SUNSTAR 商斯达实业集团是集研发、生产、工程、销售、代理经销 、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分銷世界各大品牌IC 芯片和電子元器件的连锁经营綜合性国际公司，专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商,已在全国范围内建成强大统一的供货和代理分销网络。 我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库，有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件，并解决各种技术问题。

微波光电部专业研制、代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件：晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子元器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适 配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

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技术支持: 0755-83394033 13501568376

Changes for the Better

MITSUBISHI ELECTRIC

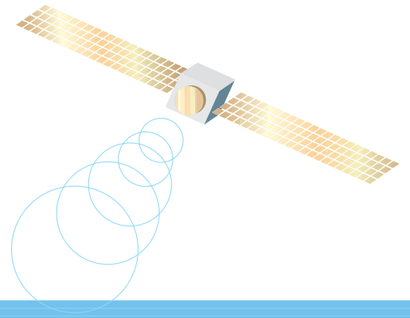
OPTICAL DEVICES

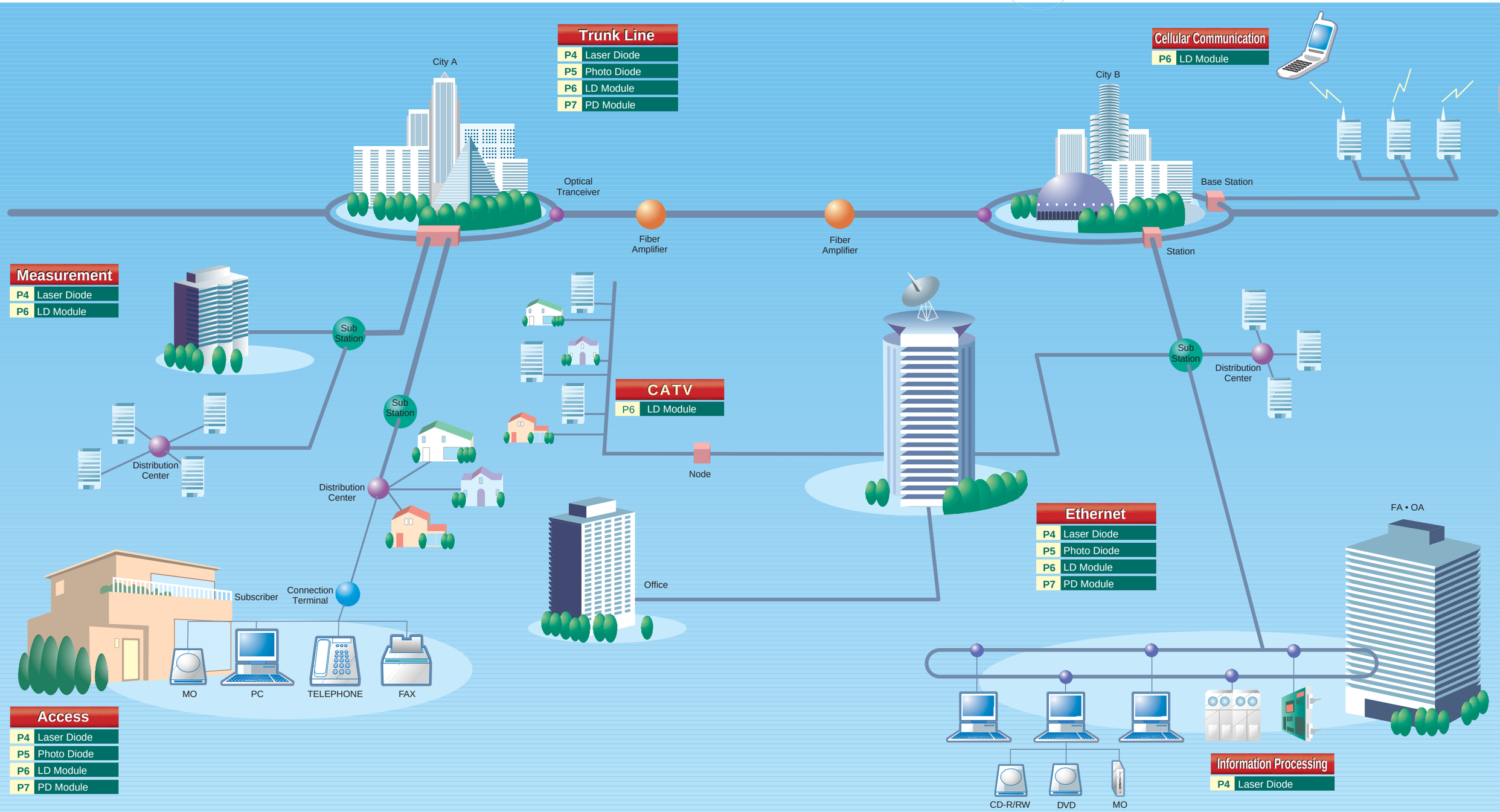
Features

- Great Variety of Product Line-up
  - Wavelength: 650nm to 1600nm
  - Product form: TO-CAN, Chip-on-Carrier, Module
- High Speed, High Power, High Performance
  - Bitrate to 40 Gbps
  - High Power to 350mW

Mitsubishi optical device products support our IT era

Along with widespread Internet use and rapid increase in the amounts of traffic information, optical fiber networks are being extended from trunk lines to subscriber lines.
CD was the first optical information-processing device, followed successively by MO, CD-R/RW and DVD±R/RW.
Now, in our IT era, optical technologies are expected to play a major role in a wide variety of areas.
Optical devices from Mitsubishi Electric are fundamental components critical for the IT era.
They allow cutting-edge optical technologies to be integrated into transmission and terminal systems, and serve various fields in both household and industry applications, including optical transmissions, measurements, LAN and information processing.
Mitsubishi optical devices can help you to take the lead in the growing optical industry.

