Plastic optical fiber standard

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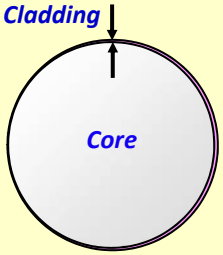
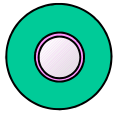
Fiber types and Materials/Constructions

Core/Cladding	Plastic/Plastic	Plastic/Plastic	Glass/Plastic	Glass/Glass
Known as	**POF(A4a.2)*1**	GI-POF(A4g)*2	PCF (HCS/HPCF)	GOF
Bandwidth (MHz-km)	3	20	20	300-1500
Fiber (corer) diameter (µm)	(250)750-1000	50-500	125-600	50-100
Transmission distance	Short	Medium	Medium	Long
Attenuation (dB/km)	250	6	6	4
Numerical Aperture	0.50	0.19-0.25	0.37	0.30
Wavelength (nm) of the source	650	650, 850	650, 850	1300,1550
Cross sections, typical sizes	 980/1,000 µm	 120/500 µm	 200/230 µm	 62.5/125 µm Multimode  Singlemode

A4a.2 is categorized in IEC 60793-2-40 .ed.3:2009

Characteristics and applications of category A4 fibers

IEC 60793-2-40

	A4a	A4b	A4c	A4d	A4e	A4f	A4g	A4h
Core Dia. (um)	Typically 15 to 35um smaller than cladding dia.				≧500	200	120	62.5
Cladding Dia.(um)	1000	750	500	1000	750	490	490	245
N.A.*1	0.5^{t}	0.5^{t}	0.5^{t}	0.3^{t}	0.25^{t}	0.190^{e}	0.190^{e}	0.190^{e}
Operating wavelength (nm)	650	650	650	650	650	650, 850, 1300	650, 850, 1300	850, 1300
Attenuation (dB/m*2)	≦30 (≦ 18)	≦30	≦30	≦18*3	≦18*3	≦10 (650nm)	≦10 (650nm)	≦3.3 (850nm)
Application	DAI, Automotive, Industrial and sensor Data-transmission	Industrial and sensor	Sensor	DAI, Data-transmission	DAI, Data-transmission	Industrial And mobile With A3 transmission equipment	Data-transmission	Data-transmission ; primarily used in ribbon structures

*1: T; Theoretical, e; Measured effective

*2: Equilibrium mode distribution launch condition

*3: using a launch NA= 0.3

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Normative reference *IEC 60793-2-40*

IEC 60793-1(all parts), Optical fibres – Part1 : Measurement methods and test procedures

-1-20,	*Fiber geometry*
-1-22,	*Length measurement*
-1-40,	*Attenuation*
-1-41,	*Bandwidth*
-1-42,	*Chromatic dispersion*
-1-43,	*Numerical aperture*
-1-46,	*Monitoring of changes in optical transmittance*
-1-47,	*Macrobending loss*
-1-50,	*Damp heat (steady state)*
-1-51,	*Dry heat*
-1-52,	*Change of temperature*

IEC 60793-2, Optical fibres – Part2 : Products specifications – General
IEC 60794-2-41, Optical fibres cables – Part 2-41: Product specification for simplex and duplex buffered A4 fibres.
IEC 60794-2-42, Optical fibres cables – Part 2-41: Product specification for simplex and duplex cables with A4fibers.

Specifications for A4a mutimode fibres

Attributes	Unit	Limits	
		A4a.1	A4a.2
Cladding diameter	Micron meter	1000 +/- 60	
Cladding non-circularity	%	≦ 6	
Core diameter	Micron meter	15 to 35 smaller than cladding dia.	
Fiber length	Km	Depends on the customer and supplier	
Tensile load yield peak	N	≧ 56	
Elongation at yield peak	%	≧ 4.0	
Attenuation at 650 nm (overfilled launch)	dB/100m	≦ 40	≦ 40
Attenuation at 650 nm (equilibrium mode distribution launch)	dB/100m	≦ 30	≦ 18
Minimum modal BW at 650nm	MHz over 100m	10	-
Minimum modal BW at 650 using RML	MHz over 100m	-	40
Theoretical N.A.	Unitless	0.50 +/- 0.15	0.485 +/- 0.045
Macrobending loss at 650nm 25mm R, 10times	dB	≦ 0.5	≦ 0.5

