MAP/950 Pro 1 Port Isolated RS422/ RS485 PCI Express Serial Card Technical Notes (LF664KB)

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This is a quick hardware installation sheet for the Axxon PCIe MAP/950 Pro Isolated RS422/RS485 1 Port I/O Card.

This product is capable of RS422 or RS485 communications up to 15 Mbps speed with a minor clock change.

Compatible with x1, x4, x8, x16 lane expansion slots. The LF664KB is a RoHS & Pb-free compliant product.

RS422/RS485 Contacts are 25kv ESD, thermal and short circuit protected. The transceivers applied in this model are 1/8th load devices and are the part # MAX3079EESD+ (RoHS) by Maxim Semiconductor.

In RS422 mode of operation, the Transmitter and Receiver will be ***ALWAYS ACTIVE***.

For RS422 mode of operation, switch the dip switch to RS422 position.

In RS485 mode of operation, the Transmitter will be ***AUTO-GATED*** (using the DTR line) for multi-drop applications under the Windows OS. The Receiver is ***ALWAYS ACTIVE*** in this mode. See the end of this document to cancel local echo.

For RS485 mode of operation, switch the dipswitch to the RS485 position. If using the enhanced Oxford device driver, **select RS485 Active High Mode under the serial port configuration.** This configuration will toggle the DTR line HIGH during a byte transmit and LOW otherwise. The circuit board performs this (DTR) feature automatically when using the Microsoft Serial driver.

RS485 communication mode is presently supported under Windows 9x, ME, NT4, XP (32/64), 2000, 2003, 2008, Vista 32/64, Windows 7 (32/64 bit), QNX, SCO Unix 5.07. Additional operating systems support may be available upon request.

RS422 communication mode is supported in at least Win 9x, ME, NT4, XP (32/64), 2000, 2003, 2008, Vista (32/64), Windows 7 (32/64) and Linux.

DB9 Male Pinout (Full Duplex, 4 wire mode)

For Full Duplex wiring, place the dip switch to the FD position.

S1.1 = FD (Full Duplex)
S1.4 = Left to enable Receiver to be always ON

Pin # 1 Isolated_Ground
Pin # 2 Isolated_CTS- (optional)
Pin # 3 Isolated_RTS- (optional)
Pin # 4 Isolated_RX-
Pin # 5 Isolated_RTS+ (optional)
Pin # 6 Isolated_CTS+(optional)
Pin # 7 Isolated_TX+
Pin # 8 Isolated_TX-
Pin # 9 Isolated_RX+

This adapter is an ISOLATED port design. Respectively DO NOT make use of the DSUB SHELL ground. Use only Pin # 1 (Isolated_Ground) for your external interfacing.

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The use of the balanced hardware flow control lines is optional. If the h/w flow control lines are not required, configure as follows:

J2 (CTS0) = Middle and BOTTOM pins shorted to **DISABLE** flow control on P1 &
do not use pin 3 (Isolated_RTS-) on the DB9M connector
do not use pin 5 (Isolated_RTS+) on the DB9M connector
do not use pin 6 (Isolated_CTS+) on the DB9M connector
do not use pin 2 (Isolated_CTS-) on the DB9M connector

To **ENABLE** hardware flow control:

J2 (CTS0) = Middle and TOP pins shorted to **ENABLE** flow control on P1.
Connect Isolated_RTS+, Isolated_RTS- and Isolated_CTS+, Isolated_CTS- to your remote device.

That is,

Isolated_CTS+ on LF664KB -> RTS+ on remote device
Isolated_CTS- on LF664KB -> RTS- on remote device
Isolated_RTS+ on LF664KB -> CTS+ on remote device
Isolated_RTS- on LF664KB -> CTS- on remote device

DB9 Male Pinout (Half Duplex, 2 wire mode)

For Half Duplex wiring, place the dipswitch to the HD position.