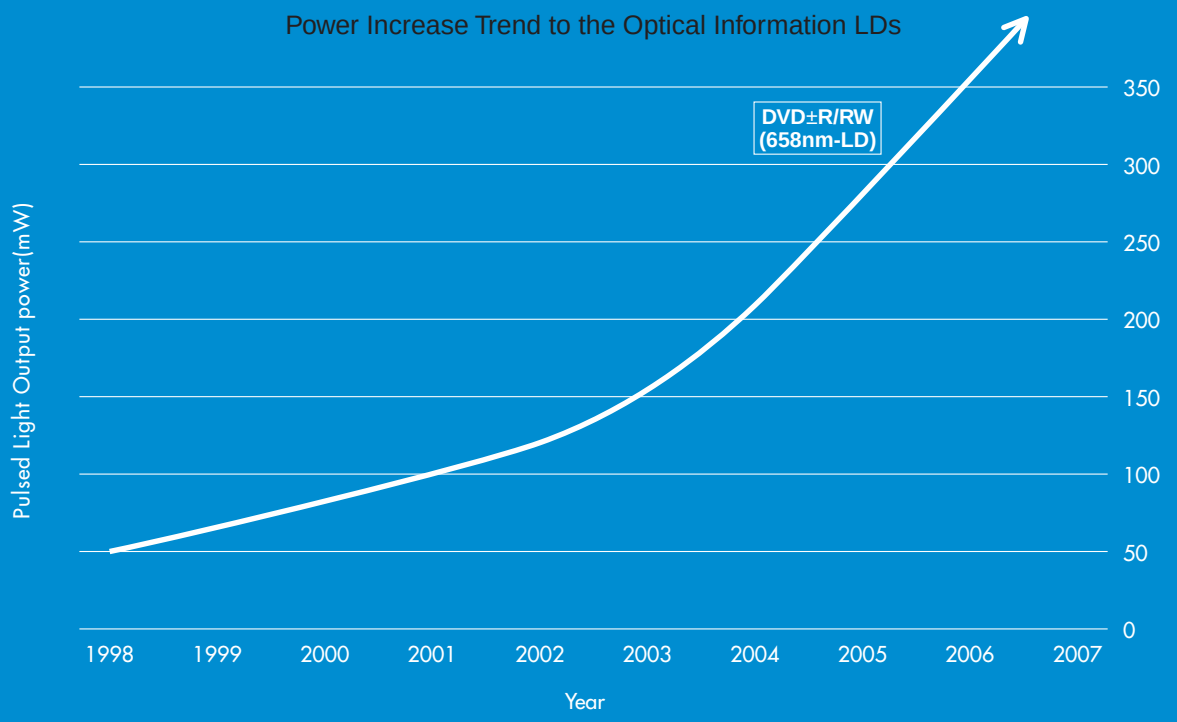




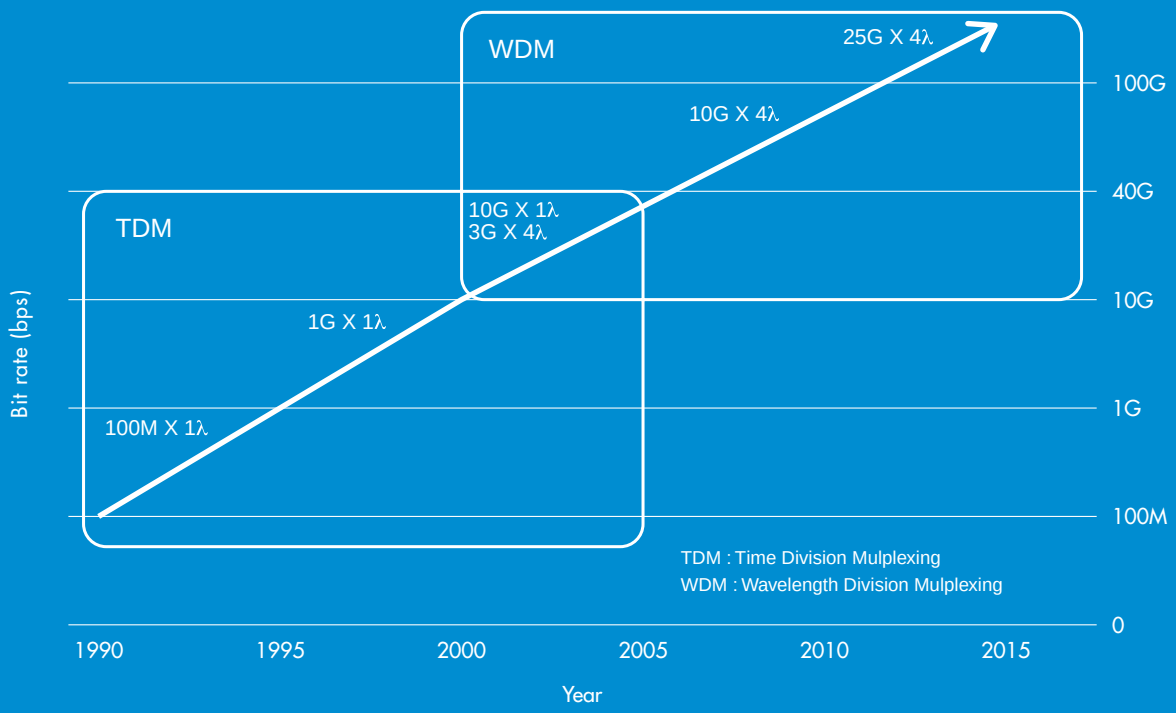
Technology Trend

As use of the Internet and mobile phones expands, the fiber-optic communications system that forms the backbone of the information infrastructure is carrying ever increasing loads of data. And the development of smaller and more sophisticated photoelectric devices demanded by the system also continues unabated. Meanwhile, the optical disks that can save these huge quantities of data are evolving from CD-R/RW into recordable DVDs, creating demand for higher output and shorter wavelengths in laser diodes.
Mitsubishi Electric was quickest off the mark in sensing these requirements of the broadband era. We are making a contribution to society by delivering products made with our outstanding developmental powers and quality control.
We will meet the needs of all, with surefire technological prowess and meticulous support.

