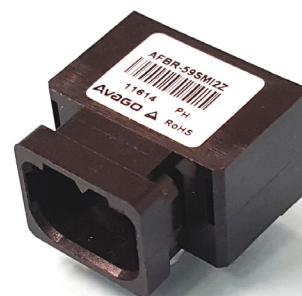


AFBR-59SMI2Z

250-MBd Compact 650-nm Transceiver for Data Communication over Polymer Optical Fiber (POF) Cables with SMI Connector



Application Note



Overview

This application note explains the handling, storage, operating, and processing of the Avago Technologies AFBR-59SMI2Z transceivers.

Packing

The Avago Technologies AFBR-59SMI2Z transceivers are shipped in anti-static coated tubes (see [Figure 1](#) and [Figure 2](#)), which are placed inside a moisture vapor barrier bag to protect the devices from humidity in the environment.

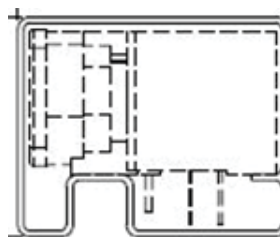
Table 1 Typical Packing Tube Information

Devices per Tube	16 (max.)
Tube Length	340 mm
Tube Height	18.3 mm
Tube Depth	22.4 mm

Figure 1 Typical Devices Placement in Anti-Static Tube



Figure 2 AFBR-59SMI2Z Typically Placed in Shipping Tube (Cross-Section)



Floor Life and Maximum Storage Time

The moisture sensitivity classification is MSL2a according to JEDEC J-STD-020D.

Unopened moisture barrier bagged devices can be stored for 12 months in an environment with a temperature not exceeding 50°C and a relative humidity (RH) not exceeding 90%.

Unpacked devices can be kept in a production environment up to 4 weeks provided a temperature not exceeding 30°C and a relative humidity (RH) not exceeding 60%. For higher temperatures in the production environment, the floor life is shortened. (See [Table 2](#).)

Table 2 MSL2a Floor Life^a

Normal	Accelerated Equivalent
4 weeks	5 days
≤ 30°C	≤ 60°C
60% RH	60% RH

a. Maximum storage time without humidity protection pack or after opening moisture barrier bag.

Electrostatic Discharge (ESD) Protection

The devices are sensitive to electrostatic discharges and therefore must be handled with care in an ESD protected area, indicated with the sign as shown in [Figure 3](#).

Figure 3 Typical Warning Sign for ESD Protected Area



An ESD event may damage or degrade the device performance. The standard DIN 61340-5-1 must be considered. The following ESD preventions should be applied. Any less extensive ESD prevention program might be unsuitable to prevent ESD damages.

- ESD floors and chairs.
- ESD tables, ESD work surfaces, and ESD storage facilities (for example, trolleys and carts).
- ESD wrist straps or connectors for wrist straps.
- ESD footwear and garments (cotton or special released materials).
- ESD gloves or finger cots.
- ESD tools (for example, nippers).
- ESD preventions at equipment parts.
 - Note that equipment parts that might directly contact the device leads must be made of dissipative materials, wherever possible. If dissipative materials cannot be used for technical reasons, metals must be used whose natural non-conductive surface layer is sufficiently thin (breakdown voltage <10V). Conducting machine parts that might contact the device leads directly must be connected to ground without a series resistor. Electrical fields in close proximity of the device must not exceed 104 V/m.
- ESD packing materials.

ESD Classification

The devices passed the following ESD tests:

Human Body Model (HBM) with $U = \pm 2$ kV, according JEDEC standard JESD22-A114 (Electrostatic Discharge [ESD] Sensitivity Testing Human Body Model [HBM]).

Handling

The devices must be handled with care. Ensure that there is no force placed on the device leads. Keep the optical port clean at all times. Keep the dust plug assembled as long as possible.

While manually handling the devices, ESD protection must be in place. To ensure solderability of the device, the operator must wear finger cots.

Device Mounting

The device is designed for through-hole mounting on a PCB. The minimum distance from the package to the PCB is mechanically defined. Recommended PCB thickness is 1.57 mm.

