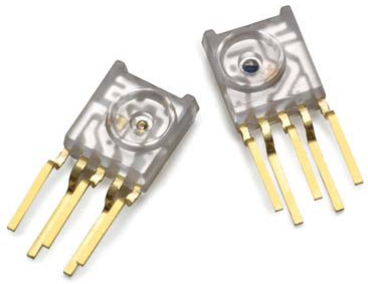
AFBR-1125Z / AFBR-2125Z

650nm Transceiver for Fast Ethernet

Data Sheet



Description

The AFBR-1125Z/ AFBR-2125Z transceiver provides the system designer with a capability to implement Fast Ethernet (125 Mbd/ 100 Mbps) over standard Polymer Optical Fiber (POF).

Transmitter

The transmitter consists of 650nm LED with an integrated driver. The LED driver operates at 3.3V. It receives LVPECL electrical input and converts it into a modulated current driving the LED. The optical subassembly efficiently couples the output power to POF.

Receiver

The receiver has a Si PIN photodiode with an integrated driver which is packaged in an optical sub-assembly. The integrated IC operates at 3.3V and converts the photocurrent to LVPECL electrical output

Signal Detect (SD)

A LVPCEL Signal Detect (SD) output is provided to indicate the presence of an optical signal. The SD output can be used to wake up the network node from sleep mode or to control a status LED, or to detect an open link

Features

- Compatible with IEEE 802.3u Fast Ethernet data communications standard
- Logic interface compatible with LVPECL (Low Voltage Positive Emitter Coupled Logic)
- Integrated CMOS driver IC
- Optimized for high-speed Fast Ethernet
- RoHS compliant (Lead free and halogen free)
- Integrated optics to efficiently focus light for fiber coupling
- Compatible with standard step index 1mm POF with a NA of 0.5 or 0.3
- Low power consumption
- Transmission length up to 100m (depending on installation conditions)
- No light toggling of LED at no signals on the input data lines.
- Optional Electrical power saving features

Applications

- Home/Office Networking
- Industrial

Absolute maximum ratings [1]

Parameter	Symbol	Min.	Max.	Units
Supply Voltage	V_{dd}	-0.5	4.5	V
Storage Temperature	T_{STG}	-40	+100	°C
Soldering Temperature (distance to package >2.2mm, 5sec, 3 times)	T_{sold}		260	°C
Electrostatic Voltage Capability 2	ESD		2.0	kV
Operating temperature (ambient)	T_A	-20	+70	°C

Notes:
1. Operation of these devices beyond Absolute Maximum Ratings can result in damage to the FOT devices
2. ESD Capability for all Pins human body model (HBM) according to JESD22-A114B

AFBR-1125Z (Transmitter)

Transmitter Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
DC Supply Voltage	V_{dd}	3.0	3.3	3.6	V
Current Consumption	I_{dd}		23	40	mA
Data Rate	DR		100		Mbps
Baud Rate	BR		125		Mbd
Input Capacitance	C_{IN}			5	pF
Input Resistance (differential)	R_{IN}		10		kΩ
Input Common-Mode Range	$V_{IN-BIAS}$	GND+0.8		V_{dd}-0.8	V
Input Voltage Swing (pk-pk)	$V_{IN-SWING}$	200		2400	mV

Transmitter Optical Characteristics (with standard POF NA = 0.5)

Parameter	Symbol	Min.	Typ.	Max.	Units
Central wavelength [1]	λc	635	650	675	nm
Spectral Bandwidth (RMS) [1]	λ			17	nm
Average Output Power [1]	P_O	-8.5		-2.0	dBm
Optical Rise Time (20% - 80%) [1]	T_R		1.2	3.0	ns
Optical Fall Time (80% - 20%) [1]	T_F		1.2	3.0	ns
Extinction Ratio [1]	EXT	10	13		dB
Random jitter [1,2]	RJ			0.76	ns
Data dependent jitter [1]	DDJ			0.6	ns
Duty cycle distortion [1]	DCD			1.0	ns

Notes:
1. Measured at the end of 1m plastic optical fiber (POF) with PRBS 2^7-1 sequence
2. Peak to peak measurement, based on BER = 2.5 x 10^{-10}

Transmitter Pin Description

Pin No.	Name	Symbol
1	Data Input (Negative)	TD-
2	Data Input (Positive)	TD+
3	Ground	GND
4	DC Supply Voltage	Vdd
5	Ground	GND

