

High Voltage Galvanic Insulation Link Family for DC (up to) 50 Mbaud

Application Note

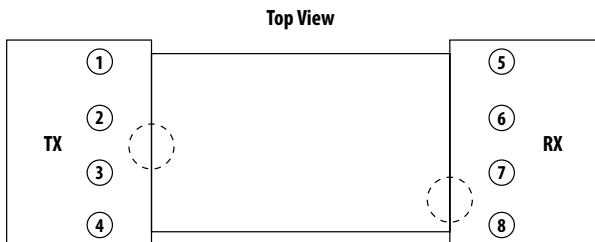
Electrical Circuits, Handling, Storage Operating and Processing Procedures



Introduction

AFBR-39xxyyRZ devices consisting of an optical transmitter and receiver operating at 650-nm wavelength are short optical transmission links and provide galvanic insulation up to 17-kV (peak) working voltage and 50-kV (peak) transient voltage.

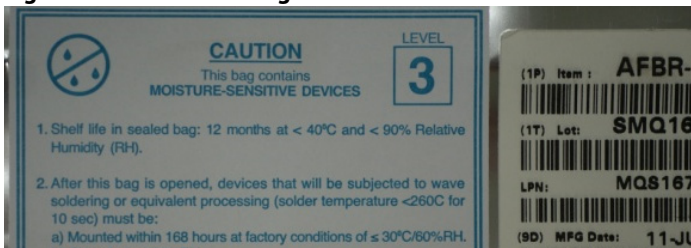
Figure 1 Pinning Schematic



Dry Packing

The AFBR-39xxyyRZ is packed in an anti-static tube shipped inside a Moisture Barrier Bag (MBB) together with desiccants and an indicator according JEDEC J-STD-33B, to keep the device protected against humidity in the environment. The label depicted in [Figure 2](#) indicates moisture sensitivity.

Figure 2 Moisture Warning Label



Floor Life and Maximum Storage Time (Shelf Life)

The moisture sensitivity classification is MSL3 according to JEDEC J-STD-020D.

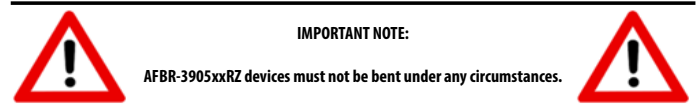
Unopened moisture barrier bagged devices can be stored up to 12 months in an environment with a temperature between 5°C and 40°C and a relative humidity (RH) not exceeding 90%.

Unpacked devices can be kept in a production environment up to 168 hours provided a temperature not exceeding 30°C and a relative humidity (RH) not exceeding 60%.

Handling

The AFBR-39xxyyRZ device is designed to cover all reasonable mechanical stresses in the application (mechanical shock and vibration tests according IEC 60068-26 and IEC 60068-2-27 applied). However, applying bending forces to the device is improper use and must be avoided. This is indicated with the label shown in [Figure 3](#).

Figure 3 Warning Label



Baking

When the device is inserted and soldered to a PCB up to 1 week after it has been taken out of the Moisture Barrier Bag, then the moisture level in the mold material is low enough to ensure minimum mechanical stress while soldering.

If the device is kept on the production floor for more than 1 week as described in the last paragraph, it is advised to bake the module before soldering.

Baking is done by removing the devices from the tube and placing them in a shallow container so that the package bodies do not touch each other. Then, the devices are placed in the bake oven, heating the devices to 100°C for 24 hours. After this procedure, the moisture content of the devices is low and the moisture-induced stress during soldering is reduced. As a general guideline, baking is recommended before every soldering attempt.

The baking procedure can be done as often as necessary.

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 shown in [Figure 4](#).

Figure 4 Warning Sign for ESD Protected Area



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

- ESD floors
- ESD tables, ESD work surfaces and ESD storage facilities (e.g., trolleys and carts)
- ESD wrist straps/connectors for wrist straps
- ESD footwear and garments (cotton or special released materials)
- ESD gloves or finger cots
- ESD chairs
- ESD tools (e.g., nippers)

- ESD preventions at equipment parts (Equipment parts which may 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 which may contact the device leads directly must be connected to ground without a series resistor.
- ESD packing materials.

