

# 850 nm Serial PMD Specifications

Presented By

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# Target Specifications for Clause 53

(Clause 38 style)

# Figure 38-1

- Almost the same as in 802.3z
- The mode conditioning patch cord does **not** apply

(802.3z Figure 38-1 shows PMA, PMD, Fiber Optic Cabling (channel) and four test points)

# Table 38-2

Operating range for 10000BASE-SX over each optical fiber type

<b>Fiber type</b>	<b>Modal BW @ 850 nm (min. overfilled launch except as noted) (MHz*km)</b>	<b>Minimum range (meters)</b>
50 $\mu$ m MMF	2000 <sup>a</sup>	2 to 300
50 $\mu$ m MMF	500	2 to 86
50 $\mu$ m MMF	400	2 to 69
62.5 $\mu$ m MMF	200	2 to 35
62.5 $\mu$ m MMF	160	2 to 28
10 $\mu$ m SMF	N/A	Not Supported

a. Bandwidth and launch condition details being defined by TIA FO2.2;  
DCD\_DJ=8ps.

# Table 38-3

## 10000BASE-SX transmitter characteristics

Description	50 $\mu\text{m}$ MMF	62.5 $\mu\text{m}$ MMF	Unit
Transmitter Type	Shortwave Laser		
Signaling speed	10.3125 +/- 100 ppm		Gbd
Wavelength ( $\lambda$ , range)	840 to 860		nm
Trise/Tfall (max; 20%-80%)	31.5		ps
RMS spectral width (max) <sup>a</sup>	0.35		nm
Average launch power (max)	See note b.		dBm
Average launch power (min)	-5.5		dBm
Average launch power of OFF transmitter (max)	-30		dBm
Extinction ratio (min) <sup>c</sup>	6.5		dB
RIN (max)	-125		dB/Hz

a. Experimental evidence suggests larger values are supportable.

b. The lesser of class 1 safety limit or average receive power (max).

c. A change to Optical Modulation Amplitude (OMA) is proposed.

# Table 38-4

## 10000BASE-SX receiver characteristics

Description	50 $\mu\text{m}$ MMF	62.5 $\mu\text{m}$ MMF	Unit
Signaling Speed (range)	10.3125 +/- 100 ppm		GBd
Wavelength (range)	840 to 860		nm
Average receive power (max)	-1.0		dBm
Receive sensitivity	-13.0		dBm
Return loss (min)	12		dB
Stressed receive sensitivity	-8.5	-7.6	dBm
Vertical eye closure penalty	2.5	3.0	dB
Receive electrical 3 dB upper cutoff frequency (max)	12.3		GHz

# Table 38-5

## Worst case 10000BASE-SX link power budget and penalties

Parameter	50 $\mu\text{m}$ MMF			62.5 $\mu\text{m}$ MMF		Units
Modal BW @ 850 nm (min. overfilled launch except as noted)	2000 <sup>a</sup>	500	400	200	160	MHz-km
Link Power budget	7.5	7.5	7.5	7.5	7.5	dB
Operating Distance	300	86	69	35	28	m
Channel insertion loss	2.59	1.81	1.75	1.63	1.60	dB
Link power penalties	4.68	4.89	4.89	4.83	4.83	dB
Unallocated margin	0.23	0.80	0.86	1.04	1.07	dB

a. Bandwidth and launch condition details being defined by TIA FO2.2;  
DCD\_DJ=8ps.

# Table 38-10

## 10000BASE-SX link jitter budget

Compliance point	Total jitter		Deterministic jitter	
	UI	ps	UI	ps
TP1	0.24	23.3	0.100	9.7
TP1 to TP2	0.284	27.5	0.100	9.7
TP2	0.431	41.8	0.200	19.4
TP2 to TP3	0.170	16.5	0.050	4.8
TP3	0.510	49.5	0.250	24.2
TP3 to TP4	0.332	32.2	0.212	20.6
TP4	0.749	72.6	0.462	44.8



# Notes and Further Work

- Notes
  - Used Piers Dawe's link model (version 041) with the following adjustments: MPN k factor = 0.5, baud rate for MPN beta.
  - Practical transmitter output power range needs either Eye Safety relaxation (in final ballot in IEC) or OFC.
- Further Work
  - Target specifications complete. Refinement work underway.