

SOCRATES EVB

Quick Start Guide

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Revision History:

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Revision	Date	Comment
1.0.0	7-Jan-15	Internal release
1.0.1	21-Jan-15	Reviewed document
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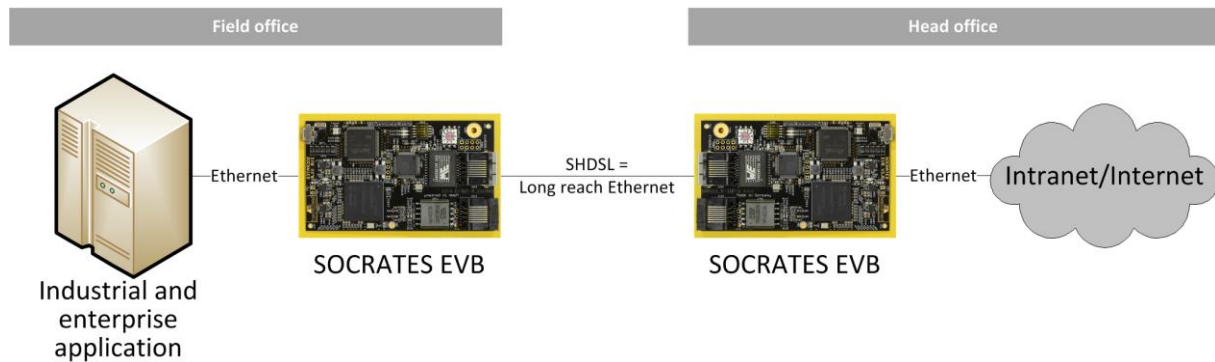
1 Introduction

The new SOCRATES EVB 1.0 Reference Design targeting industrial designs enables customers to take advantage of Lantiq SHDSL for long reach broadband connectivity. It's the first ever ready-to-copy reference design developed for the Lantiq SOCRATES Chip. The SHDSL/Ethernet Bridge Modem was developed by Teleconnect and measures only about 9 x 5 cm. It is available for online purchase through the Würth Midcom Website (<http://www.we-online.com/socratesdemo>). Teleconnect offers dedicated support for board and software customizations. With this, for the first time ever, even smaller companies without DSL expertise can include SHDSL and Long-Reach-Ethernet connectivity into their designs.

SHDSLs unique rate/reach performance makes it the product of choice in an ever more diversified field of applications ranging from business broadband access to enterprise networks and industrial communications.

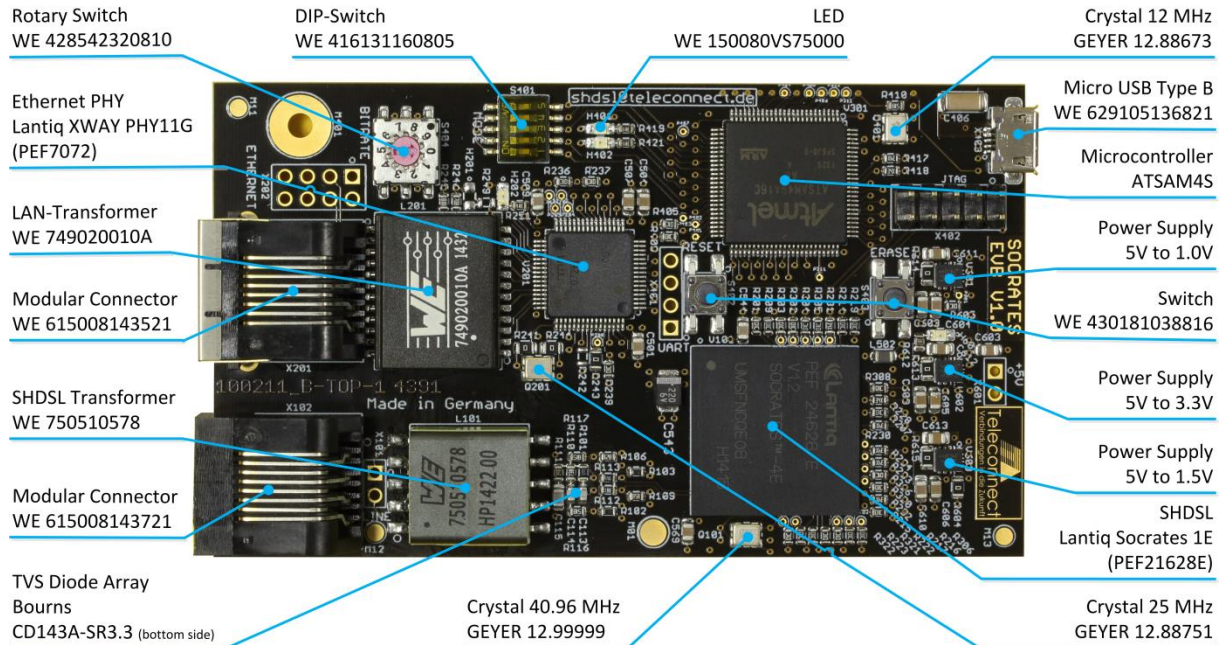
Known as long haul Ethernet, SHDSL was included in the Ethernet standard IEEE 802.3-2008, where it is named 2BASE-TL. Standard Ethernet has a maximum reach of 100 m. SHDSL has a reach beyond 15 kilometres.

