

DEVICE PRODUCT CATALOG

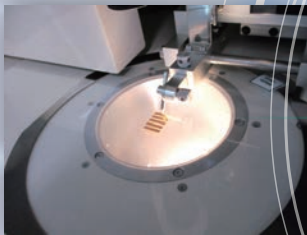
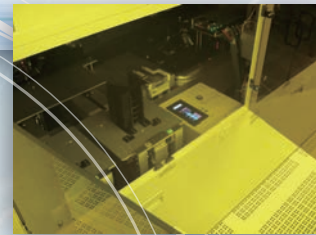
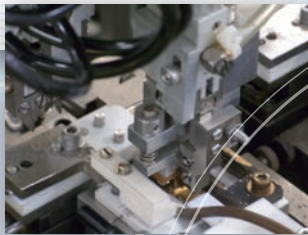
2022 - 2023

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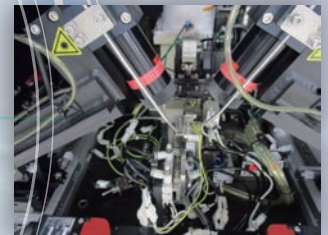
Optical Devices

■ Microfabrication ■ Device Design ■ Optical Coupling Technology ■ Crystal Growth



Core Technology

Crystal Growth~Mounting



Ultrafast Electron Devices

■ Microfabrication ■ Circuit Design ■ Mounting of High-frequency Module

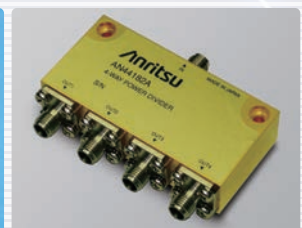


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Optical Devices



Telecommunication

Pump Laser for EDFA
1480nm FP-LD

Pump Laser for FRA
14xx nm FBG-LD

Gain Chip for Tunable Light Source
(C-band, L-band)

Semiconductor Optical Amplifier
1300nm SOA



Measurement

Light Source for Measurement Instruments

1310/1550/1625nm FP-LD
1650nm DFB-LD/SLD

Gain Chip for Tunable Light Source
(1300nm~1600nm)



Healthcare

OCT

830nm SLD
1310nm SLD
1550nm SLD
1550nm Wavelength Swept Light Source

Eye Examination
830nm SLD

Blood Flow Sensor
1310nm DFB-LD

Application

High Optical Output Power

Wide Bandwidth

For Various Wavelength



Precision

Probe Microscope
830nm SLD

Dimension/Displacement Measurement
830nm SLD
1550nm Wavelength Swept Light Source

Encoder
830nm SLD
1310nm DFB-LD

Industrial OCT
1310nm SLD
1550nm Wavelength Swept Light Source



Industrial Use

Current Sensor
830nm SLD

LIDAR/Vehicle Detection
1480nm FP-LD

FBG Strain Sensor
1550nm SLD
1550nm Wavelength Swept Light Source

Optical Powering
1550nm DFB-LD
1480nm FP-LD



Environment

Gas Sensing
1270nm~1800nm DFB-LD

Water Detection
1450nm FP-LD

Optical Devices: Selection Guide

List of Optical Devices Products

LD Module

Classification		Series/Model Number	Page No.	Optical Output Power	Laser Class	Center Wavelength	Package
Pump Laser	1.48 μm FP-LD	AF4B Series type A	—	120 to 180 mW	IIIb	1475 nm	Butterfly
		AF4B Series type B	—	200 to 250 mW	IIIb		
		AF4B Series type C	—	300 to 400 mW	IV		
		AF4B Series type D	—	420 to 500 mW	IV		
		AF4B Series type E	6	550 to 650 mW	IV		
	1.3xx μm FBG-LD	AF3B250FU400N		500 mW	IV	1340 nm	Butterfly
		AF3B250FU600N		500 mW	IV	1360 nm	
	1.4xx μm FBG-LD	AF4B2 Series type GB/GC	8	300 to 500 mW	IV	1420 to 1499 nm (300 to 400mW) 1420 to 1485nm (410 to 500mW)	Butterfly
		AF4B Series type GD Low Power Consumption Version	—	410 to 500 mW	IV	1420 to 1485nm	
1.48 μm FP-LD Uncooled type	AF4Y Series	14	80 mW 150 mW	IIIb IIIb	Min: 1478 nm/Max: 1490 nm Min: 1450 nm/Max: 1490 nm	Cylindrical	
FP-LD		AF3B Series	—	100 mW	IIIb	1310 nm	Butterfly
			10	500 mW	IV	1320 nm	
		AF5B Series	—	100 mW	IIIb	1550 nm	
			12	450 mW	IV		

* Other optical output power and center wavelength is also available, please contact our local office for further information.

