

Fiber Optic and Isolation Solutions for Renewable Energy Applications



Your Imagination, Our Innovation
Sense • Illuminate • Connect

Avago Technologies offers a wide range of fiber optic transmitters, receivers, and transceivers, and IGBT/ Power MOSFET gate drivers, and optocoupler isolation products for wind turbine, wind farm and solar electric power generation applications.

Avago fiber optic, isolated gate driver, isolation amplifier and digital optocouplers are deployed in wind turbine farms and solar energy farms today. Applications include:

- Power rectifiers and inverter power assemblies
- Control and communication boards
- Turbine control units condition monitoring systems
- Wind farm networks
- Sun tracking control
- Communications boards
- Solar farm substation automation and protection relays
- Single- and three-phase inverters
- Battery chargers
- DC-to-DC converters,
- System control and monitoring

Avago has been involved with fiber technology and international standards bodies for decades. We have offered the industry's best isolation technology, specifically designed and manufactured to meet the stringent requirements of applications in power generation systems for over 30 years.

Around the world our customers value what we do. We provide the components and technology to make their visions in the renewable energy markets grow and prosper.

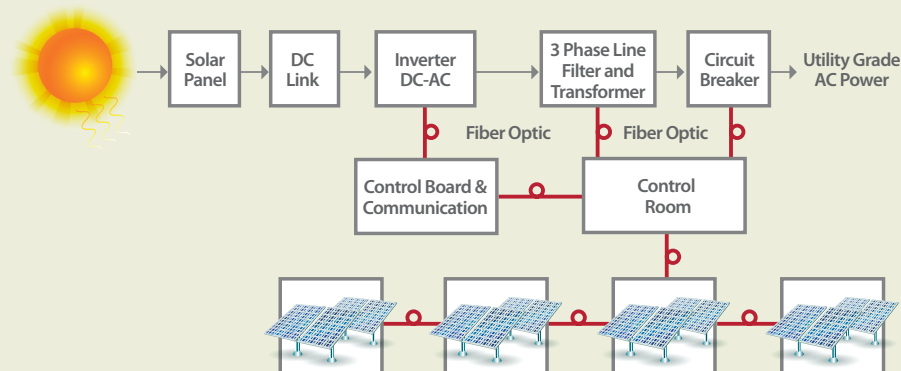
Solar Power

Fiber Optic Components Solutions

Product Line Features

- Transceivers: Broad portfolio compliant to many protocols
- Connector types: LC, SC, MT-RJ
- Wavelength : 850 nm, 1310nm
- Maximum transmission distance: 80km
- Multimode and Single-mode Fiber

Part Number	Description	Data Rate	Distance		
			POF 1 mm	HCS 200 µm	Multimode 62.5 / 125 µm
HFBR-1515BZ	650nm, Transmitter	DC – 10 MBd	40 m	200 m	–
HFBR-2515BZ	650nm, Receiver	DC – 10 MBd	40 m	200 m	–
HFBR-1505CZ	650nm, Transmitter	DC – 10 MBd	50 m	400 m	–
HFBR-2505CZ	650nm, Receiver	DC – 10 MBd	50 m	400 m	–
HFBR-1521Z	650 nm, Transmitter	DC – 5 MBd	20 m	–	–
HFBR-2521Z	650 nm, Receiver	DC – 5 MBd	20 m	–	–
HFBR-1522Z	650 nm, Transmitter	DC – 1 MBd	45 m	–	–
HFBR-2522Z	650 nm, Receiver	DC – 1 MBd	45 m	–	–
HFBR-1528Z	650 nm, Transmitter	DC – 10 MBd	40 m	300 m	–
HFBR-2528Z	650 nm, Receiver	DC – 10 MBd	40 m	300 m	–
HFBR-1414Z	820 nm, Transmitter	DC – 5 MBd	–	1500 m	2000 m
HFBR-2412Z	820 nm, Receiver	DC – 5 MBd	–	1500 m	2000 m
HFBR-1414Z	820 nm, Transmitter	DC – 20 MBd	–	–	2700 m
HFBR-2416Z	820 nm, Receiver	DC – 20 MBd	–	–	2700 m
HFBR-1414Z	820 nm, Transmitter	DC – 160 MBd	–	–	500 m
HFBR-2416Z	820 nm, Receiver	DC – 160 MBd	–	–	500 m

