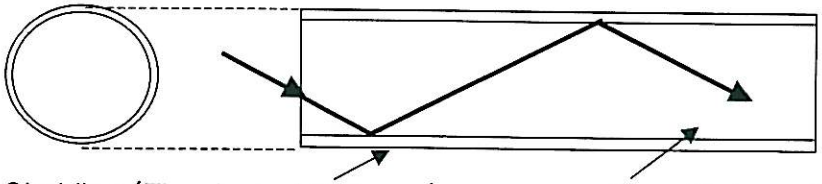
'TORAY
High Purity & High Quality
RAYTELA
Polymer Optical Fiber

Toray polymer optical fibers have been developed by Toray Industries, Inc., based on its experience in polymer and fiber manufacturing as a leading producer of synthetic fibers and plastic products in the world.
Our optical fiber is step index type with core of high-purity polymethyl methacrylate and cladding of special fluorinated polymer.
We have six types of optical fiber, of which brief descriptions are given in the following table. Our optical fiber and its fabricated products are divided into three grades according to the attenuation.

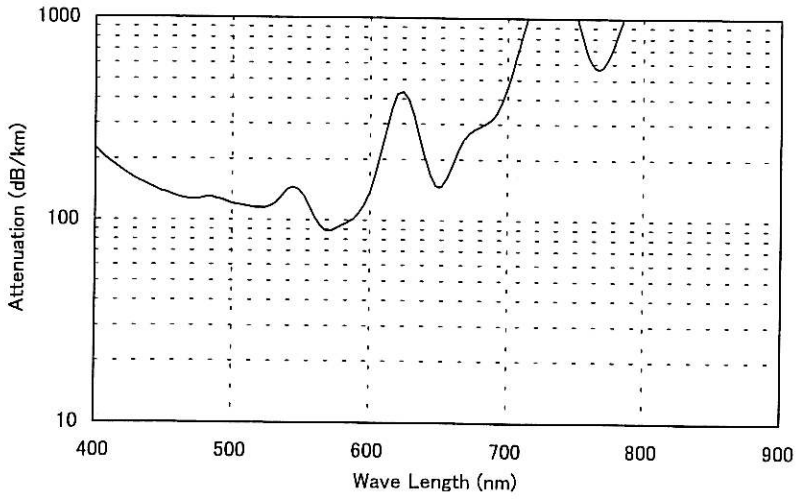


Sructure of Toray Optical Fiber and Diagram of Light Transmission

Fiber Series (※Values in the table are for reference, and can vary based on the conditions and environment of use)

Series		PG	PF	PHK	PM	PJ	PFD
Parameter		Performance					
Material	Core	Polymethyl Methacrylate (PMMA)					
	Cladding	Fluorinated Polymer					
Refractive index profile		Step Index					
Numerical aperture		0.50	0.46	0.54	0.32	0.63	0.50
Angle of incidence		60°	55°	64°	37°	78°	60°
Temperature range of use		-55~70°C	-55~85°C	55~115°C	-55~85°C	-55~85°C	-55~85°C
Main Usages		Communication Light Guide Optical Sensor Displays	Communication	Communication Optical Sensor	High Speed Data Transmission	Communication Light Guide Optical Sensor	Communication

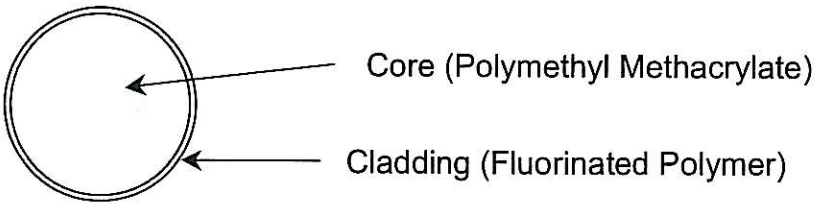
Spectral Attenuation of Optical Fiber (Typical Data)



TORAY RAYTELA®

— PG series —

1. Structure



2. Specifications

Parameter		Performance
Core	Material	Polymethyl Methacrylate (PMMA)
	Refractive index	1. 49
Cladding	Material	Fluorinated Polymer
	Refractive index	1. 41
Refractive index profile		Step index
Numerical aperture		0. 50
Angle of incidence		60°
Temperature range of use		−55～70℃

