Application Note

AFBR-FSEK50B00E

Gigabit Ethernet Evaluation Kit for the AFBR-FS50B00 Optical Wireless Transceiver

Overview

This application note introduces the Broadcom® AFBR-FSEK50B00E Evaluation Kit, which has been designed to be used as an evaluation platform for the Optical Wireless Transceiver AFBR-FS50B00. This document describes in detail the two types of boards in the evaluation kit and a very simple test setup used to check whether the kit works correctly prior to testing any user application.

Evaluation Kit

The evaluation kit includes:

- Two PCBs with RJ-45 connector and IC BCM54210, which implements the functionality of a Media Converter (boards A and D in Figure 2).
- Two PCBs with Optical Wireless Transceiver AFBR-FS50B00 (boards B and C in Figure 2).
- One USB memory stick containing technical documentation.

The evaluation kit does not include:

- CAT5 cables required for GbE communications between the evaluation kit and the user's application.
- Micro USB cables required for power supply.

Introduction

The evaluation kit AFBR-FSEK50B00E, presented in this application note, gives the system designer a convenient means to evaluate the performance of the Optical Wireless Transceiver AFBR-FS50B00.

Figure 1 shows the evaluation kit AFBR-FSEK50B00E.

Figure 1: Evaluation Kit AFBR-FSEK50B00E

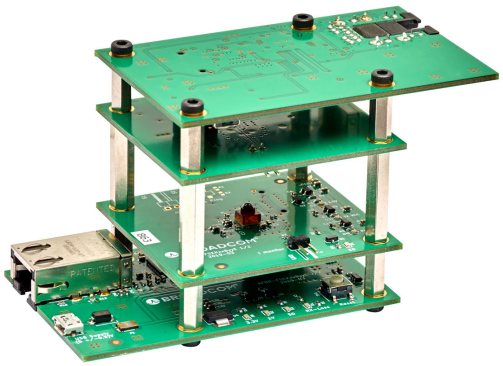
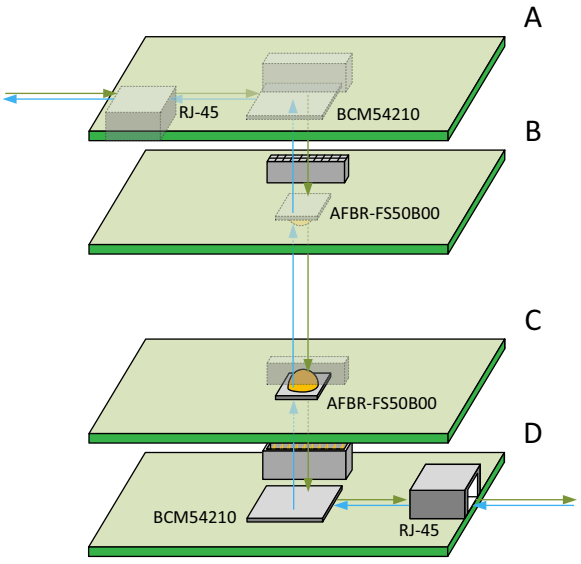


Figure 2 shows a sketch of the structure of the evaluation kit AFBR-FSEK50B00E.

Figure 2: Sketch of the Evaluation Kit AFBR-FSEK50B00E



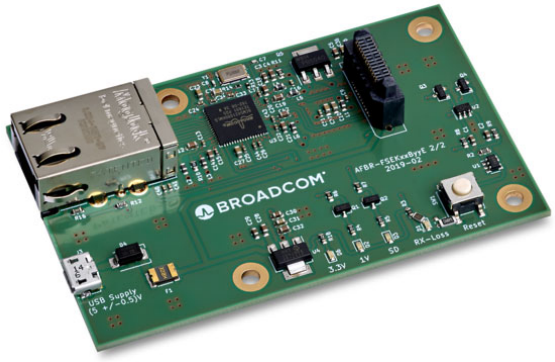
PCB Description

The evaluation kit AFBR-FSEK50B00E consists of four boards, grouped in two types: two Media Converter PCBs plus two Optical Wireless Transceiver Front-end PCBs.

Media Converter PCB

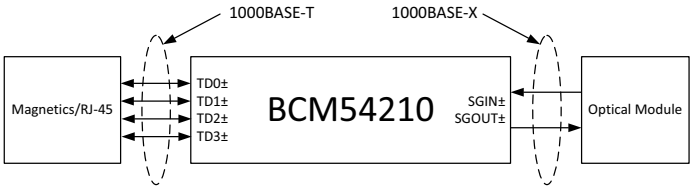
Figure 3 shows the Media Converter PCB.

Figure 3: Media Converter PCB



This PCB, which has been designated as board A and board D in Figure 2, is based on the chip BCM54210 from Broadcom. In the AFBR-FSEK50B00E evaluation kit, the BCM54210 chip has been configured to operate as a 1000BASE-T-to-1000BASE-X Media Converter, as shown in Figure 4.