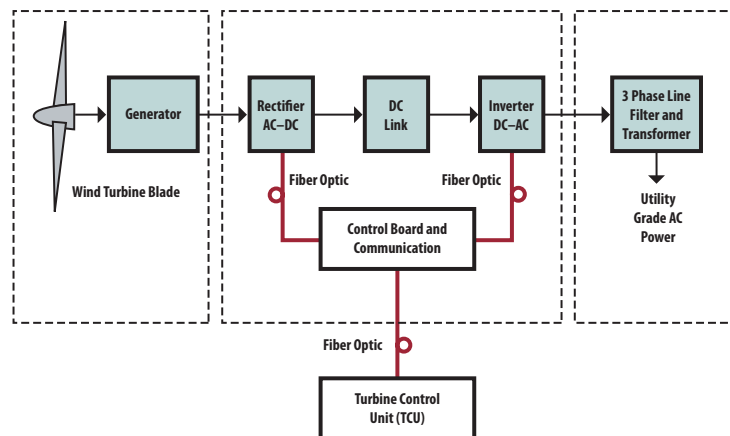


Wind Turbine Networking, Control and Communications

Fiber Optic Components Solutions



Part Number	Description	Data Rate	Distance		
			POF	HCS	Multimode
			1 mm	200 μ m	62.5 / 125 μ m
HFBR-1515BZ	650nm, Transmitter	DC – 10 MBd	40 m	200 m	–
HFBR-2515BZ	650nm, Receiver	DC – 10 MBd	40 m	200 m	–
HFBR-1505CZ	650nm, Transmitter	DC – 10 MBd	50 m	400 m	–
HFBR-2505CZ	650nm, Receiver	DC – 10 MBd	50 m	400 m	–
HFBR-1521Z	650 nm, Transmitter	DC – 5 MBd	20 m	–	–
HFBR-2521Z	650 nm, Receiver	DC – 5 MBd	20 m	–	–
HFBR-1522Z	650 nm, Transmitter	DC – 1 MBd	45 m	–	–
HFBR-2522Z	650 nm, Receiver	DC – 1 MBd	45 m	–	–
HFBR-1528Z	650 nm, Transmitter	DC – 10 MBd	40 m	300 m	–
HFBR-2528Z	650 nm, Receiver	DC – 10 MBd	40 m	300 m	–
HFBR-1414Z	820 nm, Transmitter	DC – 5 MBd	–	1500 m	2000 m
HFBR-2412Z	820 nm, Receiver	DC – 5 MBd	–	1500 m	2000 m
HFBR-1414Z	820 nm, Transmitter	DC – 20 MBd	–	–	2700 m
HFBR-2416Z	820 nm, Receiver	DC – 20 MBd	–	–	2700 m
HFBR-1414Z	820 nm, Transmitter	DC – 160 MBd	–	–	500 m
HFBR-2416Z	820 nm, Receiver	DC – 160 MBd	–	–	500 m



Wind Turbine Networking, Control and Communications

Fast Ethernet Fiber Optic Components



AFBR-5978Z Fast Ethernet Transceiver with DMI and SC-RJ connector

Features

- Compatible with electrical and optical performance of the POFAC recommendations for the Fast Ethernet over Plastic Optical Fiber (POF)
- Compatible with the electrical and optical performance of the ProfiNet recommendations the Fast Ethernet over POF and Hard-Clad Silica Fiber (HCS)
- 650nm operation
- Manufactured in an ISO 9001 certified facility
- DMI [Digital Diagnostics Monitoring Interface]
 - SFF-8472 Rev 9.3, provides real-time monitoring of:
 - Temperature
 - Supply voltage
 - Received optical power (Alarm/Warning flag)
- LVPECL signal detect output
- Temperature range -25°C to $+85^{\circ}\text{C}$

Applications

- Factory automation at Fast Ethernet speeds
- Fast Ethernet networking over POF and HCS
- Link Distance up to 50 m POF or 100 m HCS



AFBR-5978Z Demonstration Kit

Solar and Wind Power

Avago Application Specific Optocoupler Solutions

Gate Driver Features

- High peak output current
- High Common Mode Rejection (CMR)
- Wide operating temperature range
- Fast switching
- Low supply current
- Integrated IGBT protection features
- Broad range of surface mount packages

Isolation Amplifier Features

- High gain accuracy
- High linearity
- High Common Mode Rejection (CMR)
- Optical A/D Solution with Worldwide Safety Approval
- Not affected by external magnetic fields

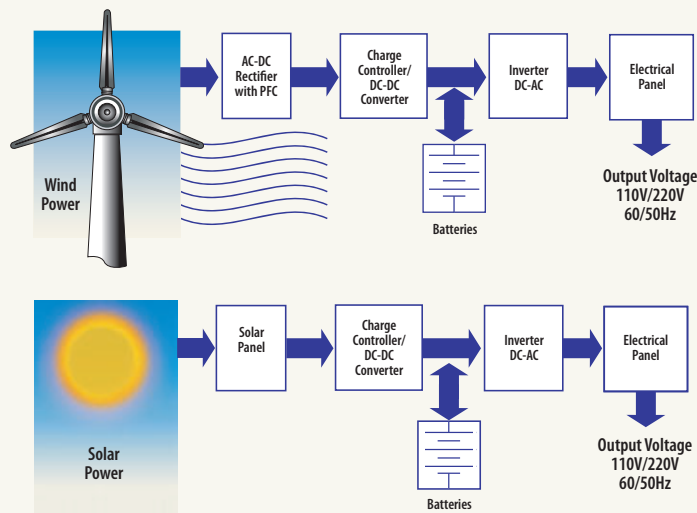


Isolated IGBT/Power MOSFET Gate Drivers

Part Number	Drive Current (Maximum)	Integrated Protection Features
ACNW3190	5.0 A	UVLO
ACPL-332J, ACPL-333J	2.5 A	Active Miller Clamp, DESAT, UVLO
ACPL-H312, ACPL-K312, ACPL-3130	2.5 A	UVLO
ACPL-331J, ACPL-330J	1.5 A	Active Miller Clamp, DESAT, UVLO
ACPL-P314, ACPL-W314-000E, HCPL-314J	0.6 A	—
ACPL-P302, ACPL-W302	0.4 A	—

