Introduction

The MCC IP-201 is a four channel I²C Bus Multiplexer Board that provides an easy way to connect multiple I²C Buses to a common I²C Bus port. The IP-201 lets you connect to multiple I²C based products from a common I²C Bus port while avoiding I²C Bus Address conflicts.

This user’s guide describes the setup and operation of the IP-201 I²C Bus Multiplexer Board.

Are you new to I²C? Want to know more? We suggest you review “What is I²C?” at www.mcc-us.com/I2CBusTechnicalOverview.pdf.

MCC products use Philips components and are licensed to use the I²C Bus.

“Purchase of Philips I²C components conveys a license under the Philips’ I²C patent to use the components of the I²C system, provided the system conforms to the I²C specifications defined by Philips.”

I²C is a trademark of Philips Corporation.

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# Table of Contents

Overall .................................................................................................................. 1

Key Features ............................................................................................................ 1

Packing Slip ............................................................................................................. 2

Interconnects ............................................................................................................ 2

1.  +5VDC Power ..................................................................................................... 2

2.  I²C Interface Connectors ..................................................................................... 3

3. Setting the IP-201 I²C Slave Address ................................................................. 3

5. Selecting an I²C Bus Port .................................................................................. 4

7. IP-201 Revision Report ....................................................................................... 6

8. Additional Information ....................................................................................... 6

Appendix A - I²C Connector Information ............................................................... 7

Appendix B - I²C Cable Information ..................................................................... 7
Overview

The IP-201 is a four channel I²C Bus Multiplexer Board that provides an easy way to connect multiple I²C Buses to a common I²C Bus port. The IP-201 lets you connect to multiple I²C based products from a common I²C Bus port while avoiding I²C Bus Address conflicts.

Key Features

- Connect a Common I²C Port to one of four (4) separate I²C Buses.
- Able to disconnect from ALL attached Buses.
- LED indicators show selected Bus.
- Bus selection controlled directly over the I²C Bus. No extra Hardware required.
- Jumper selectable Pull-up Voltage (3.3V or 5V) *(New for Rev. 2)*
- Jumper selectable I²C Slave Address (40...4E).
- Use multiple IP-201 Multiplexers for up to 32 I²C Buses.
- Based on the MCC’s iPack Stackable Board Format.
- Supports Stacked or Remote board configurations.
Packing Slip

The IP-201 I²C Multiplexer package includes the following items:

- The IP-201 I²C Multiplexer Board.
- I²C Interface Cable.
- User’s Guide (This document).

Interconnects

The IP-201 I²C Multiplexer Board includes the following interconnections:

1. +5VDC Power

The IP-201 I²C Multiplexer Board can be powered in one of three ways:

- From the +5V pin in any I²C interface connector (PCOM, P0, P1, P2, P3).
- From the +5V pin in the iPack stacking connector (J1).
- From the power jack (J3).

If the unit is powered from the power jack (J3), a +5VDC Power Supply (MCC Part# MWT-5VAG) is required. Excess power is available in the +5V pin of the I²C interface connectors.
2. I²C Interface Connectors

The IP-201 I²C Multiplexer Board includes two common (PCOM and J1) and four selectable (P0, P1, P2, P3) connectors for interfacing to external I²C Buses. Pins in these connectors include:

- I²C Clock (SCL = White)
- I²C Data (SDA = Green)
- Ground (Black)
- +5VDC (Red) (Optional)

An I²C Interface Cable is provided to connect to an external I²C Bus master device. Additional I²C Bus interface cables are available (See Appendix B).

3. Setting the IP-201 I²C Slave Address

The IP-201 Multiplexer Board includes an onboard Multiplexer Controller device with a selectable I²C Slave Address. Onboard jumpers are provided that allow the Multiplexer Controller device to be assigned to one of eight possible I²C slave addresses. To avoid addressing conflicts, the address selected slave address for the Multiplexer Controller device should not be the same as any I²C device on any connected of the I²C bus.

The IP-201 I²C Slave Address is controlled by positioning jumper blocks on header connector ADDR on the board as follows:
4. Selecting the IP-201 Pull-Up Voltage

The IP-201 Multiplexer Board provides low current (15K ohm) pull-up resistors on all I2C Interface connectors. These pull-up resistors maintain signal integrity when an I2C Interface connector is not connected to external pull-ups.

The IP-201 Multiplexer Board (Rev. 2) provides jumper selection of the pull-up voltage applied by the pull-up resistors. Jumper block J4 voltage selection includes:

<table>
<thead>
<tr>
<th>5V</th>
<th>3.3V</th>
<th>Pull-up Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>5 volt</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>3.3 volt</td>
</tr>
</tbody>
</table>

5. Selecting an I²C Bus Port

The IP-201 Multiplexer Board provides one common and four selectable I²C Bus ports. The IP-201 Multiplexer Board is always connected to the common port, as this port is usually connected to a bus master device. A selectable port is connected to the common port by writing a one byte I²C command to the IP-201 slave address.