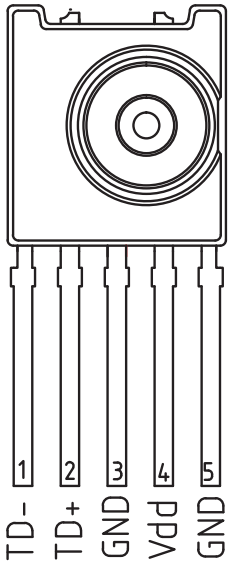


Figure 1. Transmitter Pin Layout

Package Dimensions Transmitter

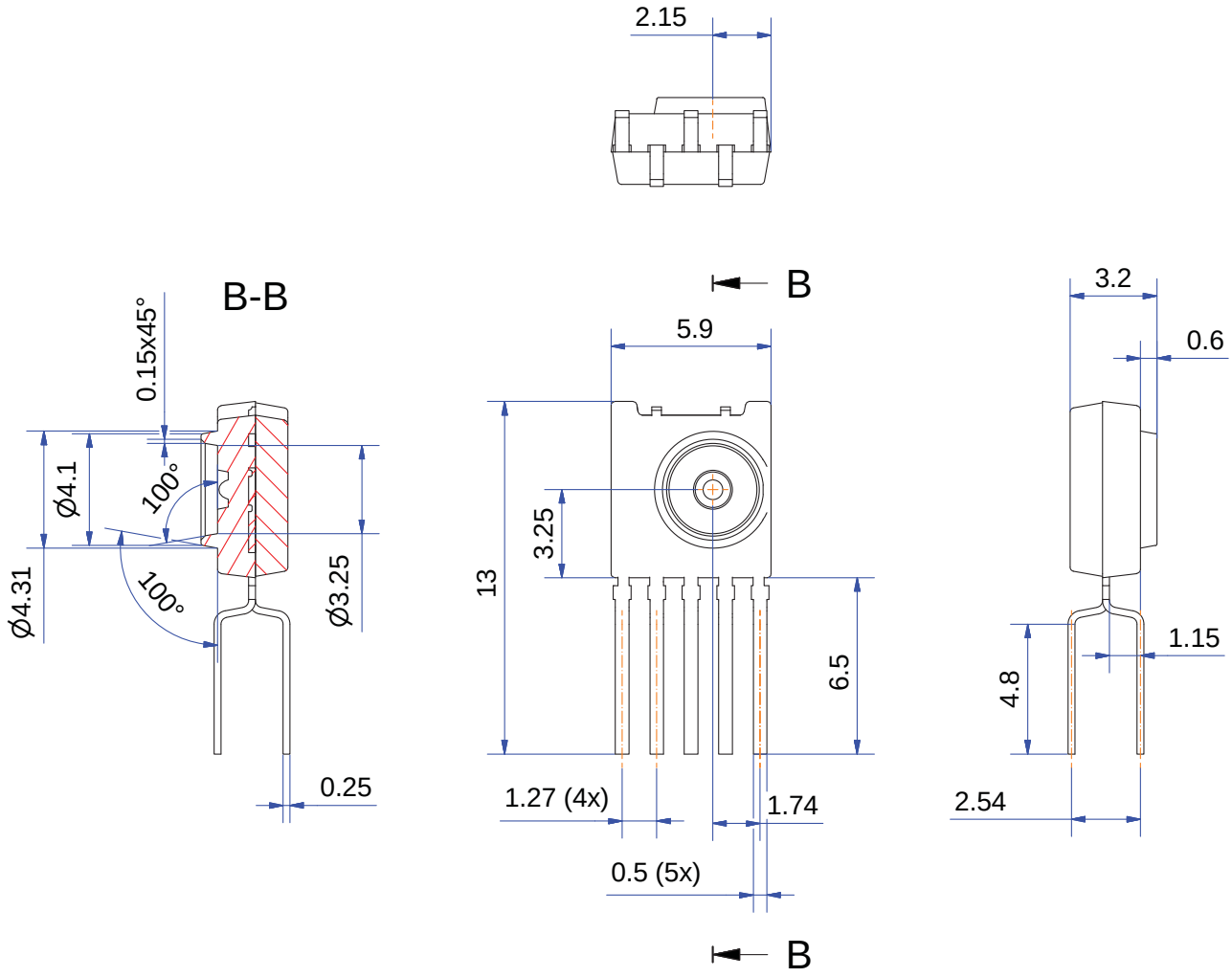


Figure 2. Package Outline Drawing Transmitter

AFBR-2125Z (Receiver)

Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
DC Supply Voltage	V_{dd}	3.0	3.3	3.6	V
Current Consumption	I_{dd}		44	55	mA
Output Offset Voltage	$(V_{QH}+V_{QnL})/2$		V_{dd} -1.2		V
Data Output Voltage Swing [2]	$\|V_{OH}-V_{OL}\|$	500		900	mV
Output Rise/ Fall Time (10% - 90%) [1]	T_R		2.5	3	ns
Output Fall time (90% - 10%) [1]	T_F		2.5	3	ns
Duty cycle distortion [1]	DCD			1.0	ns
Data dependent jitter [1]	DDJ			1.2	ns
Random jitter [1,3]	RJ			2.14	ns

Notes:
1. Measured with PRBS2^7-1 sequence
2. Single ended
3. Peak to peak measurement

Receiver Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Central wavelength [1]	λc	635	650	675	nm
Minimum Receiver Input Power [1]	$P_{in\ Min}$	-24			dBm
Maximum receiver Input power [1]	$P_{in\ Max}$			-2	dBm
Signal Detect Output Voltage – Low [2]	V_{OL}-V_{dd}	-1.83	-1.75	-1.50	V
Signal Detect Output Voltage – High [2]	V_{OH}-V_{dd}	-1.16	-1.10	-0.88	V
Signal Detect Asserted	P_A		-29		dBm
Signal Detect De-asserted	P_D		-31		dBm
Signal Detect Hysteresis	P_A-P_D	0.5	1.5		dB

Notes:
1. Averaged optical power, measured with a PRBS 2^7-1 sequence, BER < 10^{-9}
2. Termination as shown in Figure 5

Receiver Pin Description

Pin No.	Name	Symbol
1	DC Supply Voltage	Vdd
2	Ground	GND
3	Output Signal Detect	SD
4	Data Output (Negative)	RD-
5	Data Output (Positive)	RD+

