

ADAM-4540

RS-232 to Fiber Optic Converter

Introduction

The ADAM-4540 performs an interface conversion between full-duplex RS-232 signals and the equivalent in fiber optics. For applications where the transmission medium must be protected from electrical exposure, lightning, atmospheric conditions or chemical corrosion, fiber optics are the perfect solution. The ADAM-4540 is specifically designed to link various kinds of equipment, computer systems, manufacturing machines, etc., provided they have a RS-232 communication port. The fiber optic ports use standard ST connectors, and the module's flexible design accommodates different sizes of fiber optic cables, including 50/125 mM, 62.5/125 mM, and 100/140 mM. With ADAM-4540, you can easily connect your device to another device or system at a distance of up to 2 km.

Features

- Compact size economizes space
- Direct plug-and-play
- No external power supply required
- Transmission speeds of up to 115.2 Kbps
- Multi-mode optical fibers allow transmission distances in excess of 10 km
- Full-duplex, bidirectional transmission mode
- Avoids lightning strikes and EMI/RFI interference
- Prevents damage from electrostatic discharge
- Stable and error free data transmission
- High-security data protection
- Mounts easily on a DIN-rail or panel

Specifications

- **Casing:** ABS with captive mounting hardware
- **Signal:** EIA RS-232C STD & CCITT V.24 V.28
- **Communication mode:** Asynchronous
- **Fiber optics:** Multi-mode
- **Connector:** Female DB-9
- **Fiber port:** ST/SMA (optional)
- **Transmission distance:** Over 2 km
- **Wavelength:** 850 $\pm$ 20 nm
- **Optical power budget (attenuation):** 10 dB (measured with 62.5/125 mM optical fiber)
- **Transmission mode:** Full-duplex, bidirectional
- **Bit error rate:** 10⁻⁹
- **Transmission rate:** DC~115, 200 BPS³
- **Included accessories:** Nylon DIN-rail mount, SECC panel mounting bracket
- **Operating temperature:** 0 - 50°C
- **Operating humidity:** 20 - 95% (non-condensing)
- **Storage temperature:** -20 - 80°C
- **Storage humidity:** 0 - 95% (non-condensing)

Note: Multi-mode fiber optics are designed for industrial applications. 50/125 mM, 62.5/125 mM, and 100/140 mM are commonly used.

Installation

Initial Inspection

We carefully inspect the ADAM-4540 both mechanically and electrically before we ship it. It should be free of marks and scratches and in perfect order on receipt.

As you unpack the module, check it for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or fails to meet our specifications, notify our service department or your local sales representative immediately. Also, call the carrier immediately and retain the shipping carton and packing material for inspection by the carrier. We will then make arrangements to repair or replace the unit.

Before you begin installation, please make sure you have the following items:

- 1 ADAM-4540 module
- 1 Mounting bracket
- 1 User manual

Hardware Setup

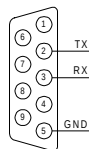
The following steps explain how to install the module:

1. Unpack the ADAM-4540 module.
2. Plug a module into the RS-232 port of each terminal to be linked.
3. Tighten the screw to secure the connection.
4. Plug the wire jumper (optical fiber with a connector on each side) into the receptacle of the transceiver pair.
5. Fasten the connectors.
6. Run the example program to test connections.

Wiring

Pin Assignment

DB-9 connector

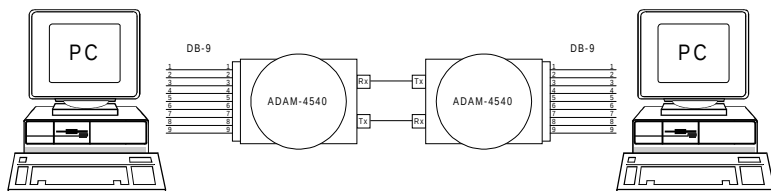


Pins 4 and 6 short together. Pins 5 and 9 short together. Pins 1, 7, and 8 short together.

Optical connector



Block Diagram



Example Program

This program can be used as a diagnostic test for the ADAM-4540. It will transmit a string to COM1 and then receive a string from COM1 (a loop-back test).

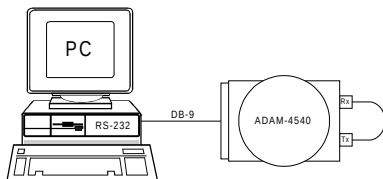
Program: LOOPBACK.C

```
#include <dos.h>
#include <io.h>
#include <stdio.h>
#include <conio.h>
#define TIME_OUT 4000
static int base0=0x3f8;
static int base1=0x2f8;
static char rec[160];
static char cmd[160];
void main ()
{
    int i, timeout;
    char rflag, tflag;
    bioscom(0, 0xE3, 0); /* Set COM1 as follows: Baud Rate=9600, Data Bits=8, */
    printf("\nInput string : "); /* Parity=None, Stop Bits=1 */
    gets(cmd);
    while (cmd[0] != 'q' && cmd[0] != 'Q')
    {
        cmd[strlen(cmd)] = 0x0d;
        i=0;
        tflag=1;
        while (tflag)
        {
            /* Send data */
            outportb (base0, cmd[i]);
            while ((inportb(base0+5) & 32) != 32);

            rflag=1;
            timeout=TIME_OUT;
            while (rflag)
            {
                /* Check received data */
                if ((inportb(base0+5) & 1) != 0)
                {
                    /* Receive data */
                    rec[i]=inportb(base0);
                    if (rec[i] == 0x0d)
                    {
                        rec[i+1]='\0';
                        printf("\nReceived data : %s\n", rec);
                        tflag=0;
                    }
                }
                rflag=0;
            }
            else
            {
                /* Check timeout */
                timeout--;
                if (timeout == 0)
                {
                    printf("Timeout error");
                    rec[i+1]='\0';
                    rflag=0;
                    tflag=0;
                }
            }
        }
        i++;
    }
    printf("\nInput command : ");
    gets(cmd);
}
```

Signal Wiring

When you run the example program, you must connect the ADAM-4540's terminals as follows:



Possible reasons for malfunction

- ⚠ The TX and RX connections are reversed.

Solution: Make sure the fiber connection is made so that the TX of one end is connected to the RX of the other.

- ⚠ Poor connection between the ADAM-4540 and the communication port.

Solution: Make sure the ADAM-4540 is securely plugged into the communication port.

- ⚠ Attenuation on the fiber causes the signal level to drop below the accepted level.

Solution: Reduce the attenuation by reducing connector loss, transmission distances, etc.

- ⚠ The connection between the communication ports is neither DTE to DTE nor DCE to DCE but is a DTE to DCE connection.

Solution: Add a converter to one of the optical modems so the pin assignments from the communication port to the modem are pin 2 to pin 3 and from pin 3 to pin 2.

- ⚠ The fiber has been damaged.

Solution: Repair or replace the fiber.

- ⚠ The ADAM-4540 has been damaged.

Solution: Use the provided software to perform a loop-back test of the optical modem to determine if it has really been damaged.