

AFBR-0978Z Evaluation Board

Digital Diagnostic 650 nm Transceiver for Ethernet (10/100 Mbps) with SC-RJ connector



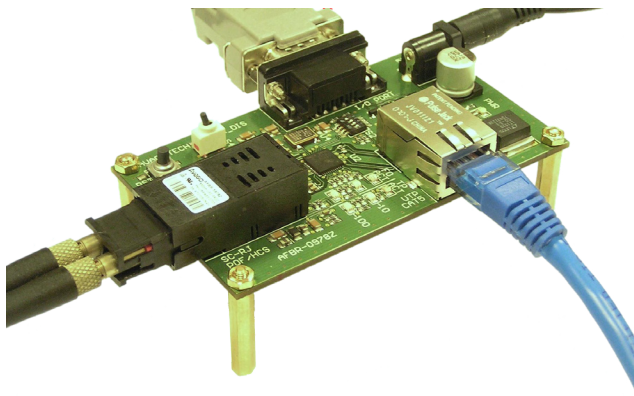
Application Note 5325

Introduction

The AFBR-5978Z transceiver provides the system designer with the ability to implement Fast Ethernet (100 Mbps) or Ethernet (10 Mbps) over standard bandwidth 0.5 NA Plastic Optical Fiber (POF) and 0.37 NA Hard Clad Silica (HCS) fiber. The AFBR-5978Z transceiver features an advanced digital diagnostic interface, compliant to the "Digital Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472 Multi-source Agreement. The connectivity available for the transceiver is SC-RJ. This product is lead free and compliant with RoHS.

AFBR-0978Z Evaluation Kit

The evaluation kit AFBR-0978Z includes two evaluation boards, an I/O cable, a SC-RJ optical cable, a CD containing user software and documentation. The evaluation boards are POF/HCS to UTP media converters for easy integration in an existing Fast Ethernet infrastructure and have several features to easily and effectively evaluate the performance of the AFBR-5978Z transceiver.



Features

- Temperature and supply voltage of the transceiver can be monitored real-time as well as the received optical modulation amplitude, which is a measure for the optical link quality;
- DMI alarm and warning levels can be retrieved and the alarm and warning flags monitored;
- Transceiver Serial ID information can be retrieved;
- Supports 10 Mbps and 100 Mbps operation in hardware and software configurable modes:
 - Forced 10 Mbps only mode;
 - Forced 100 Mbps only mode;
 - Non-transparent half duplex auto-negotiation;
 - Non-transparent full duplex auto-negotiation;
 - Transparent with auto-negotiation;
- Loopback modes for both twisted pair interface as well as fiber optic interface;
- Data Output Off mode for both twisted pair as fiber optic interface;
- Hardware Link Integrity Warning function for selected modes;
- Transmitter Disable mode of the transceiver can be toggled manually on the board or controlled and monitored via software;
- Status LEDs indicating 3.3 V power supply, current speed selection for fiber optic and twisted pair interface, current activity for fiber optic and twisted pair interface.

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AFBR-5978Z is compatible with the SC-RJ Connecting System from Reichle & De-Massari AG, Switzerland

AFBR-0978Z Circuit Design

The evaluation board (Figure 1) is based on the reference design for the AFBR-5978Z transceiver (see application note 5289).

The data signal from the twisted pair medium is routed through magnetics to the media converter IC ML6652 input pins (TPINP and TPINN); a 100 Ω resistor provides the termination. The transmitter outputs of the ML6652 (IOUT and IOUT#) are directly connected, over a 50 Ω transmission line, to the input of the transceiver with a pull-up resistor of 75 Ω to Vcc, which is placed close to the transceiver. No external capacitor is required since the $\overline{\text{TD}}$ and TD inputs of the transceiver are internally AC coupled.

The data signal is routed over a 50 Ω transmission line from the transceiver RD and $\overline{\text{RD}}$ outputs to the input pins of the ML6652 (FOINP and FOINN). These LVPECL inputs are internally biased and need to be AC coupled. The AFBR-5978Z datasheet states in the functional I/O section that when AC coupling is used, the LVPECL outputs of the transceiver have to be pulled to ground before the AC coupling to DC bias the output. This is achieved by use of a bias resistor of 160 Ω . The twisted pair outputs of the ML6652 (TPOUTP and TPOUTN) are a differential current output pair that drives the data signal through the magnetics into the twisted pair medium. Both outputs are pulled up to Vcc by a 50 Ω resistor.

