This version (15 Dec 2021 20:07) was **approved** by Wassim Magnin.

User Guide for EVAL-ADIN2111EBZ

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General Description

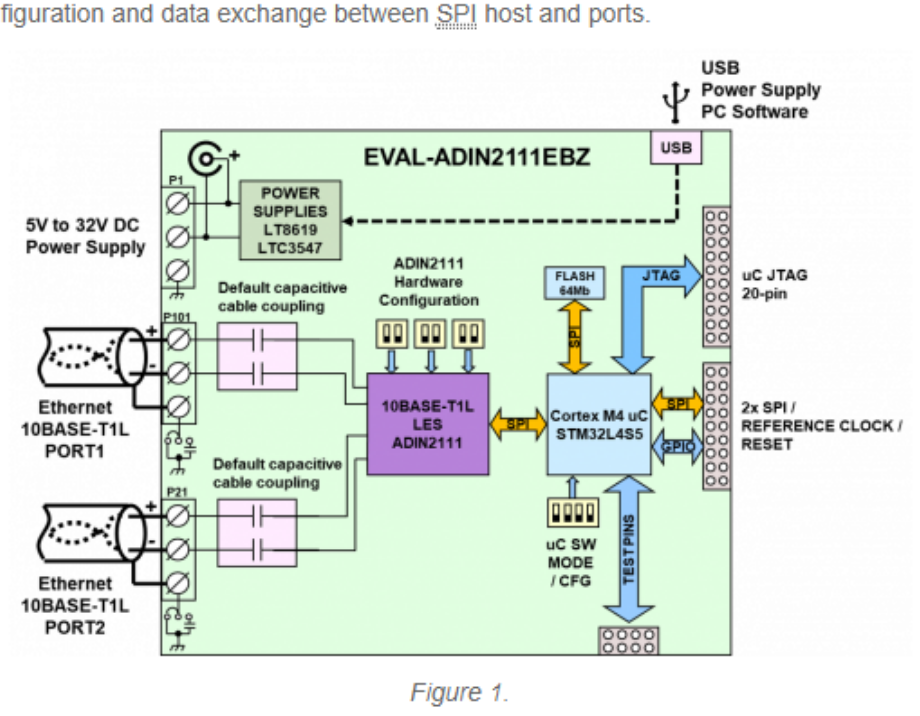
The EVAL-ADIN2111EBZ is a flexible platform enabling quick evaluation of the ADIN2111, robust, low power 10BASE-T1L 2-Port Ethernet switch. The evaluation board provides 2 10BASE-T1L channels with 10Mbit per second Single Pair Ethernet (SPE) connections reaching up to 1.7km of link distance. The ADIN2111 internal switch can be configured in store and forward mode between the two 10BASE-T1L channels and the SPI host. Cut through mode is also available between Port 1 and Port 2 and can be used without the need of the SPI host (unmanaged configuration).

The evaluation board offers two modes of operation for maximum flexibility: Connected to a PC via USB port, the full set of ADIN2111 register settings and features such as link quality monitoring and diagnostics can be accessed over the USB using the serial command interface implemented in the evaluation firmware.

Alternatively, the board can operate in cut-through mode between Port 1 and Port 2 (unmanaged configuration without firmware) where the EVAL-ADIN2111EBZ acts as a network switch forwarding packets between the 2x 10BASE-T1L ports. The 2x links are configured by setting the ADIN2111 hardware configuration pins jumper and switches. The 2x On-board Activity LEDs provide Link activity status indication for each port.

Custom firmware can also be developed and the ADIN2111 driver support package includes simple project examples to start a custom implementation.

The SPI interface provides access to the management registers required for the switch configuration, the 2 PHYs configuration and data exchange between SPI host and ports.


USB Power Supply PC Software
EVAL-ADIN2111EBZ
USB
P1
POWER SUPPLIES LT8619 LTC3547
5V to 32V DC Power Supply
ADIN2111 Hardware Configuration
FLASH 64Mb
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Default capacitive cable coupling
P101
10BASE-T1L LES ADIN2111
SPI
Cortex M4 uC STM32L4S5
SPI
GPIO
2x SPI / REFERENCE CLOCK / RESET
Ethernet 10BASE-T1L PORT1
P21
Default capacitive cable coupling
uC SW MODE / CFG
TESTPINS
Ethernet 10BASE-T1L PORT2

Figure 1.

Features

- User friendly access to all ADIN2111 features
- Stand-alone hardware configured operation
- On-board ARM Cortex-M4 STM32L4S5QII3P ultra-low-power Microcontroller

Equipment Needed

- Link partner with 10BASE-T1L interface
  Recommended to use the EVAL-ADIN1100EBZ Evaluation Board (RJ45 Ethernet interface to use as media converter between 10BASE-T1L and 10BASE-T)
- 2x 10BASE-T1L compatible Single Pair cable: max. 1.5 mm² / AWG 16 to fit screw terminal connector
- Power supply source: 5 to 32 Vdc, 0.6W, or USB as power for the board
- Optional: PC running Windows 7 and upwards with USB interface
- Optional: ST-LINK programmer

