User’s Guide

iVoLT™

I²C Bus/SMBus Voltage Level Translator

For 1.5 V to 5 V Applications

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WARNING - Life Support Applications: MCC Products are not designed for use in high risk appliances, devices, or systems where the malfunction of a MCC Product can reasonably be expected to result in a personal injury.

WARNING - Radio Frequency Emissions: This equipment can radiate levels of radio frequency energy that may cause interference to communications equipment. Operation of this equipment may cause interference with radio, television, or other communications equipment. The user is responsible for correcting such interference at the expense of the user.

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iVoLT

I²C Bus/SMBus
Voltage Level Translator

Features

• Bi-directional I²C Bus/SMBus voltage translator.
• Inserts In-Line between I²C/SMBus devices.
• Supports SCL, SDA, and Interrupt signals.
• 5 Volt maximum high-side voltage.
• 1.5 Volt minimum low-side voltage.
• 1 Volt minimum differential voltage requirement.
• Compatible with bus speeds up to 400 kHz.
• Plug-Compatible with MCC I²C Host Adapters and Bus Monitor (#MIIC-101).

Typical Applications

• Product development, manufacturing, system testing.
• Any application requiring bi-directional I²C/SMBus voltage level translation.

Description

The iVoLT is an I²C/SMBus Voltage Level Translator device designed to interface standard I²C/SMBus devices operating at different open drain voltage levels. Based on a pair of Philips’ GTL2002 Gunning Transceiver Logic-Transceiver Voltage Clamps, the iVoLT translates I²C/SMBus high voltage (1.5 V to 5 V) Clock, Data, and /INT signals to I²C/SMBus low voltage (at least 1 V below high side voltage) signals.
Pin Configuration

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 10</td>
<td>/INT</td>
<td>Interrupt Signal</td>
</tr>
<tr>
<td>2, 9</td>
<td>VCC</td>
<td>Voltage Reference</td>
</tr>
<tr>
<td>3, 8</td>
<td>SDA</td>
<td>Serial Data</td>
</tr>
<tr>
<td>4, 7</td>
<td>SCL</td>
<td>Serial Clock</td>
</tr>
<tr>
<td>5, 6</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
</tbody>
</table>

Interconnects

I²C Interface Connector

The iVoLT includes connectors for the high voltage side and the low voltage side. Both the high and the low side include connectors for the I²C/SMBus and the /INTerrupt signal (optional use).

/INTerrupt Interface Connector

/INTerrupt is an optional signal used on some I²C Bus devices. It is primarily used on slave-only devices to get the attention of a bus master. MCC I²C products that support the /INTerrupt signal use a 0.090" (2.03mm) pin/receptacle connector. The iVoLT includes a pin to pin wire for connecting the /INTerrupt signal to external devices such as the iPort/AFM I²C adapter.

Application

For proper bi-directional operation, SDA1, and SCL1 (high-side) must be connected to VCC1 (high-side) voltage through an external pull-up resistor. An optional SDA2, and SCL2 (low-side) pull-up resistor is required if the low-side to high-side to low-side voltage difference is less than 1.5 V. The pull-up resistor value needs to limit the current through the iVoLT when in the “on” state to a maximum of 3 mA (maximum allowed by the I²C Bus Specification). Minimum high-side to low-side voltage differential is 1 V.
Applications Notes:

1. Minimum high-side to low-side voltage differential is 1V.
2. Maximum high-side voltage is 5V.
3. Minimum low-side voltage is 1.5V.
4. High-side pull-up resistor required.
5. Low-Side pull-up required in voltage differential is less than 1.5V.

For additional information see the Philips Semicondutor “Bi-Directional Low Voltage Translators” application note AN10145-01.

Installation

Insert the iVoLT into the I²C/SMBus cable between high-voltage and low-voltage I²C/SMBus devices. Optionally connect the /INTerrupt line if used.
Appendix A - \( \text{I}^2\text{C} \) Connector Information

Interface Connector and Plug Information

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

\( \text{I}^2\text{C} \) 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

\( \text{I}^2\text{C} \) 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

The following \( \text{I}^2\text{C} \) Cables are available from MCC

MCC Part # CAB4 \( \text{I}^2\text{C} \) Interface Cable, 48 inches (4ft)
MCC Part # CAB8 \( \text{I}^2\text{C} \) Interface Cable, 96 inches (8ft)
MCC Part # CAB16 \( \text{I}^2\text{C} \) Interface Cable, 192 inches (16ft)
MCC Part # CABCL \( \text{I}^2\text{C} \) 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): iVoLT
Product Part Number(s): IVOLT
Product Description: I2C Bus Voltage Level Translator Module


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: CI02570b
Test Report Date: August 20th, 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