ESD Classification

The devices passed the following ESD test: Electrostatic Discharge to the Electrical Pins Human Body Model (HBM) with $U = \pm 2000V$ according to MIL-STD-883 Method 3015.

Device Mounting

The devices are designed for through-hole mounting on a PCB. The minimum distance from the package to the PCB is mechanically defined by the design of the housing which is given as drawing in the product data sheet

Solderability/Soldering Process

The qualification test, *Resistance to soldering heat - Standard soldering technique (RSH-ST)*, was done with a solder temperature of 260°C for 10 seconds (distance to package: 3 mm) according to JEDEC standard JESD22-B106D.

Hand Soldering/ Rework

Hand soldering or rework is not allowed during production process.

If hand soldering is necessary, the following guidelines must be observed:

- Heat the devices to 100°C for 24 hours.
- Soldering time must be below 350°C and limited to less than 3 seconds.
- Do not allow the lead temperature measured on the lead close to the mold package to exceed 350°C.

Note: Hand soldering and rework is a badly reproducible process. Hand soldering may cause stresses in the mold package, which affects optical performance and/or reliability if the above guidelines are not observed.

Washing

The washing process shall be done by using easily vaporizing materials like methyl, isopropyl, or isobutyl.

After washing the part(s), it is mandatory to take care of sufficient drying time at high temperature.

Recommended chemicals:

- Alcohols like methyl, isopropyl, isobutyl
- Aliphatics like hexane or heptane
- Soap solutions
- Naphtha
- De-ionized water

Do not use chemicals including:

- (Partially) halogenated hydrocarbons
- Ketones (e.g., MEK)
- Acetone
- Chloroform
- Ethyl acetate
- Phenol
- Methylene chloride
- Methylene dichloride
- N-methylpyrrolidone

In general, it is sufficient to use simple cleaning agents like alcohols or soap solutions. More aggressive chemicals like halogenated hydrocarbons are needlessly demanding to the environment and are hazardous to human health. Therefore, these should be avoided whenever possible.

Maximum Temperature at FOT

The maximum ambient temperature must not exceed 85°C.

Guidelines for Optimum Heat Transfer to PCB

The board should be designed for optimum heat transfer from the device interior via the leads to the PCB. The distance of the device body to the solder joint on the PCB shall also be minimized and the dimensions of the conductors on the PCB shall be maximized. Convection airflow around the devices shall not be obstructed. Other heat generating devices shall not be placed near the devices.

Galvanic Insulation

AFBR-39xxyyRZ is a certified optocoupler according to EN 60747-5-5:2011. Insulation values are:

Maximum Transient Voltage, peak	VIOTM_1inch	15	kV
	VIOTM_2inch	27	
	VIOTM_3inch	40	
	VIOTM_4inch	50	
Maximum Transient Voltage, effective	VISO_1inch	10.5	kV
	VISO_2inch	19	
	VISO_3inch	28.1	
	VISO_4inch	35.2	
Maximum Working Voltage, peak	VIORM_1inch	4.25	kV
	VIORM_2inch	8.5	
	VIORM_3inch	12.75	
	VIORM_4inch	17.00	
Maximum Working Voltage, effective	VIOWM_1inch	3	kV
	VIOWM_2inch	6	
	VIOWM_3inch	9	
	VIOWM_4inch	12	

For further details, refer to the data sheet.

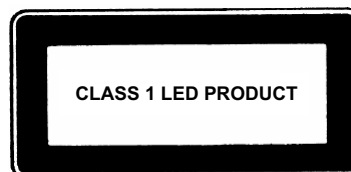
Flammability Classification

The Flammability class is UL94-V0.

Eye Safety

The device emits light with a wavelength of 650 nm (red). 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 LED Source Label



EMI Immunity

The AFBR-39xxyyRZ devices tolerate electrical noise interferences in the range of 1 MHz up to 1000 MHz with an electrical field strength of higher than 100 V/m.