Evaluation Kit Contents

- EVAL-ADIN2111EBZ board
- 3x plug-in screw-terminal connectors for 10BASE-T1L cable and external power supply
- USB-A to Mini USB-B cable (1 meter)

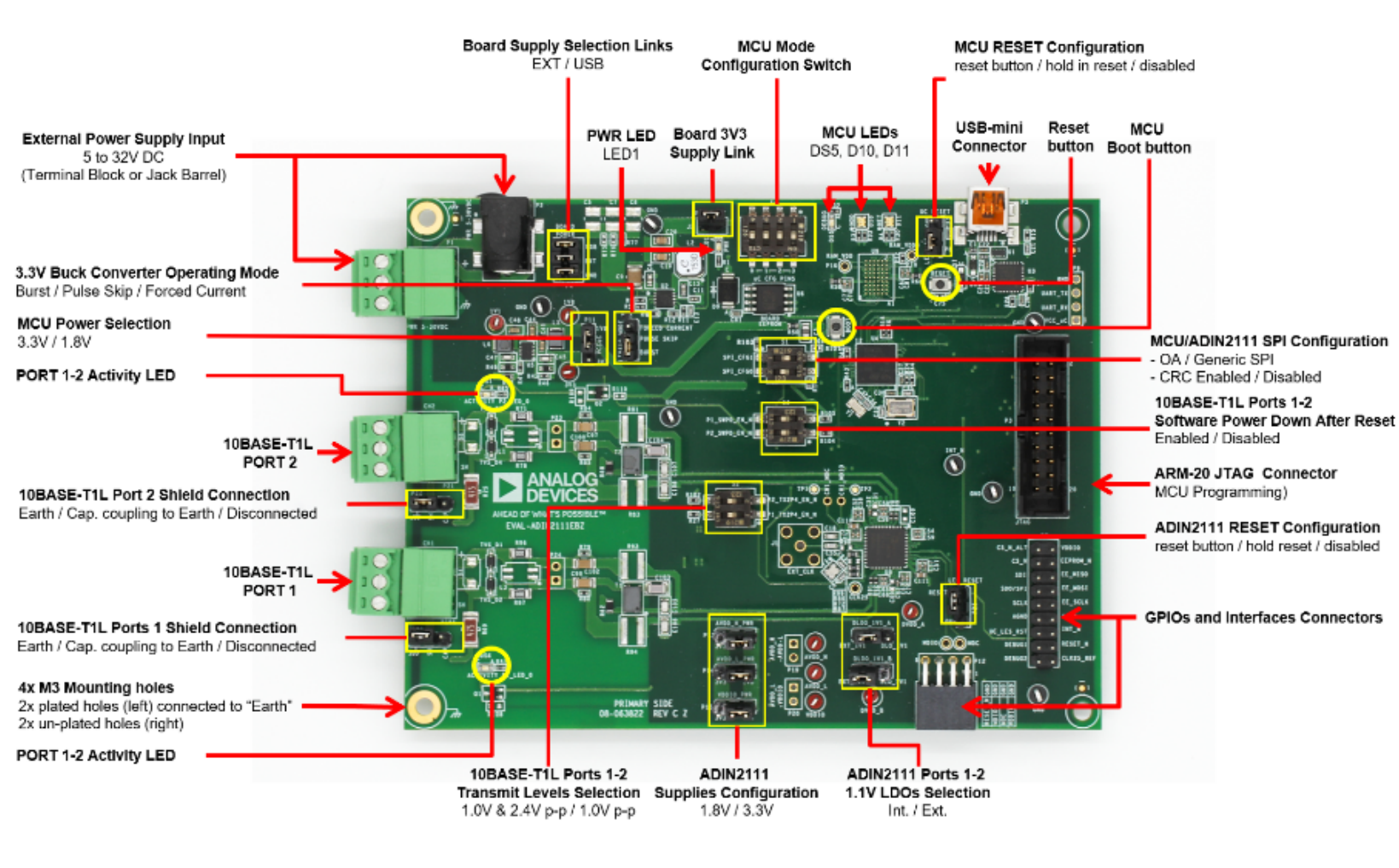
Software (Optional)

- FTDI USB Virtual Com Port driver (Available from FTDI website)
- Serial port terminal software (e.g. CompuPhase Termite)

Documentation Needed

- ADIN2111 Datasheet available from the product webpage: en/products/adin2111.html
- EVAL-ADIN1100EBZ User Guide: adin1100_userguide

Overview


Board Supply Selection Links EXT / USB
MCU Mode Configuration Switch
MCU RESET Configuration reset button / hold in reset / disabled
External Power Supply Input 5 to 32V DC (Terminal Block or Jack Barrel)
PWR LED LED1
Board 3V3 Supply Link
MCU LEDs DS5, D10, D11
USB-mini Connector
Reset button
MCU Boot button
3.3V Buck Converter Operating Mode Burst / Pulse Skip / Forced Current
MCU Power Selection 3.3V / 1.8V
PORT 1-2 Activity LED
MCU/ADIN2111 SPI Configuration - OA / Generic SPI - CRC Enabled / Disabled
10BASE-T1L Ports 1-2 Software Power Down After Reset Enabled / Disabled
10BASE-T1L PORT 2
10BASE-T1L Port 2 Shield Connection Earth / Cap. coupling to Earth / Disconnected
ARM-20 JTAG Connector MCU Programming)
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GPIOs and Interfaces Connectors
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4x M3 Mounting holes 2x plated holes (left) connected to "Earth" 2x un-plated holes (right)
PORT 1-2 Activity LED
10BASE-T1L Ports 1-2 Transmit Levels Selection 1.0V & 2.4V p-p / 1.0V p-p
ADIN2111 Supplies Configuration 1.8V / 3.3V
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Hardware

