# 10G LONG-HAUL TRANSPONDER & REPEATER

- 10G transponder for short and long haul applications

- Supports OC-192/SIM-64, 10GbE LAN PHY and WAN PHY

- Performs lull 3R (retime, reshape and retransmit) signal regeneration

- XFP or FFI line interface (1310nm, 1550nm or DWDM)

- Link distances up to 270km without in-line amplifiers

- Distances up to 1 400km for multi-span DWDM applications

- G.709 line rate with Forward Error Correction (Long-Haul Transponder)

- Digital Diagnostic Monitoring and management via SNMP or Network Management Platform (NMP)

- Remote management through embedded 10Mb DCC (Long-Haul Transponders)

- Hot swappable

- Wire speed performance with low latency and jitter

- Applications:

  o   Metro, Regional and Long Haul optical networks

  o   DWDM networks

  o   Upgrade existing CWDM and DWDM networks

  o   10G or OC-192/STM-64 signal repeaters

## OVERVIEW

The 10G transport modules are part of the MICROSENS 10G platform and are used as 10G or OC-192/STM-64 signal repeaters, long haul extenders and as DWDM transponders.

The transport modules consist of the Long-Haul transponder and the Repeater Module. The Transponder support OC-192/ STM-64 and 10GbE LAN on the client side and G709 on the line side. Repeater support all 10G protocols from 9.95 Gbps to 10.709 Gbps, including 10GbE LAN PHY, WAN PHY and OC-192/STM-64.

## APPLICATIONS

The Long-Haul module can be used to transport 10G traffic in Metro Regional and Long haul DWDM networks. It can also be used to increase capacity of existing WDM networks. Configured with an ITU DWDM optic it can be connected directly to a DWDM MUX of an existing WDM system and transport additional data at 10G rate over an additional wavelength. The module can also be used in regeneration sites of long haul networks.

Long-Haul modules have two types of optical interfaces. They can be ordered with standard XFP interfaces or FFI interfaces. In a typical application the access port will have an XFP interface and the line port will have an FFI interface. The modules may be configured to have FFI optics for both the access and line ports, ideal for long haul repeater applications. Designed by MICROSENS, FFI optical interfaces are fixed and mounted on the module and support 40km, 60km and 80km distances with 1550nm or DWDM wavelength. Combined with MICROSENS optical booster and pre-amplifier, FFI optics achieve link distances of up to 270km and up to 1 400km with in-line amplifiers.

To further enhance long haul performance, the LH Transponder has a 10.709 line bit rate that includes a transport overhead (light wrapper) that provides operation, administration and maintenance capabilities and Forward Error Correction (FEC). The FEC reduces the number of transmission errors on noisy links and enables deployment of longer optical spans. Thus, it improves transport performance and drastically increases bandwidth capacity at low cost.

## MANAGEMENT

The Long-Haul transport modules can be fully managed through SMNP or MICROSENS Network Management Platform (NMP), which includes CLI and Java-based GUI. Complete performance monitoring and management is provided, including transceiver shut off, local and remote loop back for facilitating maintenance operations and for conducting fault isolation. Digital Diagnostics Management (DDM) is supported for both XFP and FFI interfaces. This includes link status reporting, transmit (TX) and receive (RX) signal power monitoring, and operational temperature, as well as manufacturer and transceiver model information essential for inventory management. A 10Mb in-band data communications channel (DCC) is embedded in the line side for remote management (only in the LH Transponder model).

With a programmable FPGA architecture, the capabilities of the MICROSENS 10G platform can be easily extended through in-service upgrades.