S1.1 = HD to configure P1 connector as Half Duplex

For Local-Echo ON → S1.4 = Left & S1.3 = Right
For Local-Echo OFF → S1.4 = Right & S1.3 = Left

Pin # 1 Isolated_Ground
Pin # 2 Isolated_CTS- (optional)
Pin # 3 Isolated_RTS- (optional)
Pin # 5 Isolated_RTS+ (optional)
Pin # 6 Isolated_CTS+(optional)
Pin # 7 Isolated_TX+ / Isolated_RX+
Pin # 8 Isolated_TX- / Isolated_RX-

The use of the balanced hardware flow control lines is optional. If the h/w flow control lines are not required, configure as follows:

J2 (CTS0) = Middle and BOTTOM pins shorted to **DISABLE** flow control on P1 and
do not use pin 3 (Isolated_RTS-) on the DB9M connector
do not use pin 5 (Isolated_RTS+) on the DB9M connector
do not use pin 6 (Isolated_CTS+) on the DB9M connector
do not use pin 2 (Isolated_CTS-) on the DB9M connector

OR

J2 (CTS0) = Middle and TOP pins shorted to **ENABLE** flow control on P1.
Connect RTS+,RTS- and CTS+,CTS- to your remote device.

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Connect RTS+,RTS- and CTS+,CTS- to your remote device (see above pin mapping)

Slew Rate Control (J1): (Default is OPEN).

J1 will configure the slew rate for the interface on connector P1 (bottom DB9M).

Open: Maximum Baud Rate 115.2k (Default)
Short (center peg) to 500k for Maximum Baud Rate 500k operation Slew Rate
Short (center peg) to 10M for Maximum Baud Rate 15M operation Slew Rate

This circuit board offers the option for 2 methods of termination for the Transmitter, Receiver, CTS and RTS lines.

Method # 1 – Use **onboard manufacturer provided termination resistors** + Dip Switch S2

S2_Switch 4: Off = No termination, ON = Terminate TX lines with onboard 120 ohm resistor (Port P1)
S2_Switch 3: Off = No termination, ON = Terminate RTS lines with onboard 120 ohm resistor (Port P1)

S2_Switch 2: Off = No termination, ON = Terminate CTS lines with onboard 120 ohm resistor (Port P1)
S2_Switch 1: Off = No termination, ON = Terminate RX lines with onboard 120 ohm resistor (Port P1)

Method # 2 – DO NOT use the Dip Switch S2 = Leave OFF. This method allows for **user provided termination** values.

R44 = User provided termination resistor for TX (through hole ¼ watt or higher) (Port P1)
R43 = User provided termination resistor for RX (through hole ¼ watt or higher) (Port P1)

Note: This circuit board is a RoHS & Pb-free assembly. It is important that ONLY RoHS & Pb-free solder be applied for such user provided termination resistors.

Common Configuration Example # 1

4 wire RS422 mode for P1

S1.1 = FD (Left) (ON)
S1.2 = 422 (Right) (OFF)
S1.3 = Echo ON (Right) (OFF)
S1.4 = Left (ON)

Apply termination if at the end or start of the network as follows:

S2_Switch 4: Off = No termination, ON = Terminate TX lines with onboard 120 ohm resistor (Port P1)
S2_Switch 3: Off = No termination, ON = Terminate RTS lines with onboard 120 ohm resistor (Port P1)

Common Configuration Example # 2

4 wire RS485 mode for P1 with Local Echo OFF

S1.1 = FD (Left) (ON)
S1.2 = 485 (Left) (ON)
S1.3 = Echo OFF (Left) (ON)
S1.4 = Right (OFF)

Apply termination if at the end or start of the network as follows:

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S2_Switch 4: Off = No termination, ON = Terminate TX lines with onboard 120 ohm resistor (Port P1)
S2_Switch 3: Off = No termination, ON = Terminate RTS lines with onboard 120 ohm resistor (Port P1)

