



Going Green?

Industrial Fiber enables the green energy transition

Broadcom Industrial Fiber

Enabling the Green Energy Transition

Broadcom's industrial fiber products are used widely in green energy applications, including solar and wind power generation, energy storage, energy metering and monitoring, smart grid, and motor drives. These products are highly reliable in harsh industrial environments, providing mission-critical system control and communications, high-voltage isolation and protection, and accurate optical sensing and measurement.

Broadcom is a leading supplier of industrial fiber products for communication and power over fiber. Both technologies are complementary to each other and can together fulfill full optical isolation. This is fundamental for the energy transition over the coming years and decades, as it allows measurement of the electrical current in high voltage applications with a high measurement frequency. This is necessary for fast reactions in smart grids.

Very power efficient solutions e.g. Trains or power plants will use SiC gate drivers. With a complimentary solution of Power over Fiber and control signals over Fiber, it is possible to isolate gate drivers completely galvanically and drive converters more efficiently. Stable operation of HV installation will be one challenge after the energy transition. With Broadcom's Arc flash detection portfolio, it is possible to detect failures and switch the HV installation "off" to avoid damage. We have the complete portfolio for optical Arc Flash detection including Sensor, Sensor Fiber, Detector and all necessary connectors.



Industrial Fiber for Communication, Isolation & Sensing



Product Family	Part Number
Fast Ethernet Transceivers	AFBR-57E6APZ (C) – FE-SFP AFBR-59E4APZ (C) – FE-SFF AFBR-57B4APZ (C) – DC-50Mbit/s SFP
High Voltage On-board Isolation	AFBR-39xxxxRZ
Versatile Link Plastic Optic Fiber Transmitters and Receivers	AFBR-1624Z/2624Z AFBR-1529Z/2529Z AFBR-1521CZ/2521CZ
Power over Fiber	AFBR-POL2120/4120 AFBR-POx0xL AFBR-POMEK2204
Arc Flash Transceiver and Sensor	AFBR-S10TR001Z AFBR-S10PS010Z

Enabling the Green Energy Transition



Wind Energy Generation

- Offshore wind power generation takes advantage of the higher wind speeds available on the coast compared to on land
- Highly corrosive environment is a challenge for the electronics here
- Fiber optic transceivers with conformal coating protect the electronics in harsh environments

Coated
SFP-pcb after salt spray test



Not coated
SFP-pcb after salt spray test



Product Family	Part No	Benefits
Fast Ethernet Transceivers	AFBR-57E6APZC (FE-SFP) AFBR-59E4APZC (FE-SFF) AFBR-57B4APZC (DC-50Mbit/s SFP)	Conformal coating to protect the electronics in harsh environments
Versatile Link Plastic Optic Fiber Transmitter and Receiver	AFBR-1624Z/2624Z AFBR-1529Z/2529Z AFBR-1521CZ/2521CZ	For energy conversion



Solar Energy Generation

Power inverters in solar power plants:

- High voltage is needed for energy-efficient and cost-effective power generation in solar power plants
- Longer strings of PV modules reduce combiner boxes and further increase efficiency (1500V string today, first solutions for 3000V)
- High voltage isolation between power and control parts e.g. for energy measurement, switching and voltage regulation

Product Family	Part No	Benefits
Fiber Optic Shortlink	AFBR-39xxxxRZ	High voltage on-board Isolation
Versatile Link Plastic Optic Fiber Transmitter and Receiver	AFBR-1624Z/2624Z AFBR-1529Z/2529Z AFBR-1521CZ/2521CZ	For energy conversion



Emerging Green Energy Applications



Energy Storage

There are different ways to store energy:
Potential energy, eg. Hydroelectric power plants,
electro-chemical and chemical energy

Broadcom industrial fiber products ensure safe operation in all these applications:

Application	Product	Description
Pumped-storage hydro electricity	AFBR-1624Z/2624Z AFBR-1529Z/2529Z AFBR-1521CZ/2521CZ	Versatile Link Fiber Optic Transmitters and Receivers for motor control
Battery Systems	AFBR-39xxxxRZ	Fiber Optic Shortlink for high voltage on-board isolation solution
H ₂ Storage	Special modification of AFBR-57E6APZ-HT for explosive atmosphere on request.	Explosive atmosphere Fast Ethernet transceiver



Energy Transport

High Voltage DC and AC is required for efficient energy transportation over long distances, current sensing for smart grids and fast measurements for quick reactions on load changes.