Power Supplies

The EVAL-ADIN2111EBZ can be powered from three different sources:

- 5-32V DC external power supply connected to P1 terminal bock or P2 barrel connector
- USB (5V DC) using the P5 usb-mini connector

The power supply source can be configured using the P4 "BOARD POWER" link (3-positions: USB, EXT, GND).
Note that the two power supplies can be simultaneously enabled on P1 (2 jumpers inserted) as an internal common cathode diodes circuit selects the highest voltage source.

The selected input power source is converted by the step-down converter U501 (LT8619) to 3.3V
The link J2 is used to connect U2 output to the main 3.3V supply rail used on the board
The green "PWR" LED1 is ON when the 3.3V rail is present.
The board power consumption depends on the mode of operation, with the maximum of approximately 0.5W.

10BASE-T1L Cable Connection

The 10BASE-T1L cable can be connected via pluggable screw-terminal block to connector P101. If more of the pluggable connectors are needed, for easy connecting / changing cables, additional connectors can be purchased from the vendor or distributors:

- Manufacturer: Phoenix Contact
- Manufacturer part number: 1803581
- Description: "Pluggable Terminal Block, 3.81 mm, 3 Ways, 28AWG to 16AWG, 1.5 mm², Screw".

Ground Connections

The demo board has two "Earth nodes", one for each port. We call it "Earth node" here – though this node may or may not be electrically connected to Earth ground. In a real device this node would be typically connected to the device metal housing / chassis. Each Earth node can be connected as required in a wider demo system via "Earth" terminal of the power supply connector P1, or via exposed metal plating of 2 mounting holes in the left corners of the board. (The 3rd and 4th holes on the right do not have metal plating, and also no Earth connection.)

The shield of the 10BASE-T1L cables can be disconnected from this Earth node, connected directly, or connected via a 4x 1nF capacitors array for Port 1 (C85,C86,C87,C88) and Port 2 (C89,C92,C93,C95). The required connection is selected using jumper J101 (Port 1) and P22 (Port 2).

(!) Note: The EVAL-ADIN2111EBZ has been designed only as an Evaluation board. It has NOT been designed, and it has NOT been tested for electrical safety. Any equipment, device, wire, or cable connected to this demo must be already protected and safe to touch without danger of electric shock.

Hardware Configuration Setup

The EVAL-ADIN2111EBZ board is provided with links (jumper) and DIP switches that can be used to set the ADIN2111 configuration. The Table 1,2 and 3 describe the links and switches functions.

Table 1. Board Link Configuration

Link Ref.	Default Position	Description
J101	Earth	CH1 Shield shorted either directly to Earth, or via 4nF cap
P22	Earth	CH2 Shield shorted either directly to Earth, or via 4nF cap
P4	EXT	USB – Connects 5V USB supply to the input of the LT8619 EXT - Connects externally supplied power from P1 or P2 to the input of LT8619
P10	Burst	FORCED CURRENT – (H) Force Continuous mode of operation of LT8619 PULSE SKIP (o/c) - Pulse-Skipping mode of operation of LT8619 BURST (L) – Burst mode of operation of LT8619
J2	Inserted	This link supplies 3.3V rail to circuitry on the board, beyond the LT8619
P11	3V3	STM32 supply voltage – choice of 3.3V or 1.8V
P13	3V3	AVDD_H supply voltage – 3.3V (1.8V to be supported in final product)
P14	3V3	AVDD_L supply voltage – choice of 3.3V or 1.8V
P15	3V3	VDDIO supply voltage – choice of 3.3V or 1.8V
DLDO_1V1_A	DLDO_1V1	DVDD_A supply voltage – choice of EXT 1V1 rail or internally generated DLDO_1V1
DLDO_1V1_B	DLDO_1V1	DVDD_B supply voltage – choice of EXT 1V1 rail or internally generated DLDO_1P1
P19	Not Inserted	Option to short AVDD_H to AVDD_L
P20	Not Inserted	Option to short AVDD_L to VDDIO
P8	LES_RST	Option to hold STM32 in reset (GND RESET) or short it to the S5 push-button reset (LES_RST)
P25	RESET_N	Option to hold LES in reset (GND RESET) or short it to the RESET_N signal

Table 2. ADIN2111 SPI Configuration , Schematics Ref. S1

Switch Position	Switch Name	Default Position	Description
1	SPI_CFG1	ON	SPI configuration 1 OFF: Generic SPI ON: Open Alliance SPI
2	SPI_CFG0	OFF	SPI configuration 0 OFF: SPI CRC/Protection enabled. ON: SPI CRC/Protection disabled

