



## Calculation For the Fiber Optic Communication Length

### SUMMARY

The maximum distances for the EC Data Technologies fiber optic communication length have been calculated using two different methods:

1. From a Power Budget determined from the Worst Case Transmitter Power and the Worst Case Receiver Sensitivity (Standard).
2. From a Power Budget determined from the Transmit Power and Receiver Sensitivity of the actual EC Data Fiber Optic communications modules (Practical).

For maximum distance the lowest loss ratio for specified fiber cable was used. Furthermore, the distance calculations assumed the following losses:

- 2 dB loss for connections.
- 1 dB loss for aging.
- 2 dB operating margin.

Therefore, Assumed Losses = 5 dB.

### Power Budget:

Using the Worst Case Transmitter Power and the Worst Case Receiver Sensitivity, calculate the power budget for the EC Data fiber optic communication modules.

- Power Budget (Standard) = Worst Case Transmitter Power - Worst Case Receiver Sensitivity.
- Power Budget (Practical) = Actual Transmitter Power - Actual Receiver Sensitivity.

#### Power Budget (Standard)

Interface Type	Power Budget
820nm LED, Multi-mode	10 dB
1300nm LED, Multi-mode	9 dB

#### Power Budget (Practical)

Interface Type	Power Budget
820nm LED Multi-mode	15.6 dB
1300nm LED Multi-mode	13.3 dB

### Maximum Optical Input Power

The Maximum Optical Input Power is the maximum power that receiver can tolerate without causing damage to the receiver photodiode.

Interface Type	Max. Optical Input Power
820nm LED Multi-mode	-7.6 dBm



1300nm LED, Multi-mode	-11 dBm
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**Maximum Distance.**

Calculate the maximum distance that the EC Data fiber module can communicate based on the power budget calculated from the above using the Typical Loss Characteristics of the Fiber Cables listed below.

**Typical Loss Characteristics of Fiber Optic Cables**

Type of Fiber Optic Cable	Core/Clad Ratio	Loss dB/km
MM850	50/125um	2.6-3.5
MM1310	50/125um	0.55-1.5

**Maximum Distance = (Power Budget-Assumed Losses)/ Lowest Loss Ratio for the specified cable.**

**Maximum Distance (Standard)**

Interface Type	Maximum (km)
820nm LED, Multi-mode	2
1300nm LED, Multi-mode	7.2

**Maximum Distance (Practical)**

Interface Type	Maximum (km)
820nm LED, Multi-mode	4
1300nm LED, Multi-mode	15

**Conclusion**

This application note provides a brief overview of fiber optic interface calculation for EC Data fiber optic communication unit. It is only intended to point out the major calculation of each EC data fiber optic unit and to illustrate a typical application. When selecting or designing another fiber optic communication interface it is highly recommended to carefully review the fiber optic transceiver and fiber cable characteristics.