Power Increase Trend to the Optical Information LDs



Bit rate speed trend for Optical fiber communicatioin



Laser Diode for Industry·Information Processing & Instrumentation

LDs for DVD±R/RW

Type	Wavelength	Power	Features
ML1XX21	658nm	160mW(pulse)	Recordable
ML1XX23	658nm	200mW(pulse)	Recordable
ML1XX24	658nm	230mW(pulse)	Recordable
ML1XX25	658nm	250mW(pulse)	Recordable
ML1XX26	658nm	300mW(pulse)	Recordable
ML1XX27	660nm	350mW(pulse)	Recordable

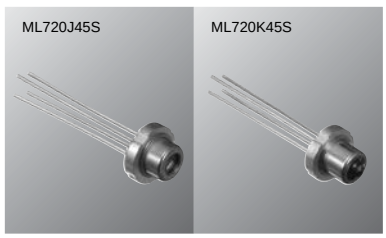
LDs for Industry, Display

Type	Wavelength	Power	Features
ML5XX51	638nm	150mW(CW)	Lateral Multi-mode
ML5XX71	638nm	220mW(CW)	Lateral Multi-mode
ML5XX54	638nm	110mW(CW)	Lateral Single-mode
ML5XX12	808nm	0.5W(CW), 1.2W(pulse)	Lateral Multi-mode
ML5CP50	638nm	8W(CW)	Lateral Multi-mode, LD bar
ML5CP8	808nm	40W(CW)	Lateral Multi-mode, LD bar (for AuSn-solder)
ML5CP9	808nm	40W(CW)	Lateral Multi-mode, LD bar (for In-solder)

