

MAP/950 Pro 1 Port Isolated RS422/ RS485 PCI Serial Card Technical Notes (Model #IC0613KB)

Revision 0.6

The IC0613KB model is a Single Channel Galvanic Isolated 422/RS485 I/O Adapter for use in the 5 volt PCI bus. This model includes provision for fail-safe biasing of external transmitter / receivers with user or factory installed resistors. This model also offers internally fail-safe receiver biasing. This design is based on a 1/8th load RS422/RS485 transceiver.

This is a quick installation sheet for the Axxon IC0613KB PCI I/O Card.

This product is capable of RS422 or RS485 communications up to 10 Mbps speed and is for use in a 5 volt PCI expansion slot only. State of the art galvanic isolation is provided without compromising the communication speeds.

Device Driver Software Configuration

The "Auto Detect Crystal" flag must be enabled for proper operation OR match the clock value for oscillator placed at E3. Axxon supplies customers with clock values of 1.8432 Mhz, 14.7456 Mhz and custom. It is important to review the value of this clock oscillator.

IMPORTANT

The Windows device driver will install 2 new serial ports into your system. This is due to this design containing a 2 UART (port) controller. Please use only the lower numbered COM port as the higher numbered COM port is not electrically connected.

After the installation of the Windows device driver, it is important to enter the

Device Manager -> COM Ports -> Select the lower numbered COM port created by this adapter -> Select DATA RATE tab -> without an application running that makes use of the COM port select the "DETECT CRYSTAL" checkbox.

This MUST return with a "Working..." for a few seconds and then a value of 14.7456 or 1.8432 varying with the stuffed oscillator value on the circuit board. The detected value is recorded into the registry and this procedure is only required for a first time installation.

Electrical Interface

RS422 Configuration

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

For RS422 mode of operation:

- S1.4 (Switch Bank S1, 4th switch) = ON (Left)
- S1.3 (Switch Bank S1, 3rd switch) = OFF (Right)
- S1.2 (Switch Bank S1, 2nd switch) = OFF (Right) = RS422 Mode
- S1.1 (Switch Bank S1, 1st switch) = ON (Left) = Full Duplex

RS422 communication mode is supported in at least Win 9x, ME, NT, XP, 2000, 2003 and Linux.

RS485 Configuration

In RS485 mode of operation, the Transmitter will be **AUTO-GATED** (using the DTR line) for multi-drop applications under the Windows OS. By default, the Receiver is **ACTIVE** in this mode.

For RS485 mode 4-wire (Full Duplex) mode of operation (with LOCAL ECHO ON):

S1.4 (Switch Bank S1, 4th switch) = ON (Left)
S1.3 (Switch Bank S1, 3rd switch) = OFF (Right)
S1.2 (Switch Bank S1, 2nd switch) = ON (Left) = RS485 Mode
S1.1 (Switch Bank S1, 1st switch) = ON (Left) = Full Duplex

You must also select RS485 Active High DTR Mode under the serial port configuration in the device driver.

For RS485 mode 2-wire (Half Duplex) mode of operation (with LOCAL ECHO ON):

S1.4 (Switch Bank S1, 4th switch) = ON (Left)
S1.3 (Switch Bank S1, 3rd switch) = OFF (Right)
S1.2 (Switch Bank S1, 2nd switch) = ON (Left) = RS485 Mode
S1.1 (Switch Bank S1, 1st switch) = OFF (Right) = Half Duplex

You must also select RS485 Active High DTR Mode under the serial port configuration in the device driver.

For RS485 mode 4-wire (Full Duplex) mode of operation (with LOCAL ECHO OFF):

S1.4 (Switch Bank S1, 4th switch) = OFF (Right)
S1.3 (Switch Bank S1, 3rd switch) = ON (Left)
S1.2 (Switch Bank S1, 2nd switch) = ON (Left) = RS485 Mode
S1.1 (Switch Bank S1, 1st switch) = ON (Left) = Full Duplex

You must also select RS485 Active High DTR Mode under the serial port configuration in the device driver.

For RS485 mode 2-wire (Half Duplex) mode of operation (with LOCAL ECHO OFF):

S1.4 (Switch Bank S1, 4th switch) = OFF (Right)
S1.3 (Switch Bank S1, 3rd switch) = ON (Left)
S1.2 (Switch Bank S1, 2nd switch) = ON (Left) = RS485 Mode
S1.1 (Switch Bank S1, 1st switch) = OFF (Right) = Half Duplex

You must also select RS485 Active High DTR Mode under the serial port configuration in the device driver.

