HFBR-150xAFZ / 2555AFZ (SMA Tx/Rx for SERCOS)

Full Metal Fiber Optic Transmitter and Receiver
for SERCOS Applications

Data Sheet

Description

SERCOS

SERCOS, an acronym for SErial Realtime COmmunications System, is a standard digital interface for communication in industrial CNC applications. SERCOS is a European (EN 61491) and international standard (IEC 61491). The optical interface allows data rates of 2, 4, 8, and 16 MBd and data transfer between numerical controls and drives via fiber-optic rings, with voltage isolation and noise immunity. The HFBR-150xAFZ and HFBR-2555AFZ products comply with SERCOS specifications for optical characteristics and connector style, and have guaranteed performance at 4, 8, and 16 MBd data rates.

Features

- Meets industrial SERCOS standard
- SMA ports
- 650 nm wavelength technology
- Metal housing and port
- Specified for use with 1 mm plastic optical fiber and 200 μm hard clad silica
- Auto-insertable and wave solderable
- Supports SERCOS 4, 8 and 16 MBd
- RoHS-compliant

Applications

- Industrial control data links
- Factory automation data links
- Voltage isolation applications
- PLCs
- Motor drives
- Sensor, meter and actuator interfaces

HCS® is a registered trademark of OFS Corporation.

CAUTION: *The small junction size inherent in the design of these components increases the components' susceptibility to damage from electrostatic discharge (ESD). It is advised that normal static precautions be taken in handling and assembly of these components to prevent damage and/or degradation which may be induced by ESD.*

Package Information

The HFBR-150xAFZ transmitters and HFBR-2555AFZ receiver are housed in a dual-in-line metal package that is high strength. The package is designed for auto-insertion and wave soldering so it is ideal for high volume production applications.

Handling and Design Information

When soldering, it is advisable to leave the protective cap on the unit to keep the optics clean. Good system performance requires clean port optics and cable ferrules to avoid obstructing the optical path. Clean compressed air often is sufficient to remove particles of dirt. Methanol on a cotton swab also works well.

Recommended Chemicals for Cleaning/Degreasing HFBR-150xAFZ and HFBR-2555AFZ Products

Alcohols: methyl, isopropyl, isobutyl.

Aliphatics: hexane, heptane.

Other: soap solution, naphtha.

Do not use partially halogenated hydrocarbons such as 1,1,1 trichloroethane, ketones such as MEK, acetone, chloroform, ethyl acetate, methylene dichloride, phenol, methylene chloride or N-methylpyrolldone. Also, Avago does not recommend the use of cleaners that use halogenated hydrocarbons because of their potential environmental harm.

Specified Link Performance

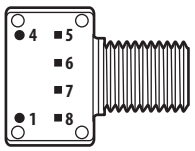
-40° C to +85° C unless otherwise noted.

Parameter	Symbol	Min.	Max.	Unit	Condition	Reference
Link Distance with	L	0.1	40	m	POF	Notes 1, 2, 4, 6
HFBR-1505AFZ/2555AFZ		0.1	100	m	HCS®	Notes 1, 3, 5, 6
Link Distance with	L	0.1	45	m	POF	Notes 1, 2, 4, 7
HFBR-1506AFZ/2555AFZ		0.1	100	m	HCS®	Notes 1, 3, 5, 7
Pulse Width Distortion HFBR-150xAFZ/2555AFZ	PWD	-11	+11	ns	POF and HCS®	Notes 1, 8

Notes:
1. With recommended Tx and Rx circuits (Figure 4 and Figure 5).
2. POF HFBR-ExxyyyZ 0.23 dB/m worst case attentuation.
3. HCS Worst Case Attenuation is 10 dB/km (0° C to 70° C) and 12 dB/km (-40° C to 85° C).
4. Including a 3 dB optical safety margin accounting for link service lifetime.
5. Including a 2 dB optical safety margin accounting for link service lifetime.
6. Signaling rate up to 10 MBd.
7. Signaling rate up to 16 MBd.
8. For PWD calculation, the pulsewidth of the receicer output is compared versus the pulsewidth of the electrical input signal of the transmitter. PWD = PW_RXout - PW_TXin. Note, that the HFBR-2555AZ is an inverting receiver, thus an electrical high pulse at the transmitter input (LED on) causes an electrical low at the receiver output. For the characterization, the transmitter has been driven with an ideal (duty cycle = 50%) PRBS7 pattern input signal.

