

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 and optocoupler products 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. Our low power digital optocouplers for single, multichannel and bi-directional applications have lead the industry for over thirty 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

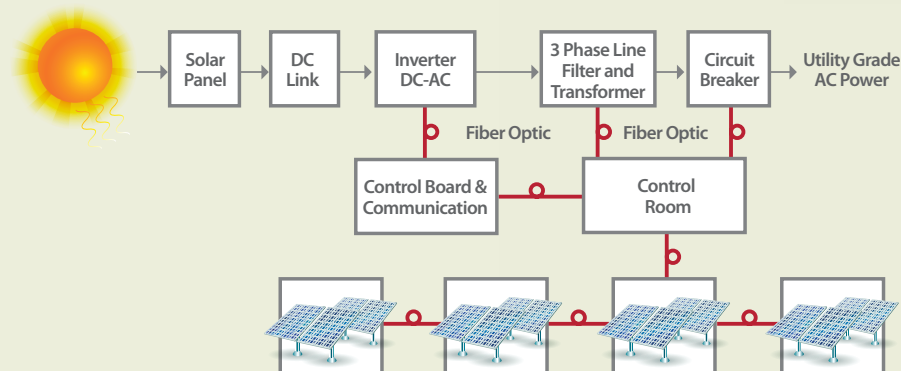
Fiber Optic Components Solutions

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

Industrial Fiber Optic Selection Guide

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

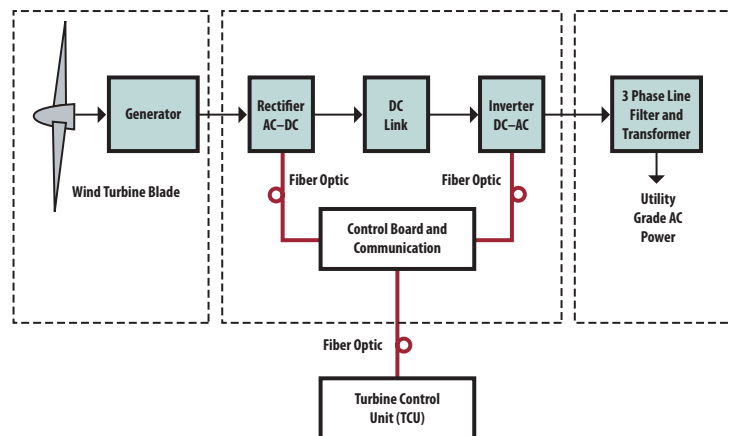


Wind Turbine Networking, Control and Communications

Fiber Optic Components Solutions



Part Number	Description	Data Rate	Distance		
			POF 1 mm	HCS 200 μ m	Multimode 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 POFAAC 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

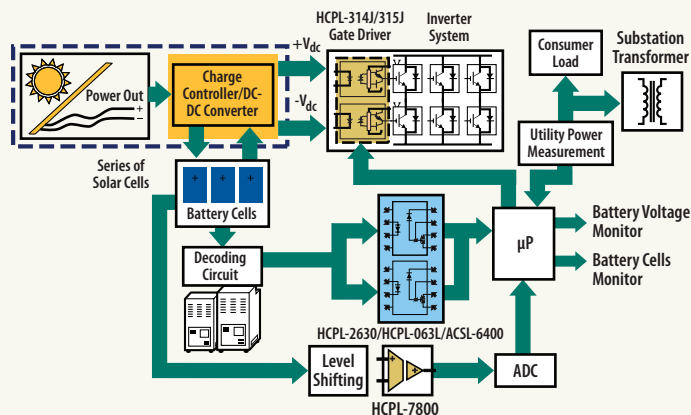
Digital Optocoupler & SSR/Photo MOSFET Solutions for

Digital Optocouplers

Part Number	Package	Benefits
ACPL-M61U	S0-5	Extended temperature: -40 °C to 125 °C
ACPL-M61L / ACPL-064L / ACPL-W61L / K64L	S0-5, S0-8, stretched S0-6, stretched S0-8	10MBd, ultra low power, -40 °C to 105 °C
ACPL-W60L / ACPL-K64L	Stretched S0-6, stretched S0-8	Smaller package, meets 8 mm creepage / clearance, high working voltage (< 1140 Vpeak)
HCNW137 / HCNW/2611	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	S0-8, S0-16	10MBd, Multi-channel, bidirectional
ACPL-772L / ACPL-072L	DIP-8, S0-8	High speed (25 MBd), high operating temperature

SSR (Photo MOSFETs)

Part Number	Description
ASSR-1218 / 19 / 1228	60 V / 0.2 A / 10 Ω
ASSR-1410 / 1411 / 1420	60 V / 0.6 A / 1 Ω
ASSR-1510 / 1511 / 1520 / 1530	60 V / 1.0 A / 0.5 Ω
ASSR-1611	60 V / 2.0 A / 0.1 Ω
ASSR-3210 / 3211 / 3220	250 V / 0.2 A / 10 Ω
ASSR-4110 / 4111 / 4120	400 V / 0.12 A / 25 Ω
ASSR-4118 / 4128	400 V / 0.1 A / 35 Ω
ASSR-5211	600 V / 0.2 A / 16 Ω
ASSR-V621 / V622	Photo Voltaic Driver



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Avago Application Specific Optocoupler Solutions for

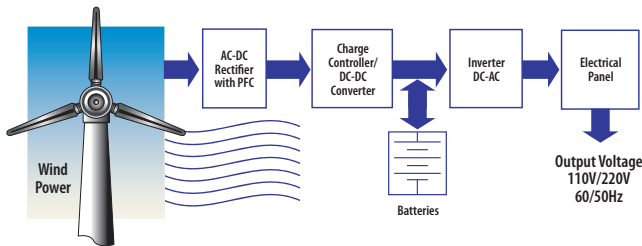
Isolated IGBT/Power MOSFET Gate Drivers

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

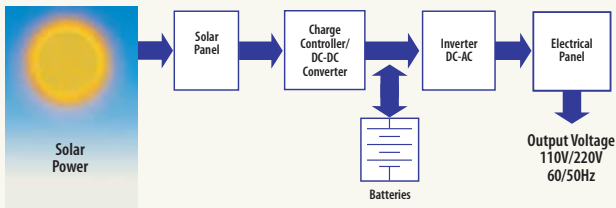


Isolation Amplifiers

Part Number	Gain Accuracy (25°C)	Features
ACPL-C78A/C780/C784	$\pm 1\%$ / $\pm 3\%$ / $\pm 5\%$	Stretched SO-8 package, Differential output, High linearity, 1140 V high working voltage
HCPL-7510/7520	$\pm 3\%$ / $\pm 5\%$	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



IGBT Controller



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](#)

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- [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](#)

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