



UM10323

PCA9600 demonstration board OM6293

Rev. 01 — 15 December 2008

User manual

Document information

Info	Content
Keywords	I2C, bus buffer, twisted pair
Abstract	The OM6293 is an add-on to NXP Semiconductors I2C 2005-1 demo board. This daughter board makes it easy to test and design with the PCA9600, a dual bidirectional bus buffer.

Revision history

Rev	Date	Description
01	20081215	user manual; initial release

Contact information

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1. Introduction

The OM6293 evaluation board features RJ45 jacks for easy setup and demonstration of the bus buffer capabilities of the PCA9600. It can be easily connected to other boards with off-the-shelf telephone or networking twisted pair wires.

The IC communicates to the host via the I²C-bus/SMBus port and extends the buses' capacitive handling, increases the current handling, extends the range, and/or allows I²C-bus signaling via differential bus hardware.

2. Features

- A complete evaluation platform for the PCA9600
- Easy to integrate daughter card
- Convenient test point for easy scope measurements and signal access

3. Getting started

3.1 Assumptions

Familiarity with the I²C-bus is recommended. It is also recommended that the user read *Application Note AN10658*, which covers other design considerations such as timing delays, maximum data transmission speeds, handling ground potential differences and designing for extreme ESD requirements.

3.2 Static handling requirements

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling. You must use a ground strap or touch the PC case or other grounded source before unpacking or handling the hardware.

3.3 System requirements

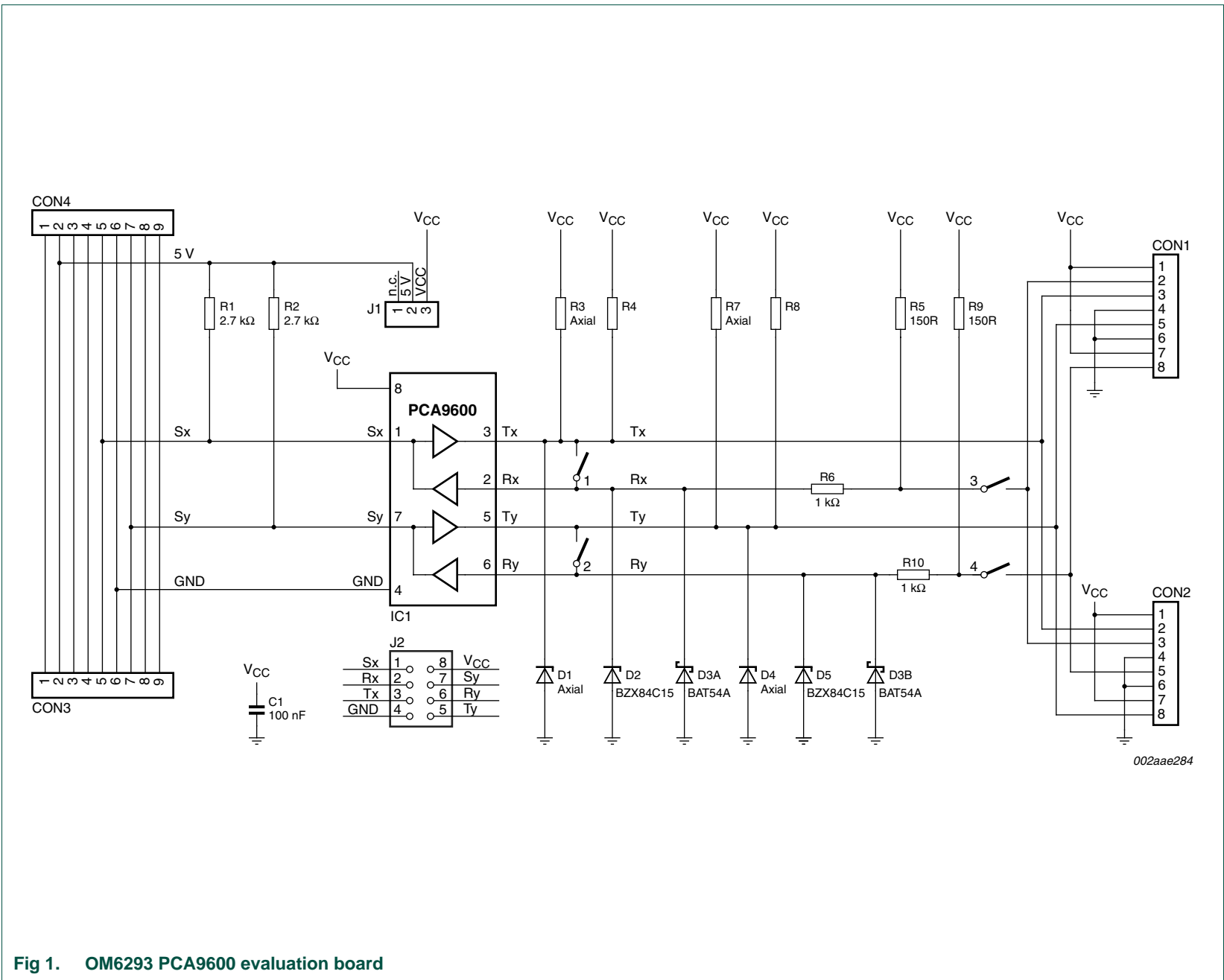
The OM6293 daughter card can be used with the Windows based OM6275 I2C 2005-1 demo board, the microcontroller-based OM6299 industrial reference design board, or stand-alone in the user's application.

3.4 Power supply

When connected to the OM6275 I2C 2005-1 demo board or the OM6299 industrial reference design board, the OM6293 can draw power from the host board through the 5 V pin on connector 3 (CON3).

An external power supply can also be used to power the board at location J1. The external power supply can range from 2.5 V to 15 V.