Reference; IEC 60793-2-40

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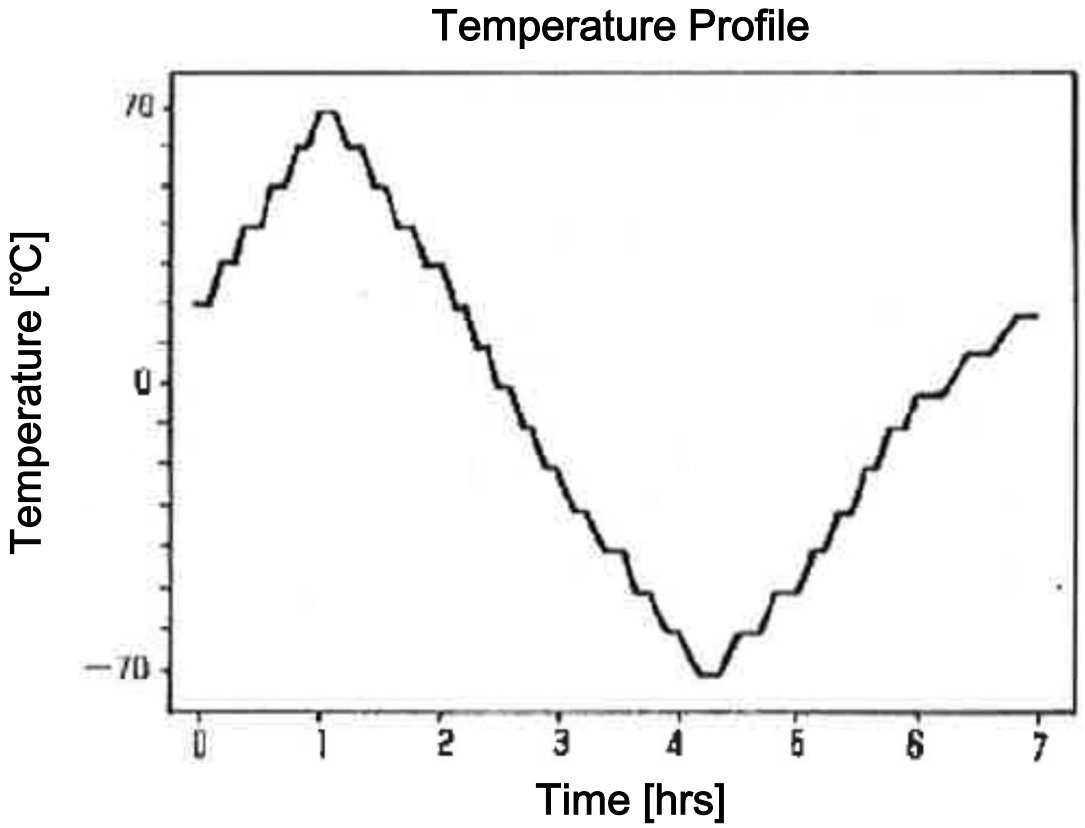
Temperature Dependence

Measurement Condition	Sample Length	12m
	Temperature Change (Cable length)	10m
	Light source	660nm LED
	Measurement	Power meter