HFBR-150xAFZ Transmitter

The HFBR-150xAFZ transmitters incorporate a 650 nm LED in a metal housing. The high light output power enables the use of both plastic optical fiber (POF) and Hard Clad Silica (HCS®). The HFBR-1505AFZ can be operated up to 10 MBd using a simple driver circuit. For data rates above 10 MBd up to 16 MBd, the HFBR-1506AFZ should be used. The HFBR-150xAFZ are compatible with SMA connectors.



BOTTOM VIEW, HFBR-150xAFZ

SEE NOTE 9

PIN	FUNCTION
1	CONNECTED TO PIN 4
4	CONNECTED TO PIN 1
5	NC
6	NC
7	CATHODE
8	ANODE

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Reference
Storage and Operating Temperature	T_S	-40	85	°C	
Peak Forward Input Current	$I_{F,PK}$		90	mA	Note 6
Average Forward Input Current	$I_{F,AVG}$		60	mA	
Reverse Input Voltage	V_R		3	V	
Lead Soldering Cycle	Temp Time		260 10	°C s	Note 7

Peak Output Power

-40° C to +85° C unless otherwise noted.

Parameter	Symbol	Min.	Typ.[1]	Max.	Unit	Condition	Ref.
HFBR-1505AFZ POF 200 μm HCS®	P_T	-7.5 -18		-3.5 -10	dBm	I_F = 60 mA	Notes 2, 3, 8 Fig. 2
HFBR-1506AFZ POF 200 μm HCS®	P_T	-6.0 -18		-2.0 -10	dBm	I_F = 60 mA	Notes 2, 3, 8 Fig. 2
Optical Power Temperature Coefficient	$\Delta P_T/\Delta T$		-0.02		dB/°C		

Electrical Characteristics

-40° C to +85° C unless otherwise noted.

Parameter	Symbol	Min.	Typ.[1]	Max.	Unit	Condition	Ref.
Forward Voltage	V_F	1.8	2.1	2.65	V	$I_{F,dc}$ = 60 mA	Fig. 1
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$		-1.8		mV/°C		Fig. 1
Breakdown Voltage	V_{BR}	3.0	13		V	$I_{F,dc}$ = -10 µA	
Peak Emission Wavelength	λ_{PK}	635	650	662	Nm		Fig. 3
Full Width Half Max	FWHM		21	30	Nm		Fig. 3
Diode Capacitance	C_O		60		pF	V_F = 0 V, f = 1 MHz	
Thermal Resistance	θ_{JC}		140		°C/W		Notes 4, 5
Rise Time HFBR-1505AFZ	t_R		13		ns	I_F = 60 mA	Note 10
Fall Time HFBR-1505AFZ	t_F		10		ns	I_F = 60 mA	Note 10
Rise Time HFBR-1506AFZ	t_R			15	ns	I_F = 60 mA	Note 10
Fall Time HFBR-1506AFZ	t_F			15	ns	I_F = 60 mA	Note 10

Notes:
1. Typical data at 25° C.
2. Optical power measured at the end of 0.5 meters of 1 mm diameter plastic or 200 µm hard/plastic clad silica optical fiber with a large area detector.
3. Minimum and maximum values for PT over temperature are based on a fixed drive current.
4. Thermal resistance is measured with the transmitter coupled to a connector assembly and fiber, and mounted on a printed circuit board.
5. To further reduce the thermal resistance, the cathode trace should be made as large as is consistent with good RF circuit design.
6. For IF,PK > 60 mA, the duty factor must maintain IF,AVG = 60 mA and pulse width = 1 µs.
7. 1.6 mm below seating plane.
8. Output power with 200 µm hard clad silica optical fiber assumes a typical -10.5 dB difference compared to 1 mm plastic optical fiber.
9. Pins 1 and 4 are for mounting and retaining purposes, but are electrically connected; pins 5 and 6 are electrically isolated. It is recommended that pins 1, 4, 5, and 6 all be connected to ground to reduce coupling of electrical noise.
10. Thresholds for rise time and fall time are 10% and 90%.