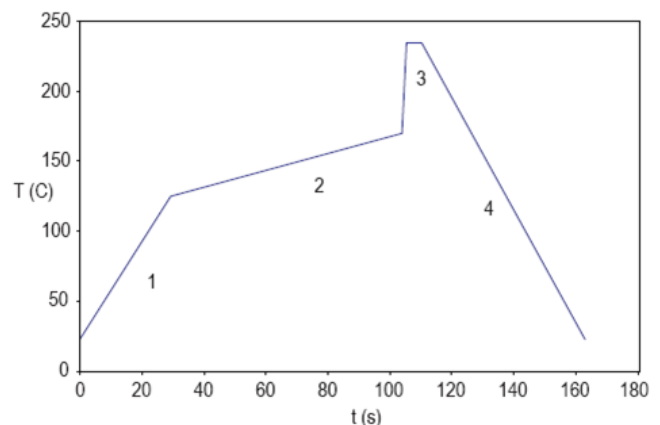
Solderability/Soldering Process

The recommended soldering method for the AFBR-59SMI2Z device is wave soldering.

Referring to [Figure 4](#), the preheat rate from room temperature to about 125°C should be about 2°C to 5°C per second (region 1). The soak time should be in the range of 30 to 120 seconds at a maximum temperature of less than 183°C (region 2). The wave portion of the process should have the component leads in contact with the wave or dual wave for less than 5 seconds (region 3). The cool down should be done fast enough to ensure a strong connection but slow enough to not cause thermal expansion stresses (region 4). Note that this proposed wave solder temperature profile is just a typical situation.

The qualification soldering test Resistance to Solder Shock was done with $1 \times 260^\circ\text{C}$ for 10 seconds according to JEDEC Standard JESD22-B106.

Figure 4 Typical Wave Solder Profile, Temperature on PCB Soldering Side



The devices are not adapted for reflow soldering by infrared heating or vapor phase reflow soldering.

If SMD components are assembled on the same PCB, the AFBR-59SMI2Z devices must be assembled afterwards. They must not be subjected to reflow solder stress.

NOTE This application note describes only the fiber optic transceiver soldering. The device maker must also consider the maximum temperature of the connector or pigtail.

Hand Soldering/Rework

Exposure of the devices to hand soldering or rework is not recommended. If hand soldering is necessary, the following guidelines must be considered. Bake the parts if possible. Do not allow the lead temperature measured on the lead close to the mold package to exceed 300°C. Soldering temperature above 245°C and below 300°C must be limited to less than 3 seconds. Prolonged exposure to solder heat, typical with hand soldering and rework, might cause stresses in the mold package, which affects optical performance and/or reliability.

Connecting the Fiber Cable

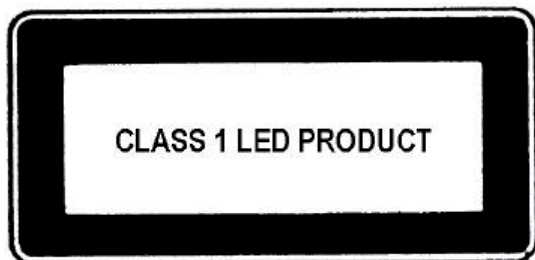
The SMI optical interconnect with its push-pull positive latching, with safe-release mechanism, provides a secure, safe, and easy to mate and de-mate optical connection.

The AFBR-59SMI2Z products are delivered with a transparent dust plug. Pull the dust plug to remove from housing.

Eye Safety

The transmitter device emits light at 650-nm (red) wavelength. This product is designed to avoid damage to the unprotected eye. To indicate the classification of the light source, a label as depicted in [Figure 5](#) can be used. However, these labels are not mandatory on the product, according to IEC 60825 version 1.2 paragraph 1.1.

Figure 5 Typical LED Source Label



Product Label

The typical AFBR-59SMI2Z product label dimensions and code explanation are shown in [Figure 6](#).

Figure 6 Typical AFBR-59FxZ Product Label



Label dimensions: 10 mm x 12 mm

Explanation of product code example:

AA1637 PH:

AA = lot number (2 digits)

16 = YY = calendar year code (2 digits) = year 2016

37 = WW = week code (2 digits) = working week 37

PH = Philippines (Country of origin)

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