Recommended Electrical Application Circuits

Figure 6 Recommended Electrical Application Circuit AFBR-3905yyRZ (Top View)

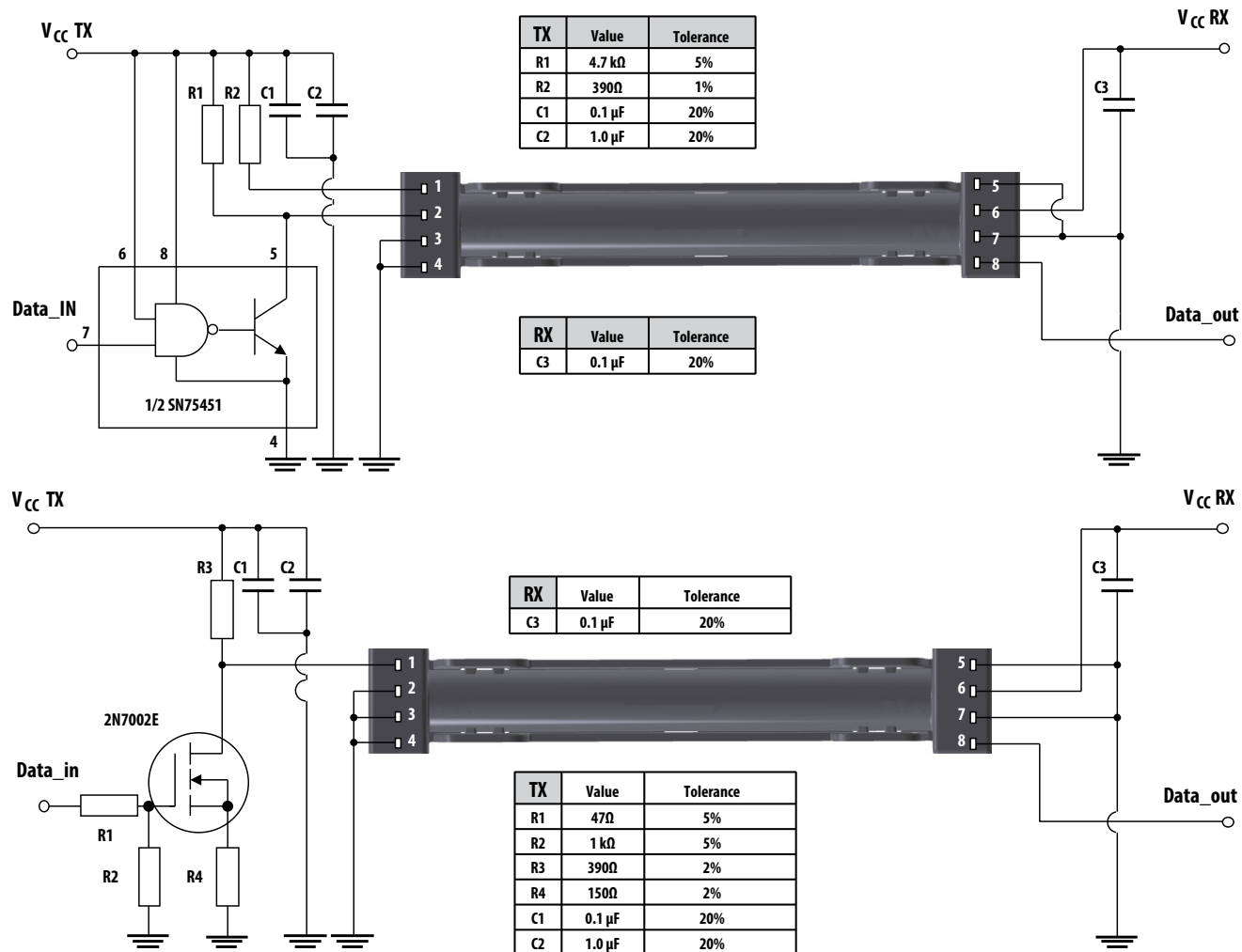


Table 1 AFBR-3905yyRZ Pin Description

Pin Number	Transmitter
1	Anode
2	Cathode
3	No function ^a
4	No function ^a

Pin Number	Receiver
5	No function ^a
6	VCC
7	GND
8	Data_out

a. It is recommended to connect this pin to signal ground.