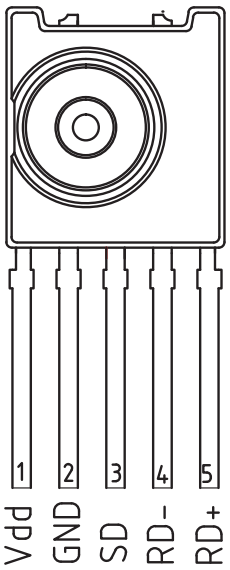


Figure 3. Receiver Pin Layout

Mechanical Data Receiver

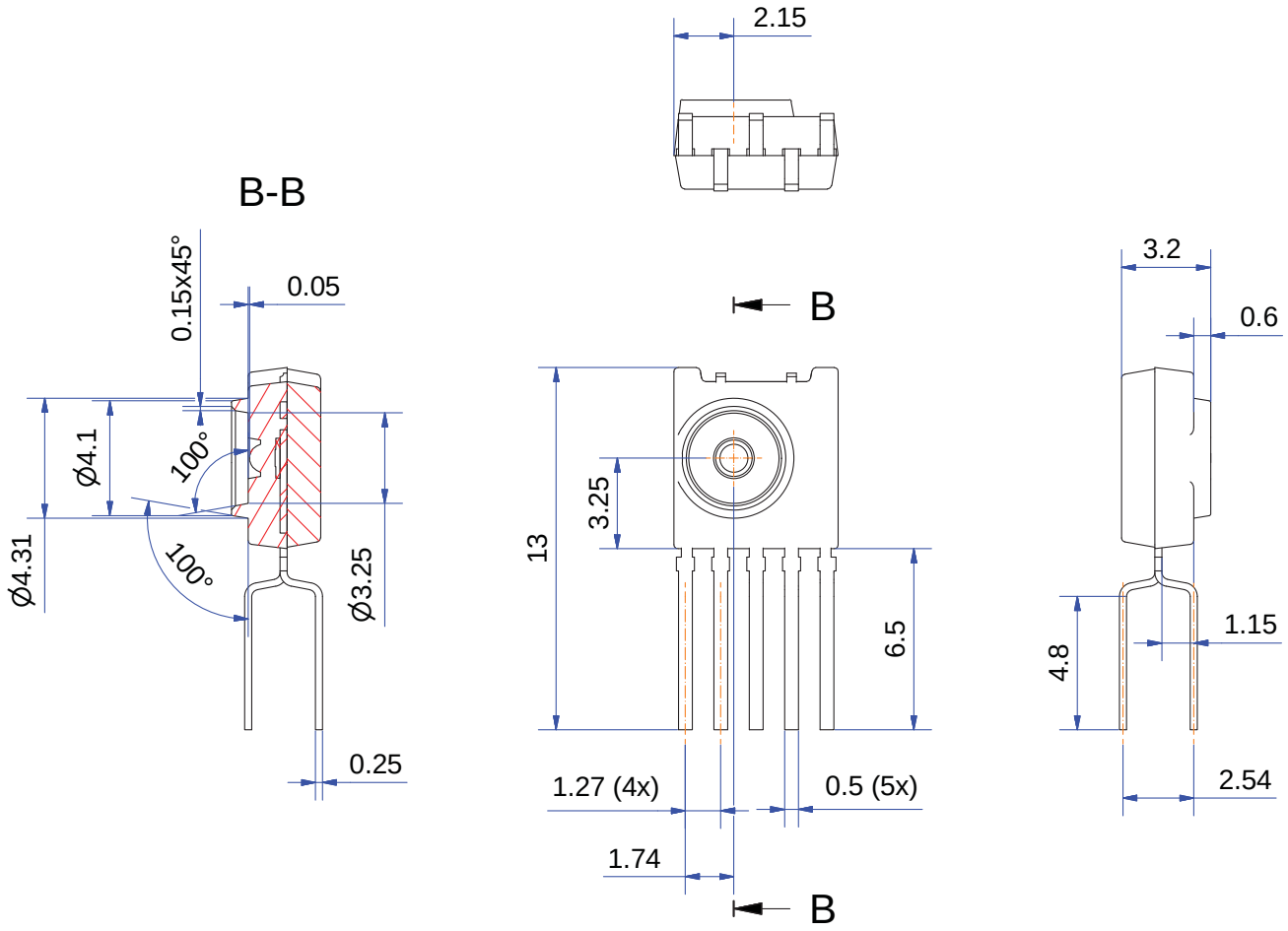


Figure 4. Package Outline Drawing Receiver

Device Marking

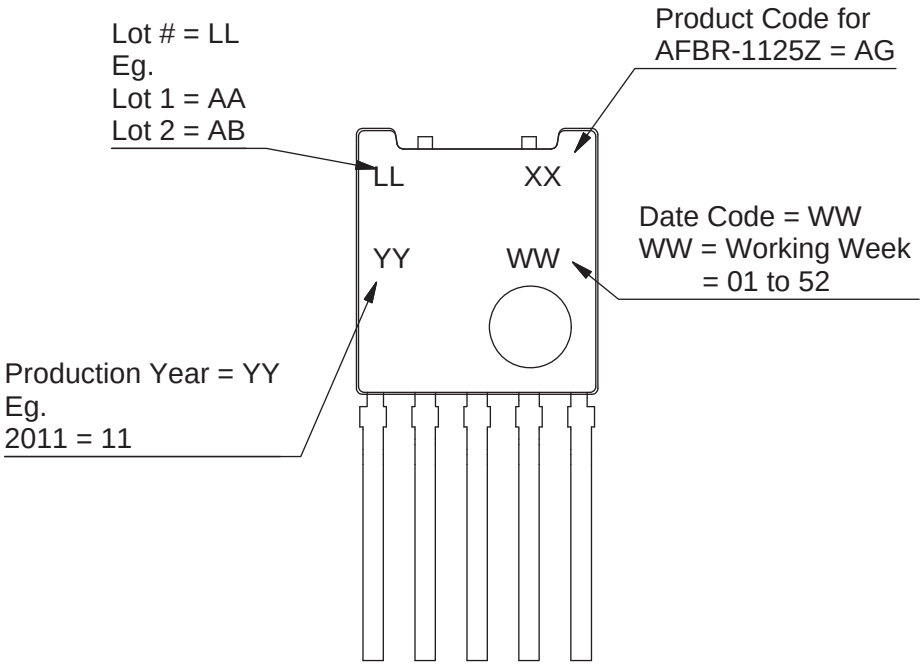


Figure 5. Transmitter Device Marking

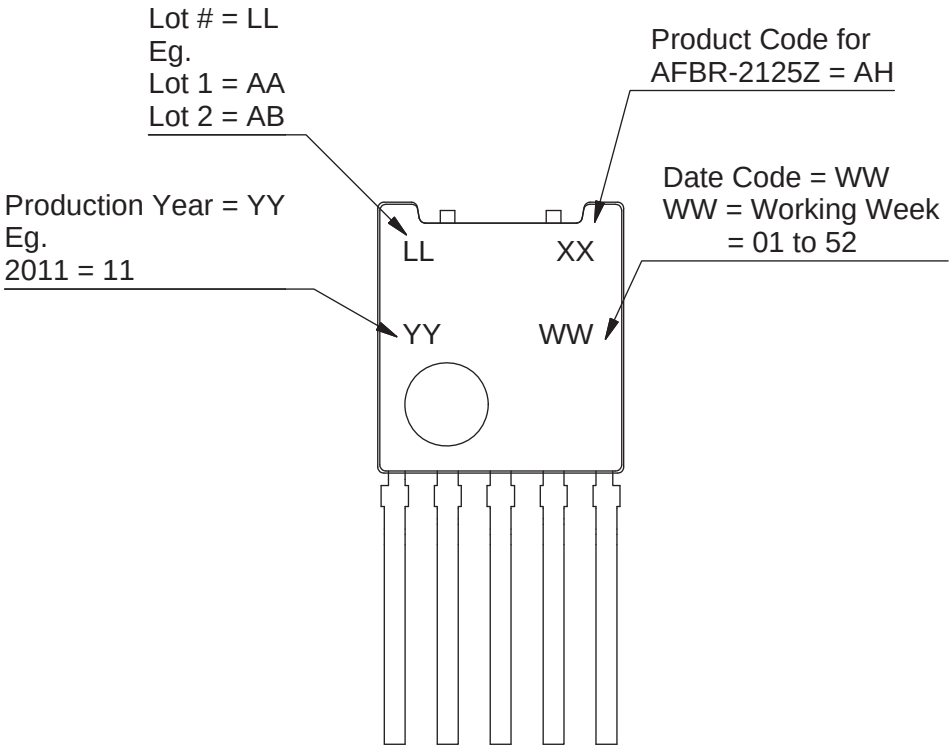


Figure 6. Receiver Device Marking

General Application Circuit

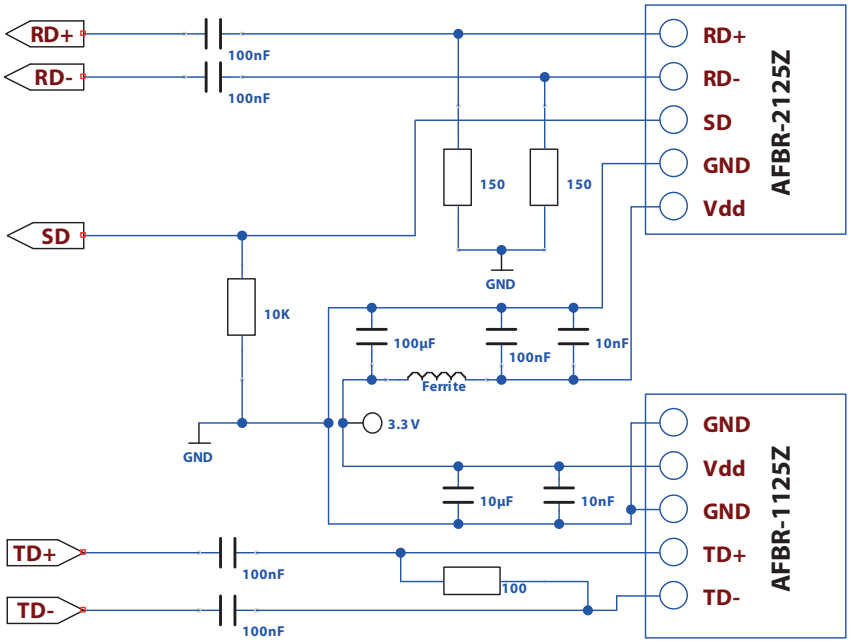


Figure 7. General Application Circuit

Note: Figure 7 shows the minimum external circuitry at AC-coupling for the connection of the optical receiver to a FE-PHY. DC-coupling would be possible, if the common mode voltage and voltage swing at the data lines are within the recommended values (see electrical characteristics, parameters). Please use the product information of the actual Fast Ethernet PHY for connecting to the optical transmitter.

Board layout- Decoupling circuit and Ground Planes

It is important to take care in the layout of your circuit board to achieve optimum performance from the transceiver. A power supply decoupling circuit is recommended to filter out noise and to assure optical product performance. It is further recommended that a contiguous signal ground plane be provided in the circuit board directly under the transceiver to provide a low inductance ground for signal return current. It is also recommended that the shield posts be connected to the chassis ground to provide optimum EMI, ESD and EMS performance. This recommendation is in keeping with good high frequency board layout practices.

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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