Table 3. ADIN2111 Transmit Level Configuration , Schematics Ref. S2

Switch Position	Switch Name	Default Position	Description
1	P2_TX2P4_EN_N	OFF	Port 2 Transmit 2.4V disable OFF: TX level 2.4V p-p or 1.0V p-p ON: TX level 1.0V p-p only
2	P1_TX2P4_EN_N	OFF	Port 1 Transmit 2.4V disable OFF: TX level 2.4V p-p or 1.0V p-p ON: TX level 1.0V p-p only

Table 4. ADIN2111 Software Power Down After Reset Configuration , Schematics Ref. S3

Switch Position	Switch Name	Default Position	Description
1	P2_SWPD_EN_N	OFF	Port 2 Software Power Down After Reset OFF: Disabled ON: Enabled
2	P1_SWPD_EN_N	OFF	Port 1 Software Power Down After Reset OFF: Disabled ON: Enabled

Table 3. Board LED indicators

Name (silkscreen)	Colour	Schematics Ref.	Description
PWR	GREEN	LED1	* OFF: 3.3V board power supply not available ON: 3.3V board power supply available
DEBUG	BLUE	DS5	Firmware heart beat * OFF: No firmware activity, reset or reprogram the board * Blinking: firmware running
MOD	RED GREEN	D10	Microcontroller Mode LED Modes 6,14 - TCP/IP stack enabled with fixed IP: * GREEN LED always ON * RED LED not used Modes 7,15 - TCP/IP stack enabled with fixed DHCP * GREEN ON: IP assigned * GREEN blinking: waiting for IP assignment from DHCP server * RED LED not used Modes 8,9 - Frame Generator/Frame Checker * GREEN OFF: No activity * GREEN ON: 10,000 packets transmitted and received with no error (err) or mismatched number of packets received (diff) * RED LED not used
NET	RED GREEN	D11	Error LED All modes * RED OFF No issue * RED ON Potential SPI communication error with ADIN2111 (see terminal message). Check power and SPI configuration on S1 * GREEN LED not used Modes 8,9 Only: Frame Generator/Frame Checker * RED OFF: No transmission error (err) or mismatch in number of packets received (diff) * RED ON: Transmission error (err) or mismatch in number of packets received (diff)
ACTIVITY_P2_LED0	GREEN	DS1	PORT 2 Link Activity LED * ON or blinking: Link activity * OFF: No link activity
ACTIVITY_P1_LED0	GREEN	DS6	PORT 2 Link Activity LED * ON or blinking: Link activity * OFF: No link activity

Microcontroller Modes of operation

The EVAL-ADIN2111EBZ can be used in various modes of operations implemented in the uC firmware. Up to 16 modes of operations can be selected by setting the 4 positions of the slide switch S4. The selected configuration is latched after the board is powered up or reset.

Therefore, to change the mode of operation, the board must be reset by pressing "RESET" button S5 or by applying power cycle after changing the position of the slide switch S4. The available modes of operation are described in Table 4 below.

Table 4. Firmware Modes of Operation, Schematics Ref. S4

CFG [3:0][i]	Mode No.	Operating Mode[ii]	Description
0000	15	TCP/IP Stack & Web Server, DHCP client, MAC Addr1	In this mode, the TCP/IP stack can be managed via UART using dynamic IP address allocation. The media converter board is then used to convert 10BASE-T1L to 10BASE-T ethernet, for which common web browsers can be used to access the associated information. MAC address 1 is used.
0001	14	TCP/IP Stack & Web Server, Fixed IP, MAC Addr1	This is a similar mode to the previous one except fixed IP address allocation is used. MAC address 1 is used.
0010	13	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0011	12	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0100	11	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0101	10	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0110	9	PHY2 Frame Generator Checker / PHY1 MAC Remote Loopback MSE reading enabled	PHY2 is set in Frame Generator/Checker Mode PHY1 is set in MAC Interface Remote loopback mode MSE readings are shown on UART. Link LED is also enabled.
0111	8	PHY1 Frame Generator Checker / PHY2 MAC Remote Loopback MSE reading enabled	PHY1 is set in Frame Generator/Checker Mode PHY2 is set in MAC Interface Remote loopback mode MSE readings are shown on UART. Link LED is also enabled.
1000	7	TCP/IP Stack & Web Server, DHCP client, MAC Addr2	The use of this mode is depicted in Figure 11. In this mode, the TCP/IP stack can be managed via UART using dynamic IP address allocation. The media converter board is then used to convert 10BASE-T1L to 10BASE-T ethernet, for which common web browsers can be used to access the associated information. MAC address 2 is used.
1001	6	TCP/IP Stack & Web Server, Fixed IP, MAC Addr2	This is a similar mode to the previous one except fixed IP address allocation is used. MAC address 2 is used.
1010	5	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1011	4	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1100	3	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1101	2	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
2111	1	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1111	0	Reset ADIN2111	Keep the the ADIN2111 in reset mode

[i] *Switch in ON position = signal logic 0 for microcontroller (shorted to ground).*
Switch in OFF position = signal logic 1 (pulled up by a resistor)

[ii] *RESERVED means the microcontroller and command line interface is active (serial port).*

Software

The EVAL-ADIN2111EBZ can be used as a stand-alone board, with the firmware already pre-programmed in the microcontroller flash memory. The mode of operation can be set using the S4 Configuration DIP switch and the link status is indicated by LEDs. There is no software required for this stand-alone use case.

