

Tracii[®]

400 kBit/s I²C Tracer

User's Manual

**telos EDV Systementwicklung GmbH
Schlüterstraße 16
D-20146 Hamburg**



Number	TraciiUM.doc
Version	1.29
Date	99.11.10

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii [®] - 400 kbit/s I ² C Tracer	Version	1.29	Page 2

Contents

1. Introduction.....	3
2. Glossary	4
3. References	4
4. Frequently Asked Questions - Support	4
5. Unpacking	4
6. Safety Precautions	4
7. Quick Start	4
8. Have A Look	5
9. Power.....	6
10. I²C Connector	6
11. PC-Printer Port.....	7
12. Configuration	8
13. I²C Levels.....	9
14. I²C Termination	9
15. Trace Mode.....	9
16. Life Support Application	10
17. Contact Tracii.....	11
18. Tracii[®] Specifications	11

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii [®] - 400 kbit/s I ² C Tracer	Version	1.29	Page 3

1. Introduction

Tracii[®] is a stand-alone, full-speed I²C-Bus interface communicating with the PC via a standard printer port. To have the Tracii[®] as a high end I²C tracing appliance no compromises have been made. To maximise performance, Tracii[®] has no microcontroller. Instead, all functions are directly implemented in silicon using a dedicated ASIC. An Altera ASIC is configured from an on-board EPROM holding the ASIC configuration.

The advantage of a solution with a dedicated logic performing the necessary activities directly in hardware is to have many independent blocks working at the same time. Dependencies between them are appearing just for a few moments, i.e. for data exchange or to start and stop processes in other blocks.

Tracii[®] is a solution optimised for high rate I²C monitoring.

The board supports the I²C operating modes Single-MASTER, SLAVE and TRACE.

- 64k static memory for buffering data from and to PC / I²C-Bus.
- 7-bit and 10-bit slave-address support.
- Transfer rates up to 400 kBit/s (on byte-level).
- Bitrate can be set by software between 100 bit/s and 400 kBit/s. Rates higher than 400 kBit/s are possible although not specified by I²C standard.
- In TRACE mode I²C clock is stretched only on buffer overflow.
- I²C levels from 3.3 volts to 5 volts are supported.
- Active I²C-Bus termination
- The bus protocol fulfils the I²C-Bus Specification for Standard and Fast Mode.
- In Trace Mode all traffic or the communication with a dedicated address can be logged.
- For the Trace Mode time stamp support is available.
- The I²C logic is located in an Altera programmable logic device which is configured from a 27C256 EPROM. Modifications on the logic are possible by simply changing the EPROM.
- Terminated parallel port interface to PCs
- 10 by 10 cm sized board delivered without AC/DC adapter.
- Stocko connector for I²C with centred power.
- External 8 - 9 V supply, DC connector available for connecting standard DC adapter (not included).
- Alternatively the board can be supplied from the I²C power lines.

The most recent versions of this and other product related documents can be found at <http://www.telos.de/tracii/>

telos EDV Systementwicklung GmbH
Schlüterstraße 16
D-20146 Hamburg
Phone +49 40 450173-0
Fax +49 40 450173-99
<mailto:info@telos.de>
<http://www.telos.de/>

Tracii[®] is the new brand for the formerly product TE-I2C400.

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii® - 400 kbit/s I²C Tracer	Version	1.29	Page 4

2. Glossary

ASIC	Application-Specific Integrated Circuit
Onboard	5 volts DC generated on-board of Tracii®
SCL	I²C Clock Line
SDA	I²C Data Line

3. References

[The I²C bus and how to use it](#) Philips Semiconductors, 1995

4. Frequently Asked Questions - Support

Frequently asked questions are answered on our WEB site, please use the URL
<http://www.telos.de/tracii/faq.htm>.

Please contact our support team under <mailto:support@tracii.de>. We will come back to you soon.

5. Unpacking

Tracii®, like all electronic equipment, is static sensitive. Please take the proper precautions when handling the device. Keep the board in its conductive wrapping until you are ready to use it. Use and store it in an ESD safe location.