Board Power

The supplied 5 V power adapter is connected to the board by a DC plug and is suitable for 220 V/50 Hz or 110 V/60 Hz outlets. Note that this power adapter does not ground the board to earth. To avoid damage to measurement equipment connected to the board or incorrect measurement results, make sure the evaluation board is connected to ground. Connecting one of the I/O ground pins or the DC plug ground pin to earth accomplishes this.

Initial Setup

The twisted pair interface (RJ-45 port) is configured in a straight-through mode. If the evaluation kit is used to link two Ethernet devices, one of these devices should be a hub or switch. Otherwise one cross-over cable needs to be used to complete the link.

To get started it is recommended to set-up both AFBR-0978Z boards in the “transparent with auto-negotiation” mode. This is established by setting S2: 1-OFF, 2-OFF, 3-OFF, 4-ON and setting S3: all OFF. See table 1 for other settings.

Once the hardware configuration has been set, the AFBR-0978Z evaluation board is ready to be incorporated in the Ethernet (test) environment.

Table 1. Function descriptions and switch settings for DIP switches S2 and S3

S2	Function	Switch	State	S3	Function	Switch	State
	Twisted Pair output ON	1	OFF		Forced 10 Mbps mode	1	OFF
	Twisted Pair output OFF	1	ON		(auto-negotiation is off, duplex mode is selected by link partners)	2	ON
	Fiber Optic output ON	2	OFF			3	OFF
	Fiber Optic output OFF	2	ON			4	OFF
	Link Integrity Warning mode enabled (works only if media converter is set in Forced 10 or 100 Mbps mode)	3	ON		Forced 100 Mbps mode (auto-negotiation is off, duplex mode is selected by link partners)	1	ON
		4	OFF			2	OFF
	Link Integrity Warning mode disabled (default)	3	OFF			3	OFF
		4	ON			4	OFF
					Non-transparent half duplex auto-negotiation (for FO partner without auto-negotiation, only half duplex is advertised)	1	OFF
						2	OFF
						3	ON
						4	OFF
					Non-transparent auto-negotiation (for FO partner without auto-negotiation)	1	OFF
						2	OFF
						3	OFF
						4	ON
					Transparent with auto-negotiation (suitable when both FO and TP partners support auto-negotiation)	1	OFF
						2	OFF
						3	OFF
						4	OFF

