

Datasheet

## EM316GSW-XY

Gigabit/Fast Ethernet Multifunction Converter/Repeater/Transponder/Multi-Media Switch



### Overview

Fiber grooming (media conversion and optimization) incorporates a wide variety of data transmission functions traditionally implemented through multiple independent solutions. The MRV XY multifunction media converters combine media conversion, distance extension, and fiber optimization into versatile multi-function modules. The EM316GSW-XY, is an extremely versatile transponder/converter for the Fiber Driver Optical Multi-Service Platform.

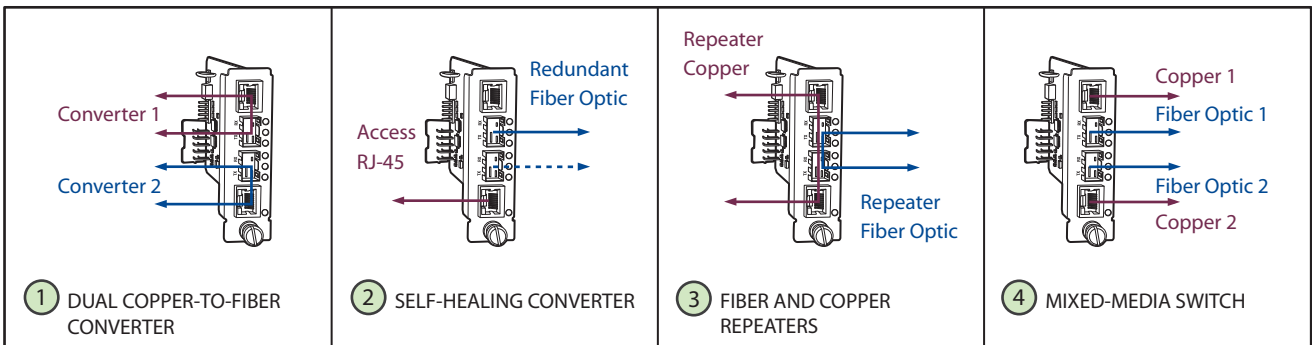
The EM316GSW-XY combines two Gigabit copper ports and two modular SFP Gigabit Ethernet ports to serve several traditional roles with virtually any network media.

- ① Dual Copper-to-Fiber Converter – Fast/Gigabit Ethernet
- ② Self-Healing Converter - redundant trunk and access links
- ③ Fiber and Copper Repeaters – multi-mode or single-mode fiber support
- ④ Mixed-Media Switch - media conversion with collision isolation

### Highlights

- Hundreds of functions in one module including:
    1. Dual 10/100/1000Base-T, Ethernet copper-to-fiber (100Base-FX or 1000Base-X) converter
    2. Self-healing 10/100/1000Base-T, Ethernet copper-to-fiber (100Base-FX or 1000Base-X) converter
    3. Dual repeater - fiber-to-fiber (100Base-FX or 1000Base-X) and copper-to-copper (10/100/1000Base-T)
    4. Mixed-media Ethernet switch – two copper (10/100/1000Base-T) and two fiber (100Base-FX or 1000Base-X) interfaces
  - Copper 10/100/1000Base-T ports with auto-negotiation and automatic MDI/MDIX sensing
  - Speed-matching conversion between all ports
  - Manual configuration for speed, duplex, auto-negotiation, MDI/MDIX, and loopback
  - Jumbo packet support (9600B)
  - Link fault pass-through (most modes)
    - Link Integrity Notification (LIN) – MRV protocol
  - “Layer 1” ring redundancy for fault tolerance based on MRV Ethernet Automatic Protection Switching (MAPS)
  - VLAN support
  - Loopback testing
  - IEEE 802.3u compliance
  - SFP support for Fast Ethernet, Gigabit Ethernet, and multirate transceivers
  - Hot-swap support - modules can be removed and replaced without impacting other modules in the chassis
  - Optical performance monitoring through SFP Digital Diagnostics (SFF-8472)
  - Advanced SNMP management
- Compatibility with all powered Fiber Driver chassis

Figure 1: Modes of operation



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The revolutionary paradigm of the versatile XY (multi-dimensional) converter family simplifies network planning and installations while reducing replacement inventory requirements. The two copper 10/100/1000 Ethernet ports and two modular SFP Fast/Gigabit Ethernet ports may be configured and combined in literally hundreds of ways to serve the traditional converter, repeater, and switch roles with the flexibility for modern media and protocols. A single Fiber Driver module now fills the roles of several legacy network components, with SFP options multiplying the possible applications still further.