3. Fiber Product List

Product Code	Core Diameter (μm)	Cladding Diameter (μm)	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PGS−FB 250	240	250	12, 000	≦ 0. 30
PGR−FB 250				≦ 0. 35
PGU−FB 500	486	500	6, 000	≦ 0. 18
PGR−FB 500				≦ 0. 25
PGU−FB 750	735	750	2, 700	≦ 0. 15
PGR−FB 750			9, 000	≦ 0. 20
PGU−FB1000	980	1, 000	1, 500	≦ 0. 15
PGR−FB1000			5, 250	≦ 0. 20
PGU−FB1500	1, 480	1, 500	700	≦ 0. 15
PGR−FB1500				≦ 0. 20
PGR−FB2000	1, 980	2, 000	350	≦ 0. 15
PGR−FB3000	2, 980	3, 000	150	≦ 0. 20

4. Cord Product List

Product Code	Fiber/Jacket Diameter (mm)	Number of Fibers	Jacket	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PGU-CD 501-10-E	0.5/1.0	1	PE	500	≦0.18
PGS-CD 501-10-E					≦0.22
PGU-CD 751-22-E	0.75/2.2	1	PE	500	≦0.15
PGS-CD 751-22-E					≦0.18
PGU-CD1001-22-E	1.0/2.2	1	PE	500 1,000	≦0.15
PGS-CD1001-22-E					≦0.18
PGS-CD1501-22-E	1.5/2.2	1	PE	600	≦0.18
PGU-CD2001-30-E	2.0/3.0	1	PE	300	≦0.15
PGR-CD2001-30-E					≦0.20
PGU-CD 502-10-E	0.5/1.0/2.0	2	PE	500	≦0.18
PGS-CD 502-10-E					≦0.22
PGU-CD1002-22-E	1.0/2.2/4.4	2	PE	500	≦0.15
PGS-CD1002-22-E					≦0.18

5. Cable Product List

Product Code	Fiber/Cord/ Cable Diameter (mm)	Number of Fibers	Cord/Cable Material	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PGS-CL1001-22E50V	1.0/2.2/5.0	1	PE/Soft PVC	250	≦0.25

6. Light Guide Product List

Product Code	Fiber/Jacket Diameter (mm)	Number of Fibers	Jacket	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PGS-LG265- 4E10	0.265/1.0	4	PE	500	≦0.30
PGS-LG265- 8E13	0.265/1.3	8	PE	500	≦0.30
PGS-LG265-16E22	0.265/2.2	16	PE	500	≦0.30
PGS-LG265-32E28	0.265/2.8	32	PE	500	≦0.30
PGS-LG265-48E30	0.265/3.0	48	PE	500	≦0.30
PGS-LG265-64E33	0.265/3.3	64	PE	500	≦0.30
PGS-LG500-12E30	0.5/3.0	12	PE	500	≦0.20
PGS-LG500-16E33	0.5/3.3	16	PE	500	≦0.20
PGS-LG500-32E42	0.5/4.2	32	PE	500	≦0.20

Toray Industries, Inc. Head Office (2nd Head Office Bldg.)

Optical Fiber Sales Sect. Electronics & Information Materials Dept.

8-1, Mihama, 1-chome, Urayasu, Chiba 279-8555 JAPAN

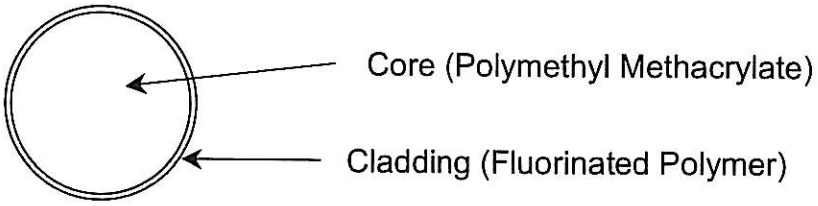
TEL: +81-(0)47-350-6058 FAX: +81-(0)47-350-6063

http://www.toray.co.jp/raytela/

TORAY RAYTELA®

— PF series —

1. Structure



2. Specifications

Parameter		Performance
Core	Material	Polymethyl Methacrylate (PMMA)
	Refractive index	1. 49
Cladding	Material	Fluorinated Polymer
	Refractive index	1. 42
Refractive index profile		Step index
Numerical aperture		0. 46
Angle of incidence		55°
Temperature range of use		−55～85℃

