FluxLight
OPTICAL TRANSCEIVERS

Datasheet

# 10338-FL

10G, SFP+, RJ45, CAT6A, 30m, EXT

## Quick Spec

| | |
|---|---|
| **Rate Category:** | 10G |
| **Supported Rate(s):** | 10G |
| **Cable Type:** | Copper (RJ-45) |
| **Form Factor:** | SFP+ |
| **Reach:** | 30m |
| **Interface Type:** | 10GBASE-T |
| **Standard/Protocol:** | IEEE 802.3an 10GBASE-T; SFP+ MSA |
| **DDM:** | Supported |
| **Connector Type:** | RJ45 |
| **Power Consumption:** | 2.5W max |
| **Operating Temperature:** | −5°C to +85°C (EXT) |



## Overview

The FluxLight 10338-FL is a hot-pluggable copper SFP+ transceiver for 10 Gigabit Ethernet (10GBASE-T, IEEE 802.3) over Category 6a or Category 7 twisted-pair cable at distances up to 30 m. It uses 16-level (PAM-16) line encoding at an 800 MHz symbol rate across all four cable pairs and presents a 10.3125 Gb/s serial interface to the host. Serial ID and digital diagnostic monitoring (module temperature and supply voltage, per SFF-8472) are available over the two-wire interface. Each 10338-FL is programmed for 100% compatibility with the target OEM platform and is backed by a FluxLight lifetime warranty.

## Features

- 10 Gigabit Ethernet (10GBASE-T) over copper twisted-pair cable
- Hot-pluggable SFP+ footprint with compact RJ-45 connector
- Up to 30 m over Category 6a/7 cable
- Compliant with SFP+ MSA and IEEE 802.3 (10GBASE-T)
- Digital Diagnostic Monitoring (DDM) per SFF-8472: module temperature and supply voltage
- Single +3.3 V supply, 2.5 W max
- Operating case temperature: −5°C to +85°C (EXT)
- RoHS compliant and lead-free
- 100% compatible with and programmed for the target OEM platform
- Backed by a FluxLight lifetime warranty

## Applications

- 10GBASE-T Ethernet over Category 6a (or better) copper cable
- Connecting SFP+ switch ports to copper-cabled 10G servers, storage and appliances
- Top-of-rack and in-row data center links up to 30 m

## Absolute Maximum Rating

The operation in excess of any absolute maximum ratings might cause permanent damage to this module.

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Storage Temperature | TS | -40 | 85 | °C |
| Operating Case Temperature | TOP | -5 | 85 | °C |

## Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Supply Current | Is | | 700 | 800 | mA | 2.5W max power over full range of voltage and temperature |
| Input Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | Referenced to GND |

## General Specifications

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Data Rate | BR | | 10.3125 | | Gb/s | IEEE 802.3 compatible. |
| Cable Length | L | | | 30 | m | Category 6a/7 cable |

## High-Speed Electrical Signals

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Line Frequency | fL | | 800 | | MHz | 16-level encoding, per IEEE 802.3, 10GBASE-T |
| Tx Output Impedance | Zout,TX | | 100 | | Ω | Differential |
| Rx Input Impedance | Zin,RX | | 100 | | Ω | Differential |
| Differential data input swing | $V_{inswing}$ | 500 | | 1100 | mV | Differential |
| Differential data output swing | $V_{outswing}$ | 500 | | 1100 | mV | Differential |
| Tx Input Impedance | Zin | | 100 | | Ω | Differential |
| Rx Output Impedance | Zout | | 100 | | Ω | Differential |
| Rise/Fall Time | Tr,Tf | 25 | | 47 | ps | 20%-80% |

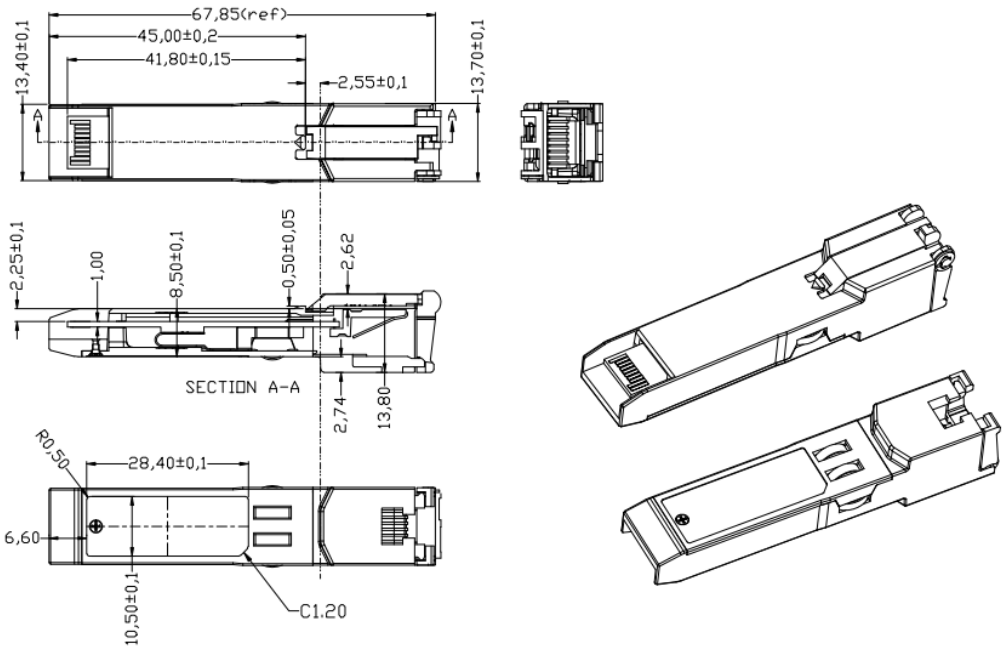
## Digital Diagnostic Functions

The module supports digital diagnostic monitoring (DDM) over the two-wire serial interface per SFF-8472. As a copper module it has no laser or optical receiver, so it reports module temperature and supply voltage; the laser bias current and optical power fields are not used.

