *Fastcom® X-Sync Protocol™* is only available on our Fastcom® ***Sync Com*** and ***FSCC*** product lines. The *Fastcom® X-Sync Protocol™* is a *new* synchronous protocol--essentially a completely user definable frame format. You can define your own sync byte(s), CRC, data length and termination sequence. This allows a programmer to interface to synchronous systems and legacy systems that don't use standard synchronous protocols. Customers can also create a custom protocol for unique application.

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Sync Com™ Product Information / Specifications

Fastcom® X-Sync Protocol™ Features

- ✓ NRZ, NRZI, FM0, FM1, Manchester, Differential Manchester encoding
- ✓ 0 – 4 bytes for opening and closing flags
- ✓ 0 – 32 bytes of masking for opening and closing flags
- ✓ Different opening and closing flags
- ✓ Shared opening and closing flags, or unique flags for each frame
- ✓ LSB or MSB order of transmission
- ✓ CRC-8, CRC-16, CRC-32, CRC-CCITT
- ✓ Address checking for each frame
- ✓ Zero insertion (insert a 0 after five consecutive 1's)
- ✓ One insertion (insert a 1 after seven consecutive 0's)
- ✓ Signal polarity
- ✓ Frame syncing signals



Sync Com™ Product Information / Specifications

Exclusive Fastcom® FSCC Programmable Clock

Why this is important: In a typical design, data rates are derived by dividing the frequency of a fixed crystal by a divisor that is loaded into the serial controller chip by your program. Because it is undesirable to have a remainder as part of the division results, certain data rates are just not possible.

Instead of a fixed crystal, Fastcom® FSCC products use a programmable clock frequency generator. This exclusive feature enables the programmer to achieve data rates precisely and in 1 cycle increments -- up to the maximum data rate capability of the drivers and receivers.

The Fastcom® FSCC uses the IDT ICS307-03 programmable clock generator -- look the data sheet up online, it's interesting. The device can be reprogrammed on the fly, making it ideal for applications where many different frequencies are needed or achieving a precise data rate (no remainder after division). It is capable of generating frequencies from 200Hz to 270 MHz thus allowing the FSCC programmer to generate precise data rates ranging from DC to Daylight (as the expression goes) in increments of 1 cycle.



Sync Com™ Product Information / Specifications

Sync Com™ Features

- ✓ **New high performance firmware synchronous serial controller**
- ✓ **Up to 70Mbit/s synchronous communication**
- ✓ **HDLC, SDLC, and *Fastcom® X-Sync Protocol™***
- ✓ **Transparent bit-stream mode**
- ✓ **Exclusive *X-Sync Protocol™***
- ✓ **CRC-8, CRC-16, CRC-32, CRC-CCITT**
- ✓ **DPLL x16 sampling**
- ✓ **NRZ, NRZI, FM0, FM1, Differential Manchester**
- ✓ **Exclusive Fastcom® Programmable Clock Generator**
 - Data Rates up to 70Mbps/S (Driver/Receiver limitation)
 - Programmable in 1 cycle increments
- ✓ **Configurable Transmit and receive data clocks**
- ✓ **Automatic RS-485 handling**
 - Echo canceling option
- ✓ **Full set of handshaking signals (see pinout diagrams)**
- ✓ **Legendary technical support. Fast / Comprehensible**
- ✓ **Expect the Sync Com™ to be on duty for a lifetime**
- ✓ **Designed and manufactured in Wichita, Kansas, USA**



Sync Com™ Product Information / Specifications

We are Greener than they are ...

The Sync Com meets or exceeds all of the current requirements for the following environmental and emission standards:

- ✓ **REACH – SVHC -163**
- ✓ **RoHS 2**
- ✓ **CE**
- ✓ **FCC Class B** (Better than 'A')

Sync Com Software API

- ✓ Windows 7 and Window 10
 - Application software examples
 - Software documentation
- ✓ Linux
 - Kernel 2.6.25 and higher
 - Application software examples
- ✓ FSCC / F-Core firmware documentation
- ✓ Loopback test programs and test plug

Monitor www.fastcomproducts.com for software bug fixes, updates, and new features.