## NETWORK TOPOLOGY
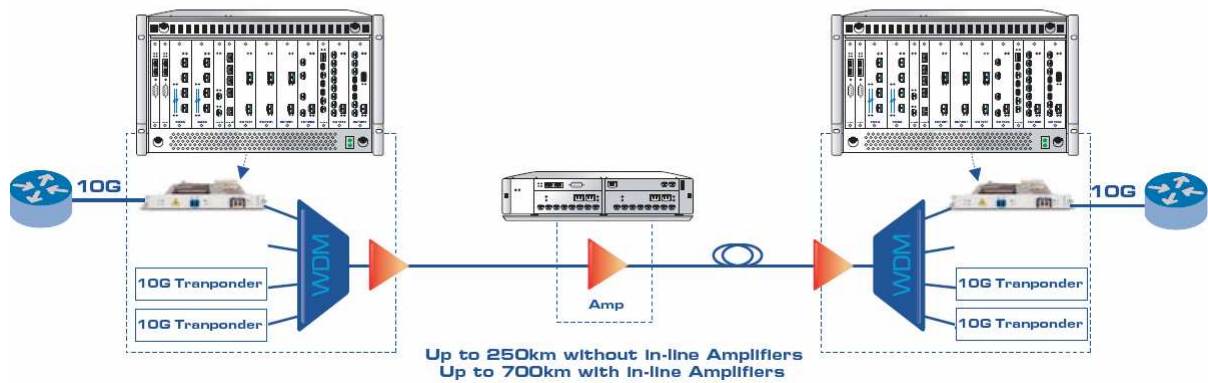


### LH Repeater
The Repeater module takes one slot in the MICROSENS chassis. This module is designed to provide full 3R signal regeneration for any 10G data signal. The module comes with standard XFP interfaces for both the access and line ports. For long haul applications the Repeater can be ordered with FFI optics on either the line port or for both the line and access ports.

### LH Transponder
The LH Transponder is a 10G transponder designed for long haul applications. It includes Forward Error Correction (FEC) capability and can extend 10G signals to distances of up-to 270 km without in-line amplifiers and up-to 1 400km with in-line amplifiers. This 2-slot module is capable of accepting either a 10GbE LAN PHY, 10GbE WAN PHY or OC-192/STM-64 (SONET/SDH).

Typical Transponder module comes with an XFP access port and an FFI optical interface on the line port but can be ordered with any interface combination.