Isolation Amplifiers

Part Number	Gain Accuracy (25°C)	Features
ACPL-C78A, ACPL-C780, ACPL-C784	±1% / ±3% / ±5%	Stretched SO-8 package, Differential output, High linearity, 1140 V high working voltage
HCPL-7510, HCPL-7520	±3% / ±5%	DIP-8 package, Single-ended output, High linearity
ACPL-796J	12 bits ENOB	16 bits of resolution, 74 dB min SNR, -40° C to 105° C operating temperature, SO-16 package, 1140 V high working voltage



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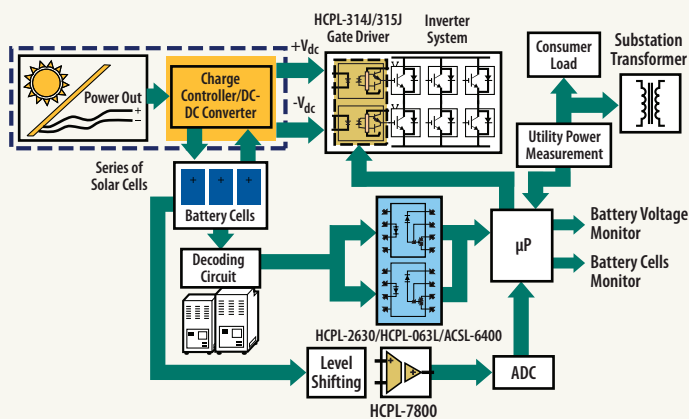
Digital Optocouplers

Features

- 3.3V/5V supply
- Ultra Low Power (~2mA/ch power consumption)
- Multi-channel and bidirectional
- Broad range of surface mount packages
- Reinforced Insulation.
- Wide operating temperature range (up to 125°C)

Digital Optocouplers

Part Number	Package	Benefits
ACPL-M61U	SO-5	Extended temperature: -40 °C to 125 °C
ACPL-M61L, ACPL-061L, ACPL-064L, ACPL-W61L, ACPL-K64L	SO-5, SO-8, stretched SO-6, stretched SO-8	10MBd, ultra low power, -40 °C to 105 °C
ACPL-W60L, ACPL-K64L	Stretched SO-6, stretched SO-8	Smaller package, meets 8 mm creepage / clearance, high working voltage (< 1140 Vpeak)
HCNW137, HCNW2611	400 mil widebody	DTI > 0.4 mm, high working voltage (> 1414 Vpeak)
ACNV2601	500 mil widebody	DTI > 2 mm, high working voltage (> 1768 Vrms), high isolation voltage (7500 Vrms)
ACSL-6210, ACSL-6400, ACSL-6410, ACSL-6420	SO-8, SO-16	10MBd, Multi-channel, bidirectional
ACPL-772L, ACPL-072L	DIP-8, SO-8	High speed (25 MBd), high operating temperature



Avago White Papers

- White Paper: Fiber Optics in Solar Energy
- White Paper: Industrial Fiber Optic Products for Wind Farm Applications
- Safety Considerations When Using Optocouplers and Alternative Isolators for Providing Protection Against Electrical Hazards

Selection Guides

- Optoisolation Products
- Isolation Product Solutions for Commercial and Industrial Applications
- Industrial Fiber Optic Components, Cabling and Accessories

Newsletters, Videos and Webinars

- Avago's Optocouplers Meeting Your Design Needs
- Webinars
- eNewsletter Signup
- Register for your own My Avago Web Page
- Optocoupler and Fiber Flash Videos

Optocoupler Application Notes

- Optocouplers

Spice Models and Evaluation Boards

- Optocoupler Spice Models
- Fiber Optic Evaluation Kits and Accessories

Wind Power Organizations

- American Wind Energy Association
- China Wind Power
- European Wind Energy Association (EWEA)
- Global Wind Energy Council
- Spanish Wind Energy Association (AEE)
- Wind Power Works

Contact Avago Technologies

- Website
- Technical Response Centers
- Sales Offices
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For product information and a complete list of distributors, please go to our web site:

www.avagotech.com
www.avagotech.com/fiber
www.avagotech.com/optocouplers

For technical support please email a Technical Response Center in your region:

United States: support@avagotech.com

Europe: info@promotionteam.de

Asia Pacific: pacrim.components@avagotech.com

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