Sync Com™ Product Information / Specifications

Mechanical characteristics

- ✓ Overall dimensions: 3.9" X 3.9" X 1.27"
- ✓ Weight: 11.8 ounces
- ✓ Case Material: 6061-T6 milled aluminum, anodized
- ✓ Case top: Cast Acrylic
- ✓ Mechanically designed to be stackable (like building blocks)

Manufacturing Process

- ✓ IPC – A -- 610Rev. F, Class 2
- ✓ 24 hour burn-in
- ✓ Fully tested

Operating Environment: **Commercial, 0°C to +70°C**

Power Requirement: **5V, 300mA Typical**

Optional Features

- ✓ Customize termination resistors
- ✓ Available without aluminum case for custom installations
- ✓ Available in other temperature ranges

A minimum order or an extra charge may be required



Sync Com™ Product Information / Specifications

Sync Com™ Package Contents

- ✓ High quality box and sleeve
 - Reference information on the sleeve
- ✓ Fastcom® USB jump drive
 - Software drivers and example programs (API)
 - Jump drive is reusable
- ✓ Sync Com device
- ✓ Loopback plug
- ✓ 3' USB cable

Fastcom® is the Best Value

- ✓ **Worldwide** sales and support
- ✓ **Free** -- One year of basic technical support
- ✓ **Free** – Unlimited online updates
- ✓ **Open source** software examples
- ✓ **Lifetime** hardware warranty (limits apply)
- ✓ **Quantity discount** available
- ✓ Bulk packaging available
- ✓ Academic discount to institutions
- ✓ Available now

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Termination Resistors and DB25 Pin Description

Termination and Bias Resistors

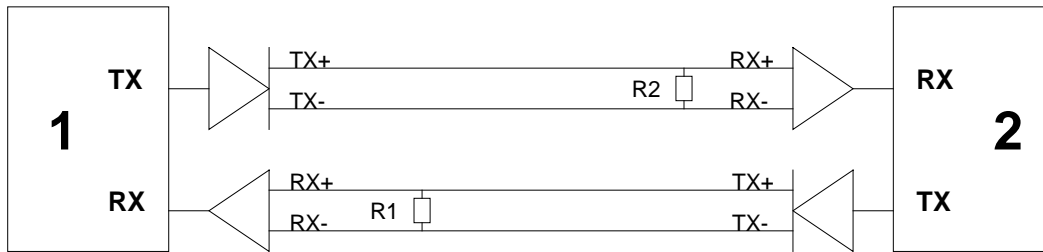
In both the RS-422 and the RS-485 mode, the receiver end of the cable between two stations must be terminated with a resistor equal to the characteristic impedance of the wire (termination resistance). This is to prevent signal reflections in the wire and to improve noise rejection. However, **you do not need to (and do not) add termination resistance to your cables when you use the Sync Com or Async Com. The termination resistor is built in.** If you are using the Sync Com in a multi-drop network, the termination resistor should be removed from all units except the first and last (see the RS-485 illustration).

The **bias resistors** on the Sync Com and Async Com are designed to hold a differential receiver in a known state (preventing oscillation) when nothing is connected to it. Bias resistors do not need to be changed or removed even in a multi-drop network.

Note: Single ended RS-232 interfaces do not require termination or bias resistors.

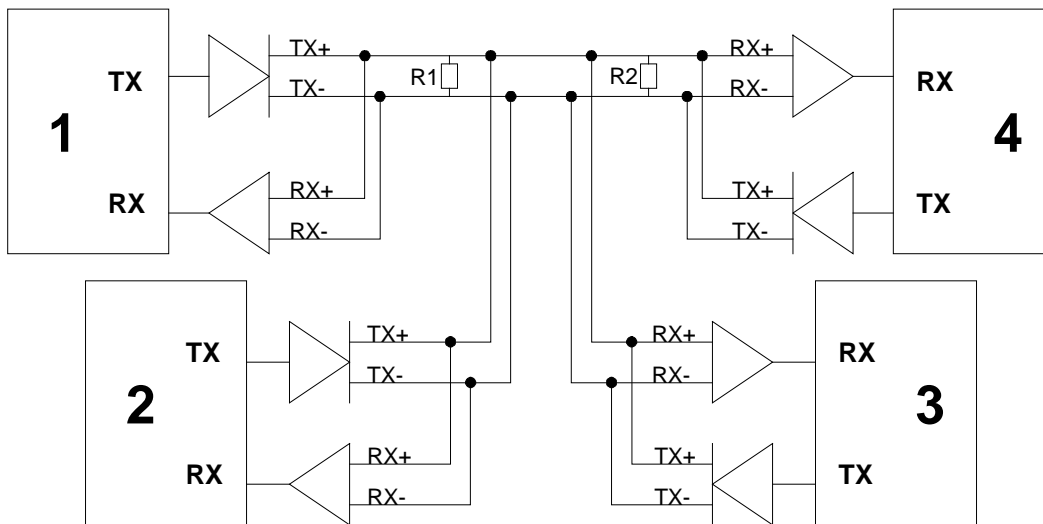
Note: The bias resistors are not shown.