Broadcom Arc Flash detection is ideal for increased resilience and protection in these high voltage energy installations.

Description	Part No	Benefits
Sensor Transceiver	AFBR-S10TR001Z	<ul style="list-style-type: none"> • Improved security • Localized detection • Highest speed
Point Sensor	AFBR-S10PS010Z	
Sensor fiber POF	AFBR-TUS500Z	

Mass Transit



Drives

Growing cities will lead to an increasing demand for public transportation

- Power over Fiber provides full isolation of SiC drives, that enables faster switching and increased efficiency.
- Broadcom Versatile Link Plastic Fiber Optic components are an ideal solution to control SiC

Application:

Traction drive. Propulsion converter. Auxiliary converter, Multifunction vehicle bus (MVB), IGBT driver board, Control link

Product	Description
AFBR-1624Z/2624Z	Versatile Link Plastic Optic Fiber Transmitters and Receivers
AFBR-1529Z/2529Z	
AFBR-1521CZ/2521CZ	



Energy Metering

Energy metering can be achieved by optically isolated measurement directly in the high voltage path (Pantograph).

Broadcom's Power over Fiber for isolated sensing in combination with fiber data communication is the ideal solution for energy metering for mass transit applications.

Product	Description
AFBR-POCx0xL	Power converter components
AFBR-POL2120/4120	Laser

Industrial Fiber Product Stewardship

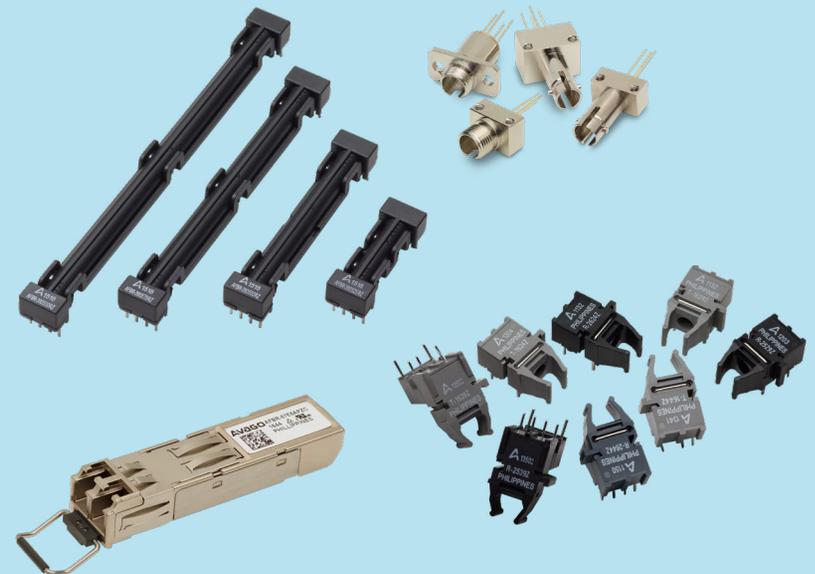


RoHS



REACH

Broadcom strives to provide the highest quality products while ensuring compliance with the relevant regulatory requirements, including RoHS, REACH and regulations related to Conflict Minerals. Refer to [Broadcom's Environmental, Social & Governance \(ESG\) report](#) for more information on environmental stewardship.



Broadcom Inc. is a global infrastructure technology leader built on 50 years of innovation, collaboration and engineering excellence.

Broadcom Inc. (NASDAQ: AVGO) is a global technology leader that designs, develops and supplies a broad range of semiconductor and infrastructure software solutions.

Broadcom's category-leading product portfolio serves critical markets including data center, networking, enterprise software, broadband, wireless, storage and industrial. Our solutions include data center networking and storage, enterprise, mainframe and cyber security software focused on automation, monitoring and security, smartphone components, telecoms and factory automation.

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