Laser Diode for Optical Communication System

FP-LDs for Subscriber and Data Communication

Type	Wavelength	Power	Features
ML7XX45	1.31μm	5mW	~622Mbps for FTTH application
ML7XX46	1.31μm	13mW	~622Mbps High optical power LD for PON application
ML7XX19	1.31μm	5mW	~2.5Gbps High speed application
ML9XX45	1.55μm	5mW	~622Mbps for FTTH application

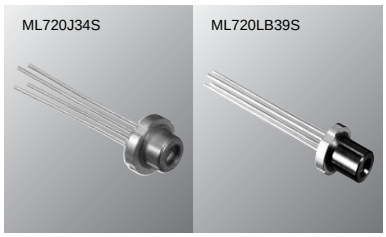


DFB-LDs for Trunk Line, Access Network and Data Communication

●Wide temperature with uncoded operation, high speed operation ●8 wavelength for CWDM* is available.

Type	Wavelength	Power	Features
ML7XX11	1.31μm	5mW	~1.25Gbps
ML7XX34	1.31μm	5mW	2.5Gbps, 1275~1350nm(25nm spacing)
ML7XX39	1.31μm	5mW	G-PON ONT
ML9XX46	1.49μm	15mW	2.5Gbps, High optical power LD for PON application
ML9XX11	1.55μm	5mW	~1.25Gbps
ML9XX43	1.55μm	5mW	2.5Gbps, 1470~1610nm(20nm spacing)

*Coarse Wavelength Division Multiplexing



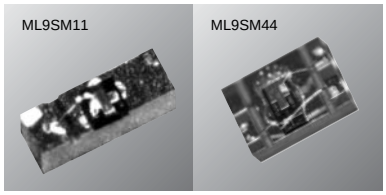
Laser Diode for Optical Communication System

DFB-LDs, EAM-LD for Long Haul WDM Transmission*

●High speed operation DWDM wavelength based on ITU-T specification are available

Type	Active Diameter	Structure	Features
ML9XX11	1.53~1.56μm	10mW	2.5Gbps DFB-LD, ~175km reach, for C-band 47channel
ML9XX44	1.55μm	5mW	10Gbps EAM-LD(C band)

*Wavelength Division Multiplexing



High power LDs for Optical Time Domain Reflectometer

●High optical power output under pulse operation

Type	Active Diameter	Structure	Features
ML7XX10	1.31μm	300mW	ø5.6mm CAN package
ML9XX10	1.55μm	200mW	ø5.6mm CAN package

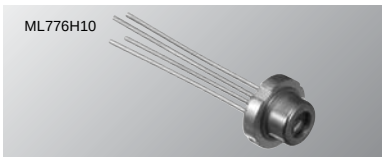
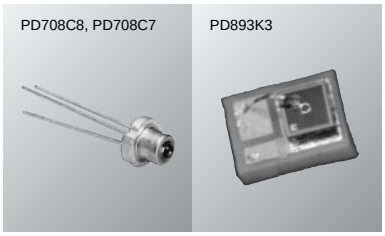


Photo Diode for Optical Communication System

PIN-PDs and APDs for Optical Fiber Communication

●Small dark current ●PD/APD with TIA are available

Type	Active Diameter	Structure	Features
PD7XX8	ø80μm	PIN	~1Gbps, TO-56 with ball lens, flat glass window
PD7XX7	ø40μm	PIN	2.5Gbps, TO-56 with ball lens, flat glass window
PD7XX26	ø20μm	PIN	10Gbps, chip on carrier
PD8XX2	ø50μm	APD	~1Gbps, TO-56/chip on carrier
PD8XX3	ø35μm	APD	2.5Gbps, TO-56/chip on carrier
PD8XX4	ø35μm	APD-TIA*	2.5Gbps, APD with TIA*, TO-CAN
PD8XX20	ø50μm	APD-TIA*	2.5Gbps lower voltage operating APD·3.3V with TIA*, TO-CAN
PD8XX10	ø20μm	APD	10Gbps, chip on carrier