Typical RS-422 Installation



R1 & R2 - Line Termination (100 ohms)

Typical RS-485 Installation

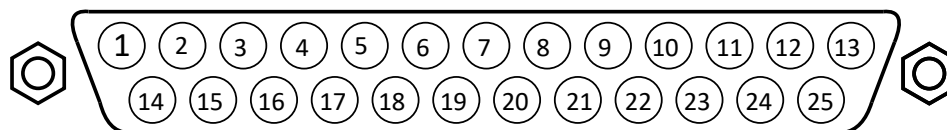


R1 & R2 - Line Termination (100 ohms)

Sync Com RS-422/RS-485 & Sync Com LVDS DB25 Pinout

The DB 25 connector on both the Sync Com RS-422/RS-485 and the Sync Com LVDS use the same pinout design – but not the same termination design.

Connector viewed from the front.

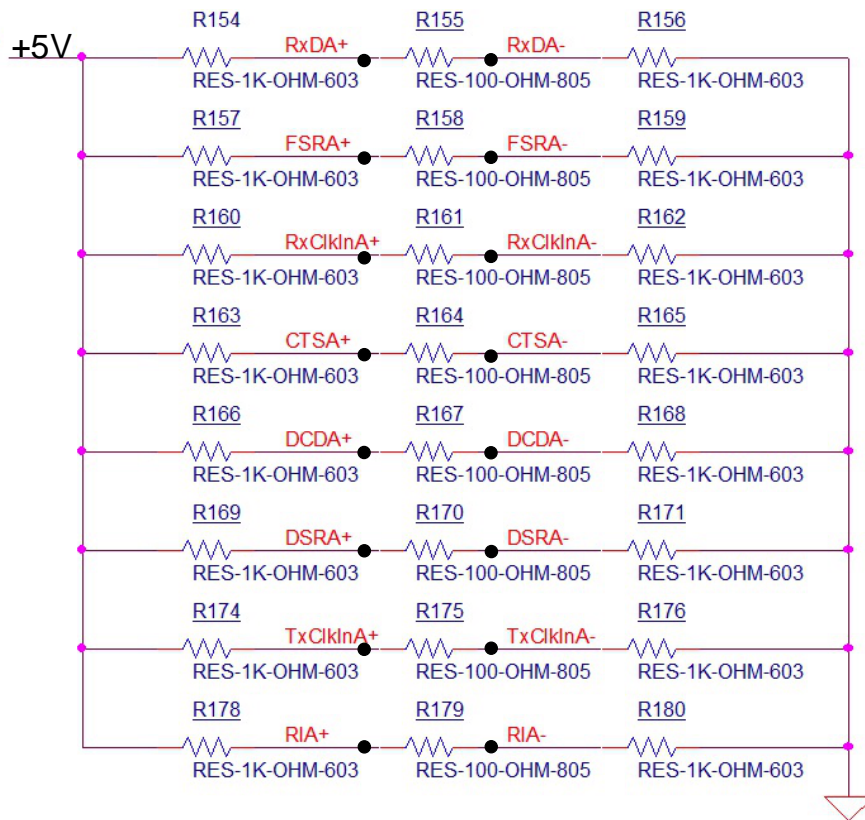


1	Ground	
2	Tx Clock Out -	14 Tx Clock Out +
3	Tx Data -	15 Tx Data +
4	Tx Clock In -	16 Tx Clock In +
5	RTS -	17 RTS +
6	FST/DTR -	18 FST/DTR +
7	DCD -	19 DCD +
8	RI -	20 RI +
9	CTS -	21 CTS +
10	DSR-	22 DSR +
11	FSR -	23 FSR +
12	Rx Data -	24 Rx Data +
13	Rx Clock In -	25 Rx Clock In +