3. Fiber Product List

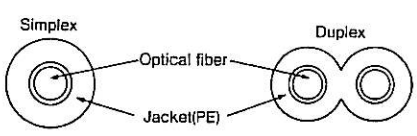
Product Code	Core Diameter (μm)	Cladding Diameter (μm)	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PFU−FB 500	486	500	6, 000	≦ 0. 18
PFU−FB 750	735	750	2, 700	≦ 0. 15
PFU−FB1000	980	1, 000	1, 500 5, 250	≦ 0. 15

4. Cord Product List

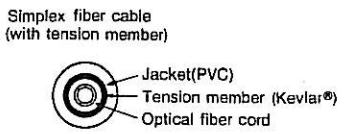
Product Code	Fiber/Jacket Diameter (mm)	Number of Fibers	Jacket	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PFU-CD 501-10-E	0.5/1.0	1	PE	500	≦0.18
PFU-CD 501-15-E	0/5/1.5	1	PE	500	≦0.18
PFU-CD 751-18-E	0.75/1.8	1	PE	500	≦0.15
PFU-CD 751-22-E	0.75/2.2	1	PE	500	≦0.15
PFU-CD1001-22-E	1.0/2.2	1	PE	500 1,000	≦0.15
PFU-UD1001-22-E	1.0/2.2	1	PE UL Grade VW-1	500 1,000	≦0.15
PFU-UD1001-22-V	1.0/2.2	1	PVC UL Grade VW-1	500 1,000	≦0.15
PFU-CD1001-22-AD	1.0/2.2	1	Polyamide12 (D2B)	500	≦0.15
PFU-CD 502-10-E	0.5/1.0/2.0	2	PE	500	≦0.18
PFU-CD 502-15-E	0/5/1.5/3.0	2	PE	500	≦0.18
PFU-CD 752-18-E	0.75/1.8/3.6	2	PE	500	≦0.15
PFU-CD 752-22-E	0.75/2.2/4.4	2	PE	500	≦0.15
PFU-CD1002-22-E	1.0/2.2	2	PE	500	≦0.15
PFU-UD1002-22-E	1.0/2.2	2	PE UL Grade VW-1	500	≦0.15
PFU-UD1002-22-V	1.0/2.2	2	PVC UL Grade VW-1	500	≦0.15

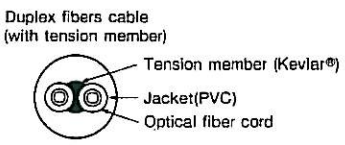
5. Cable Product List

Product Code	Fiber/Cord/ Cable Diameter (mm)	Number of Fibers	Cord/Cable Material	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PFU-CL1001-22E50VT	1.0/2.2/5.0	1	PE/Soft PVC With KEVLAR®	250 500	≦0.18
PFU-CL1002-22E60VT	1.0/2.2/4.4/6.0	2	PE/Soft PVC With KEVLAR®	250 500	≦0.18



Cord





Cable

Toray Industries, Inc. Head Office (2nd Head Office Bldg.)

Optical Fiber Sales Sect. Electronics & Information Materials Dept.

8-1, Mihama, 1-chome, Urayasu, Chiba 279-8555 JAPAN

TEL: +81-(0)47-350-6058 FAX: +81-(0)47-350-6063

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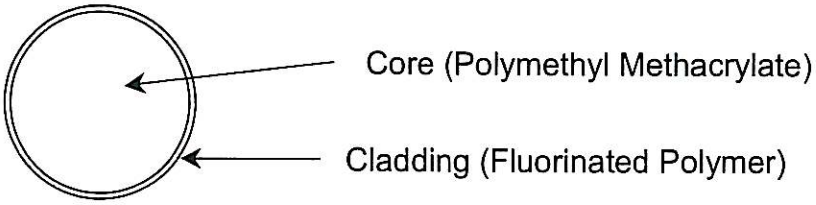
TORAY RAYTELA®

— PJ series —

1. Structure

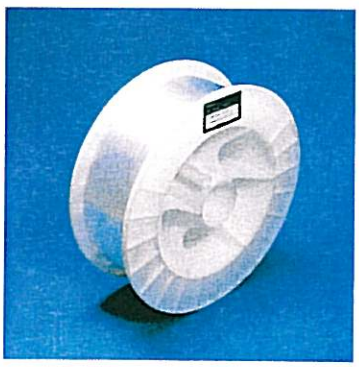


2. Specifications

Parameter		Performance
Core	Material	Polymethyl Methacrylate (PMMA)
	Refractive index	1. 49
Cladding	Material	Fluorinated Polymer
	Refractive index	1. 35
Refractive index profile		Step index
Numerical aperture		0. 63
Angle of incidence		78°
Temperature range of use		−55～85℃