EYE SAFETY: *The HFBR-150xAFZ is a Class 1 LED Product and eye safe when used within the data sheet limits and under normal operating conditions. This includes all reasonably foreseeable single fault conditions per IEC60825-1 and amendments.*

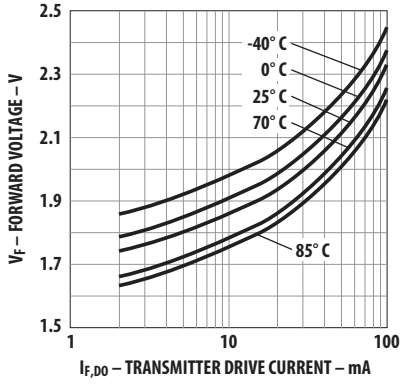


Figure 1. Typical forward voltage vs. drive current

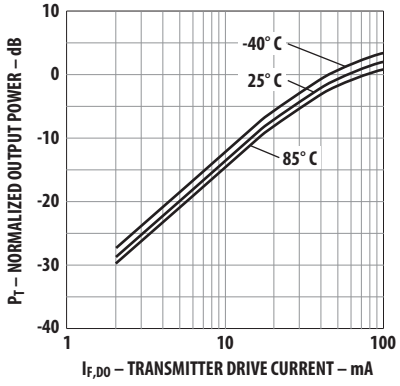


Figure 2. Typical normalized optical power vs. drive current

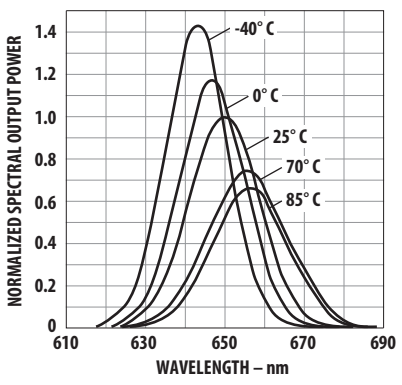


Figure 3. Typical normalized optical spectra

Recommended Circuitry for HFBR-150xAFZ / 2555AFZ

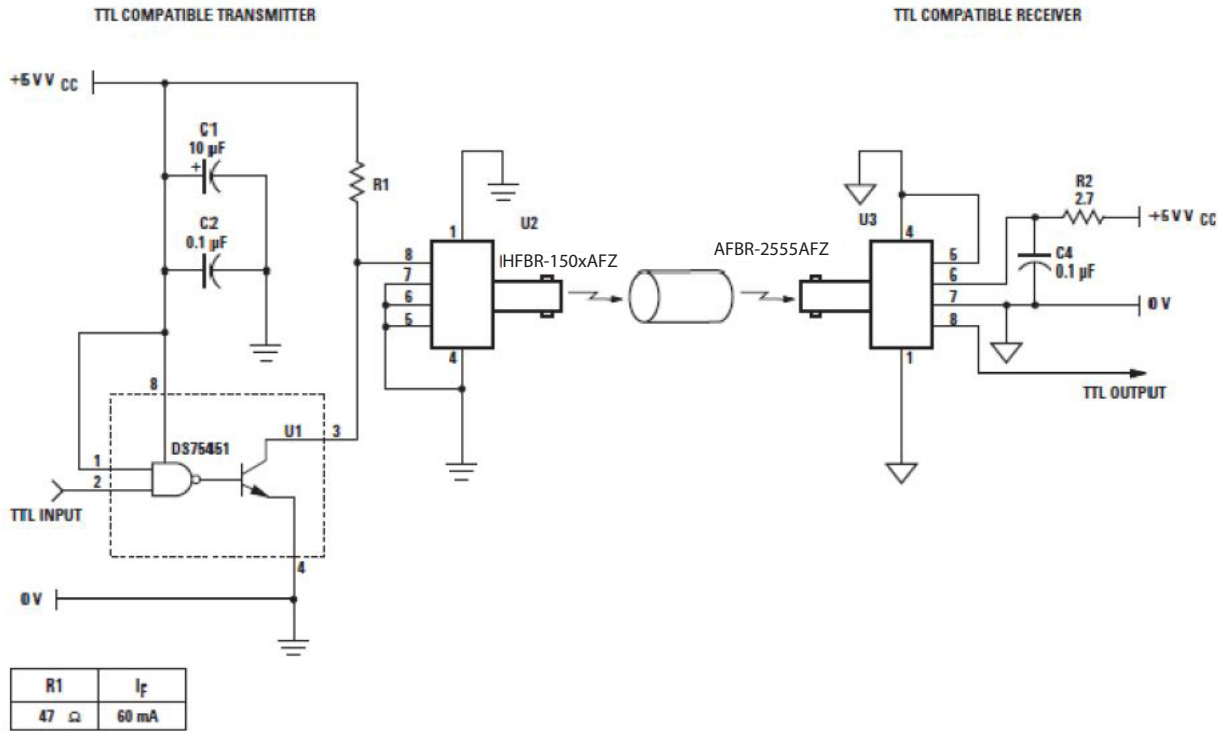