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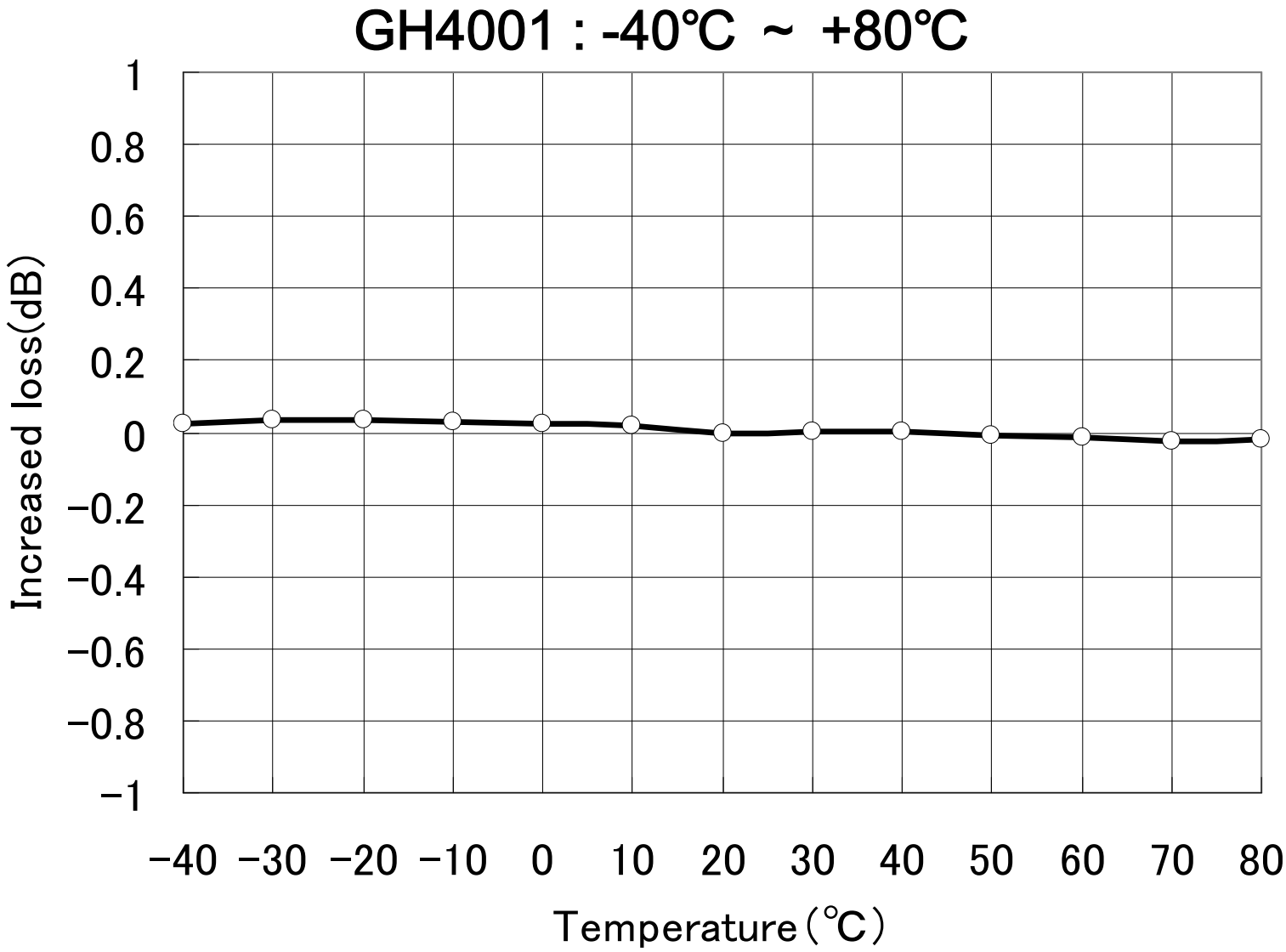
Temperature Dependence