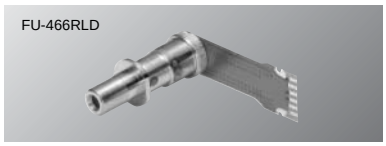
*Trans-Impedance Amplifier

LD Module for Optical Communication System

FP-LD Module for Subscriber

Receptacle type

Type	Features
FU-466ULD	10Gbps 1310nm for Xenpak/X2, XMD-MSA compliant
FU-466RLD	10Gbps 1310nm for SFP+, XMD-MSA compliant

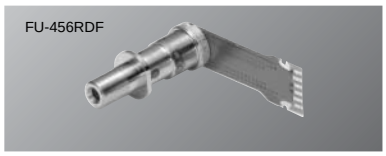


DFB-LD module for trunk line

●Multiple package and wavelength availability ●High speed response and reliability

Receptacle type

Type	Features
FU-40RDF	2.5Gbps 1310nm for SFP
FU-60RDF	2.5Gbps 1470~1610nm(20nm spacing) for SFP
FU-442RDF	8.5Gbps 1310nm for SFP+
FU-456UDF	10Gbps 1310nm for Xenpak/X2, XMD-MSA compliant
FU-456RDF	10Gbps 1310nm for XFP, XMD-MSA compliant



Pigtail type

Type	Features
FU-450SDF	2.5Gbps 1310nm with isolator
FU-650SDF	2.5Gbps 1470~1610m(20nm spacing) with isolator

EAM-LD module for trunk line

●High dense long haul transmission. XMD-MSA package is available

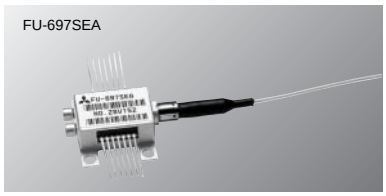
Receptacle type

Type	Features
FU-610REA	10Gbps for XFP, XMD-MSA compliant

Pigtail type

Type	Features
FU-697SEA**	40Gbps, XLMD-MSA compliant

**Under Development



LD Module for Optical Communication System

DFB-LD module for mobile communication and CATV application

●Multiple package and wavelength availability ●Low distortion and noise.

Pigtail type

Type	Features
FU-450SDF	4mW 1310nm with isolator
FU-650SDF	4mW 1470~1610nm(20nm spacing) with isolator

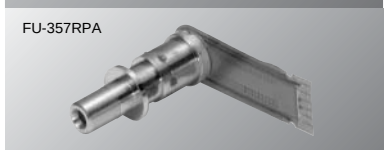
PD Module for Optical Communication System

PD/APD module for subscriber and trunk line

●Multiple package availability ●Low noise, high sensitivity and response

Receptacle type

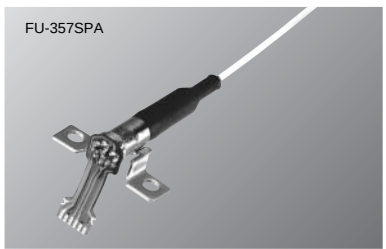
Type	Features
FU-300RPA	2.5Gbps APD with TIA for SFP
FU-357RPP	10Gbps PD with TIA for XFP, XMD-MSA compliant
FU-357UPA	10Gbps APD with TIA for Xenpak/X2, XMD-MSA compliant
FU-357RPA	10Gbps APD with TIA for XFP, XMD-MSA compliant

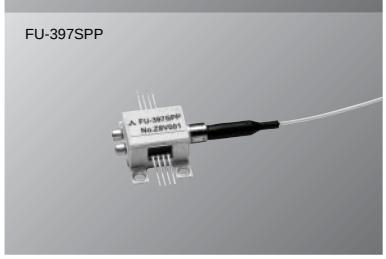


Pigtail type

Type	Features
FU-318SAP	~1.25Gbps APD
FU-319SPA	2.5Gbs APD with TIA
FU-357SPA	10Gbps APD with TIA
FU-397SPP**	40Gbps PD with TIA, XLMD-MSA compliant