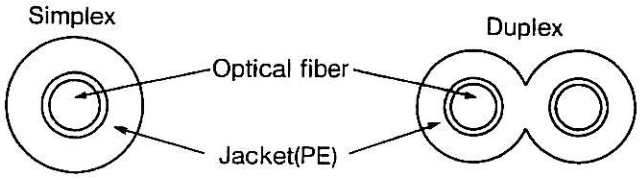
3. Fiber Product List

Product Code	Core Diameter (μm)	Cladding Diameter (μm)	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PJS−FB 250	240	250	12, 000	≦ 0. 30
PJR−FB 250				≦ 0. 35
PJU−FB 500	486	500	6, 000	≦ 0. 18
PJR−FB 500				≦ 0. 25
PJU−FB 750	735	750	2, 700	≦ 0. 15
PJR−FB 750			9, 000	≦ 0. 20
PJU−FB1000	980	1, 000	1, 500	≦ 0. 15
PJR−FB1000			5, 250	≦ 0. 20



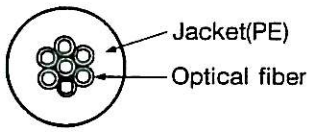
4. Cord Product List

Product Code	Fiber/Jacket Diameter (mm)	Number of Fibers	Jacket	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PJS-CD 501-10-E	0.5/1.0	1	PE	500	≦0.22
PJS-CD1001-22-E	1.0/2.2	1	PE	500	≦0.18
PJS-CD1001-22-A	1.0/2.2	1	Polyamide12	1,000	≦0.18



5. Light Guide Product List

Product Code	Fiber/Jacket Diameter (mm)	Number of Fibers	Jacket	Length on Spool (m／spool)	Attenuation at 650nm (dB/m)
PJS-LG250- 7E13	0.25/1.3	7	PE	500	≦0.30
PJS-LG250- 9E13	0.25/1.3	9	PE	500	≦0.30



Toray Industries, Inc. Head Office (2nd Head Office Bldg.)

Optical Fiber Sales Sect. Electronics & Information Materials Dept.

8-1, Mihama, 1-chome, Urayasu, Chiba 279-8555 JAPAN

TEL: +81-(0)47-350-6058 FAX: +81-(0)47-350-6063

http://www.toray.co.jp/raytela/

Toray Raytela® Global Network

Manufacturer and Distributor

Toray Industries, Inc.

Optical Fiber Sales Section

1-8-1, Mihama, Urayasu-shi, Chiba, 279-8555 Japan

TEL: +81-47-350-6058 FAX: +81-47-350-6063 http://www.toray.co.jp/raytela/

Europe, Africa, and Middle East

○United Kingdom

Toray Europe Ltd.(TEL)

3rd Floor, 7 Old Park Lane, London W1K 1AD, England, U. K.

TEL (44-20) 7663-7700 FAX (44-20) 7872-8071

○Except U.K.

Toray Deutschland GmbH (TDG)

Hugenottenallee 175, 63263 Neu-Isenburg, Germany

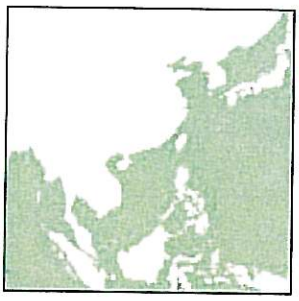
TEL (49-6102) 7999-0 FAX (49-6102) 7999-291 http://www.toray.de

The Americas

Toray Marketing & Sales (America), Inc. (TOMAC)

461 Fifth Avenue, 9th Floor, New York, NY 10017, U.S.A

TEL(1-212)697-8150 FAX(1-212)972-4279 http://www.torayusa.com/tomac



Asia and Oceania

○China

Toray Industries (China) Co., Ltd. (TCH)

10th Floor HSBC TOWER 101 Yin Cheng East Road, Pudong New Area, Shanghai, China

TEL (86-21) 6841-1470 FAX(86-21) 6841-2454

Toray Industries (H.K.) Ltd. (THK)

14th Floor, TAL Building, 49 Austin Road, Kowloon, Hong Kong, China

TEL (852) 2196-7079 FAX(852) 2196-7138

○Chinese Taipei

Tong Shing Inc.