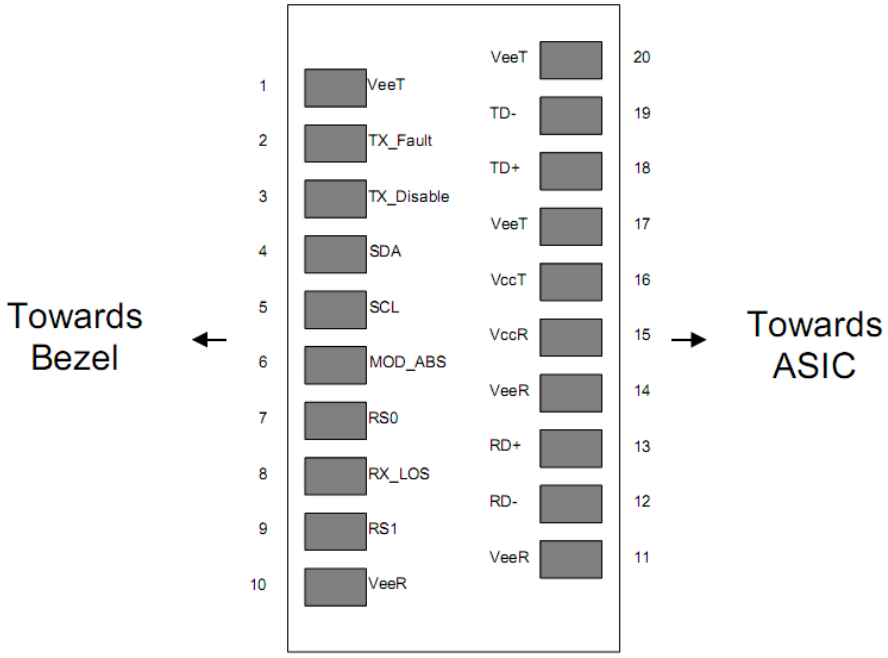
| Parameter | Symbol | Reported |
|---|---|---|
| Module temperature | DMI_Temp | Yes |
| Supply voltage | DMI_VCC | Yes |
| Laser bias current | DMI_Ibias | N/A (copper) |
| TX optical power | DMI_TX | N/A (copper) |
| RX optical power | DMI_RX | N/A (copper) |

## Mechanical Dimensions

Units: mm



## Pin Assignment and Description




| Pin | Signal Name | Description | Plug Seq. |
|---|---|---|---|
| 1 | VeeT | Transmitter Ground | 1 |
| 2 | TX FAULT | Transmitter Fault Indication | 3 |
| 3 | TX DISABLE | Transmitter Disable | 3 |
| 4 | SDA | SDA Serial Data Signal | 3 |
| 5 | SCL | SCL Serial Clock Signal | 3 |
| 6 | MOD_ABS | Module Absent. Grounded within the module | 3 |
| 7 | RS0 | Not Connected | 3 |
| 8 | LOS | Loss of Signal | 3 |
| 9 | RS1 | Not Connected | 3 |
| 10 | VeeR | Receiver Ground | 1 |
| 11 | VeeR | Receiver Ground | 1 |
| 12 | RD- | Inv. Received Data Out | 3 |
| 13 | RD+ | Received Data Out | 3 |
| 14 | VeeR | Receiver Ground | 1 |
| 15 | VccR | Receiver Power Supply | 2 |
| 16 | VccT | Transmitter Power Supply | 2 |
| 17 | VeeT | Transmitter Ground | 1 |
| 18 | TD+ | Transmit Data In | 3 |

Pin Assignment and Description (Continued)

| Pin | Signal Name | Description | Plug Seq. |
|---|---|---|---|
| 19 | TD- | Inv. Transmit Data In | 3 |
| 20 | VeeT | Transmitter Ground | 1 |

- TX Fault is not supported.
- TX Disable as described in the SFP+ MSA is applicable to the 10GBASE-T module.
- MOD_ABS is grounded within the module to indicate that the module is present.
- SCL and SDA are the clock and data lines of the two-wire serial interface for serial ID. They should be pulled up with a 4.7–10 kΩ resistor on the host board.
- RD-/+: These are the differential receiver outputs. They are AC-coupled 100 Ω differential lines which should be terminated with 100 Ω differential at the user SerDes.
- VccR and VccT are the receiver and transmitter power supplies.
- TD-/+: These are the differential transmitter inputs. They are AC-coupled differential lines with 100 Ω differential termination inside the module.

## ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.