Figure 4: Media Converter Block Diagram



The Media Converter operation mode allows the communication between the user's application connected to the RJ-45 connector located on this PCB and the Optical Wireless Transceiver AFBR-FS50B00 located on the Optical Wireless Transceiver Front-end PCB. The device receives the data stream from the user's application through the RJ-45 port of boards A or D and delivers it to the Optical Wireless Transceiver AFBRFS50B00 of boards B or C (see Figure 2). It also receives the data stream from the Optical Wireless Transceiver AFBR-FS50B00 of boards B or C and delivers it to the user's application through the RJ-45 port of boards A or D.

Differential data lines and a connector designed for high-speed communication connect the BCM54210 chip to the Optical Wireless Transceiver AFBR-FS50B00.

There are a few status LEDs available on this PCB:

- Signal Detect (SD) LED: It turns green when the receiver of the AFBR-FS50B00 module receives a valid optical data signal at its input. It is OFF otherwise.
- Rx Loss status LED: It turns red when the receiver of the copper link does not receive a valid data signal. It is OFF otherwise.
- 3.3V status LED: It turns green if the corresponding power supply works correctly.
- 1.0V status LED: It turns green if the corresponding power supply works correctly.

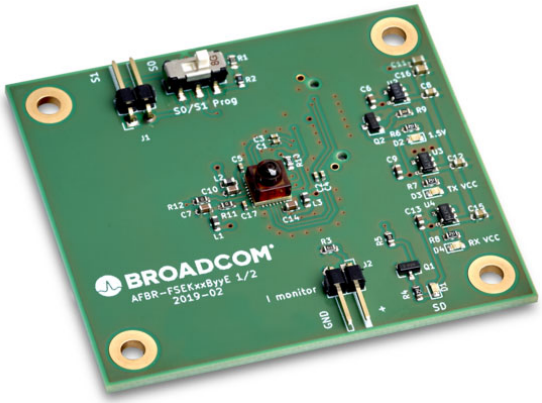
There is also one reset button on this PCB. When pressed, this button resets the BCM54210 device.

While 3.3V is the main voltage required by both the BCM54210 chip and the Optical Wireless Transceiver AFBR-FS50B00, 1.0V is the voltage required by the PLL included in the BCM54210 chip. This latter voltage is internally generated by the BCM54210 chip.

Optical Wireless Transceiver Front-End PCB

Figure 5 shows the Optical Wireless Transceiver Front-end PCB.

Figure 5: Optical Wireless Transceiver Front-End PCB



This PCB has been designated as board B and board C in Figure 2.

The main element on this PCB is the Optical Wireless Transceiver AFBR-FS50B00, which is the device under evaluation.

In the configuration of the AFBR-FSEK50B00E evaluation kit, the Optical Wireless Transceiver AFBR-FS50B00 allows data communication at up to 1.25 Gb/s.

This PCB is connected to the Media converter PCB by means of a high-speed connector. This connector is used to transfer data as well as to supply the 5.0V coming from the Micro USB connector available on the Media Converter PCB.

The 3.3V required by the Optical Wireless Transceiver AFBR-FS50B00 are generated from the 5.0V supplied through the high-speed connector by means of voltage regulators.

Three status LEDs are available on this PCB:

- Tx VCC status LED.
- Rx VCC status LED.
- 1.5V status LED.

The purpose of the Tx and Rx status LEDs is to provide information on the correctness of the voltage supplies. They turn green if the corresponding power supply works correctly. The 1.5V status LED is not used.

NOTE: There is also one S1/S2-Prog switch on this PCB. It MUST be in the Prog position.

Test Setup

The easiest way to check whether the evaluation kit works correctly is to connect one of the RJ-45 ports of the kit to a PC with a GbE-capable (1000BASE-T) LAN card and the other RJ-45 connector to a router with GbE-capable (1000BASE-T) ports and access to the Internet, and then ping any website or browse the World Wide Web.

Figure 6 shows a block diagram of the connection described between the evaluation kit, the PC, and the router.

Figure 6: Block Diagram of the Test Setup

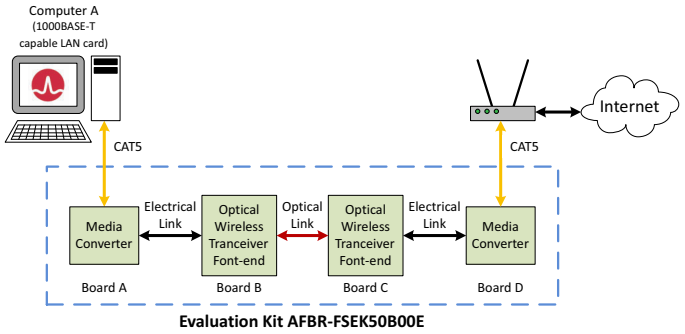
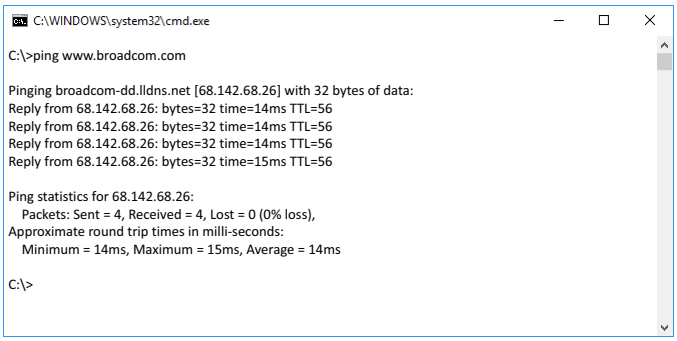


Figure 7 shows the output given by the Windows command when the site www.broadcom.com is pinged.