**Under Development





Selection Guide for Opto-discrete Devices

Category	Application	Wavelength	Power	Series Name (Features・Structure)
Information Processing	DVD±R/RW	658nm	$P_{O(P)}$=160mW	ML1XX21 (Visible light, High Power)
			$P_{O(P)}$=200mW	ML1XX23 (Visible light, High Power)
			$P_{O(P)}$=230mW	ML1XX24 (Visible light, High Power)
			$P_{O(P)}$=250mW	ML1XX25 (Visible light, High Power)
			$P_{O(P)}$=300mW	ML1XX26 (Visible light, High Power)
			$P_{O(P)}$=350mW	ML1XX27 (Visible light, High Power)

$P_{O(P)}$:Pulse Output

Category	Application	Wavelength	Power	Series Name (Features・Structure)
Industry, Display	TO-Can	638nm	Po=150mW (CW) (Lateral multi-mode)	ML5XX51
			Po=220mW (CW) (Lateral multi-mode)	ML5XX71
			Po=110mW (CW) (Lateral single-mode)	ML5XX54
		808nm	Po=0.5W (CW)/1.2W (pulse) (Lateral multi-mode)	ML5XX12
	LD-bar	638nm	Po=8W (CW) (Lateral multi-mode)	ML5CP50
		808nm	Po=40W (CW) (Lateral multi-mode)	ML5CP8 (for AuSn solder)
				ML5CP9 (for In solder)

