

High Density Fiber Solutions for Data Centers

Data Center cabling standards

	TIA	ISO/IEC	CENELEC
Design (Data Center)	TIA-942	ISO/IEC 11801-5	EN 50173-5
Planning/ Installation		ISO/IEC 14763-2	EN 50174-2
Fiber Testing		ISO/IEC 14763-3	EN 50346
Fiber Testing- Installed Plant			
Multimode Attenuation	TIA-526-7	IEC 61280-4-1	
Single-mode Attenuation	TIA-526-14	IEC 61280-4-2	
Fiber Inspection		IEC61300-3-35	

Optical Fiber standards

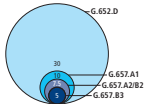
Multimode Fiber

	Attenuation (dB/km)			Effective Modal Bandwidth (MHz/km)		Standards		
	850 nm	1300 nm	953 nm	850 nm	953 nm	TIA	ISO/IEC 60793-2-10:2019 Standard	Bend Insensitive
OM3	3.5	1.5	N/A	2000	N/A	TIA-492AAAC-B	A1-OM3a	A1-OM3b
OM4	3	1.5	N/A	4700	N/A	TIA-492AAD	A1-OM4a	A1-OM4b
OM5	3	1.5	2.3	4700	2470	TIA-492AAE	A1-OM5a	A1-OM5b

Single-mode Fiber

OS Designation	Cabled Fiber Attenuation (dB/km)		
	1310 nm	1383 nm	1550 nm
OS1a	1.0	1.0	1.0
OS2	0.4	0.4	0.4

Fiber bend radius (mm)



Fiber Connector Standards

The following connectors are recommended in the Data Center cabling standards:

	TIA	ISO/IEC
LC	TIA 604-10	IEC 61754-20
MPO	TIA 604-5 (MPO-12) TIA 604-18 (MPO-16)	IEC 61754-7-1 (Single Row) IEC 61754-7-2 (Dual Row)

Emerging Fiber Connectors



Fiber Cable Containment Planning

Comparison of standard tight-buffer premise cable vs. AFL MicroCore® Cable with SpiderWeb Ribbon® (SWR®) in cable tray



Premise trunks with standard tight buffer construction (576 fibers)

Transceiver Form Factors

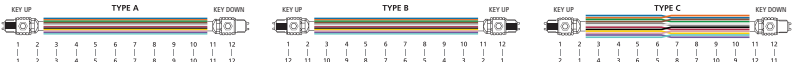
	SFP+/SFP28/ SFP56	CFP/CFP2/ CFP4/CFP8	CXP	QSFP+/QSFP28/ QSFP56	QSFP-DD	OSFP
MSA						
Typical Applications	10G/25G/50G	100G/400G	40/100G	40G/100G/200G	200G/400G	100/200/400G
Connector Interface						
LC	x	x		x	x	x
MPO-12		x		x	x	x
MPO-24		x	x		x	x
MPO-16					x	x
CS					x	x
SN					x	x
MDC					x	x

Ethernet Applications and Loss Budgets

SPEED	STANDARD	OM3		OM4/OM5		Single-mode (OS1a/OS2)	
		Loss Budget	Distance	Loss Budget	Distance	Loss Budget	Distance
10G	10GBASE-SR	2.6	300 m	2.9	400 m	6	10 km
	10GBASE-LR						
	40GBASE-SR4	1.8	70 m	1.5	150 m		
40G	40GBASE-LR4					6.7	10 km
	40GBASE-ER4					18.5	40 km
	40GBASE-SR4	1.8	70 m	1.9	100 m		
50G	50GBASE-SR					6.3	10 km
	50GBASE-LR						
	100GBASE-SR2	1.8	70 m	1.9	100 m	3	500 m
100G	100GBASE-SR4	1.8	70 m	1.9	100 m		
	100GBASE-SR10	1.9	100 m	1.5	150 m		
	100GBASE-LR4					6.3	10 km
200G	200GBASE-SR4	1.8	70 m	1.9	100 m		
	200GBASE-DR4					3	500 m
	200GBASE-LR4					6.3	10 km
400G	400GBASE-SR16	1.9	70 m	1.9	100 m		
	400GBASE-DR4					3	500 m
	400GBASE-LR8					6.3	10 km

Fiber Polarity

Method	Adapter Orientation	Array Adapter Type	Fiber Order	Duplex Cord Types required at LC/MPO modules	Trunk and Cord Types Required in Parallel Channels
A	Key up/Key down	A (opposed)	Consecutive (1-1, 2-2, etc)	A-to-A + A-to-B	A + B
B	Key up/Key up	B (aligned)	Transposed (1-12, 2-11, etc)	A-to-B	B
C	Key up/Key down	A (opposed)	Pair-flipped (1-2, 2-1, etc)	A-to-B	A + B + C
F	Key Up/Key Down	A (opposed)	Transposed (1-12, 2-11, etc)	A-to-B	B



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Project Implementation