FSR - Frame sync receive
FST - Frame sync transmit

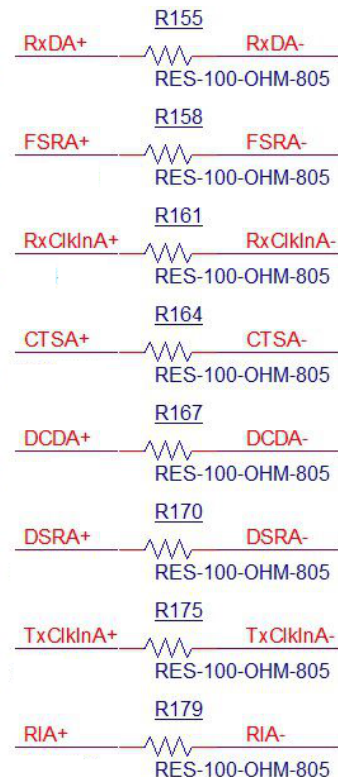
Sync Com RS-422/RS-485 Line Termination

Note: 1KΩ bias resistors are used, 100Ω line termination resistors are used



Sync Com LVDS Line Termination

Note: Unlike RS-422/485 system, bias resistors are not used for LVDS line termination. LVDS systems use 100Ω line termination only.

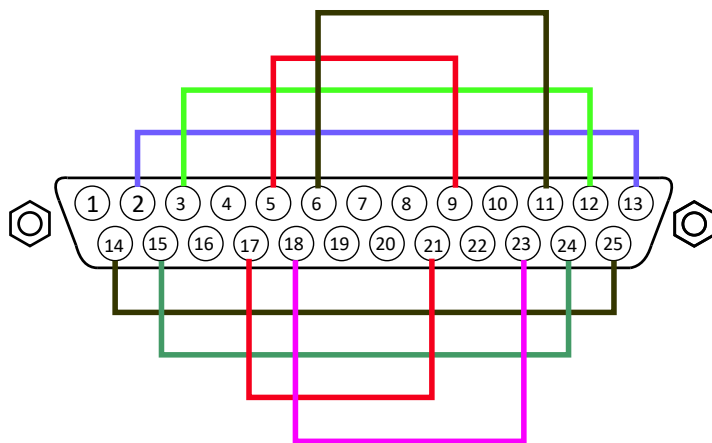




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Sync Com RS-422/RS-485 & Sync Com LVDS Loopback Diagram

The RS-422/RS-485 and LVDS loopbacks are the same.
Connector viewed from the back.



RS-422, RS-485, LVDS Loopback Connections

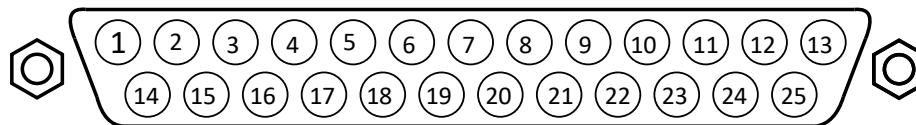
The loopback plug must be used with test program. Not all signals are tested. Program source code is on the jump drive.

Signal	Pin #	Connect to	Pin #	Signal
TXCKO+	14	-----	25	RXCKI+
TXCKO-	2	-----	13	RXCKI-
TXD+	15	-----	24	RXD+
TXD-	3	-----	12	RXD-
RTS+	17	-----	21	CTS+
RTS-	5	-----	9	CTS-
FST+	18	-----	23	FSR+
FST-	6	-----	11	FSR-

Sync Com RS-232

DB25 Pinout

Connector viewed from the front.



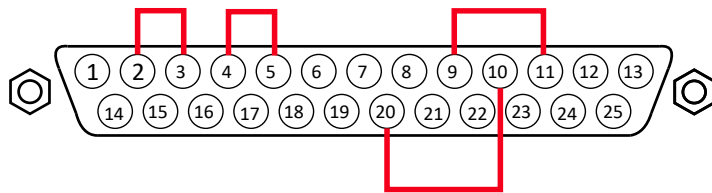
	1 Ground	
2 Tx Data		14
3 Rx Data		15
4 RTS		16
5 CTS		17
6 DSR		18
7 Ground		19
8 DCD		20 DTR / FST
9 Rx Clock In		21
10 FSR		22 RI
11 Tx Clock Out		23
12 Tx Clock In		24
13		25

FSR – Frame Sync Receive

FST – Frame Sync Transmit

Sync Com RS-232 Loopback Diagram

Connector viewed from the back.



RS-232 Loopback Connections

The loopback plug must be used with the test program. Not all signals are tested. Program source code is on the jump drive.