The EVAL-ADIN2111EBZ can also be interfaced with a host computer via the USB port. The full set of ADIN2111 PHY and MAC registers and features such as link quality monitoring can be accessed via the command line interface.

Note that the default firmware is configured with the SPI interface set to OPEN Alliance SPI with Protection enabled. The ADIN2111 hardware configurations pins must be set accordingly using the DIP switch S1 (see table 2 for reference).

Driver For USB COM Port

The EVAL-ADIN2111EBZ has an onboard USB-UART converter (FTDI FT232R).

Ensure that the appropriate Virtual Com Port driver is installed on the host platform before connecting the EVAL-ADIN2111EBZ to the host computer via the USB cable.

The drivers are available from FTDI, at the time of writing this document at https://ftdichip.com/drivers/vcp-drivers/

COM Port and Terminal Settings

When the EVAL-ADIN2111EBZ is connected to the host, it will become available in the host system as a USB Com Port, and will be assigned a com port number. The number will depend on the system settings, on com port devices previously connected and assigned in the system, and on the FTDI driver settings.

The EVAL-ADIN2111EBZ microcontroller communicates over a standard UART interface, with the following settings:

- Baudrate: 115200
- Data Bits: 8
- Stop Bits: 1
- Parity: none

The protocol is based on ASCII text commands and messages. Each message sent from the firmware to the host is finished by both <CR> and <LF> characters. For the commands received from host the firmware expects <CR>, <LF> or <CR> + <LF>.

(For information: <CR> .. "carriage return", ASCII code 0x0D, <LF> .. "line feed", ASCII code 0x0A)

Terminal Commands and Messages

The EVAL-ADIN2111EBZ firmware works with the common serial terminals. It has been tested on Windows platform with PuTTY, RealTerm, Termite and Hyperterminal. (*The examples in this document were captured using Compuphase Termite*).

Initial Welcome Message

When the EVAL-ADIN2111EBZ is correctly connected via the USB Virtual COM Port using the terminal software, the firmware sends an initial welcome message as displayed below.
Note that a hardware reset of the board (using S5 "RESET" button) or the 'info' command will also display the welcome message. This can be useful to check the ADIN2111 information and link status.

```
================================================
ANALOG DEVICES 10BASE-T1L Demo Serial Interface
================================================
© 2021 Analog Devices Inc. All rights reserved
================================================
Firmware ver.: 1.2.1
Board Name: EVAL-ADIN2111EBZ
Board revision: B
Board Serial Number: 12345
uC CFG3-2-1-0: ON-OFF-OFF-OFF (Mode 7)
Board Configuration:TCP/IP Stack+WebServer,DHCP,MAC Addr2
SPI Access to ADIN2111: Success
MAC address: 00:e0:22:fe:da:ca
IP Address: not assigned
CH1 Link status: Down
Master/Slave: Not run
Tx Level: Not run
CH2 Link status: Down
Master/Slave: Not run
Tx Level: Not run
================================================
Type '<?><new line>' for a list of commands
================================================
```

Terminal Commands

Command	Description	Use
macwrite	Write in MAC registers. <regAddress> and <Data> in hex	macwrite <RegAddress>,<Data> <newLine>
	Read MAC registers.	