Gain Chip

Classification		Series/Model Number	Page No.	Center Wavelength	Laser Class	ASE Optical Output Power [mW/mA]	Normal facet reflectance	Package
Gain Chips	1.5 μm Gain Chip	AE5T310BY10P	15	1480 to 1540 nm	IIIb	5 mW/200 mA	LR (6%)	Chip Carrier
		AE5T315BY20P		1490 to 1550 nm		10 mW/200 mA	HR (95%)	
		AE5T310BY60P	—	1530 to 1590 nm		5 mW/200 mA	LR (6%)	
		AE5T315BY70P		1540 to 1600 nm		10 mW/200 mA	HR (95%)	

* Other center Wavelength (O,E,S and L-band) and facet reflectance is also available, please contact our local office for further information.

SOA

Classification		Series/Model Number	Page No.	Gain	Laser Class	Polarizaioit Dependant Gain	Package
SOA	1.3 μm SOA Module	AA3F215CA	16	15 dB	IIIb	≤1.5 dB, 1653.7 nm	6pin Small PKG
	1.3 μm SOA Chip Carrier Type	AA3T115CY	17	18 dB	IIIb	≤1.5 dB, 1653.7 nm	Chip Carrier

SLD

Classification		Series/Model Number	Page No.	Optical Output Power	Laser Class	Center Wavelength	Spectral Width	Package
SLD	0.8 μm SLD	AS8K215GY30M	18	5 mW	IIIb	830 nm	15	CAN
		AS8E210GP30M	19	1 mW	IIIb			Cylindrical
		AS8B112G230M	20	2 mW	IIIb		14	Butterfly
		AS8B115G230M		5 mW	IIIb			
		AS8B115L240M		5 mW	IIIb	840 nm	50	
	1.31 μm SLD	AS3E113HJ10M	—	3 mW	IIIb	1310±20 nm	53	Cylindrical
		AS3B119GM10M	22	15 mW	IIIb		55	Butterfly
	1.55 μm SLD	AS5B125EM50M	—	25 mW	IIIb	1550±20 nm	60	
	1.65 μm SLD	AS6B118GM50M	22	10 mW	IIIb	1650±20 nm	70	
	1.55 μm SLD	AS5B310KM50M	23	3 mW typ.	IIIb	1550±20 nm	60	Butterfly
		AS5B320EM50M		25 mW typ.	IIIb		55	
	SLD unit with Drive Circuits	AM8P8006SL45G	24	7 mW	IIIb	880 nm	50	Unit

DFB-LD Module

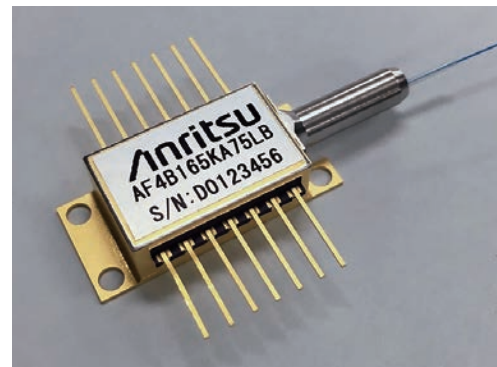
Classification		Series/Model Number	Page No.	Optical Output Power	Laser Class	Center Wavelength	Package
DFB-LD	1.65 μm DFB-LD	AF6B407BJ537F	25	7 mW	IIIb	1653.7 nm	Butterfly

Wavelength Swept Light Source

Classification		Series/Model Number	Page No.	Center Wavelength	Laser Class	Wavelength Sweep Range	Sweep Frequency	Package
Wavelength Swept Light Source	1.5 μm Wavelength Swept Light Source bench-top Type	AQA5500P	26	1550 nm	1	30 to 110 nm	1250 Hz	Bench-top
		AQB5500P				15 to 70 nm	150 Hz	
	1.5 μm Wavelength Swept Light Source built-in Type	AQA5500D	27			30 to 110 nm	1250 Hz	Built-in
		AQB5500D				15 to 70 nm	150 Hz	

1.48 μm LD Module AF4B Series type E

AF4B SERIES type E is 1.48 μm high power laser diode modules designed for Er doped fiber amplifier. The laser is packaged in a 14 pin butterfly package with optical isolator, monitor photodiode and thermo-electric cooler (TEC).