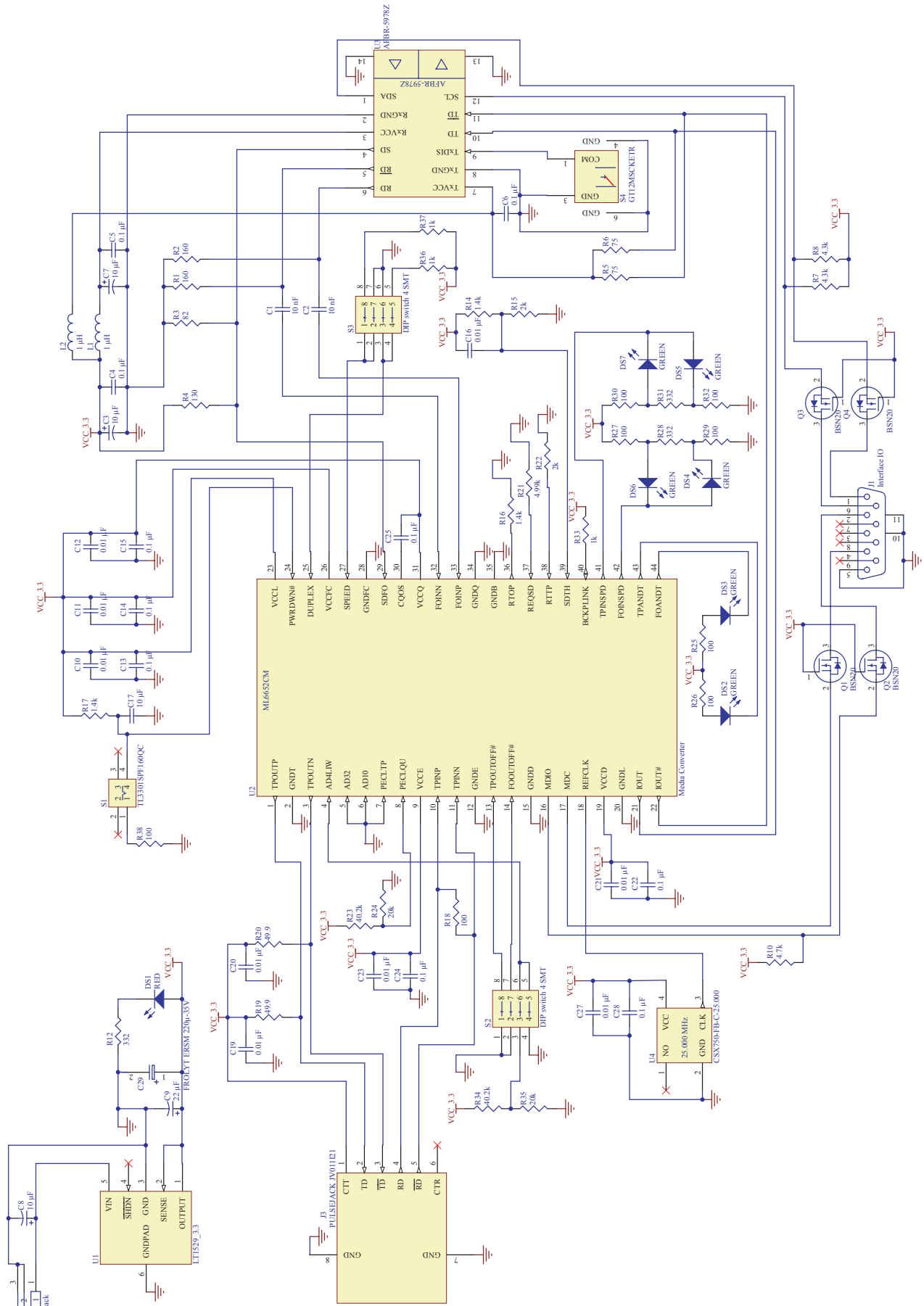


Figure 1. Schematic of the AFBR-0978Z evaluation board featuring a fully configurable media converter

AFBR-0978Z Software

The evaluation kit comes with a special software program for direct control of the evaluation board (see Figure 2).

Hardware requirements: PC with at least one ECP parallel printer port, Windows® 2000 or XP. Windows® Vista™ is not supported.

A more detailed description of the hardware configuration and software functionality is given in the AFBR-0978Z user manual.

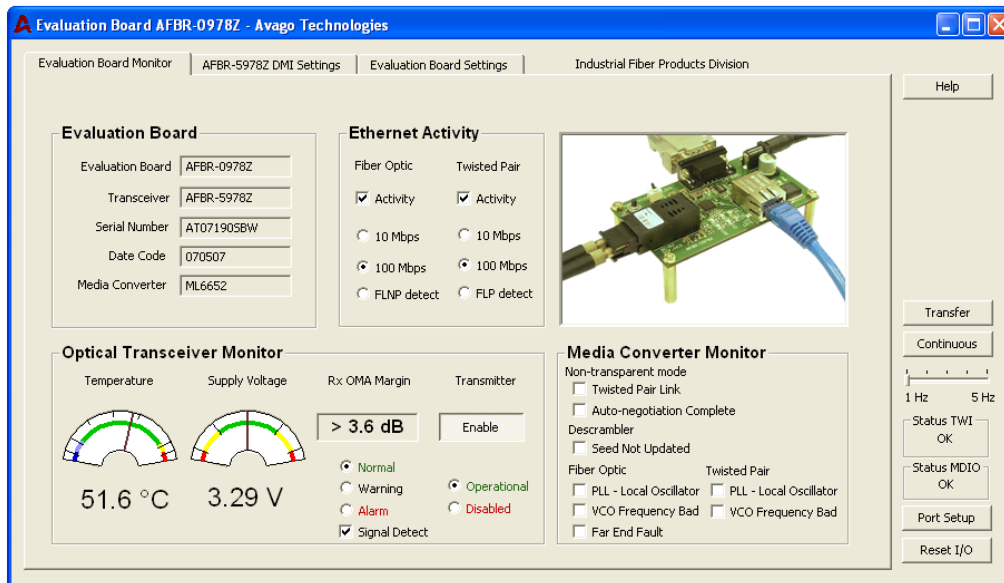


Figure 2. The AFBR-0978Z software interface

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