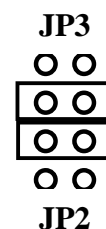
6. Safety Precautions

Tracii® shall be installed only with an EN60950 approved power supply.

7. Quick Start

For those who are no friends of reading manuals here is a quick start:

Configure JP3/JP2 this way to have the board using DC from the DC connector.



Connect the I²C bus to the Tracii® and link the parallel port adapter (female DSUB 25) to the PC. The PC parallel port needs to be configured for **EPP mode**, please check your BIOS set-up.

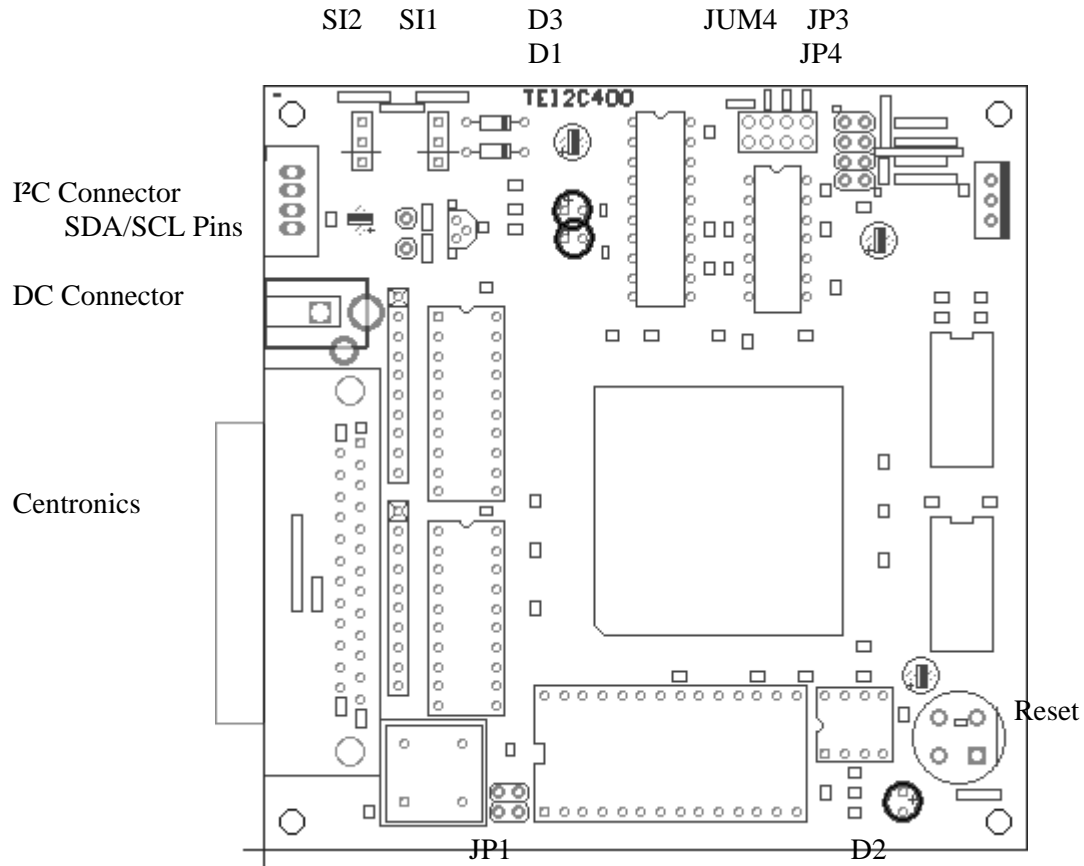
Finally connect the external power supply with 8 to 9 volts DC.

The light emitting diode “PWR” turns on immediately signalling power. “RESET” turns on for a short moment during the reset phase of the Tracii®. As soon as the ASIC is configured, “ConfOK” is illuminated. The “Reset” LED is not available on all boards.

With the help of the reset button a board reset can be initiated manually at any time.

