# FTG-M12G-S85Q-55M

GBIC 1000Base-SX, 850nm, multi-mode, 550m



## Description

FTG-M12G-S85Q-55M series GBIC transceiver can be used to setup a reliable, high speed serial data link over multi-mode fiber. Maximum link span can reach 550m. Module is fully compliant with GBIC MSA specifications and it is available in two hardware versions:
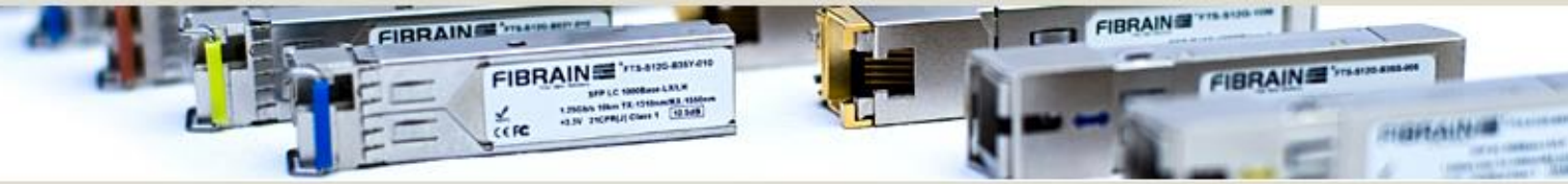
| Model | Operating case temperature |
|---|---|
| FTG-M12G-S85Q-55M | 0~70°C |
| FTG-M12G-S85Q-55MI | -40~85°C |

Host device can access module internal EEPROM memory via $I^2C$ interface.

Transceiver can be prepared as compatible with: Cisco, HP, Netgear, Avaya, D-Link, Brocade, Extreme Networks, Huawei, Enterasys, 3Com, Alcatel-Lucent and other. To confirm compatibility please contact technical support before ordering.

## Applications

- Gigabit Ethernet (1.25Gbps)
- Fiber Channel (1.0625Gbps)

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## Key features

- SC Duplex receptacle
- Transmission distance up to 550m
- VCSEL diode 850nm transmitter, PIN receiver
- Throughput up to 1.25Gb/s (1x Fibre Channel, Gigabit Ethernet)
- Fully compliant with GBIC MSA INF-8053
- Hot-Pluggable
- RoHS compliant
- Class 1 laser safety
- Low power dissipation (<1W)
- Metal case for low EMI
- Operating case temperature* : 0~70°C / -40~85°C

## Specification

**Supported transmission technology**
Gigabit Ethernet, Fibre Channel

**Speed supported for Ethernet technology**
1.25Gbps

**Speed supported for Fibre Channel technology**
1.0625Gbps

**Transmission medium**
Multi-mode fiber 50/125µm or 62.5/125µm [on shorter distance]

**Transmission distance\*\***
550m

**Receptacle type**
SC Duplex

**Wavelength**
850nm

**Output power**
-9~-3dBm

**Receiver sensitivity**
-18dBm

**Power supply voltage**
5V

**Total power consumption**
< 1W

**Operating environment – temperature\***
0~70°C   /   -40~+85°C

**Operating environment - humidity**
5~95% non-condensing

**Dimensions**
65.35mm × 33.3mm × 10.5mm

\* - standard / industrial version

\*\* - transmission distance depends on optical link attenuation

# Detailed technical specification

## Pin Description

| Pin | Name | Function/Description | Notes |
|---|---|---|---|
| 1 | RX_LOS | Loss of Signal | 4 |
| 2 | RGND | Receiver Ground | |
| 3 | RGND | Receiver Ground | |
| 4 | MOD_DEF(0) | Module Definition 0-Grounded in module | 3 |
| 5 | MOD_DEF(1) | Module Definition 1-Two wire serial ID interface | 3 |
| 6 | MOD_DEF(2) | Module Definition 2-Two wire serial ID interface | 3 |
| 7 | TX_DISABLE | Transmitter Disable-Module disables on high or open | 2 |
| 8 | TGND | Transmitter Ground | - |
| 9 | TGND | Transmitter Ground | - |
| 10 | TX_FAULT | Transmitter Fault Indication | 1 |
| 11 | RGND | Receiver Ground | - |
| 12 | RD- | Inverse Received Data out | 5 |
| 13 | RD+ | Received Data out | 5 |
| 14 | RGND | Receiver Ground | - |
| 15 | VccR | Receiver Power - +5V±5% | 6 |
| 16 | VccT | Transmitter Power - +5V±5% | 6 |
| 17 | TGND | Transmitter Ground | - |
| 18 | TD+ | Transmitter Data In | 7 |
| 19 | TD- | Inverse Transmitter Data In | 7 |
| 20 | TGND | Transmitter Ground | - |

**Notes:**

1. TX Fault is open collector/drain output which should be pulled up externally with a 4.7KΩ-10KΩ resistor on the host board. When high, this output indicates a laser fault of some kind. Low indicates normal operation.

2. TX Disable input is used to shut down the laser output per the state table below. It is pulled up to Vcc within the module.

   Low (0 – 0.8V):                  Transmitter on

   Open or High (2.0 – VccT):     Transmitter Disabled

3. Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up to Vcc with a 4.7KΩ-10KΩ resistor on the host board

   Mod-Def 0 is grounded by the module to indicate that the module is present.

   Mod-Def 1 is clock line of two wire serial interface for optional serial ID.

   Mod-Def 2 is data line of two wire serial interface for optional serial ID.

4. LOS (Loss of signal) - when high, this output indicates the received optical power is below the worst case receiver sensitivity (as defined by the standard in use). Low indicates normal operation.

5. These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω differential at the user SERDES. The AC coupling is done inside the module and thus not required on the host board.