6th Floor, No.123 Nanking East Road, Section 2, Taipei, Taiwan

TEL (886) 2-2506-0700 FAX (886) 2-2508-0662

○South Asia and Oceania

Toray Industries (Singapore) Pte. Ltd. (TSP)

31c Exeter Road, #03-01 Comcentre IIIAtrium, Singapore 239734, Republic of Singapore

TEL (65) 6533-3288 FAX(65) 6533-2215

Japan

Toray International, Inc.

8-1, Mihama 1-chome, urayasu, Chiba 279-8555, Japan

TEL+81-47-350-6117 FAX+81-47-350-6089 http://www.toray-intl.co.jp

Handling Precautions

I .Products

Please follow the guidelines stated below when handling Toray Raytela® Plastic Optical Fiber fibers, cord, cables and other processed items. (hereinafter referred to as Raytela® Optical Fiber)

II.Safety Precautions

1.Usage Precautions

(1) Raytela® Optical Fiber shall under no circumstance come into direct contact with food, nor shall it be used inside the human body

2.Design Precautions

(1) When designing a system using Raytela® Optical Fiber, be sure to fully review the Raytela® Optical Fiber characteristics, as described in the technical manuals before usage.

(2) The characteristics shown in the technical manuals do not guarantee the safety and adaptability of the product. Please confirm the safety and adaptability of the products according to the intend use of the products.

3.Usage

(1) Do not use the fiber under extreme temperatures. Refer to the individual Raytela®Optical Fiber technical specification sheets, for operational temperature requirements. If the temperature exceeds 200℃, there is a danger of gas emitting and/or ignition from the decomposition of the fiber.

(2) When a halogen lamp or condensed sunbeams are used as a light source, a heat cut filter or cooling device needs to be used to prevent the temperature from rising past the limit of the fiber.

(3) Avoid usage in dusty, dirty places. If dust and/or dirt adheres to the terminals of Raytela® Optical Fiber, the optical characteristics of the fiber may deteriorate. Furthermore, Raytela® Optical Fiber may melt and/or burn by igniting dust under high temperature conditions.

4.Disposal Precautions

(1) Raytela® Optical Fiber contains fluorocarbon resin. Some products are also sheathed in vinyl chloride resin. When incinerated, such products may generate corrosive and poisonous hydrogen fluoride gas or hydrogen chloride gas. When disposing, incinerate in an acid-resistant incinerator equipped with a toxic substance remover/filter, or commission an industrial waste treatment specialist to bury them.

(2) It is necessary to observe the laws and regulations of the country or providence where the fiber is to be incinerated or buried for disposal.

III.How to get the most performance out of Raytela® Optical Fiber

1.Precautions against physical environmental factors

(1) Do not apply force that exceeds the maximum allowable tension factor.

(2) Do not bend the fiber in a tight arc. If excessive stress is applied, especially near the connectors, optical characteristics may deteriorate. The radius of the arc in which the fiber is bent should not be less than the equivalent of 20 times the outside diameter of the fiber.

(3) Do not apply tight twists to Raytela® Optical Fiber. The optical characteristics of Raytela®Optical Fiber will decline if used while being twisted.

(4) In addition to the above, avoid applying excessive force, repetitive bending, and dropping.

2.Precautions against chemical environmental factors

(1) Do not bring Raytela® Optical Fiber into contact with plasticizers (Phthalate, etc.) and/or soft PVC material (including: electric wire jacket, vinyl tape etc.). Plasticizers may move thus, the optical characteristics may deteriorate. Please test in advance to check for negative effects.

(2) When Raytela® comes in contact with detergents, adhesives, oils, solvents and other chemicals, the optical characteristics may deteriorate. Verification of the resistance of Raytela® against these chemicals should be confirmed in the technical specification manuals.

3.Precautions against other environmental factors

(1) Under high moisture conditions, to maintain the quality of the fiber, it is necessary to devise a cable that will keep excessive moisture out of Raytela® Optical Fiber.

(2) Avoid using Raytela® Optical Fiber in environments where it will be exposed to ultraviolet rays, radioactive rays and other special energy rays.

The typical data contained herein are for general reference use only and are not expressed guarantees.
The information is based on tests believed to be reliable but each user should conduct his own tests to determine the suitability of TORAY optical fiber in his own particular applications.
All information in this guide is subject to change without prior notice.

Toray Industries, Inc.

Optical Fiber Sales Section

1-8-1, Mihama, Urayasu-shi, Chiba, 279-8555 Japan

TEL: +81-47-350-6058 FAX: +81-47-350-6063 http://www.toraypf.jp/raytela/