The SFP interfaces allow connection to many media types limited only by pluggable fiber optic interface options. Each interface may be provisioned to 100Base-FX and 1000Base-X.

- Single or dual fiber 100Base-FX or 1000Base-X
- Multi-mode (MM) or MM extended (MMX)
- Single-Mode at 1310 nm or 1550 nm (up to 120 km)
- Coarse and Dense Wave Division Multiplexing
- Copper 1000 Base-T or 10/100Base-T

Most available SFPs use MSA-compliant (SFF-8724) Digital Diagnostics, so these devices provide advanced optical performance monitoring for proactive network administration and maintenance. The small form-factor is also designed for portability and interoperability, so inventory costs and downtime may be reduced with fewer spare parts shared between many systems.

Each 10/100/1000Base-T RJ-45 Ethernet port supports auto-negotiation and automatic MDI/MDI-X sensing for plug-and-play Ethernet connections. Either a straight- through or crossover cable may be used on either port.

The EM316GSW-XY module supports jumbo packets up to 9600 bytes in compliance with modern internetworking protocols including MPLS over Ethernet, Q-in-Q (VLAN stacking), MAC-in-MAC, and others.

For flexible link management, the EM316GSW-XY supports link fault pass-through with MRV's Link Integrity Notification (LIN). It ensures correct propagation of link faults by disabling both ends of a failed link, which allows devices dependent upon link state such as switches and routers to accurately respond to network conditions. LIN is not applicable when the XY module is acting as a mixed-media switch.

### Traditional Applications

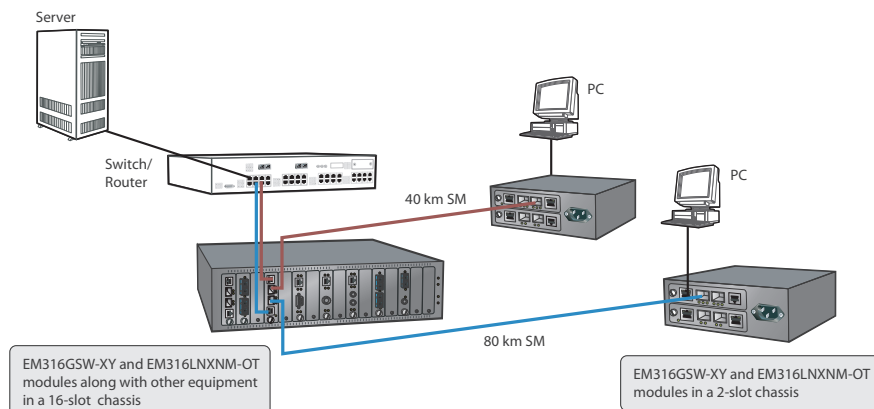
With a flexible internal architecture, the EM316GSW-XY is a price-competitive solution that offers multiple operational modes for various applications. (See Figure 1.)

#### 1. Dual Copper (10/100/1000Base-T) to Fiber (100Base-FX or 1000Base-X) Converter

In this mode (see Figure 2) , the module provides two independent copper-to-fiber Fast/Gigabit Ethernet converters for the price of a single one. This configuration doubles the density of a managed central office 16-slot chassis to 30 converters.

The EM316GSW-XY high-density solution promotes the usage of media conversion and distance extension over fiber while minimizing the investment in expensive internetworking systems using built-in fiber optic interfaces.