Figure 4. Recommended transmitter and receiver drive circuit ($I_{F, on}$ = 60 mA nominal at T_A = 25° C) for data rate up to 10 MBd, with transmitter HFBR-1505AFZ

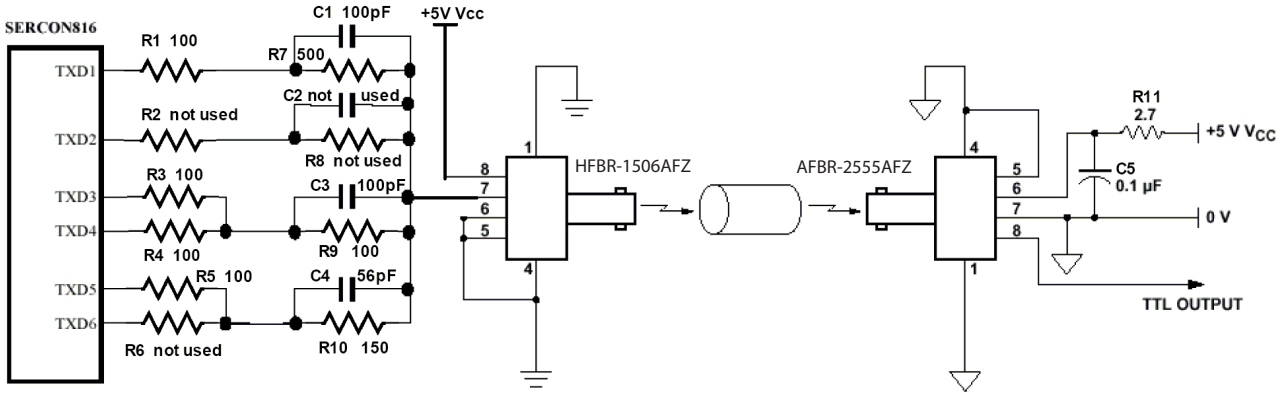
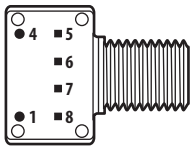


Figure 5. Recommended drive circuit according to SERCOS An17 (Ifnom ~ 35 mA) for data rate up to 16 MBd with transmitter HFBR-1506AFZ

HFBR-2555AFZ Receiver

The HFBR-2555AFZ receiver consists of an IC with an integrated photodiode to produce a logic compatible output. The receiver output is a "push–pull" stage compatible with TTL and CMOS logic. The HFBR-2555AFZ is compatible with SMA connectors.