8. Have A Look

A look on the top side of the Tracii®



Centronics	Interface to the PC's printer port
D1	Light emitting diode LED "Pwr" - power available
D2	Light emitting diode LED "Reset" - illuminated during reset
D3	Light emitting diode LED "ConfOK" - illuminated on board ok
I²C Connector	4 pin I²C connector
JP1	EPROM
JP2	I²C Level
JP3	Power
JUM4	for future extensions
Reset	Reset button
SDA/SCL Pins	I²C pins SDA and SCL on test pins
SI1	DC connector power fuse, 315mA
SI2	I²C connector power fuse, 100mA

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii [®] - 400 kbit/s I ² C Tracer	Version	1.29	Page 6

9. Power

Tracii[®] can be powered in two ways:

- External 5 volts DC provided on the I²C Connector.

Note: This supply must be of high quality and may never exceed 5.5 volts. The board is not protected against reverse or higher voltage.

Using power of minor quality might imply serious problems with the board. If for instance the connection PC / tracer fails please check the power quality.

- 5 volts generated onboard from 8 to 9 volts DC fed in through the DC connector. The ground is on the outside of the connector. The board is safe against reverse voltages.



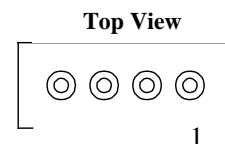
Note: Do not exceed 9 volts to prevent the linear voltage regulator from destruction.

The board is capable of providing the **onboard** voltage on the I²C connector to supply low power appliances drawing not more than 50mA.

10. I²C Connector

The I²C connector has four pins each labelled on the bottom side of the board.

Pin 1	SCL	I ² C clock line
Pin 2	GND	common ground
Pin 3	VCC	Power supply.
Pin 4	SDA	I ² C data line



Pin3, VCC may be used as a supply for the board or as a supply for external devices depending on jumper settings. Please refer to chapter *12 Configuration* for set-up.

Additionally, two I²C test pins are located beneath the connector. One for SDA and one for SCL.

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii [®] - 400 kbit/s I ² C Tracer	Version	1.29	Page 7

11. PC-Printer Port

The data transfer between the I²C-Bus Interface and the PC is done via bi-directional printer port. A bi-directional EPP port is required to read data from the interface at full speed without slowing down the I²C-Bus operation.

The Tracii[®] connector is male whilst the PC parallel connector is female. A simple D-SUB 25 one by one cable with a female and a male end is used for connection.

In case the software has problems contacting the board please verify

- PC parallel interface is used (female interface)
- a one by one cable is taken
- the parallel port is configured for EPP mode (ECP is not supported)
- supply voltage and last not least: quality of supply

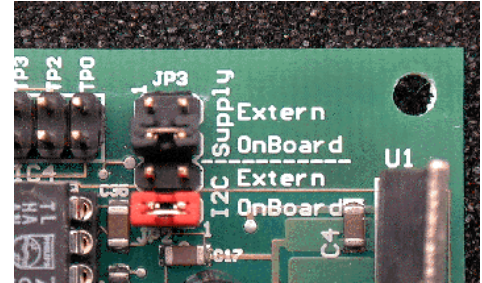
Note: Please be careful connecting Tracii[®]. Never apply it to a PC serial port. This may cause a serious damage of the board.

12. Configuration

Some jumpers are used for configuration of the board.

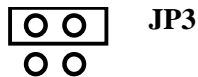
JP2 and JP3 are placed next to the voltage regulator.

JP3 controls the Power supply. Tracii® can be supplied either from an external AC/DC adapter or from the 5 volts located on the I²C.

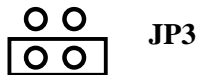


JP2/3 on boards with SN#0398-*

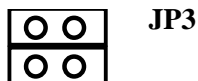
Tracii® gets its power from “Extern” via the I²C connector. This assumes 5 volts to be available from the I²C connector’s VCC pin.



Board is supplied by the local “OnBoard” power.

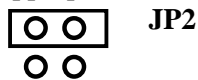


This configuration is used to supply the board locally AND to distribute the local power on the I²C connector for supplying external hardware.