Figure 7 Recommended Electrical Application Circuit AFBR-3950yyRZ (Top View)

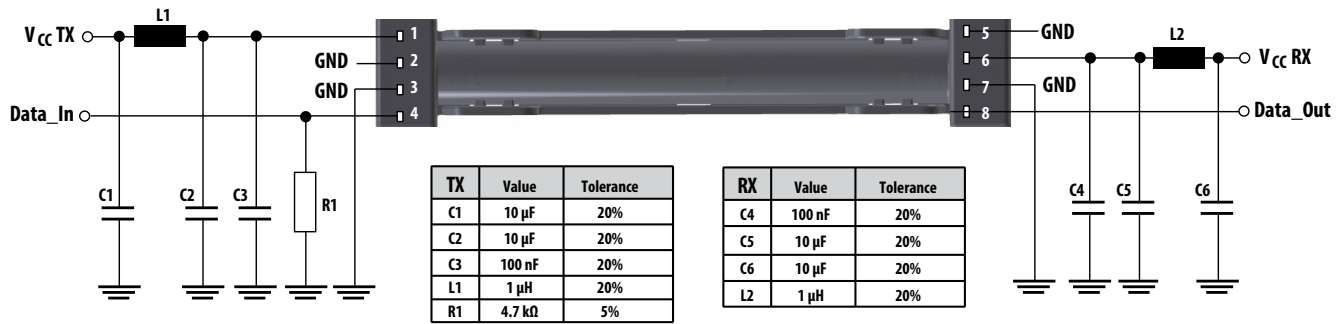
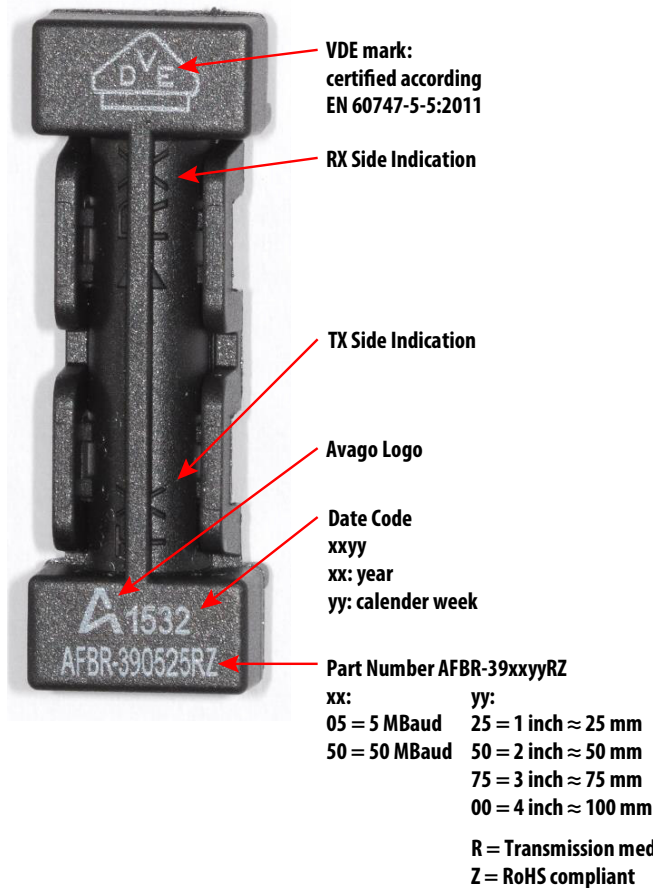


Table 2 AFBR-3950yyRZ Pin Description

Pin Number	Transmitter	Pin Number	Receiver
1	V _{CC} TX	5	No function ^a
2	No function ^a	6	V _{CC} RX
3	GND	7	GND
4	Data_in	8	Data_out

a. It is recommended to connect this pin to signal ground.

Figure 8 Device Marking



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