Signal	Pin #	Connect to	Pin #	Signal
TXD	2	-----	3	RXD
RTS	4	-----	5	CTS
FSR	10	-----	20	DTR
TXCLKO	11	-----	9	RXCLKI



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Sync Com LED Indicators



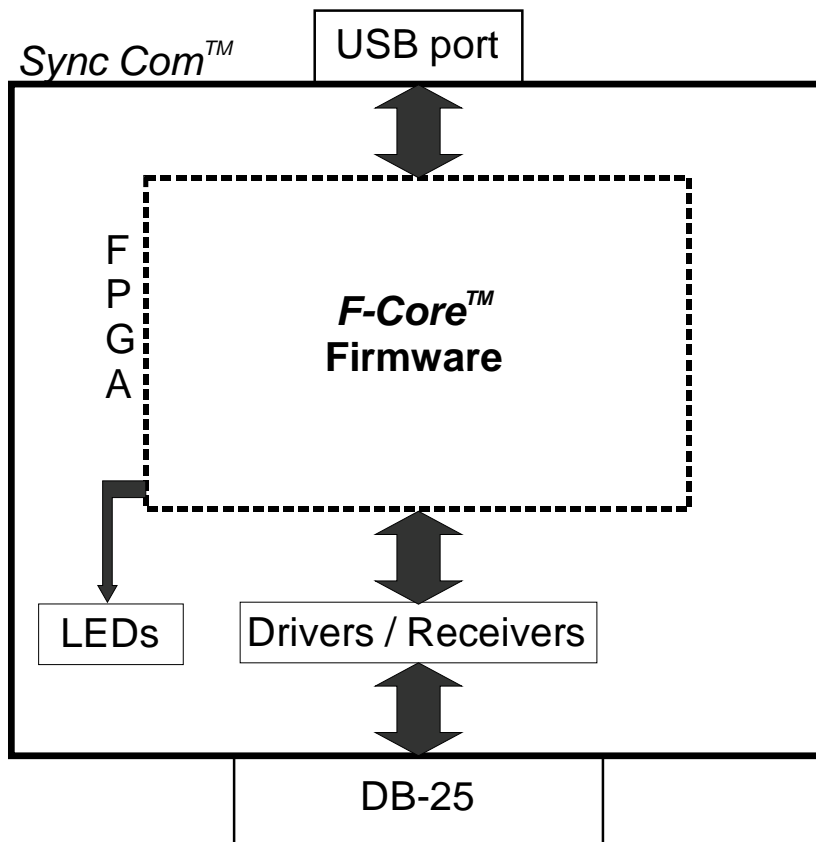
1 Power OK
USB Power OK

2 FPGA OK
FPGA is Ready

3 Rx Data
Receive Data Activity

4 Tx Data
Transmit Data Activity

Sync Com™ Flow Diagram



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COMMTECH

Parent Company
Est. 1984



FASTCOM

Communication
Boards



SYNC COM

High-Speed Data
Communication Adapter

Our Company

Commtech, Inc. has been designing and building our Fastcom® line of industrial / commercial / scientific devices in Wichita, Kansas for more than 30 years. We are an essential supplier in the C⁴ISR (Command, Control, Communications, Intelligence and Reconnaissance) supply chain and are privileged to provide communication adapters and software for use in human space flight systems. We design and build our own Fastcom® product line in Wichita and have thousands of our serial interfaces in the field. In our manufacturing process, we give domestic suppliers preference and if possible, we will always provide items of higher quality than requested by our customer.

Arthur Alvis

President

Commtech, Inc.

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www.fastcomproducts.com

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CE Letter of Conformance



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FASTCOM®
Fast Sync Serial Adapters

THE FASTCOM®: Sync Com™ FAMILY

I hereby certify that the **FASTCOM®: Sync Com™** family of serial adapters meets all of the requirements for the **CE Mark** under the **EU Directive 2014/30/EU**. An example of this family, the **FASTCOM®: Sync Com™ 422/485** has been tested by the Nebraska Center for Excellence in Electronics, Lincoln, NE and shown to meet these requirements.

This family is comprised of the following models:

FASTCOM®: Sync Com™ 422/485
FASTCOM®: Sync Com™ LVDS
FASTCOM®: Sync Com™ 232

These models share similar applications, functions, construction and components; and therefore they meet the requirements for the **CE Mark**.

Glen Alvis
Chief Engineer

Date:

3/13/18