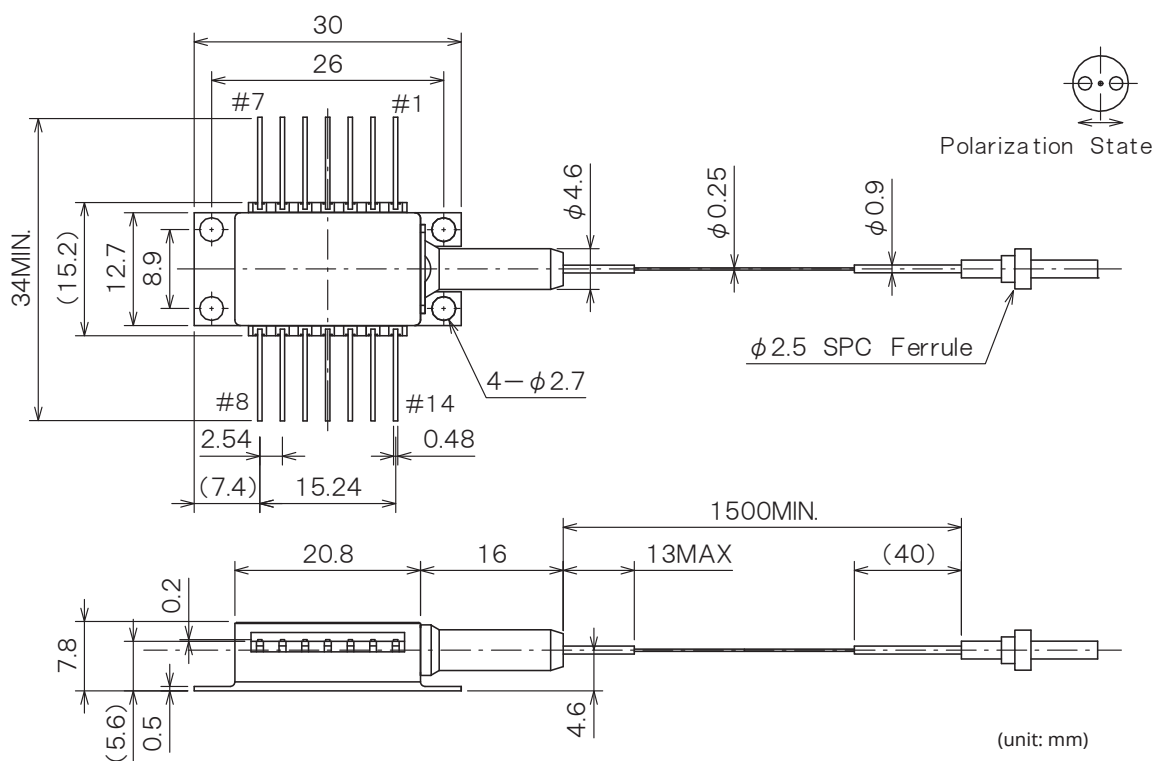
FEATURES

- Optical Output Power:
AF4B155KA/KD75LB: 550 mW
AF4B160KA/KD75LB: 600 mW
AF4B165KA/KD75LB: 650 mW
- Fiber (UV coating fiber: $\varnothing 0.25$ mm)
Single mode fiber (SMF)/Polarization maintaining fiber (PMF)
- 14 pin butterfly Package
- Built-in optical Isolator, Monitor photodiode and Thermo-electric cooler
- LD operating temperature: 35°C

APPLICATION

- Er doped Fiber Amplifier

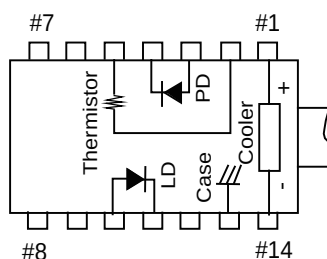
DIMENSIONS



*The polarization direction of the SLD is parallel to the slow axis of the PMF.

PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Cooler Anode	8	NC
2	Thermistor	9	NC
3	PD Anode	10	LD Anode
4	PD Cathode	11	LD Cathode
5	Thermistor	12	NC
6	NC	13	Case
7	NC	14	Cooler Cathode



■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Ratings	Unit
LD Forward Current	I_F	2800	mA
LD Reverse Voltage	V_R	2	V
PD Forward Current	I_{FD}	10	mA
PD Reverse Voltage	V_{RD}	20	V
Operating Case Temperature	T_C	-5 to +70	°C
Storage Temperature	T_{stg}	-40 to +85	°C
Cooler Current	I_C	5.8	A

*Excess over the absolute maximum ratings may cause device failure.

■ OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{LD}=35^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Threshold Current	I_{th}	—	—	—	250	mA
Center Wavelength	λ_c	at Rated Power, RMS (-20 dB)	1460	1475	1490	nm
Spectral width	$\Delta\lambda$	at Rated Power, -20 dB	—	5	10	nm
Monitor Current	I_m	at Rated Power	300	—	3000	μA
PD Dark Current	I_d	$V_{RD}=5\text{ V}$	—	—	0.1	μA
Tracking Error	ΔP_i	$I_m=\text{const.}$, $T_C=-5$ to $+70^{\circ}\text{C}$	-0.5	—	0.5	dB
Isolation	R_O	$T_{LD}=35^{\circ}\text{C}$	—	30	—	dB
Extinction Ratio*	X_p	at Rated Power	17	—	—	dB
Thermistor Resistance	R_{th}	$T_{LD}=35^{\circ}\text{C}$	—	6.5	—	k Ω
		$T_{LD}=25^{\circ}\text{C}$	—	10.0	—	

*This specification is only specified for PMF model.

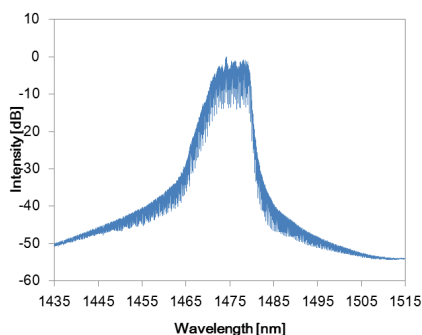
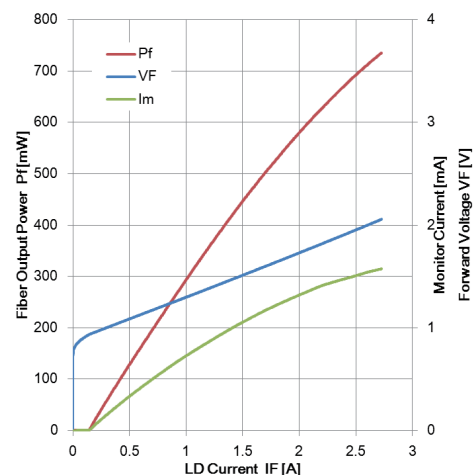
■ OPTICAL OUTPUT POWER/COOLER/CONSUMPTION POWER

Item	Symbol	type E			Unit
Output Power	P_f	550	600	650	mW
Forward Current (BOL)	I_F	1980	2170	2400	mA
Forward Voltage (BOL)	V_F	2.00	2.05	2.15	V
Forward Voltage (EOL)	V_F	2.24	2.30	2.41	V
Cooler Current (EOL)	I_C	2.30	2.60	2.90	A
Cooler Voltage (EOL)	V_C	2.85	3.15	3.45	V
Consumption Power	P_{total}	11.0	13.0	15.5	W

*EOL=BOL $\times$ 1.12

■ TYPICAL CHARACTERISTICS

- Output Power/Forward Voltage/Monitor Current [AF4B165KA75LB]
- Emission spectrum



■ ORDERING INFORMATION

MODEL: A F 4 B 1 # # # # B

◆Center Wavelength range L: $\pm 15\text{ nm}$ K: $\pm 10\text{ nm}$
◆Center Wavelength 75: 1475 nm 80: 1480 nm 70: 1470 nm 65: 1465 nm
◆Fiber and connector A: SMF Ferrule D: PMF Ferrule G: SMF FC/PC K: PMF FC/PC
◆Optical output power 55: 550 mW 60: 600 mW 65: 650 mW

■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
LD Forward Current	I_F	2200	mA
LD Reverse Voltage	V_R	2	V
PD Forward Current	I_{FD}	10	μ A
PD Reverse Voltage	V_{RD}	20	V
Operation Case Temperature	T_C	-20 to +70	$^{\circ}$ C
Storage Temperature	T_{stg}	-40 to +85	$^{\circ}$ C
Cooler Current	I_C	5.8	A

*Excess over the absolute maximum ratings may cause device failure.

■ OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{FBG}=25^{\circ}\text{C}$, $T_{LD}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Threshold Current	I_{th}	—	—	—	180	mA
Center Wavelength	λ_c	at rating output power, RMS (-20 dB)	$\lambda_T-1.0$	λ_T	$\lambda_T+1.0$	nm
Spectrum Width	$\Delta\lambda$	at rating output power, -10 dB	—	—	3.5	nm
Monitor Current	I_m	at rating output power, $V_{RD}=5$ V	100	—	2000	μ A
PD Dark Current	I_d	$V_{RD}=5$ V	—	—	0.1	μ A
Tracking Error	ΔP_f	$I_m=\text{const}$, $T_C=-20$ to $+70^{\circ}\text{C}$	-0.5	—	0.5	dB
Thermistor Resistance	R_{th}	$T_{LD}=35^{\circ}\text{C}$, $B=3900\pm100\text{K}$	9.5	10	10.5	k Ω
Polarization Extinction Ration	X_p	at rating output power	17	—	—	dB

■ OPTICAL OUTPUT POWER/COOLER/CONSUMPTION POWER ($T_{LD}=25^{\circ}\text{C}$)

Item	Symbol	Type GB							Type GC			Unit
Center Wavelength	λ_T	1420 to 1499							1420 to 1485			nm
Output Power	P_f	300	320	340	350	360	380	400	420	450	500	mW
LD Current (BOL)	I_F	1150	1200	1300	1400	1400	1400	1400	1600	1700	1800	mA
Forward Voltage (BOL)	V_F	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	V
Forward Voltage (EOL)	V_F	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.5	2.5	V
Cooler Current (EOL)	I_C	2.20	2.20	2.30	2.35	2.40	2.45	2.50	2.60	2.70	2.90	A
Cooler Voltage (EOL)	V_C	2.70	2.70	2.80	2.85	2.90	2.95	3.00	3.10	3.20	3.40	V

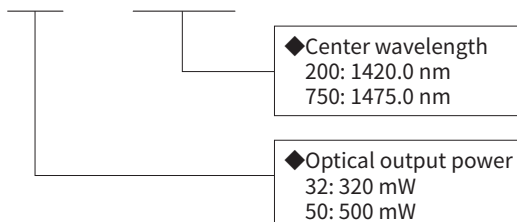
Note: $I_{F_EOL}=I_{F_BOL} \times 1.2$, maximum value

■ SPECIFICATION OF PIGTAIL FIBER

Item	Min.	Typ.	Max.	Unit
Cut-off Wavelength	1300	—	1400	nm
Mode Field Diameter @1550 nm	10.0	10.5	11.0	μ m
Clad Diameter	124	125	126	μ m
UV Coating Diameter	230	245	260	μ m
Temperature Characteristic of FBG Wavelength	—	0.01	0.02	nm/ $^{\circ}$ C
Bending Radius	30	—	—	mm