4. Schematic



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Fig 1. OM6293 PCA9600 evaluation board



Fig 2. OM6293 fitted to the 9-pin header on OM6275 I2C 2005-1

5. Bill of materials

Table 1. Bill of materials

Part type	Designator	Footprint	Description
2.54 mm 4x2 way header	J2	4x2 way 2.54 mm PIN HEADER	Test point connector
Molex 22-28-6270	CON4	9 way 2.54 mm PIN HEADER	9-pin connector
Molex 22-15-2096	CON3	9 way 2.54 mm PIN SOCKET	9-pin socket
	R8	R0805	SMD resistor
	R4	R0805	SMD resistor
Multicomp 7005-8P8C	CON2	RJ-45 8TH	RJ-45 8 way connector
Multicomp 7005-8P8C	CON1	RJ-45 8TH	RJ-45 8 way connector
1 kΩ	R10	R0805	SMD resistor
1 kΩ	R6	R0805	SMD resistor
2.7 kΩ	R1	R0805	SMD resistor
2.7 kΩ	R2	R0805	SMD resistor
100 nF	C1	C0805	SMD capacitor
150R	R9	R0805	SMD resistor
150R	R5	R0805	SMD resistor
	R7	AXIAL VR25(0.4)	user installed leaded resistor
	R3	AXIAL VR25(0.4)	user installed leaded resistor
	D1	DIODE SOD57 (0.5)	user installed leaded Zener diode
	D4	DIODE SOD57 (0.5)	user installed leaded Zener diode
BAT54A	D3A	SOT23	Schottky diode
BAT54A	D3B	SOT23	Schottky diode
BZX84C15	D5	SOT23	user installed SMD Zener diode

Table 1. Bill of materials ...continued

Part type	Designator	Footprint	Description
BZX84C15	D2	SOT23	user installed SMD Zener diode
2.54 mm 3 way header	J1	3 way 2.54 mm PIN STRIP	supply selector header
PCA9600	IC1	SO8	dual bidirectional bus buffer
OMRON A6T-4104	S1	DIP8	DIP switch

6. Using the OM6293 with the I2C 2005-1 demo board

The board can be easily configured to demonstrate two common applications:

- Generating an Fm+ compatible drive signal for other application boards, and
- Driving long Cat5e communication cables in '4-signal' mode using two daughter boards.

6.1 Generating an Fm+ compatible drive signal

A single daughter board is fitted to the 9-pin expansion header of the I2C 2005-1 evaluation board and can be powered from the switched 5 V supply on that board.

The I2C 2005-1 evaluation board's 9-pin header signals are duplicated on the daughter board's 9-pin header CON4 to allow further expansion or connection of other daughter cards.

The P82B96/PCA9600 generates Fm+ signals on the 8P8C modular (RJ45) jack CON1 that are compatible with, for example, the PCA9633 LED Demo Board Fm+ signals. To select this option, it is necessary to close switches 1 and 2 on the DIP switch S1 and to open switches 3 and 4. (The RJ45 jack CON2 should not be used.)

The 5 V power selection jumper should be fitted between pins 2 and 3 on header J1.

The input signals from the I2C 2005-1 evaluation board and the corresponding Fm+ signals as delivered to the RJ45 jack CON1 are available for probing on the 8-pin header J2.

For further details on this setup, refer to the *Application Note AN10658*, section 3.1.

6.2 Driving long Cat5e cables in 4-signal mode

One board is fitted to the 9-pin expansion header of the I2C 2005-1 evaluation board and can be powered from the switched 5 V supply of that board by fitting the jumper between pins 2 and 3 on header J1.

The board is configured for driving long Cat5e cables by opening switches 1 and 2 on the DIP switch S1 and closing the switches 3 and 4. The cable to be driven, fitted with standard 8P8C modular connectors (RJ45), is fitted into the RJ45 jack CON1. The other end of the cable is fitted into the RJ45 jack CON2 of a second or 'remote' P82B96/PCA9600 daughter board. This 'remote' board will derive its 5 V supply from the first board, via the cable and CON2. Use of CON2, with its different wiring configuration, provides the necessary crossover linking from Tx on one board to Rx on the other.

Ensure that the 5 V power selection jumper is fitted between pins 2 and 3 on header J1 or that some alternative logic supply voltage is connected to pin 2 on J1 so that there is a supply voltage for the I²C-bus on the Sx/Sy side of this 'remote' board. The cable bus signals will be converted back to conventional I²C-bus levels by the 'remote' P82B96/PCA9600 and both the cable bus and I²C-bus signals are available for probing on the 8-pin header J2. They are also available on the 9-pin header CON4 in the same format as on the I2C 2005-1 expansion header.

Note that only the 'switched 5 V' supply from the I2C 2005-1 board is used on CON1/CON2. The un-switched 5 V and 3.3 V supplies are not available on the Cat5e cable and therefore are not available on CON4 in modes where boards are linked only by the Cat5e cable.

For further details on this setup, refer to *Application Note AN10658*, section 3.2.

7. Abbreviations

Table 2. Abbreviations

Acronym	Description
DIP	Dual In-line Package
ESD	ElectroStatic Discharge
Fm+	Fast-mode Plus
I ² C-bus	Inter-Integrated Circuit bus
IC	Integrated Circuit
LED	Light-Emitting Diode
PC	Personal Computer
SMBus	System Management Bus
SMD	Surface Mount Device

8. References

- [1] **AN10658, Sending I²C-bus signals via long communications cables** — NXP Semiconductors; application note; www.nxp.com/acrobat/applicationnotes/AN10658
- [2] **PCA9600, Dual bidirectional bus buffer** — NXP Semiconductors; Product data sheet; www.nxp.com/pip/PCA9600

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