BOTTOM VIEW, HFBR-2555AFZ

SEE NOTE 4

PIN	FUNCTION
1	CONNECTED TO PIN 4
4	CONNECTED TO PIN 1
5	NO CONNECT
6	V_{CC}
7	GND
8	V_O

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Reference
Storage and Operating Temperature	T_S	-40	85	°C	
Supply Voltage	V_{CC}	-0.3	5.5	V	
Maximum DC Output Current	$I_{O,DC}$		10	mA	
Lead Soldering Cycle	Temp Time		260 10	°C s	Note 2

Electrical/Optical Characteristics

-40° C to +85° C, 3.135 V < VCC < 5.25 V

Parameter	Symbol	Min.	Typ.[1]	Max.	Unit	Condition	Ref.
Optical Input Peak Power Range	P_{INPK}	-20 -22		-1 -3	dBm	1 mm POF 200 μm HCS® |PWD| < 11 ns	Notes 3, 5 Fig. 6
Supply Voltage	V_{CC}	3.135		5.25	V		
Supply Current	I_{CC}		11	20	mA	V_O = open	
High Level Output Voltage	V_{OH}	2.4	V_{CC}-0.3	V_{CC}	V	R_L = 2 kΩ	
Low Level Output Voltage	V_{OL}		0.2	0.4	V	R_L = 2 kΩ	
Output Rise Time	t_R		4	15	ns	C_L = 10 pF	Note 3
Output Fall Time	t_F		2	15	ns	C_L = 10 pF	Note 3

Notes:
1. Typical data are at 25° C, VCC = 5.0 V.
2. 1.6 mm below seating plane.
3. In recommended receiver circuit, with an optical signal from the recommended transmitter circuit.
4. Pins 1 and 4 are electrically connected to the metal housing and are also used for mounting and retaining purposes. It is required that pin 1 and 4 be connected to ground to maintain metal housing shield effectiveness.
5. Verified with a PRBR7 signal with mark ratio = ½. $P_{INPK} = P_{INAVG} + 3$ dB.