## ADDING 10G WAVELENGTHS TO EXISTING DWDM NETWORK
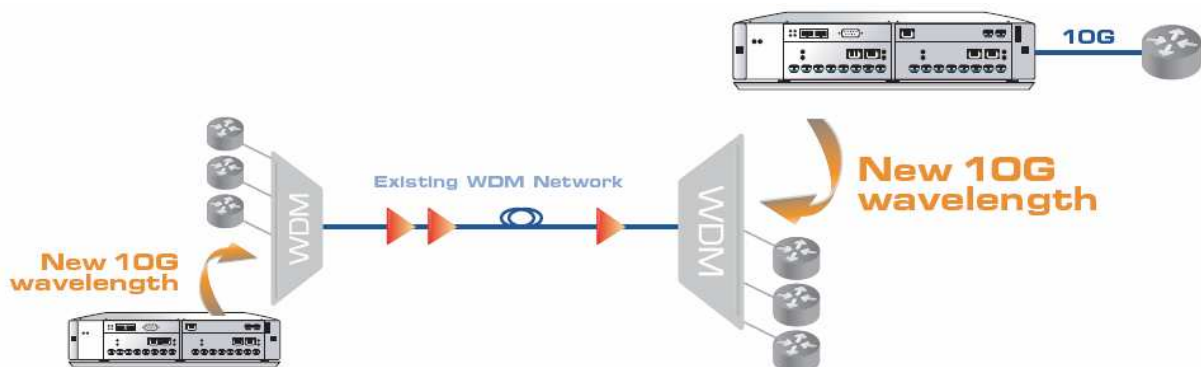
## Order Information

| Article no. | Description | Connectors |
|---|---|---|
| MS430550M | 10G Transponder with 3R Regeneration, Line Port 1&2: 2x XFP Slots (XFPs not included) | 2 x XFP |
| MS430551M-x | 10G Transponder with 3R Regeneration, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface, x - FFI option, (XFPs/FFI not included) | 1 x XFP<br>1 x FFI |
| MS430551M-x-nn | 10G Transponder with 3R Regeneration, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface DWDM, x - FFI option, nn: Channel # , (XFPs/FFI not included) | 1 x XFP<br>1 x FFI |
| MS430552M-xy-nnmm | 10G Transponder with 3R Regeneration, Line Port 1&2: Fixed Fiber Interface, x/y: FFI DWDM option, nn/mm: DWDM-Channel #, (FFI not included) | 2 x FFI |
| MS430551MT-x | Tunable 10G Transponder with 3R Regeneration, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface, x - FFI Tunable option, (XFPs/FFI not included) | 1 x XFP<br>1 x Tun FFI |
| MS430552MT-xy | Tunable 10G Transponder with 3R Regeneration, Line Port 1&2 Fixed Fiber Interface, x/y - FFI Tunable option, (FFI not included) | 2 x Tun FFI |
| MS430560M | 10G Transponder with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1&2: 2x XFP Slots (XFPs not included) | 2 x XFP |
| MS430561M-x | 10G Transponder with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface, x - FFI option, (XFPs/FFI not included) | 1 x XFP<br>1 x FFI |
| MS430561M-x-nn | 10G Transponder with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface DWDM, x - FFI option, nn: Channel #, (XFPs/FFI not included) | 1 x XFP<br>1 x FFI |
| MS430561MT-x | Tunable 10G Transponder with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface, x - FFI Tunable option, (XFPs/FFI not included) | 1 x XFP<br>1 x Tun FFI |
| MS430562M | 10G Regenerator with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1&2: 2x XFP Slots (XFPs not included) | 2 x XFP |
| MS430563M-xy | 10G Regenerator with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1&2 Fixed Fiber Interface, x,y - FFI option, (FFI not included) | 2 x FFI |
| MS430563M-xy-nnmm | 10G Regenerator with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1&2 Fixed Fiber Interface DWDM, x/y - FFI option, nn/mm: Channel #, (FFI not included) | 2 x FFI |
| MS430563MT-xy | Tunable 10G Regenerator with FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1&2 Fixed Fiber Interface, x/y - FFI Tunable option, (FFI not included) | 2 x Tun FFI |
| MS430564M | 10G Transponder with NG FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1&2: 2x XFP Slots (XFPs not included) | 2 x XFP |
| MS430565M-x | 10G Transponder with NG FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface, x - FFI option, (XFPs/FFI not included) | 1 x XFP<br>1 x FFI |
| MS430565M-x-nn | 10G Transponder with NG FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface DWDM, x - FFI option, nn: Channel #, (XFPs/FFI not included) | 1 x XFP<br>1 x FFI |
| | | |

## Technical specifications

**Type**
10G Long-Haul Transponder & Repeater

**Protocols**
Transponder Client:
 OC-192/ STM-64, 10GbE LAN
Transponder Line: G709 line rate
Repeater Client:
 Any 10G from 9.95 to 10.709 G
Repeater Line:
 Any 10G from 9.95 to 10.709 G

**Interfaces**
Transponder Client: XFP
Transponder Line:
    XFP / FFI /  tunable FFI
Repeater Client: XFP / FFI
Repeater Line:
    XFP / FFI /  tunable FFI

**Management**
MIB - SNMPV2c Private MIB
Remote Management – 10Mb DCC

**Optical Connector**
Dual LC (Client and Line)

**Operating Temperature**
-5°C to +50°C

**Storage Temperature**
-20°C to +70°C

**Power Consumption**
Transponder: 24,5W typical
Repeater: 12W typical

**Size**
Transponder: 2 slots
Repeater: 1 slot

**Indicators**
HW ready, SW ready,
Alarm: Loss of incoming signal (line and client); Transceiver Fail (XFP/FFI, line and client)

**References**
XFP MSA rev 4.0;
ITU-T G707 12/2003 edition;
ITU-T G709 03/2003 edition;
Telcordia GR253 issue 3;
IEEE 802.3-2002;
IEEE 803.3ae-2002; Fiber Channel; 10GFC Rev 3.5

## Order Information

| Article no. | Description | Connectors |
|---|---|---|
| MS430565MT-x | Tunable 10G Transponder with NG FEC for 10G LAN or 10G WAN/OC-192/STM-64, Line Port 1: XFP Slot, Line Port 2: Fixed Fiber Interface, x - FFI Tunable option, (XFPs/FFI not included) | 1 x XFP<br>1 x Tun FFI |
| | | |

## Chassis

| | | |
|---|---|---|
| MS430500M | 19" Chassis 2 HU, 5 module slots, 2x 48 VDC power supplies, incl. Backplane | |
| MS430502M | 19" Chassis 6 HU, 19 module slots, 2x 48 VDC power supplies, incl. Backplane | |

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