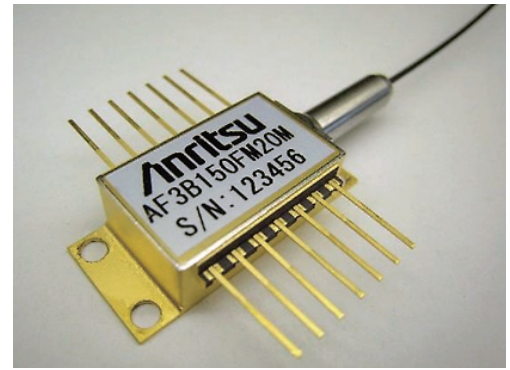
■ ORDERING INFORMATION

Model number : A F 4 B 2 # # F U # # # F



1.3 μm LD Module AF3B150FM20M

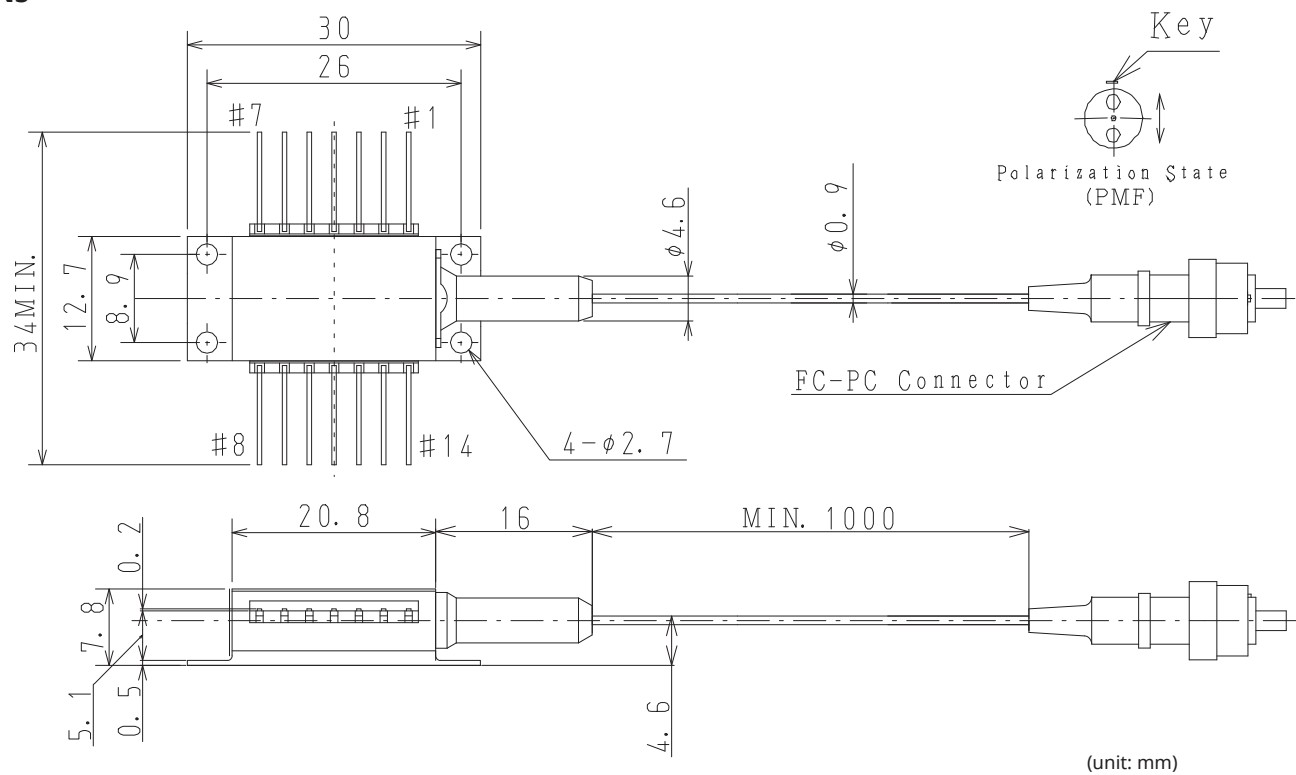
AF3B150FM20M is 1.3 μm laser diode module designed for optical measurement and communication.



FEATURES

- Optical output power: 500 mW ($I_f \leq 1800$ mA)
- Wavelength: 1320 ± 20 nm
- Fiber: Flame-retardant PMF ($\varnothing 0.9$ mm)
- FC-PC connector
- 14-pin butterfly package
- Built-in optical isolator
- Internal monitor PD and TEC
- Low power consumption

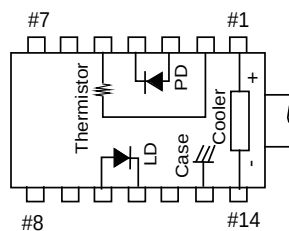
DIMENSIONS



*The polarization direction of the SLD is parallel to the slow axis of the PMF.

PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Cooler Anode	8	NC
2	Thermistor	9	NC
3	PD Anode	10	LD Anode
4	PD Cathode	11	LD Cathode
5	Thermistor	12	NC
6	NC	13	Case
7	NC	14	Cooler Cathode



■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
LD Forward Current	I_F	2200	mA
LD Reverse Voltage	V_R	2	V
PD Forward Current	I_{FD}	10	mA
PD Reverse Voltage	V_{RD}	20	V
Operating Case Temperature	T_C	-20 to +70	°C
Storage Temperature	T_{stg}	-40 to +85	°C
Cooler Current	I_C	5.8	A

*Excess over the absolute maximum ratings may cause device failure.