4 wire RS485 mode for P1 with Local Echo ON

S1.1 = FD (Left) (ON)
S1.2 = 485 (Left) (ON)
S1.3 = Echo ON (Right) (OFF)
S1.4 = Left (ON)

Apply termination if at the end or start of the network as follows:

S2_Switch 4: Off = No termination, ON = Terminate TX lines with onboard 120 ohm resistor (Port P1)
S2_Switch 3: Off = No termination, ON = Terminate RTS lines with onboard 120 ohm resistor (Port P1)

Notes on RS485 mode software configuration

In RS485 mode of operation, the Transmitter will be ***AUTO-GATED*** (using the DTR line) for multi-drop applications. The Receiver can be switch configured to either **ENABLE or DISABLE** the Local Echo.

For RS485 mode of operation, set the dipswitch to the RS485 position. **You must also select RS485 Active-High Mode under the serial port configuration.** This configuration will toggle the DTR line HIGH during a byte transmit and LOW otherwise.

Fail-Safe Biasing

Varying with your installation, external resistors may be required for fail-safe biasing of other devices in your communication wiring. That is, to ensure an IDLE state during the absence of all transmitters in the RS485 interface, external pull up resistor for the TX+/RX+ and an external pull down resistor for the TX-/RX- connection. Note: The receivers used in the LF664KB design are internally fail-safe but other non-Axxon designs may not offer this feature. Without a fail-safe biasing the receiver may pick up stray noise as a start bit causing data corruption.

The values for these resistors are based on the total load of the RS485 network. A common tested value is 330 ohms for both the pull up and pull down leads. This value assumes that termination will be used, otherwise 4.7K is another choice. **Axxon uses 4.7k to fail-safe bias the externally connected devices, so termination should NOT be used**. You may use your own values as an option as noted.

Switch S3 permits selection between Axxon or user provided fail-safe resistors.

S3 is for the fail-safe biasing configuration of connector P1

S3_Switch 1: Off = No fail-safe resistor on RX+ OR User provided fail-safe resistor using R59 (Pull-Up)
S3_Switch 1: ON = 4.7k Fail-safe resistor on RX+ (**User provided ROHS resistor at R59 should not be installed**)

S3_Switch 2: Off = No fail-safe resistor on TX- OR User provided fail-safe resistor using R57 (Pull-Down)
S3_Switch 2: ON = 4.7k Fail-safe resistor on TX- (**User provided ROHS resistor at R57 should not be installed**)

S3_Switch 3: Off = No fail-safe resistor on RX- OR User provided fail-safe resistor using R58 (Pull-Down)
S3_Switch 3: ON = 4.7k Fail-safe resistor on RX- (**User provided ROHS resistor at R58 should not be installed**)

S3_Switch 4: Off = No fail-safe resistor on TX+ OR User provided fail-safe resistor using R56 (Pull-Up)
S3_Switch 4: ON = 4.7k Fail-safe resistor on TX+ (**User provided ROHS resistor at R56 should not be installed**)
Note: This circuit board is a RoHS & Pb-free assembly. It is important that ONLY RoHS & Pb-free solder be applied for such user provided fail-safe biasing resistors.

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R59 = User provided Pull Up resistor for RX+ (through hole ¼ watt or higher) (Port P1)
R57 = User provided Pull Down resistor for TX- (through hole ¼ watt or higher) (Port P1)
R58 = User provided Pull Down resistor for RX- (through hole ¼ watt or higher) (Port P1)
R56 = User provided Pull Up resistor for TX+ (through hole ¼ watt or higher) (Port P1)

Galvanic Isolation

The default version of the LF664KB adapter features a 2500 Vrms galvanic isolated single RS422/RS485 port. This advanced hardware design consists of superior isolation methods and an onboard isolated DC-DC convertor.

