

# HFBR-3810Z & HFBR-3810MSZ

650 nm Fiber Optics Link for DC to 10Mbaud



## Data Sheet



### Description

HFBR-3810Z consists of an optic transmitter and receiver operating at 650nm wavelength. The pin to pin air gap distance of 25.1mm provides transient voltage suppression of 12kV.

### Applications

- Drives/Inverters
- Galvanic isolation on one single PCB

### Features

- Data transmission at signal rates of DC to 10MBaud
- DC coupled receiver with CMOS/TTL output for easy designs: no data encoding or digitizing circuitry required
- High noise immunity
- RoHS compliant
- Transient voltage suppression of up to 12kV according IEC 60664-1
- Laser class 1 according to IEC-60825: Amendment 2001

## HFBR-3810Z & HFBR-3810MSZ DC to 10MBaud Data Link

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Signaling Rate	$f_s$	DC	10	Mbd
Storage and Operating Temperature	$T_{S,O}$	-40	+85	°C
Receiver supply voltage	$V_{CC}$	-0.5	+5.5	V
Receiver Average Output Current	$I_{O,AVG}$	-16	16	mA
Receiver Output Power Dissipation	$P_{OD}$		80	mW
Transmitter Peak Forward Input Current <sup>[1]</sup>	$I_{F,PK}$		90	mA
Transmitter Reverse Input Voltage	$V_R$		3	V
Rated impulse voltage <sup>[2]</sup>	$V_T$		12	kV
Lead Soldering Cycle <sup>[3, 4]</sup>	Temp	$T_{SOL}$	+260	°C
	Time		10	Sec
Nominal Voltage of the supply system <sup>[2]</sup>	$V_{eff}$		1000	V

Notes:

- For  $I_{F,PK} > 60\text{mA}$ , the duty cycle factor must maintain  $I_{F,AV} \leq 60\text{mA}$  and pulse width  $\leq 1\mu\text{s}$
- [IEC 60664-1] Overvoltage category 4; inhomogeneous field; pollution degree 3; material group 2; altitude up to 2000m for HFBR-3810MSZ and up to 3000m for HFBR-3810Z above sea level
- 1.6mm below seating plane; wave soldering only
- MSL class 3

### Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units
Ambient Temperature	$T_A$	-40	85	°C
Power Supply Voltage <sup>[1]</sup>	$V_{CC}$	4.75	5.25	V
Transmitter Peak Forward Current <sup>[2]</sup>	$I_{F,P}$	54	90	mA
Transmitter Average Forward Current <sup>[2]</sup>	$I_{F,AV}$		60	mA

Note:

- <100m<sub>p-p</sub> Noise
- Current applied at the transmitter must not exceed 50μA in order to guarantee a logical "1" at the RX output

### Mechanical Dimensions

Parameter	Symbol	HFBR 3810Z	HFBR 3810MSZ	Unit
Clearance	$d_C$	25.1	20.1	mm
Creepage	$d_{CP}$	28.7	23.1	mm
Clearance Internal <sup>[1]</sup>	$d_{CI}$	21.1	21.1	mm
Creepage Internal <sup>[1]</sup>	$d_{CPI}$	25.1	25.1	mm

Notes:

- Only air gap with non conductive mold the distance is 24.6mm.
- CTI value of the housing material is 600.

**All the data in this specification refers to the operating conditions above and over lifetime unless otherwise stated.**

**ATTENTION:** Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Electrical Input Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Forward Voltage <sup>[1]</sup>	V <sub>F</sub>	1.8	2.1	2.65	V
Forward Voltage Temperature Coefficient	$\Delta V_F / \Delta T$		-1.8		mV/°C
Reverse Input Breakdown Voltage <sup>[2]</sup>	V <sub>BR</sub>	3.0	13		V
Diode Capacitance <sup>[3]</sup>	C <sub>0</sub>		60		pF

Notes:

1. I<sub>F,dc</sub> = 60mA
2. I<sub>F,dc</sub> = -10μA
3. V<sub>F</sub> = 0V; f = 1MHz

## Electrical Output Signal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Condition
Supply Current (without LED current)	I <sub>CC</sub>		27	45	mA	
High Level Output Voltage	V <sub>OH</sub>	4.2	4.7		V	
Low Level Output Voltage	V <sub>OL</sub>		0.22	0.4	V	
Output Risetime (10-90%) <sup>[1, 2]</sup>	t <sub>r</sub>		10	20	ns	
Output Falltime (90-10%) <sup>[1, 2]</sup>	t <sub>f</sub>		10	20	ns	
Power Supply Noise Immunity	PSNI	0.1	0.4		V <sub>pp</sub>	Sine Wave DC - 10MHz

Notes:

1. C<sub>L</sub> = 10pF
2. In the recommended drive circuit
3. Typical Value measured from junction to PC board solder joint for horizontal mount package

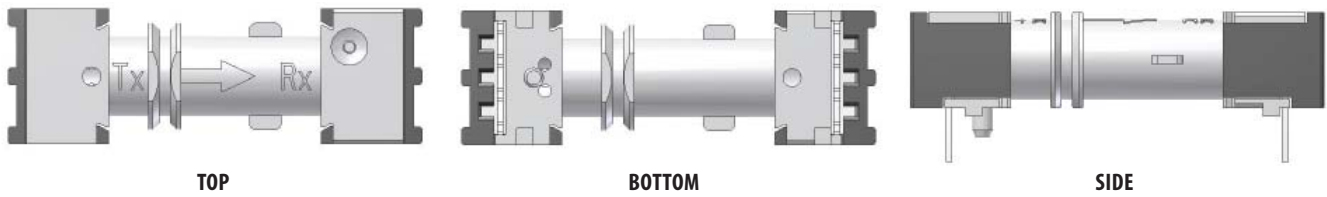
**Specified Link Performance**, T<sub>A</sub> = -40° to +85°C, DC to 10MBaud, unless otherwise noted.

Parameter	Symbol	Min.	Typ	Max.	Unit	Condition
Signaling Rate	f <sub>S</sub>	DC		10	Mbaud	NRZ
Pulse Width Variation <sup>[1]</sup>	PWV	80		120	ns	10Mbaud
Propagation Delay Time <sup>[2]</sup>	t <sub>D</sub>		95		ns	Assuming a delay of 10ns from the application (already included)
Duty Cycle Distortion <sup>[3]</sup>	DCD	-10		+10	ns	10Mbaud

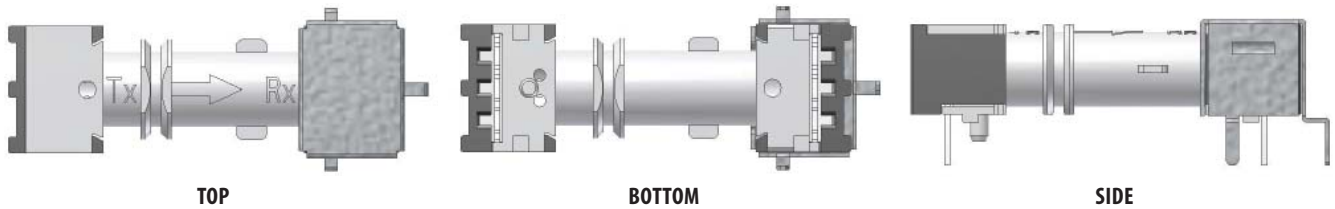
Notes:

1. Minimum/maximum duty cycle distortion +/-10ns
2. Determined from 50% of the rising edge of data\_in to 50% of the consecutive falling egde of data\_out
3. +/-10% of the nominal pulse width