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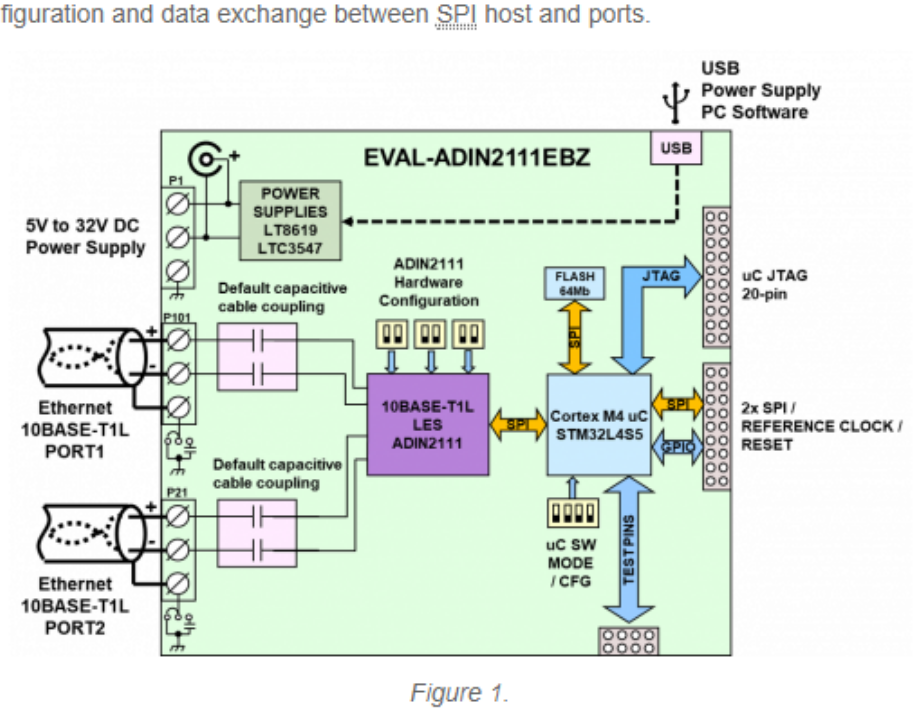
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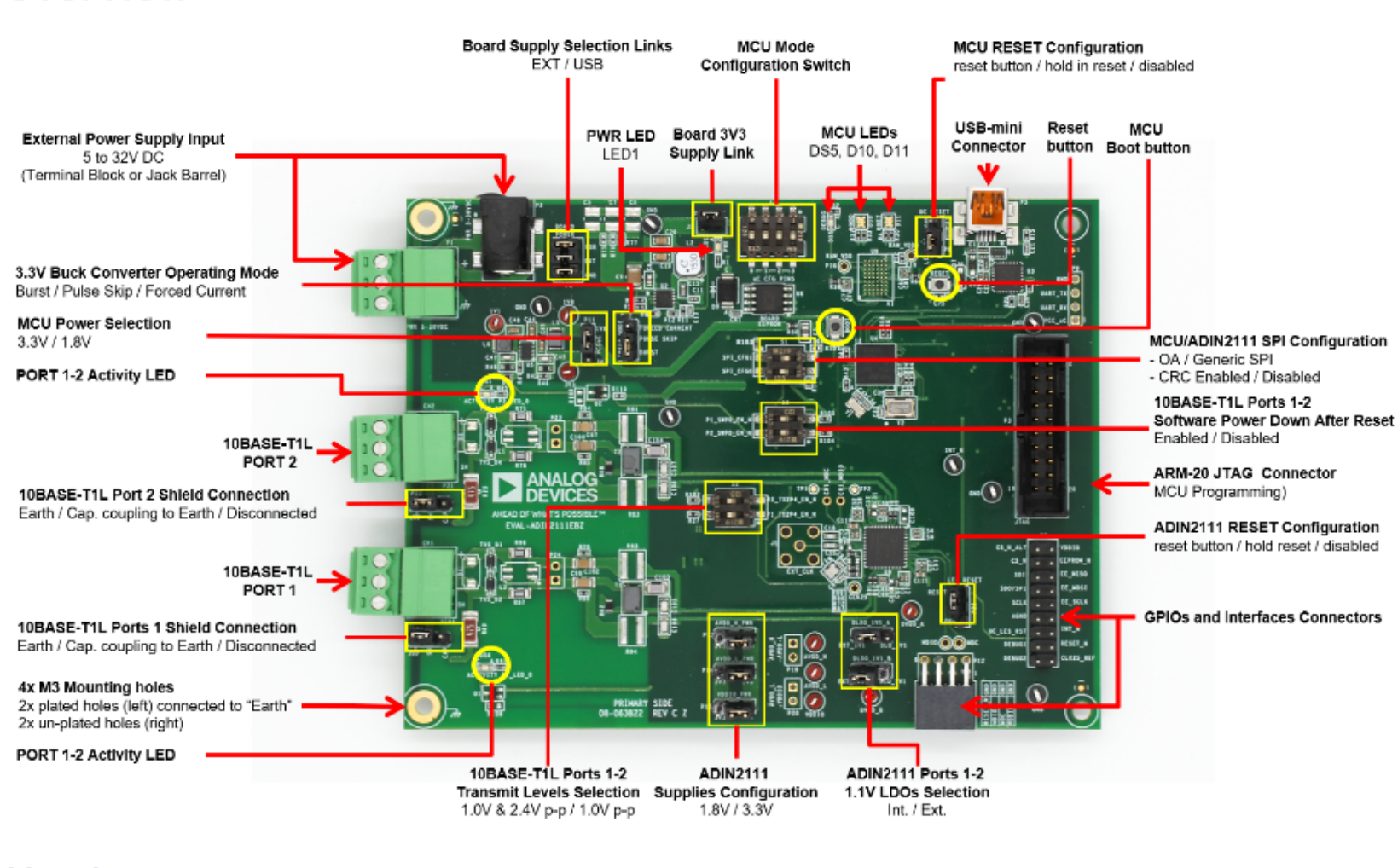
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Hardware Configuration Setup

The EVAL-ADIN2111EBZ board is provided with links (jumper) and DIP switches that can be used to set the ADIN2111 configuration. The Table 1,2 and 3 describe the links and switches functions.