The default model offers:

Isolated DC-DC Convertor @ 3000 Vrms
Isolated logic design @ 2500 Vrms

As an option, you may order:

Isolated DC-DC Convertor @ 6000 Vrms (or higher)
Isolated logic design @ 5000 Vrms

Please contact your local reseller and/or Axxon for additional details for this upgrade.

Hardware Method to Cancel Local Echo

The decision to cancel or enable Local Echo may vary with your application. With Local Echo ON, the serial port will have the RECEIVER always ENABLED providing for a “local echo” of all transmitted data if configured for half-duplex (2 wire) mode. With Local Echo OFF, the local receiver will automatically DISABLE when the local transmitter is ENABLED and remain ENABLED otherwise

To ENABLE Local Echo on connector P1

S1.3 = Echo ON (Right) (OFF)
S1.4 = Left (ON)

To cancel Local Echo on connector P1

S1.3 = Echo OFF (Left) (ON)
S1.4 = Right (OFF)

Recommended Reference documents:

MAX3079EESD+ datasheet:
http://pdfserv.maxim-ic.com/en/ds/MAX3070E-MAX3079E.pdf

Questions? Please contact us via email: softio@softio.com or phone: 1-800-361-1913 to speak with our Tech Support staff from 10 AM to 6 PM (EST).

Disclaimer

This adaptercard is not for use in life support nor mission-critical applications.

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LF664KB Device Driver Configuration Guide

The LF664KB is a very flexible design allowing for assorted permutation of installation methods for Windows, Linux, SCO Unix, DOS and QNX operating systems. Linux support requires the application of a firmware update to the adapter.

For Windows, there are 3 basic choices for the device driver mappings to support this adapter.

Windows Driver - Option # 1

The latest Windows compatible device driver package at the listed URL. This is a DTM tested and Microsoft signed driver set which is able to make use of the enhanced features of the Oxford 16C950 UART model.

http://www.softio.com/drivers/final-pkg-2011-01-18.zip ***; Links are case-sensitive***

- Support for RS422 or RS485 interface
- case sensitive URL – type exactly as shown
- For RS485 interface, please configure the dip switches to suit the RS485 interface
- For use with XP → Windows 7 (32/64 bit) operating systems (DTM tested and Microsoft signed release)

Download -> unzip to a temp folder on your system (ie. C:\axxon). Boot your system to allow for a Plug & Play detection of the adapter card and for each request for a device driver please point to the temp folder (ie. C:\axxon). Most of Axxon's designs consist of multi-functions and likewise you will be prompted for the device driver for each and every function. This release of the device driver is suitable for up to Windows 7 (32/64 bit), Windows 2008, Vista (32/64 bit), Windows XP 32/64, Windows 2003, Windows 2000. Current operating systems will Plug & Play detect our product line and prompt for a device driver.

Windows Driver - Option # 2

The default clock source used in this product is **1.8432 Mhz**. As an option you may install the default Windows Microsoft serial driver. The use of the Microsoft serial driver is possible for RS422 or RS485 interfaces.

To install the Microsoft Serial driver, please download and apply the following installation file from our website:

http://www.softio.com/ic0560kb/MSPORTS.INF

- Support for RS422 or RS485 interface
- case sensitive URL – type exactly as shown
- For RS485 interface, please configure the dipswitches to suit the RS485 interface
- This is an unsigned INF file and is for use with XP and higher operating systems (not 64 bit drivers that require signed INF files and signed driver packages)

Windows Driver - Option # 3

As a third option, it is possible to support the mapping of the Microsoft coded, Microsoft Windows supplied serial port driver with the LF664KB adapter and Windows 7 (32/64 bit). For this method of installation a simple adapter firmware is required along with the use of a signed INF file package. The signed INF package will instruct the operating system to map the Windows OS supplied serial port driver to the Axxon LF664KB adapter. Please contact us if this option is of interest.

Your questions are welcomed.

Our support staff may be reached via phone or email: support@softio.com

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