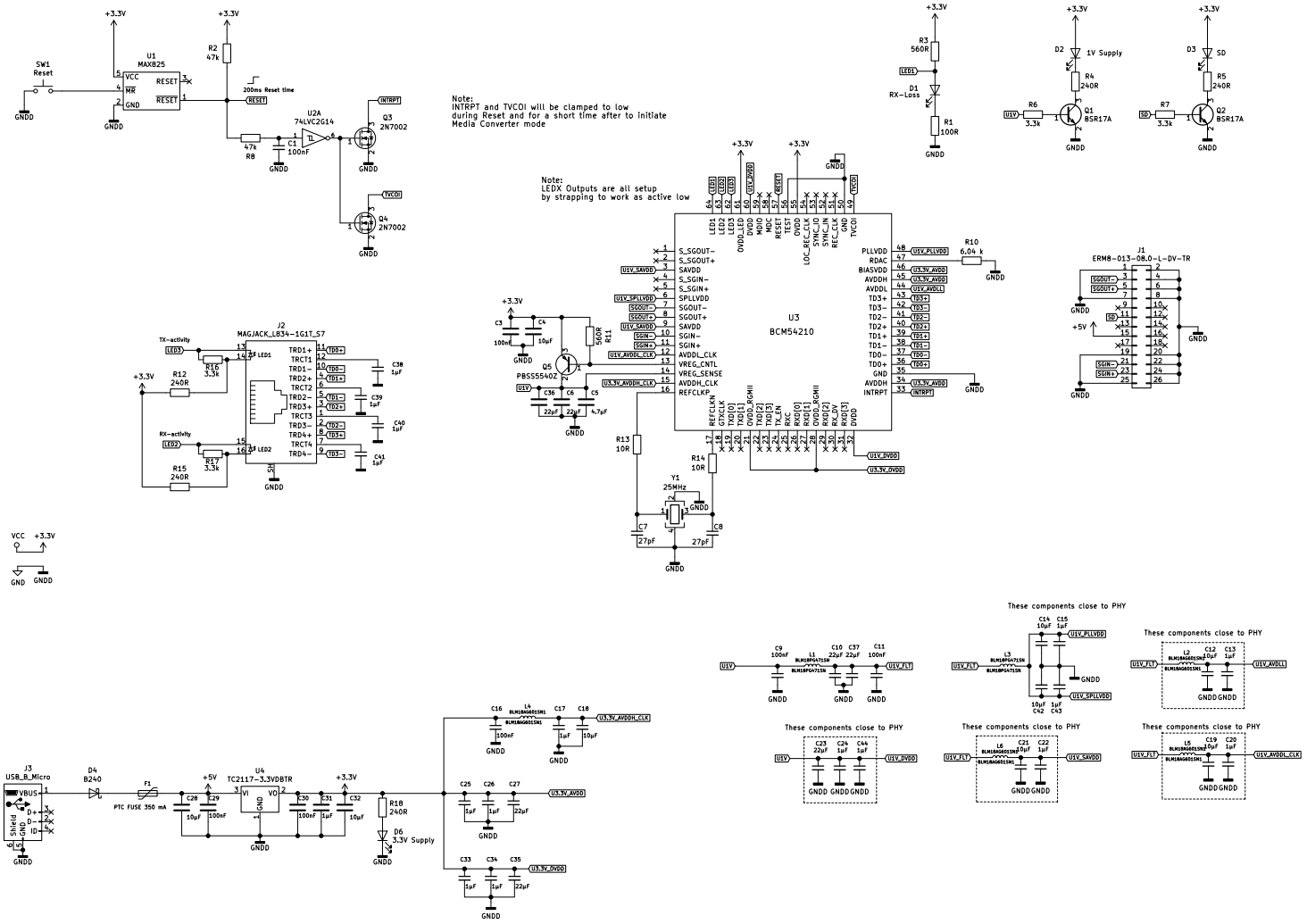
Figure 7: Output of Windows Command when www.broadcom.com Is Pinged



ATTENTION: The link between the systems connected to the two RJ-45 ports of the AFBR-FSEK50B00E evaluation kit might not be established if power is supplied to the boards A and D (see Figure 2) simultaneously. To ensure that the link between the systems will be set up correctly, there must be a delay of at least 1 second between power up of the first board and power up of the second board.

Schematics

Media Converter PCB



Optical Wireless Transceiver Front-End PCB