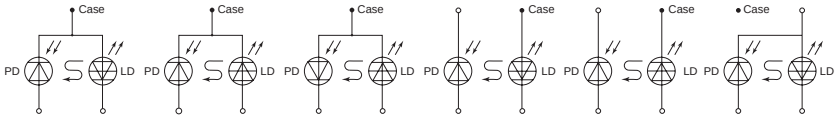
Type Name Definition

Opto Discreate Devices

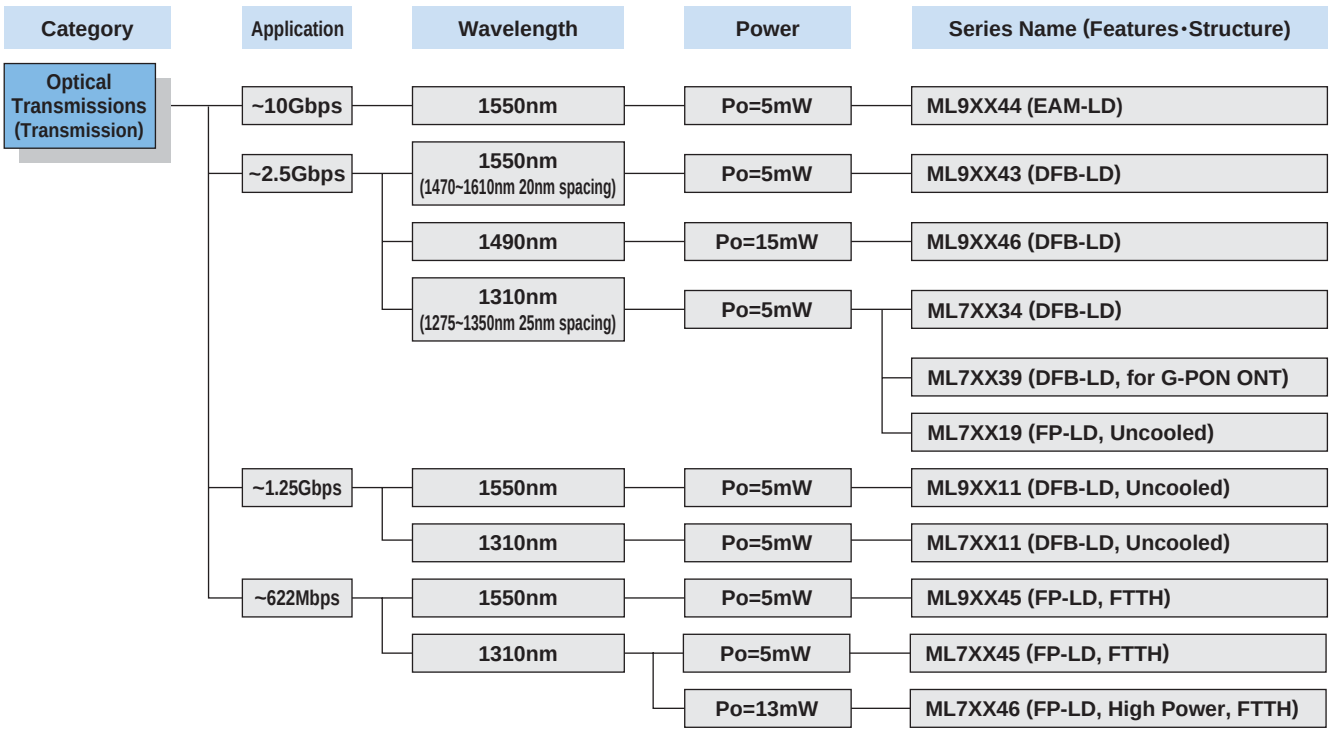
ML 7 25B 45 F

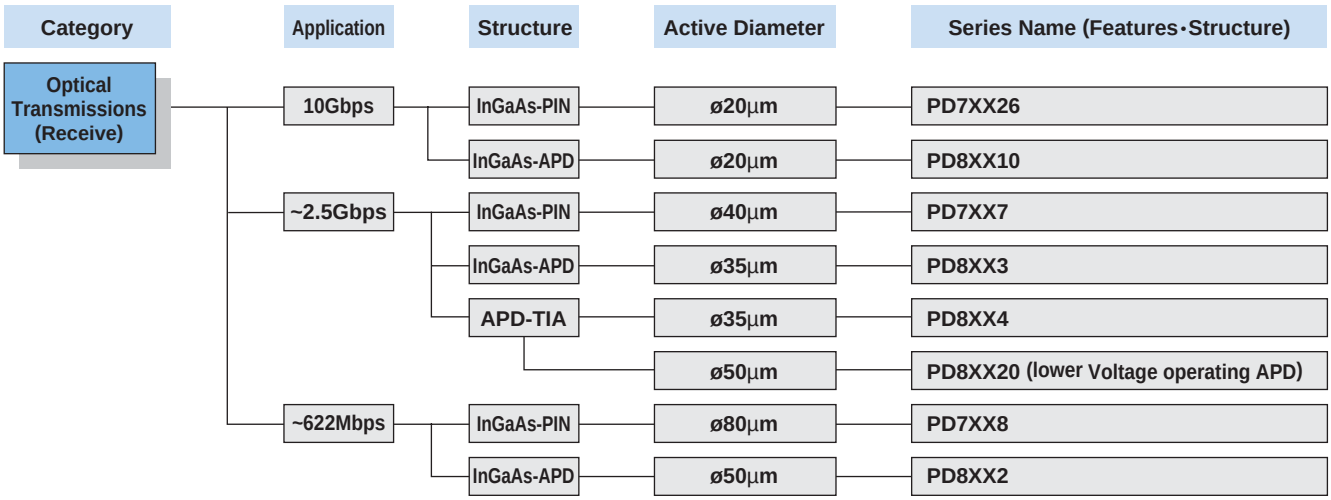
- ML: Device Type [ML: Laser Diode PD: Photo Diode]
- 7: Wavelength ····· Categories
- 25B: Package
- 45: Chip Series
- F: Pin Assignment (Available for Monitor PD contained Package)

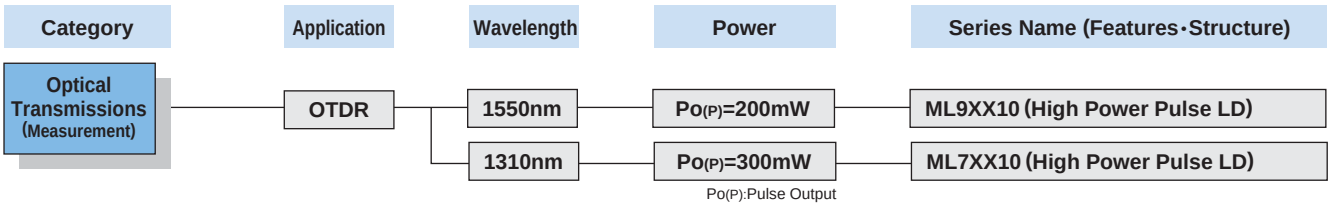
Device Type	Wavelength	Wavelength Range
ML	1	600<λ≤700
	5	500<λ≤1000
	7	1250<λ≤1400
	9	1400<λ
PD	7 8	1000<λ≤1600

Type	N	C	R	F	E	S
						
LD	Anode Common	Cathode Common	Cathode Common	Anode Common	Cathode Common	Floating
PD	Cathode Common	Cathode Common	Anode Common	Floating	Floating	Floating