The IP-201 port selection command uses the following format:

<table>
<thead>
<tr>
<th>Start</th>
<th>IP-201 Slave Address (0x40...0x4E Jumper Selectable)</th>
<th>Select Port Command Byte (0x00, 01, 02, 03, 04=None)</th>
<th>stoP</th>
</tr>
</thead>
</table>
The IP-201 Multiplexer Board Port Command Byte value and the selected I²C Bus port is as follows:

<table>
<thead>
<tr>
<th>Command Byte</th>
<th>I²C Port Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>P0</td>
</tr>
<tr>
<td>0x01</td>
<td>P1</td>
</tr>
<tr>
<td>0x02</td>
<td>P2</td>
</tr>
<tr>
<td>0x03</td>
<td>P3</td>
</tr>
<tr>
<td>0x04</td>
<td>None</td>
</tr>
</tbody>
</table>

Once a port is selected, all I²C messages sent to the common port will appear at the selected port. All I²C messages sent to the selected port will appear at the common port.
7. IP-201 Revision Report

This section defines revisions and changes made to the IP-201:

Revision: 1

1. Initial Release

Revision: 2

1. Add 5V/3.3V pull-up voltage selection jumper (J4).

8. Additional Information

For additional information on the I²C Bus, please refer to the following:

“What is I²C?”
www.mcc-us.com/I2CBusTechnicalOverview.pdf

“Frequently Asked Questions (FAQ)”
www.mcc-us.com/faq.htm

"The I²C and How to Use It"
www.mcc-us.com/i2chowto.htm

"80C51-Based 8-Bit Microcontroller" Data Handbook.
Philips Semiconductors, Tel. (800)227-1817

"I²C Peripherals for Microcontrollers" Data Handbook.
Philips Semiconductors, Tel. (800)227-1817
Appendix A - I²C Connector Information

Interface Connector and Plug Information

MCC uses two (2) different connectors and plug assemblies. We have found these parts to be compatible.

I²C Receptacle Connectors

Molex SEMCONN ACCESS.bus Receptacle Connector

Molex Part # 15-83-0064

AMP SDL (Shielded Data Link) Connectors for ACCESS.bus

AMP Part # 4-943197-1

I²C Plug Connectors

Molex SEMCONN ACCESS.bus Plug

Molex Part # 15-83-1564

AMP SDL (Shielded Data Link) Plug for ACCESS.bus

Bush Amp Part # 520851-1
Ferrule Amp Part # 520433-1
SDL (Shell) Amp Part # 520461-1
SDL (Shell) Amp Part # 520460-1
SDL Amp Part # 4-520424-1

Appendix B - I²C Cable Information

The following I²C Cables are available from MCC:

MCC Part # CAB4 I²C Interface Cable, 48inches (4ft)
MCC Part # CAB8 I²C Interface Cable, 96 inches (8ft)
MCC Part # CAB16 I²C Interface Cable, 192 inches (16ft)
MCC Part # CABCL I²C and SMBus Clip Lead Cable
Declaration of Conformity

This Declaration of Conformity is issued by the indicated company which is solely responsible for the declared compliance.

Product(s): I2C Bus Multiplexer Board
Product Part Number(s): IP-201
Product Description: 4-Channel I2C Bus Multiplexer Board


Compliant Standards:

EN 55022 : 1998
Emissions Standard
Conducted Emissions (Class B)
Radiated Emissions (Class B)

EN 55024 : 1998
Immunity Standard
Immunity to Radiated Electromagnetic Fields
Immunity to Fast Transient Bursts - AC Power Lines
Immunity to Conducted Field - AC Power Lines
Immunity to Voltage Dips - AC Power Lines
Immunity to Electrostatic Discharge

Test Laboratory Information:

Cass Industries Ltd., Blackbrook Trading Estate, Weybrook Road, Manchester M19 2QD, ENGLAND.
Test Report Number: CI02570c
Test Report Date: August 22nd, 2005
Technical file held by: Micro Computer Control Corporation, 17 Model Avenue / PO Box 275, Hopewell, New Jersey 08525 USA, or its applicable authorized distributor or representative.

Responsible Company: Micro Computer Control Corporation, 17 Model Avenue / PO Box 275, Hopewell, New Jersey 08525 USA, or its applicable authorized distributor or representative.

Signature of Authorized Representative:

Edward Thompson

Name: Edward Thompson
Title: President, Micro Computer Control Corporation
Date: 09-JAN-07