Table 1. Board Link Configuration

Link Ref.	Default Position	Description
J101	Earth	CH1 Shield shorted either directly to Earth, or via 4nF cap
P22	Earth	CH2 Shield shorted either directly to Earth, or via 4nF cap
P4	EXT	USB – Connects 5V USB supply to the input of the LT8619 EXT - Connects externally supplied power from P1 or P2 to the input of LT8619
P10	Burst	FORCED CURRENT – (H) Force Continuous mode of operation of LT8619 PULSE SKIP (o/c) - Pulse-Skipping mode of operation of LT8619 BURST (L) – Burst mode of operation of LT8619
J2	Inserted	This link supplies 3.3V rail to circuitry on the board, beyond the LT8619
P11	3V3	STM32 supply voltage – choice of 3.3V or 1.8V
P13	3V3	AVDD_H supply voltage – 3.3V (1.8V to be supported in final product)
P14	3V3	AVDD_L supply voltage – choice of 3.3V or 1.8V
P15	3V3	VDDIO supply voltage – choice of 3.3V or 1.8V
DLDO_1V1_A	DLDO_1V1	DVDD_A supply voltage – choice of EXT 1V1 rail or internally generated DLDO_1V1
DLDO_1V1_B	DLDO_1V1	DVDD_B supply voltage – choice of EXT 1V1 rail or internally generated DLDO_1P1
P19	Not Inserted	Option to short AVDD_H to AVDD_L
P20	Not Inserted	Option to short AVDD_L to VDDIO
P8	LES_RST	Option to hold STM32 in reset (GND RESET) or short it to the S5 push-button reset (LES_RST)
P25	RESET_N	Option to hold LES in reset (GND RESET) or short it to the RESET_N signal

Table 2. ADIN2111 SPI Configuration , Schematics Ref. S1

Switch Position	Switch Name	Default Position	Description
1	SPI_CFG1	ON	SPI configuration 1 OFF: Generic SPI ON: Open Alliance SPI
2	SPI_CFG0	OFF	SPI configuration 0 OFF: SPI CRC/Protection enabled. ON: SPI CRC/Protection disabled

Table 3. ADIN2111 Transmit Level Configuration , Schematics Ref. S2

Switch Position	Switch Name	Default Position	Description
1	P2_TX2P4_EN_N	OFF	Port 2 Transmit 2.4V disable OFF: TX level 2.4V p-p or 1.0V p-p ON: TX level 1.0V p-p only
2	P1_TX2P4_EN_N	OFF	Port 1 Transmit 2.4V disable OFF: TX level 2.4V p-p or 1.0V p-p ON: TX level 1.0V p-p only

Table 4. ADIN2111 Software Power Down After Reset Configuration , Schematics Ref. S3

Switch Position	Switch Name	Default Position	Description
1	P2_SWPD_EN_N	OFF	Port 2 Software Power Down After Reset OFF: Disabled ON: Enabled
2	P1_SWPD_EN_N	OFF	Port 1 Software Power Down After Reset OFF: Disabled ON: Enabled

Table 3. Board LED indicators

Name (silkscreen)	Colour	Schematics Ref.	Description
PWR	GREEN	LED1	* OFF: 3.3V board power supply not available ON: 3.3V board power supply available
DEBUG	BLUE	DS5	Firmware heart beat * OFF: No firmware activity, reset or reprogram the board * Blinking: firmware running
MOD	RED GREEN	D10	Microcontroller Mode LED Modes 6,14 - TCP/IP stack enabled with fixed IP: * GREEN LED always ON * RED LED not used Modes 7,15 - TCP/IP stack enabled with fixed DHCP * GREEN ON: IP assigned * GREEN blinking: waiting for IP assignment from DHCP server * RED LED not used Modes 8,9 - Frame Generator/Frame Checker * GREEN OFF: No activity * GREEN ON: 10,000 packets transmitted and received with no error (err) or mismatched number of packets received (diff) * RED LED not used
NET	RED GREEN	D11	Error LED All modes * RED OFF No issue * RED ON Potential SPI communication error with ADIN2111 (see terminal message). Check power and SPI configuration on S1 * GREEN LED not used Modes 8,9 Only: Frame Generator/Frame Checker * RED OFF: No transmission error (err) or mismatch in number of packets received (diff) * RED ON: Transmission error (err) or mismatch in number of packets received (diff)
ACTIVITY_P2_LED0	GREEN	DS1	PORT 2 Link Activity LED * ON or blinking: Link activity * OFF: No link activity
ACTIVITY_P1_LED0	GREEN	DS6	PORT 2 Link Activity LED * ON or blinking: Link activity * OFF: No link activity

Microcontroller Modes of operation

The EVAL-ADIN2111EBZ can be used in various modes of operations implemented in the uC firmware. Up to 16 modes of operations can be selected by setting the 4 positions of the slide switch S4. The selected configuration is latched after the board is powered up or reset.

Therefore, to change the mode of operation, the board must be reset by pressing "RESET" button S5 or by applying power cycle after changing the position of the slide switch S4. The available modes of operation are described in Table 4 below.