Using SHDSL enables customer to Transmit Ethernet over only one unshielded twisted wire pair or over any other cable.



2 Component Overview

The following picture shows the top side of SOCRATES EVB. The most important components are described in this chapter.



Please download the latest version of the bill of material. It is recommended to use the listed components.

2.1 SHDSL chip SOCRATES-1e PEF21628E

SOCRATES is the world's leading SHDSL solution. For more information about Lantiq Semiconductor see <http://www.lantiq.com/> and about SHDSL see <https://www.lantiq.com/shdsl>.

Please register at <http://www.lantiq.com/> for data sheets.

It is also possible to use the pin compatible 2 or 4 channel chips PEF22628E and PEF24628E. However, SOCRATES EVB provides only one usable channel.

2.2 Würth Elektronik (WE)

For more information about Würth Elektronik GmbH & Co. KG please look at <http://www.we-online.com>.

The largest number of components used at SOCRATES EVB is provided by WE. The picture shows only the main components. There are a lot of further components besides those depicted. Please also look at SOCRATES EVB bill of material.

2.3 Bourns

For more information about Bourns, Inc., please look at <http://www.bourns.com/>.

Bourns is a leading supplier of SHDSL protection solutions.

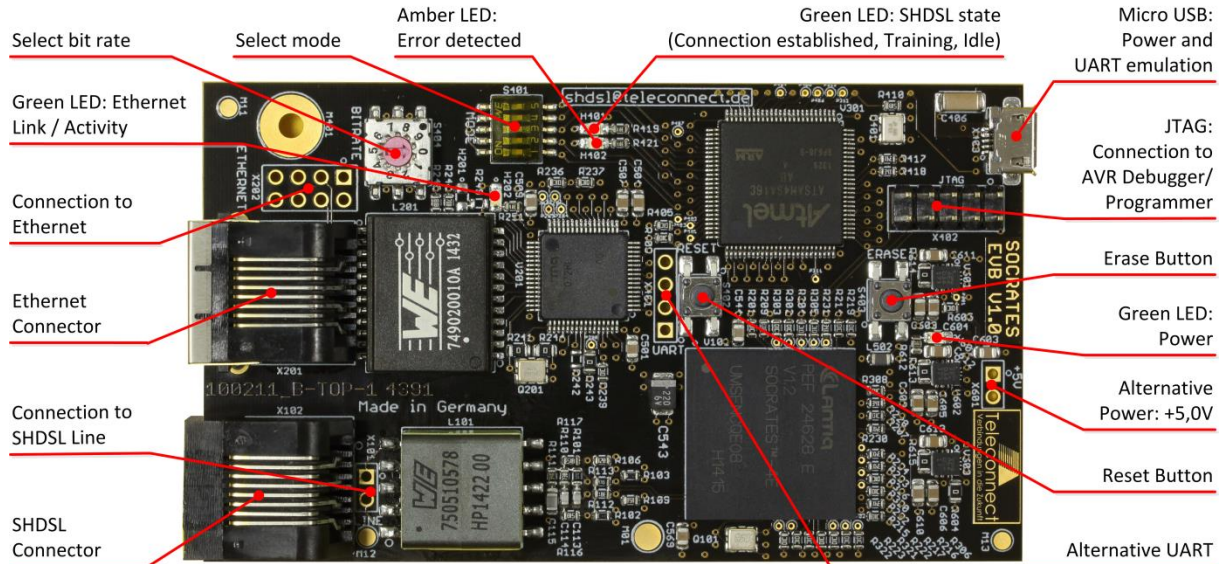
2.4 GEYER

Further information about GEYER ELECTRONIC e.K. are given at <http://www.geyer-electronic.com/>.

The used 40.96MHz crystal is a special development for the SOCRATES chip.

3 Functional description

The following picture shows the control and operating elements. The SOCRATES EVB is designed to work autonomously without using external software. Just plug and play!



3.1 SHDSL Connector

The unshielded RJ45 connector is used for connecting the SOCRATES EVB to one SHDSL line (according to ITU-T G.991.2) using Pin 4 and 5. The other pins are not connected. A standard Ethernet cable is also usable. Beside the RJ45 connector SOCRATES EVB provides the possibility to use a pin header.

3.2 Ethernet Connector

The shielded RJ45 connector is a standard Ethernet interface. It is compatible to 10BASE-T and 100BASE-TX Ethernet according to IEEE 802.3. Besides the RJ45 connector SOCRATES EVB provides the possibility to use a pin header.

3.3 Micro USB

The main function of the Micro USB Connector is the power supply. Connect to USB plug-in power supply (5 V) or any self-powered USB host interface. The Micro USB Connector can also be used as a management interface using UART emulation.

3.4 Reset Button

Pressing this button triggers hardware reset of processor and SHDSL interface.

3.5 Erase Button

There are two functions: Pressing the Erase Button during reset (Reset button is also pressed) will clear the whole flash memory. This is necessary to reload a new Firmware version via processors SAM-BA interface.