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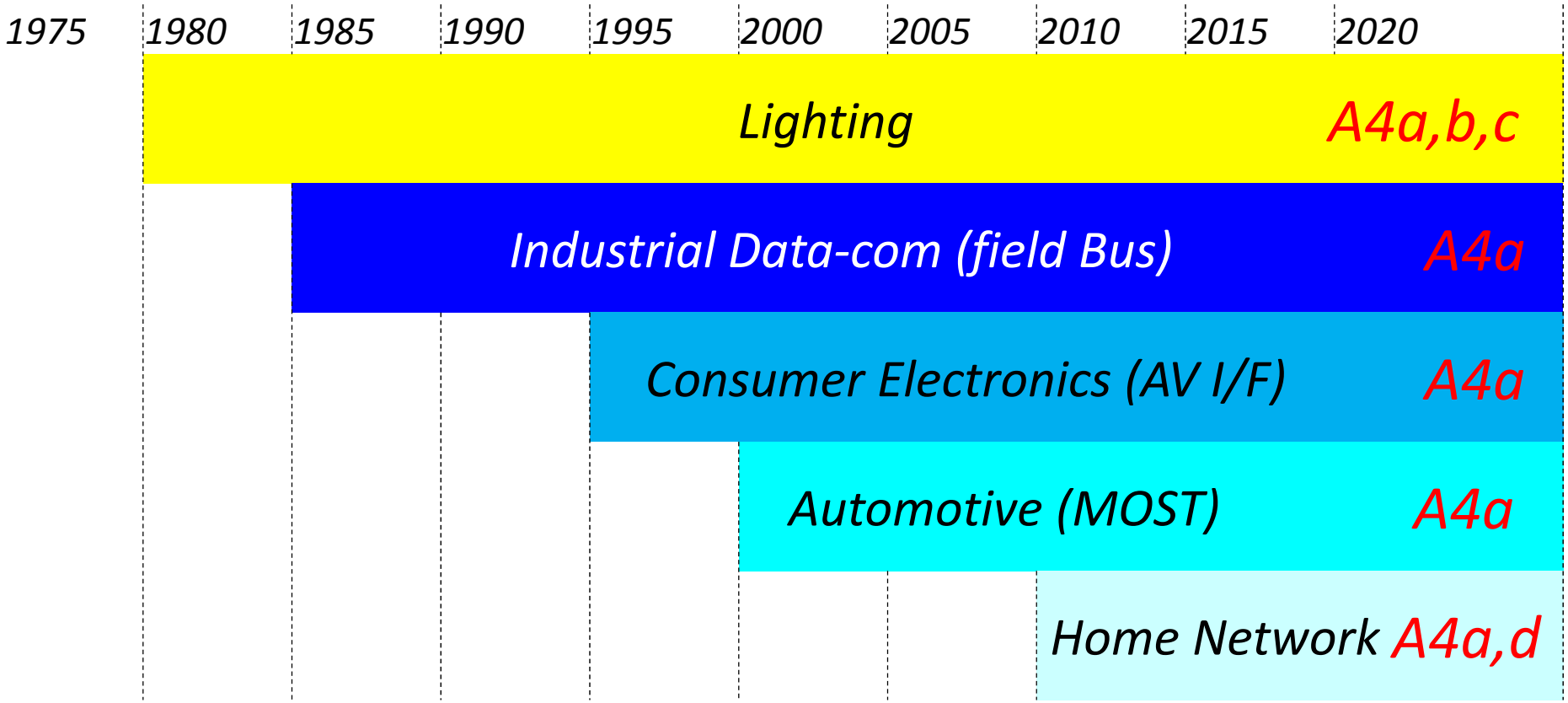
reference

Expansion of Data Applications

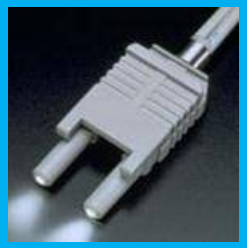


Plastic Optical fiber(POF)

has *more than 30 years, long history*

has *been used in several Data-com purpose(FA,Automotive,Home)*

Connector interfaces for A4a POF

Applications	Connectors
Industrial(Field Bus)	**SMA 905** 
Consumer(AV I.F)	**Versatile Link** **IEC 60874-17 Type F05** **IEC 61754-16 Type PN**   
Automotive(MOST)	**MOST** 
Home Network	**IEC 61754-21 Type SMI** **Fiber-Lock** **Opto-Lock**