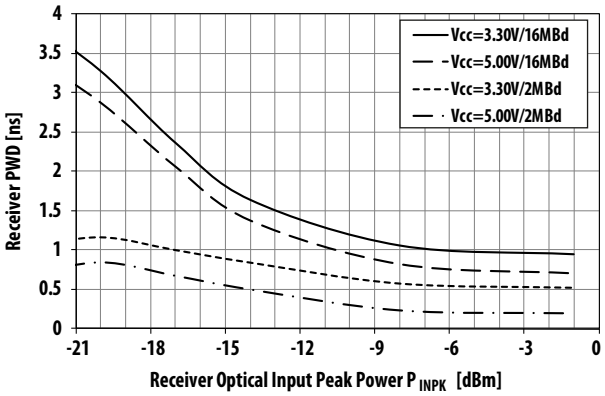
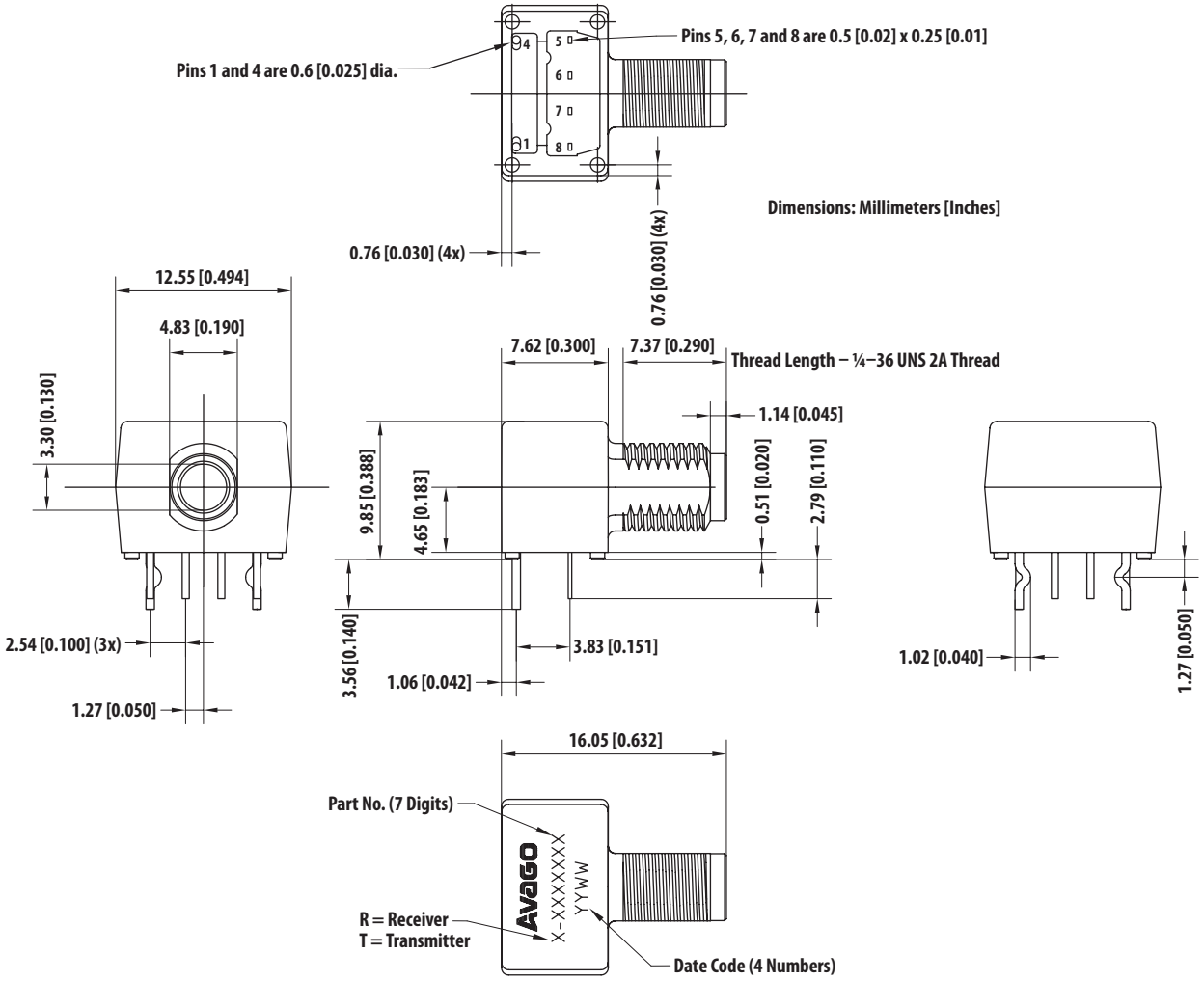


Figure 6. Typical POF receiver pulse width distortion vs. optical power

Mechanical Dimensions

HFBR-150xAFZ / 2555AFZ



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

AV02-3000EN - December 16, 2011

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Fibre Optic Transmitters, Receivers, Transceivers ***category:***

Click to view products by Broadcom ***manufacturer:***

Other Similar products are found below :

STV.2413-574-00262 TRPRG1VA1C000E2G TOTX1350(V,F) FTLX3813M349 SCN-1428SC LTK-ST11MB HFD8003-002/XBA HFD3020-500-ABA FTLF1429P3BCVA S6846 SCN-2638SC FTL410QE4N FTLC9555FEPM TQS-QG4H9-J83 SCN-1570SC SCN-1601SC SCN-1338SC SFPPT-SR3-01 HFD8003-500-XBA SCN-1383SC 2333569-1 LNK-ST11HB-R6 FTL4C1QL3L FTL4C1QE3L FTL4C1QL3C SPTSHP3PMCDF SPTSBP4LLCDF SPTMBP1PMCDF SPTSHP2PMCDF SF-NLNAMB0001 SPTSLP2SLCDF SPTSQP4LLCDF 1019682 1019683 1019705 HFBR-1415Z AFBR-5803ATQZ AFBR-5803ATZ PLR135/T9 TGW-Q14BB-FCQ AFBR-5803AZ TQS-Q1LH8-XCA03 TQS-Q1LH8-XCA05 TQS-Q1LH8-XCA10 TQS-Q1LH9-2CA HFBR-1414Z HFBR-1527Z HFBR-1528Z HFBR-2406Z HFBR-2505AZ