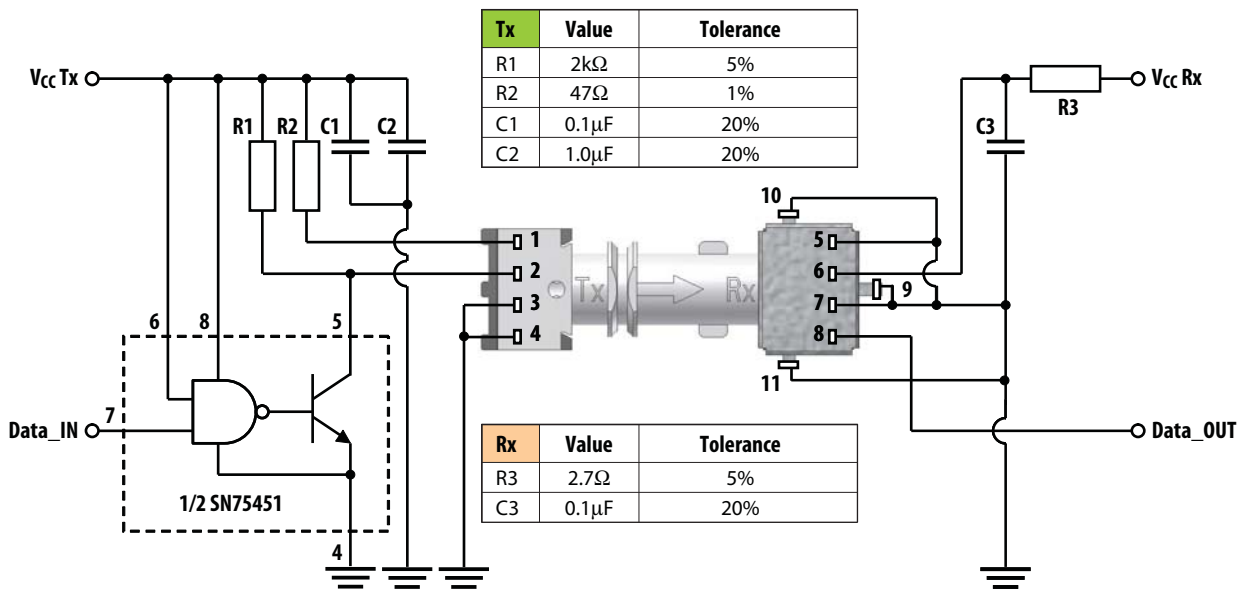
### Package views - HFBR-3810Z



### Package views - HFBR-3810MSZ



### Mandatory Drive circuit – Top view



### Pin description

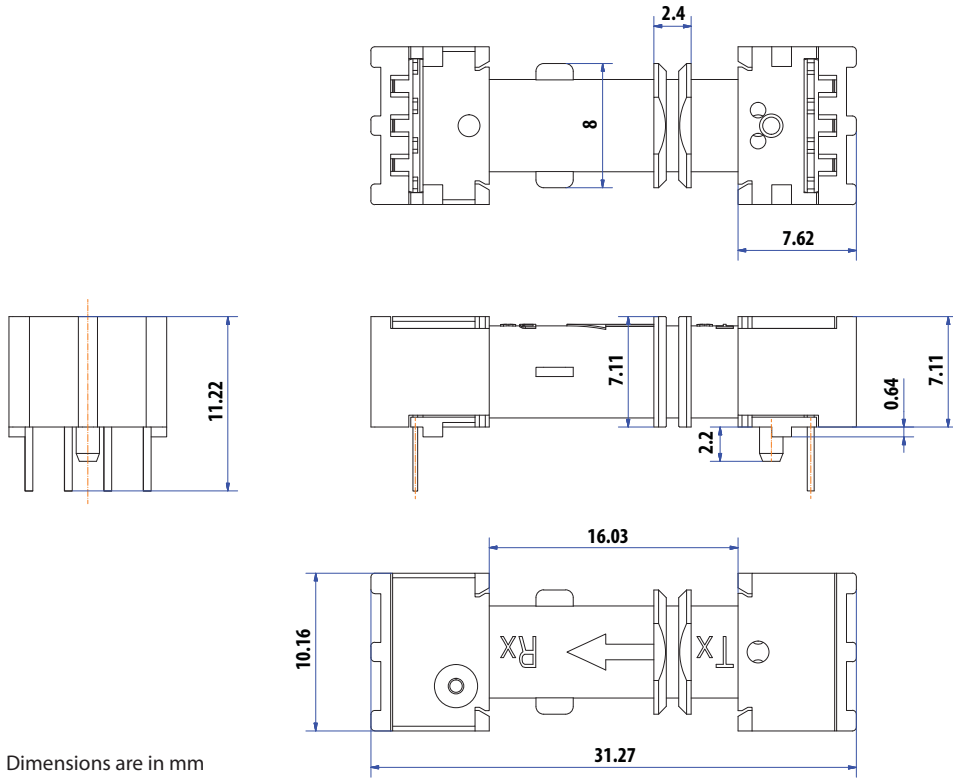
Pin No.	Transmitter
1	Anode
2	Cathode
3	GND
4	GND