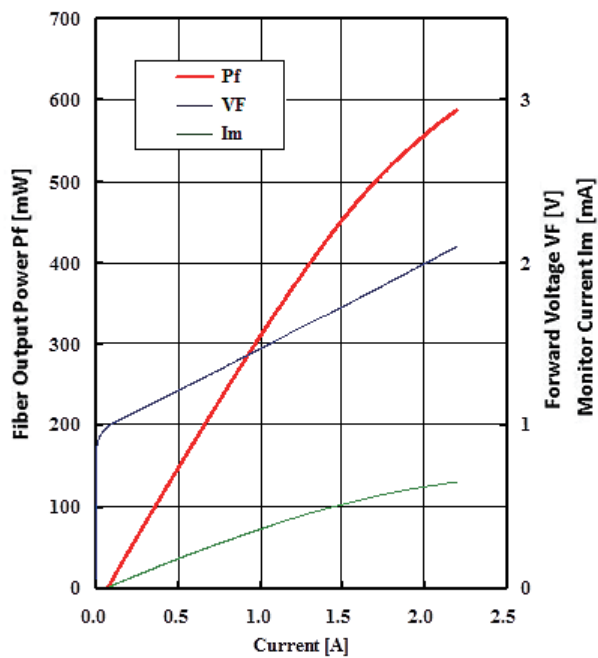
■ OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{LD}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Power	P_f	—	—	—	500	mW
Forward Voltage	V_F	$P_f=500\text{ mW}$	—	—	2.3	V
Threshold Current	I_{th}	—	—	—	180	mA
Forward Current (BOL)	I_F	$P_f=500\text{ mW}$	—	—	1800	mA
Center Wavelength	λ_c	$P_f=500\text{ mW}$, RMS (-20 dB)	1300	1320	1340	nm
Spectral Width	$\Delta\lambda$	$P_f=500\text{ mW}$, RMS (-20 dB)	—	5	10	nm
Monitor Current	I_m	$P_f=500\text{ mW}$, $V_{RD}=5\text{ V}$	100	—	2000	μA
PD Dark Current	I_d	$V_{RD}=5\text{ V}$	—	—	0.1	μA
Tracking Error	ΔP_f	$I_m=\text{const}$, $T_C=-20\text{ to }+70^{\circ}\text{C}$	-0.5	—	0.5	dB
Cooler Voltage	V_C	$I_F=*EOL$, $T_C=70^{\circ}\text{C}$	—	—	4	V
Cooler Current	I_C	$I_F=*EOL$, $T_C=70^{\circ}\text{C}$	—	—	3.5	A
Thermal Resistance	R_{th}	$T_{LD}=25^{\circ}\text{C}$, $B=3900\pm100\text{K}$	9.5	10	10.5	k Ω
Optical Isolation	R_o	$T_{LD}=25^{\circ}\text{C}$	—	30	—	dB
Extinction Ratio	X_p	$P_f=500\text{ mW}$	17	—	—	dB

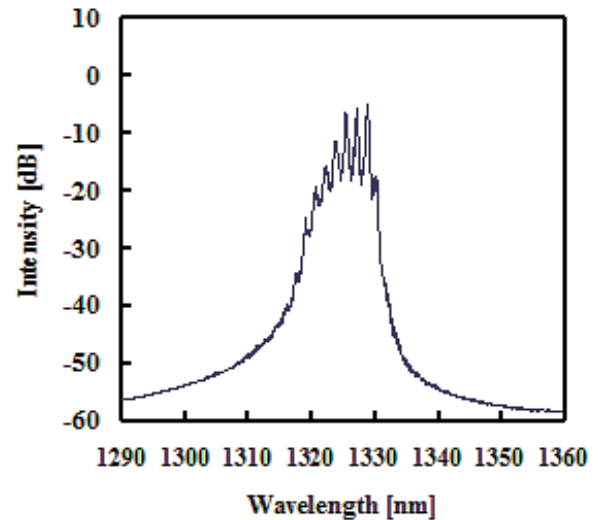
*EOL=BOL $\times 1.12$

■ TYPICAL CHARACTERISTICS

- Output Power/Forward Voltage/Monitor Current



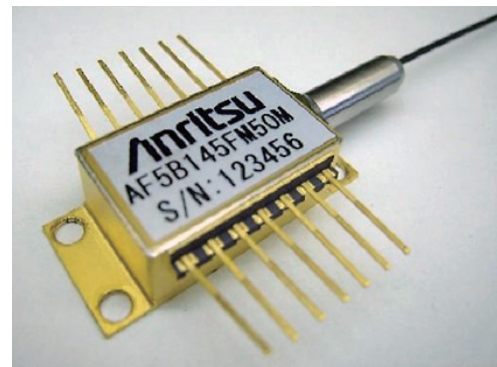
- Emission spectrum ($P_f=500\text{ mW}$)