Table 4. Firmware Modes of Operation, Schematics Ref. S4

CFG [3:0][i]	Mode No.	Operating Mode[ii]	Description
0000	15	TCP/IP Stack & Web Server, DHCP client, MAC Addr1	In this mode, the TCP/IP stack can be managed via UART using dynamic IP address allocation. The media converter board is then used to convert 10BASE-T1L to 10BASE-T ethernet, for which common web browsers can be used to access the associated information. MAC address 1 is used.
0001	14	TCP/IP Stack & Web Server, Fixed IP, MAC Addr1	This is a similar mode to the previous one except fixed IP address allocation is used. MAC address 1 is used.
0010	13	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0011	12	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0100	11	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0101	10	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
0110	9	PHY2 Frame Generator Checker / PHY1 MAC Remote Loopback MSE reading enabled	PHY2 is set in Frame Generator/Checker Mode PHY1 is set in MAC Interface Remote loopback mode MSE readings are shown on UART. Link LED is also enabled.
0111	8	PHY1 Frame Generator Checker / PHY2 MAC Remote Loopback MSE reading enabled	PHY1 is set in Frame Generator/Checker Mode PHY2 is set in MAC Interface Remote loopback mode MSE readings are shown on UART. Link LED is also enabled.
1000	7	TCP/IP Stack & Web Server, DHCP client, MAC Addr2	The use of this mode is depicted in Figure 11. In this mode, the TCP/IP stack can be managed via UART using dynamic IP address allocation. The media converter board is then used to convert 10BASE-T1L to 10BASE-T ethernet, for which common web browsers can be used to access the associated information. MAC address 2 is used.
1001	6	TCP/IP Stack & Web Server, Fixed IP, MAC Addr2	This is a similar mode to the previous one except fixed IP address allocation is used. MAC address 2 is used.
1010	5	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1011	4	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1100	3	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1101	2	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
2111	1	RESERVED	The uC makes no autonomous attempt to interact with the ADIN2111
1111	0	Reset ADIN2111	Keep the the ADIN2111 in reset mode

[i] *Switch in ON position = signal logic 0 for microcontroller (shorted to ground).*
Switch in OFF position = signal logic 1 (pulled up by a resistor)

[ii] *RESERVED means the microcontroller and command line interface is active (serial port).*

Software

The EVAL-ADIN2111EBZ can be used as a stand-alone board, with the firmware already pre-programmed in the microcontroller flash memory. The mode of operation can be set using the S4 Configuration DIP switch and the link status is indicated by LEDs. There is no software required for this stand-alone use case.

The EVAL-ADIN2111EBZ can also be interfaced with a host computer via the USB port. The full set of ADIN2111 PHY and MAC registers and features such as link quality monitoring can be accessed via the command line interface.

Note that the default firmware is configured with the SPI interface set to OPEN Alliance SPI with Protection enabled. The ADIN2111 hardware configurations pins must be set accordingly using the DIP switch S1 (see table 2 for reference).

Driver For USB COM Port

The EVAL-ADIN2111EBZ has an onboard USB-UART converter (FTDI FT232R).

Ensure that the appropriate Virtual Com Port driver is installed on the host platform before connecting the EVAL-ADIN2111EBZ to the host computer via the USB cable.

The drivers are available from FTDI, at the time of writing this document at https://ftdichip.com/drivers/vcp-drivers/

COM Port and Terminal Settings

When the EVAL-ADIN2111EBZ is connected to the host, it will become available in the host system as a USB Com Port, and will be assigned a com port number. The number will depend on the system settings, on com port devices previously connected and assigned in the system, and on the FTDI driver settings.

The EVAL-ADIN2111EBZ microcontroller communicates over a standard UART interface, with the following settings:

- Baudrate: 115200
- Data Bits: 8
- Stop Bits: 1
- Parity: none

The protocol is based on ASCII text commands and messages. Each message sent from the firmware to the host is finished by both <CR> and <LF> characters. For the commands received from host the firmware expects <CR>, <LF> or <CR> + <LF>.

(For information: <CR> .. "carriage return", ASCII code 0x0D, <LF> .. "line feed", ASCII code 0x0A)

Terminal Commands and Messages

The EVAL-ADIN2111EBZ firmware works with the common serial terminals. It has been tested on Windows platform with PuTTY, RealTerm, Termite and Hyperterminal. (*The examples in this document were captured using Compuphase Termite*).

Initial Welcome Message

When the EVAL-ADIN2111EBZ is correctly connected via the USB Virtual COM Port using the terminal software, the firmware sends an initial welcome message as displayed below.
Note that a hardware reset of the board (using S5 "RESET" button) or the 'info' command will also display the welcome message. This can be useful to check the ADIN2111 information and link status.

```
================================================
ANALOG DEVICES 10BASE-T1L Demo Serial Interface
================================================
© 2021 Analog Devices Inc. All rights reserved
================================================
Firmware ver.: 1.2.1
Board Name: EVAL-ADIN2111EBZ
Board revision: B
Board Serial Number: 12345
uC CFG3-2-1-0: ON-OFF-OFF-OFF (Mode 7)
Board Configuration:TCP/IP Stack+WebServer,DHCP,MAC Addr2
SPI Access to ADIN2111: Success
MAC address: 00:e0:22:fe:da:ca
IP Address: not assigned
CH1 Link status: Down
Master/Slave: Not run
Tx Level: Not run
CH2 Link status: Down
Master/Slave: Not run
Tx Level: Not run
================================================
Type '<?><new line>' for a list of commands
================================================
```

Terminal Commands

Command	Description	Use
macwrite	Write in MAC registers. <regAddress> and <Data> in hex	macwrite <RegAddress>,<Data> <newLine>
	Read MAC registers.	