Pin No.	Receiver
5	GND
6	VCC(5V)
7	GND
8	Data_OUT
9, 10, 11	GND (shield option <sup>[1]</sup> )

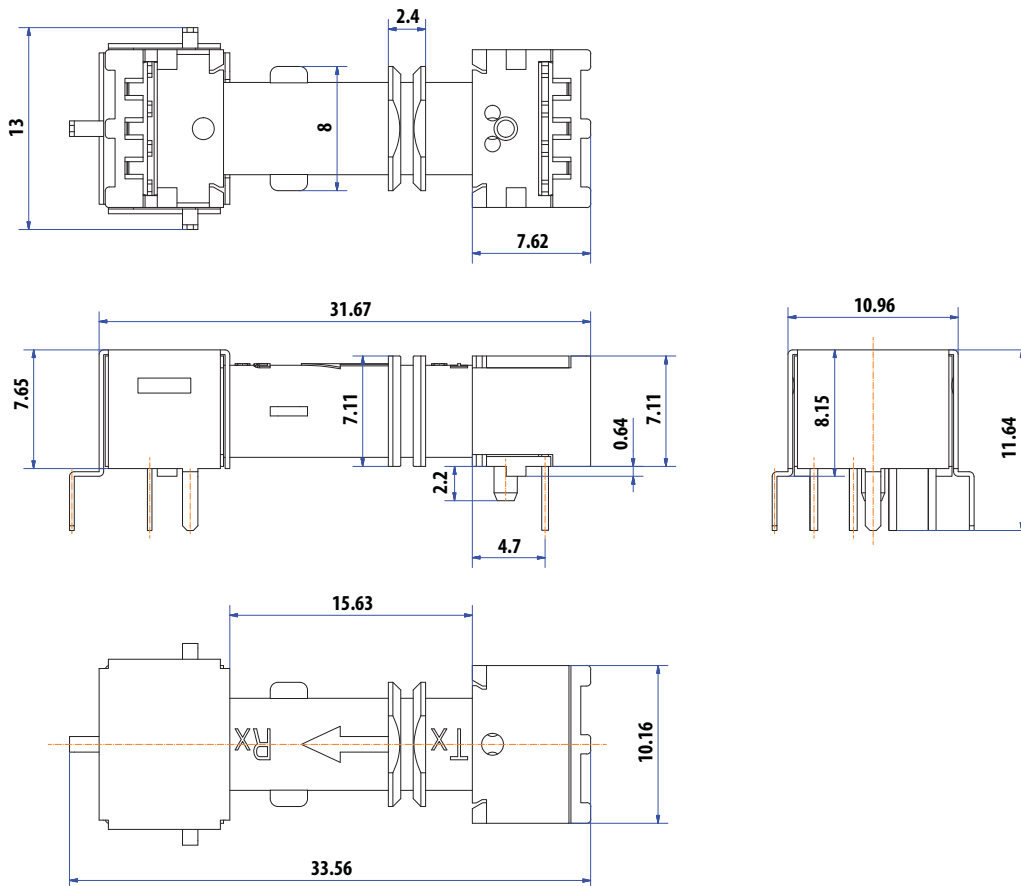
Note:

1. Pin 9,10 and 11 are not available if HFBR-3810Z is used and therefore do not need to be considered.

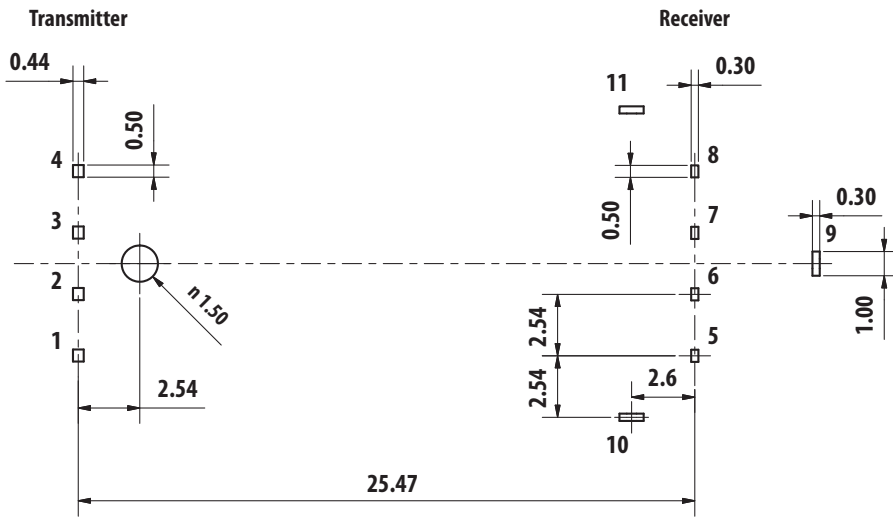
### Mechanical Dimensions - HFBR-3810Z



### Mechanical Dimensions - HFBR-3810MSZ

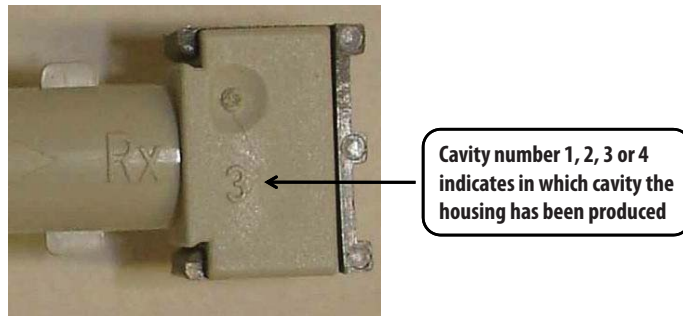
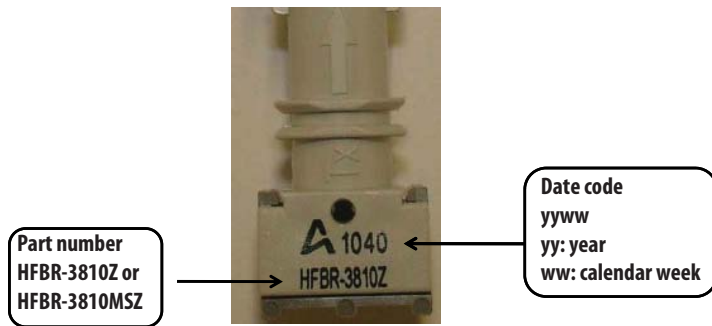


## Footprint bottom view - HFBR-3810Z and HFBR-3810MSZ



Dimensions are in mm

## Marking - HFBR-3810Z and HFBR-3810MSZ



For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies in the United States and other countries. Data subject to change. Copyright © 2005-2011 Avago Technologies. All rights reserved.  
AV02-2510EN - November 21, 2011

**AVAGO**  
TECHNOLOGIES