For RS485 mode of operation, switch 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. Under WinNT and/or Linux, this configuration is automatically made within the device driver.

RS485 communication mode is presently supported under Windows 9x, ME, NT, XP, 2000 and 2003. Additional operating systems support may be available upon request. *Please contact Axxon for a WinNT device driver for RS485 operation. Assistance is also available for RS485 support under the Linux operating system using the 2.4 kernel.*

DB9 (P1) Male Pinout (Full Duplex, 4 wire mode)

For Full Duplex wiring, place the dipswitch S1.1 to the FD position.

Pin # 1 Isolated_Ground
Pin # 9 Isolated_RX- = RXB
Pin # 4 Isolated_TX+ = TXA
Pin # 5 Isolated_TX- = TXB
Pin # 8 Isolated_RX+ = RXA

DB9 (P1) Male Pinout (Half Duplex, 2 wire mode)

For Half Duplex wiring, place the dipswitch S1.1 to the HD position.

Pin # 1 Isolated_Ground
Pin # 4 Isolated_TX+ / Isolated_RX+ = D+ (Data +)
Pin # 5 Isolated_TX- / Isolated_RX- = D- (Data -)

(Switch S2.2) RXP: RX phase polarity. (Default is OPEN, Right side). If closed (Left side), pin out will change to reversed polarity:

Pin # 9 Isolated_RX+
Pin # 8 Isolated_RX-

(Switch S2.3) TXP: TX phase polarity. (Default is OPEN, Right side). If closed (Left side), pin out will change to reversed polarity:

Pin # 4 Isolated_TX-
Pin # 5 Isolated_TX+

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

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 10M operation Slew Rate

For communication speeds > 1 Mbaud, the device U1 must be removed. Contact Axxon for additional details.

RS422/RS485 Contacts are 15kv ESD and short circuit, current protected. The receiver is fail-safe biased.

This circuit board offers the option for 2 methods of termination for both the Transmitter and Receiver.

Method # 1 – Use **onboard 120 ohm termination resistors** (included via R6 & R7) + Dip Switch S2

S2.4 (Switch Bank S2, 4th switch): Off = No termination, ON = Terminate TX lines with onboard 120 ohm resistor (Port P1)
S2.1 (Switch Bank S2, 1st switch): 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.

R4 = User provided termination resistor for TX (through hole ¼ watt or higher) (Port P1)
R3 = User provided termination resistor for RX (through hole ¼ watt or higher) (Port P1)

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 IC0613KB design are internally fail-safe but other non-Axxon designs may not offer this feature.

The values for these resistors is 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_Switch 1: Off = No fail-safe resistor on RX+ OR User provided fail-safe resistor using R11 (Pull-Up)

S3_Switch 1: ON = 4.7k Fail-safe resistor on RX+ (**User provided fail-safe resistor at R11 should not be installed**)

S3_Switch 2: Off = No fail-safe resistor on TX- OR User provided fail-safe resistor using R9 (Pull-Down)

S3_Switch 2: ON = 4.7k Fail-safe resistor on TX- (**User provided fail-safe resistor at R9 should not be installed**)

S3_Switch 3: Off = No fail-safe resistor on RX- OR User provided fail-safe resistor using R10 (Pull-Down)

S3_Switch 3: ON = 4.7k Fail-safe resistor on RX- (**User provided fail-safe resistor at R10 should not be installed**)

S3_Switch 4: Off = No fail-safe resistor on TX+ OR User provided fail-safe resistor using R8 (Pull-Up)

S3_Switch 4: ON = 4.7k Fail-safe resistor on TX+ (**User provided fail-safe resistor at R8 should not be installed**)

R8 = User provided Pull Up resistor for TX+ (through hole ¼ watt or higher) (Port P1)

R9 = User provided Pull Down resistor for TX- (through hole ¼ watt or higher) (Port P1)

R11 = User provided Pull Up resistor for RX+ (through hole ¼ watt or higher) (Port P1)

R10 = User provided Pull Down resistor for RX- (through hole ¼ watt or higher) (Port P1)

How to Cancel Local Echo for RS485

To ENABLE the Local Echo, place Switch 1.3 to the RIGHT (OFF) & Switch 1.4 to the LEFT (ON)

To CANCEL (DISABLE) the Local Echo, place Switch 1.3 to the LEFT (ON) & Switch 1.4 to the RIGHT (OFF)

Questions? Please contact us via email: support@softio.com or phone: 1-800-361-1913 (US/Canada) to speak with our Tech Support staff from 10 AM to 6 PM (M-F)(EST) or 10 AM to 4 PM (Saturday)(EST).