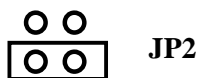


JP2 controls the reference voltage for the I²C-Bus.

I²C reference voltage comes from the local “OnBoard” power. Obviously this setting is appropriate for a reference of 5 volts only.

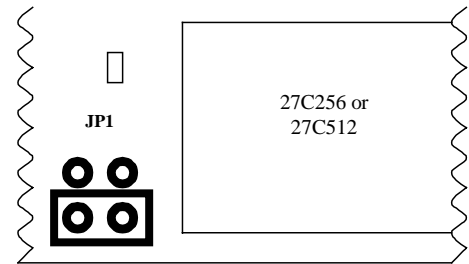


I²C reference voltage is equal to the “Extern” VCC on the I²C connector. This is important for I²C levels different to 5 volts. Please refer to chapter 12, *Configuration* for details.



Note: JP2 is labelled erroneously on Tracii® boards with serial numbers starting #0398.. The text “External” and “OnBoard” are to be read in reverse order.

At the board edge JP1 is located near to the EPROM. JP1 needs to be set this way:

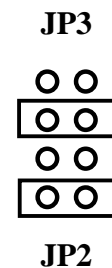


13. I²C Levels

Although Tracii® is running with 5 volts, it is capable of working with I²C levels down to 3.3 volts.

For all I²C levels different to 5 volts, the I²C reference voltage needs to be provided for the VCC pin of the I²C connector AND external DC has to be fed in through the DC connector to supply the board itself.

JP2 and JP3 are to be configured this way:



14. I²C Termination

Tracii® has an on-board I²C bus termination. Depending on the board type the terminations varies: All boards have an active termination controlled by the CMOS switch of type 4066. Boards with serial numbers starting #0398 have an additional passive termination of 1.8k.

The termination seems to be low but please be aware that this board is designed for high speed I²C with up to 400kbit/s.

If your application has problems with this termination you may remove the 4066 circuit. This increases the pull-up values by about two.

If you are interested in having a more flexible termination please consider using the new telos product "Tracii400".

15. Trace Mode

One of the outstanding features of Tracii® are its tracing capabilities.

Depending on the software configuration the following activities on the I²C-Bus are recorded:

- All data on the I²C-Bus
- All data following a specified SLAVE-address

In TRACE-mode, no acknowledge will be generated by the hardware. Clock-stretching is only required if a local buffer overflow occurs. Due to the 64kB local buffer memory this is a minor event.

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii® - 400 kbit/s I ² C Tracer	Version	1.29	Page 10

16. Life Support Application

This product is not designed for use in life support appliances, devices, or systems where malfunction of this product can reasonably be expected to result in personal injury. Customers using or selling this product for use in such applications do so at their own risk and agree to fully indemnify telos for any damages resulting from such improper use or sale.

telos EDV Systementwicklung GmbH			
User's Manual		Date	99.11.10
Tracii [®] - 400 kbit/s I ² C Tracer	Version	1.29	Page 11

17. Contact Tracii

Tracii has its own web site <http://www.tracii.de>.

Please consult this page for

- [software updates](#)
- documentation updates
- [frequently asked questions](#)
- [production information](#)
- [price and delivery information](#)

Besides you can contact us this way:

Tracii Support

fon: +49 (0)40 450173 61

fax: +49 (0)40 450173 99

<mailto:support@tracii.de>

Sales

fon: +49 (0)40 450173 60

fax: +49 (0)40 450173 99

<mailto:sales@telos.de>

Snail Mail

telos EDV Systementwicklung GmbH

Schlueterstrasse 16

20146 Hamburg

Germany

We will come back to you soon.

18. Tracii[®] Specifications

Power supply 8 – 9 volts 200 mA not stabilised, via DC connector

or

5 volts 200 mA stabilised ,via I²C connector

If external appliances are supplied by the board via the VCC pin of the I²C connector, 50 mA may never be exceeded.

The respective current has to be added to the above definitions.

The length of the I²C-Bus may not exceed 2 meters. The length of the parallel port bus may not exceed 3 meters.

Size: 10 x 10 cm