**Figure 2:** Managed Dual Copper-to-Fiber Converter Application



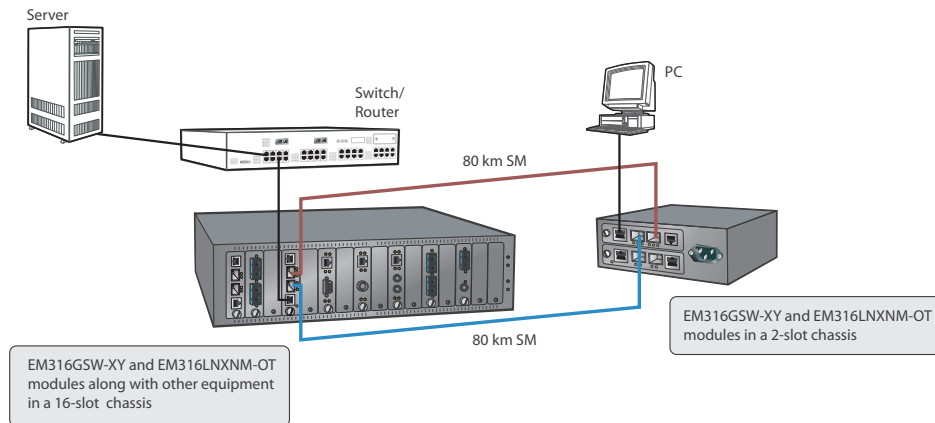
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### 2. Self-Healing Copper-to-Fiber Converter

In this mode, the module acts as a single 10/100/1000Base-T copper to redundant 100Base-FX or 1000Base-X fiber (dual-SFPs) converter. (See Figure 3.) Two protected fiber optic paths extend the Ethernet segment with virtually no downtime.

MRV's unique self-healing protection allows optical path exchange with nearly zero data loss and without detection by link-based internetworking protocols such as STP or OSPF.

**Figure 3:** Managed Redundant Copper-to-Fiber Converter Application



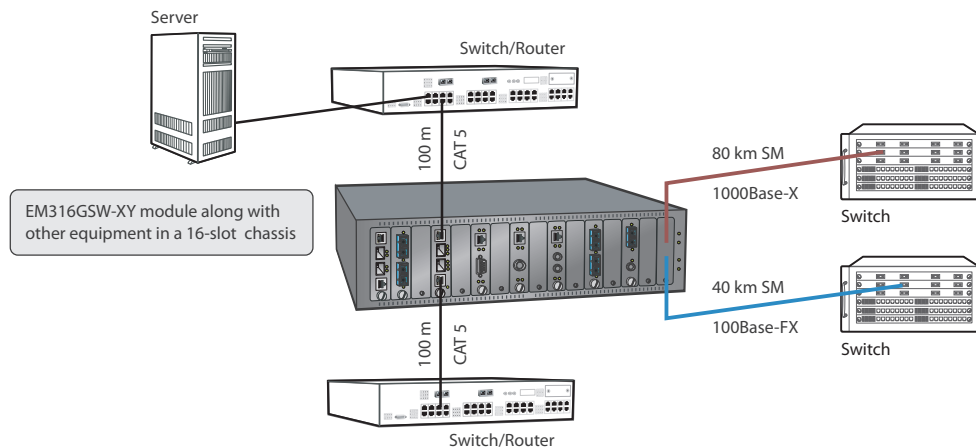
### 3. Dual-Repeaters-Fiber Optic and Copper

In this mode, the module acts as a pair of repeaters.

- Fiber optic repeater between the two SFP ports with any supported interfaces
- Copper repeater between the two 10/100/1000 Base-T interfaces (See Figure 4.)

The fiber optic repeater enables distance extension over a fiber optic cable, with full data and clock regeneration for extended distances. The copper repeater offers distance extension over a copper infrastructure with speed and duplex matching, and automatic MDI/MDIX sensing on each RJ-45 interface.

**Figure 4:** Managed Fiber Repeater and Copper Repeater Application







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## Physical Specifications

<b>Operating Temperature</b>	0°C to 60°C (32°F to 140°F)
<b>Storage Temperature</b>	-40°C to 70°C (-40°F to 158°F)
<b>Relative Humidity</b>	85% maximum, non-condensing
<b>Physical Dimensions</b>	25 mm x 75 mm x 175 mm deep (1" x 3" x 7" deep)
<b>Weight</b>	Approximately 120 - 240 g (4.2 - 8.5 oz) depending on configuration
<b>Regulatory Compliance</b>	FCC Part 15, Class A; IC, Class A; EMC Directive: Emission (Class A) and Immunity;
	WEEE Directive: Wheelie Bin Mark; RoHS Directive; China RoHS; REACH SVHC

Ordering Info	Model	Function	Protocol	Connectors
	EM316GSW-XY	Gigabit/Fast Ethernet multifunction converter/ repeater/transponder/multi-media switch	10/100/1000Base-T / 100-FX or 1000-X	SFP (x2) / RJ-45 (x2)

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