Selection Guide for Opto-discrete Devices







Po(P):Pulse Output

Selection Guide for Optical Module

Category	Application	Package	Structure	Wavelength	Series Name
Optical transmissions (LD module)	40Gbps	Pigtail	EAM-LD	1550nm	FU-697SEA **
	~10Gbps	Receptacle	EAM-LD	1550nm (Including C band)	FU-610REA (XFP)
			DFB-LD	1310nm	FU-456RDF (XFP/SFP+)
					FU-456UDF (Xenpak/X2)
			FP-LD	1310nm	FU-466RDF (SFP+)
					FU-466UDF (Xenpak/X2)
	~8Gbps	Receptacle	DFB-LD	1310nm	FU-442RDF (SFP+)
	~2.5Gbps	Receptacle	DFB-LD	1550nm (1470~1610nm)	FU-60RDF (8 wavelength for CWDM)
				1310nm	FU-40RDF
		Pigtail	DFB-LD	1550nm (1470~1610nm)	FU-650SDF (8 wavelength for CWDM)
				1310nm	FU-450SDF
	Mobile communication CATV	Pigtail	DFB-LD	1550nm (1470~1610nm)	FU-650SDF (8 wavelength for CWDM)
				1310nm	FU-450SDF

Category	Application	Package	Structure	Series Name
Optical transmissions (PD module)	~40Gbps	Pigtail	PD	FU-397SPP **
	~10Gbps	Receptacle	APD-TIA	FU-357RPA (XFP)
				FU-357UPA (Xenpak/X2)
			PD-TIA	FU-357RPP (XFP/SFP+)
		Pigtail	APD-TIA	FU-357SPA
	~2.5Gbps	Receptacle	APD-TIA	FU-300RPA (SFP)
		Pigtail	APD-TIA	FU-319SPA
	~1.25Gbps	Pigtail	APD-TIA	FU-318SAP

**Under Development

Type Name Definition

DFB-LD/EAM-LD/FP-LD/PD-APD Module

FU-6 50 S DF-FW6M15

- Optical Module
- LD Module

No.	Wavelength
4	1.3μm
6	1.55μm

PD/APD Module

No.	Wavelength
3	Long–

- A proper figure of each product
- Shows using optical fiber — S : Single-mode fiber P : PM fiber none : Multi-mode fiber R : LC receptacle U : SC receptacle
- Shows kind of LD chip

LD	FP laser diode
DF	DFB laser diode
HL	High power FP LD
EA	EA LD

PD	Photo diode
AP	Avalanche photo diode
PP	Photo diode with Trans-impedance amplifier
PA	Avalanche photo diode with Trans-impedance amplifier

- Shows connector type, pin-connection type, level of optical output, customer code and specification's number, wavelength cord, etc.
  none : without connector V : PC polished FC connector W : PC polished SC connector L : APC polished SC connector

Safety Cautions for Use or Disposal of Listed Products

The warnings below apply to all products listed in this pamphlet.

	Warning
Laser Beam	While the laser diode is on, its gives a laser beam. Even if we can't see a laser beam by its wavelength, penetration into the eye by a laser beam or its reflected light may cause eye injury. Prevent the irradiating part or its reflected light from entering the eyes.
Injury	Fiber fragments may cause injury. In cases of fiber bending or breakage, never touch the fragment.
GaAs	Gallium arsenide (GaAs) is used in these products. To avoid danger, strictly observe the following cautions. • Never place the products in your mouth. • Never burn or break the products, or use any type of chemical treatment to reduce them to gas or powder. • When disposing of the products, always follow the laws which apply, as well as your own company's internal waste treatment regulations.
Disposal of Flame-Retarded Fiber Core Wire	Flame-retarded resin corresponds to industrial waste and waste plastic as defined in the Wastes Disposal and Public Cleaning Law. In compliance with the Wastes Disposal and Public Cleaning Law, consign disposal to an operator licensed in the treatment and disposal of industrial waste materials. When the local municipality is responsible for the disposal, consign the work to the said municipality. This product is a bromine type flame-retarded resin, containing bromine compounds and antimony trioxide. All disposal operations should be conducted with full consideration of this content.

SUNSTAR 商斯达实业集团是集研发、生产、工程、销售、代理经销 、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分銷世界各大品牌IC 芯片和電子元器件的连锁经营綜合性国际公司，专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商,已在全国范围内建成强大统一的供货和代理分销网络。 我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库，有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件，并解决各种技术问题。

微波光电部专业研制、代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件：晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子元器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适 配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

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