During runtime additional information about software and line state will be printed to the serial interface (USB UART emulation and hardware UART) if the button is pressed.

3.6 Select Mode

The DIP switch is used for selection of operation mode.

There are 5 DIP switches available. The following table describes the functions.

Switch number	Description	Switch function
1	Device Mode	On: STU-C (Master, CO mode) Off: STU-R (Slave, CPE mode)
2	Extended Rates	On: Extended bitrates (64..15288kbps) Off: ITU-T standard bitrates (192..5696kbps)
3	Reserve	Reserved for future use
4	Test mode (TM1)	Both off: no test mode (normal function) TM1 on, TM2 off: PSD test TM1 off, TM2 on: idle (Silent State) Both on: Loopback
5	Test mode (TM2)	

Please note that you have to remove protective tab on top of DIP switch before first use.

3.7 Select bit rate

The rotary switch is used for selection of the bitrates. If the switch position is stable for more than 4 seconds the software will accept the new setting and reconfigure the SOCRATES chip set. The target SNR margin is set to 6 dB.

Switch position	Extended rates (DIP switch 2)	Line probing (PMMS)	Bit rate [kbit/s]	PAM
0 (default)	Off	Enabled	192...5696	Auto
1	Off	Disabled	192	16
2	Off	Disabled	384	16
3	Off	Disabled	512	16
4	Off	Disabled	768	16
5	Off	Disabled	1536	16
6	Off	Disabled	2048	16
7	Off	Disabled	2304	32
8	Off	Disabled	3072	32
9	Off	Disabled	5696	32
0 (default)	On	Enabled	64...15288	Auto
1*	On	Disabled	64*	4
2*	On	Disabled	192*	4
3*	On	Disabled	192*	8
4*	On	Disabled	2496*	4
5*	On	Disabled	5056*	8
6*	On	Disabled	7616*	16
7*	On	Disabled	10176*	32
8*	On	Disabled	12736*	64
9*	On	Disabled	15288*	128

* The configuration of fixed bitrates in extended rates mode is only possible by SHDSL Master (CO mode, STU-C). The SHDSL Slave (CPE mode, STU-R) ignores the switch position and always uses line probing (switch position 0).

3.8 LEDs

3.8.1 Power (green)

Off: SOCRATES EVB not powered up

On: Power supply ok, the board is active

3.8.2 SHDSL state (green)

Off: SHDSL not active

Slow blinking: SHDSL is ready (SOCRATES is initialized)

Fast blinking: SHDSL training phase

On: SHDSL connection is established

3.8.3 Ethernet Link/Activity (green)

Off: no Ethernet connection

On: Ethernet link detected

Blinking: Ethernet connection with data traffic

3.8.4 Error (Amber)

Off: The board is working without any failure

On/blinking: An error has occurred

4 Start-up guide

The following description provides an easy way to establish a data connection using SHDSL. You need at least one SOCRATES EVB and one other standard conform SHDSL EFM modem.

However, the easiest way to make a SHDSL connection is to use two SOCRATES EVB. The following sections are describing two common use cases.

4.1 Realize Long-Reach-Ethernet Connectivity

- Check your existing application (infotainment systems, video surveillance, vending machines, traffic control, emergency communication, sense and control ...) for an existing Ethernet interface.
- Connect Ethernet interface to SOCRATES EVB.
- Select bit rate and operation mode
 - standard (192...5696kbps) or extended bit rate (64...15288kbps),
 - master mode (STU-C) or slave mode (STU-R).
- Connect 5 V power supply to the Micro USB connector.
 - The power LED, Error LED and the SHDSL LED go on.
 - After some seconds the amber Error LED and SHDSL LED go off.
 - The SHDSL LED starts blinking slowly after some seconds.
- Connect SHDSL lines.
 - The SHDSL LED blinks fast during SHDSL Training.
 - The SHDSL LED is on if the SHDSL connection is established.
- Ready! You are using SHDSL for your data connection.

4.2 Start-up using two boards

1. Verify settings: DIP switch 2 on (for highest possible data rate up to 15 Mbps), all other DIP switches off, rotary switch on 0 (exempt you wish a special bit rate).
2. Switch on Device Mode (DIP switch 1) for master mode (STU-C) at one board, the other stays in slave mode (STU-R, DIP switch 1 off).
3. Connect both SHDSL connectors together. You can use a standard Ethernet patch cable.
4. Power up both boards. E.g. connect the micro USB plugs to PC.
 - The power LED, Error LED and the SHDSL LED go on.
 - After some seconds the amber Error LED and SHDSL LED go off.
 - The SHDSL LED starts blinking slowly after some seconds.
 - The SHDSL LED blinks fast during SHDSL Training.
 - The SHDSL LED is on if the SHDSL connection is established.
5. Disconnect the Ethernet cable from your computer; plug it into the Ethernet connector of the first board. Connect the wall outlet to the Ethernet connector to the second board.
 - The Ethernet LED is on if Ethernet connection was established.
 - The Ethernet LED starts blinking indicating Ethernet traffic.
6. Ready! You are using SHDSL for your data connection.