6. VccR and VccT are the receiver and transmitter power supplies. They are defined as 5V±5% at the GBIC connector pin. The in-rush current will typically be no more than 30mA above steady state supply current after 500ns.

7. TD-/+: These are the differential transmitter inputs. They are AC coupled differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on host board.

## Electrical parameters

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Transmitter Differential Input Volt | +/-TX_DAT | 650 | | 2000 | mV p-p | 1 |
| Receiver Differential Output Volt | +/-RX_DAT | 600 | | 2000 | mV p-p | 2 |
| Tx_Disable Input Voltage – Low | $V_{IL}$ | 0 | | 0.8 | V | |
| Tx_Disable Input Voltage – High | $V_{IH}$ | 2.0 | | Vcc | V | |
| Tx_Fault Output Voltage – Low | $V_{OL}$ | 0 | | 0.8 | V | 3 |
| Tx_Fault Output Voltage – High | $V_{OH}$ | 2.0 | | Vcc | V | 3 |
| Rx_LOS Output Voltage- Low | $V_{OL}$ | 0 | | 0.8 | V | 3 |
| Rx_LOS Output Voltage- High | $V_{OH}$ | 2.0 | | Vcc | V | 3 |
| Throughput | B | | 1250 | | Mb/s | |
| Total current requirement | | | | 270 | mA | |

## Transmitter parameters

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Central wavelength | λc | 830 | 850 | 860 | nm | |
| Spectral width | Δλ | | | 0.85 | nm | |
| Site mode suppression ratio | SMSR | 30 | | | dB | |
| Launch optical power | $P_o$ | -9 | | -3 | dBm | 4 |
| Extinction ratio | EX | 9 | | | dB | |
| Dispersion penalty | | | | 1 | dB | |
| Optical rise/fall time | $T_{rise}/T_{fall}$ | | | 260 | ps | 5 |
| Eye diagram | Compliant with IEEE802.3-2005 Gigabit Ethernet 1000BASE-SX | | | | | |

## Receiver parameters

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Sensitivity | $P_{min}$ | | | -18 | dBm | 6 |
| Central wavelength | λc | 770 | | 860 | nm | |
| Receiver overload | $P_{MAX}$ | 0 | | | dBm | 6 |
| RX_LOS Asserted | $S_A$ | -35 | | | dBm | |
| RX_LOS De-Asserted | $S_D$ | | | -19 | dBm | |
| RX_LOS Hysteresis | - | | 3.0 | | dB | |
| Optical return loss | ORL | 12 | | | dB | |

**Notes:**

1. Internally AC coupled and terminated to 100Ω differential load.
2. Internally AC coupled, but requires a 100Ω differential termination or internal to Serializer/Deserializer.
3. It is open collector/drain output which should be pulled up externally to Vcc with a 4.7KΩ-10KΩ resistor on the host board. LOS: logic 0 indicates normal operation; logic 1 indicates no signal detected.
4. Optical power is launched into MMF
5. 20-80%
6. Measured with PRBS $2^{23}-1$ at $10^{-12}$ BER

## Mechanical specification
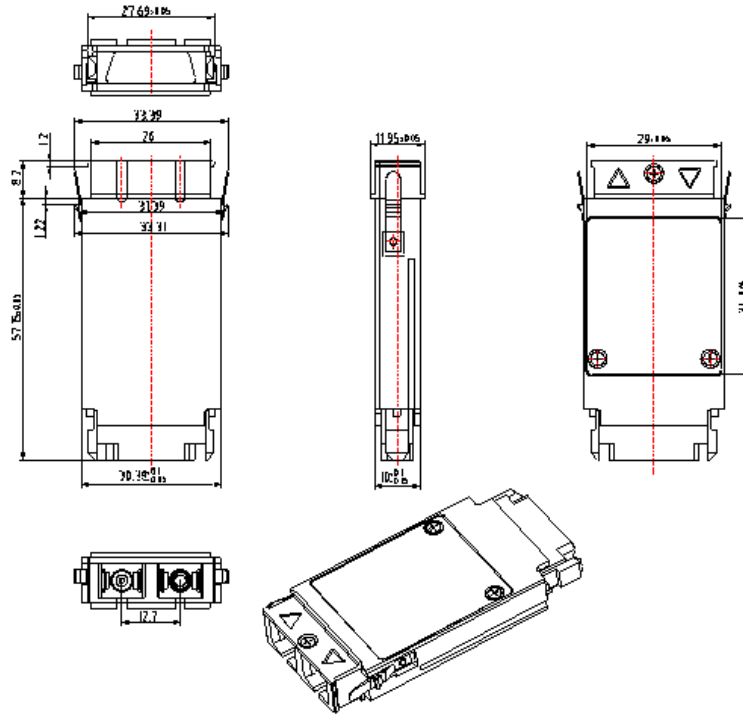


## Recommended environment conditions

| Parameter | Symbol | Min | Typ | Max | Unit |
|-----------|--------|-----|-----|-----|------|
| Operating Temperature Range (industrial) | T | -40 | - | 85 | $^0C$ |
| Operating Temperature Range (standard) | T | 0 | 25 | 70 | $^0C$ |
| Supply Voltage | $V_{CC}$ | 4.75 | 5 | 5.25 | V |
| Relative Humidity | RH | 5 | - | 95 | % |

## Ordering information

FTG-M12G-S85Q-55M – 850nm, 550m, multi-mode, SC duplex, commercial temperature (0~70°C)
FTS-M12G-S85Q-55M**I** – 850nm, 550m, multi-mode, SC duplex, **extended temperature** (-40~85°C)

For further information regarding host device PCB layout recommendation, power supply requirements, EEPROM memory map please check:

INF-8053 - Technical specification for GBIC transceiver

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