1.55 μm LD Module

AF5B145FM50M

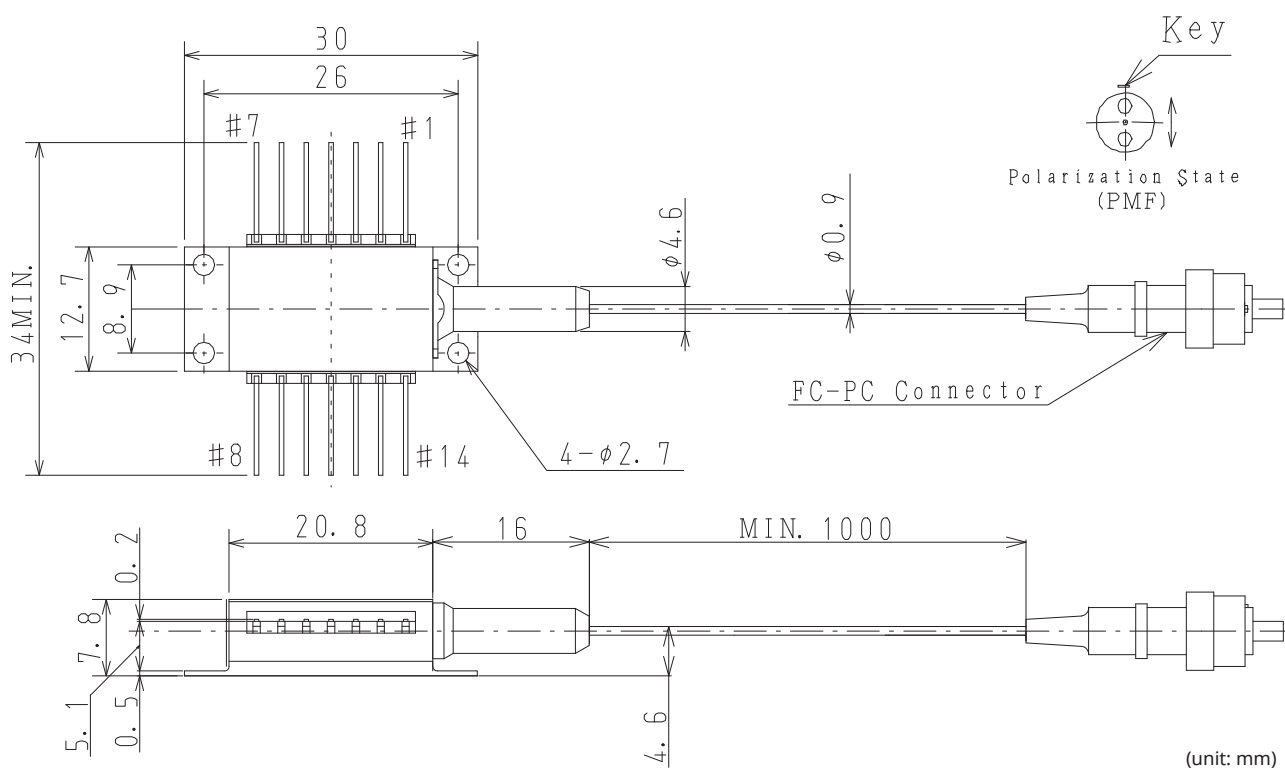
AF5B145FM50M is 1.55 μm laser diode module designed for optical measurement and communication.



FEATURES

- Optical output power: 450 mW ($I_F \leq 1800$ mA)
- Wavelength: 1550 ± 20 nm
- Fiber: Flame-retardant PMF ($\varnothing 0.9$ mm)
- FC-PC connector
- 14-pin butterfly package
- Built-in optical isolator
- Internal monitor PD and TEC
- Low power consumption

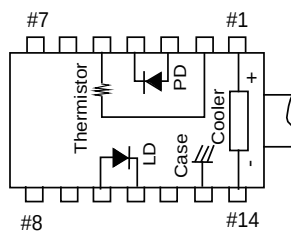
DIMENSIONS



*The polarization direction of the SLD is parallel to the slow axis of the PMF.

PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Cooler Anode	8	NC
2	Thermistor	9	NC
3	PD Anode	10	LD Anode
4	PD Cathode	11	LD Cathode
5	Thermistor	12	NC
6	NC	13	Case
7	NC	14	Cooler Cathode



■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
LD Forward Current	I_F	2200	mA
LD Reverse Voltage	V_R	2	V
PD Forward Current	I_{FD}	10	mA
PD Reverse Voltage	V_{RD}	20	V
Operating Case Temperature	T_C	-20 to +70	°C
Storage Temperature	T_{stg}	-40 to +85	°C
Cooler Current	I_C	5.8	A

*Excess over the absolute maximum ratings may cause device failure.

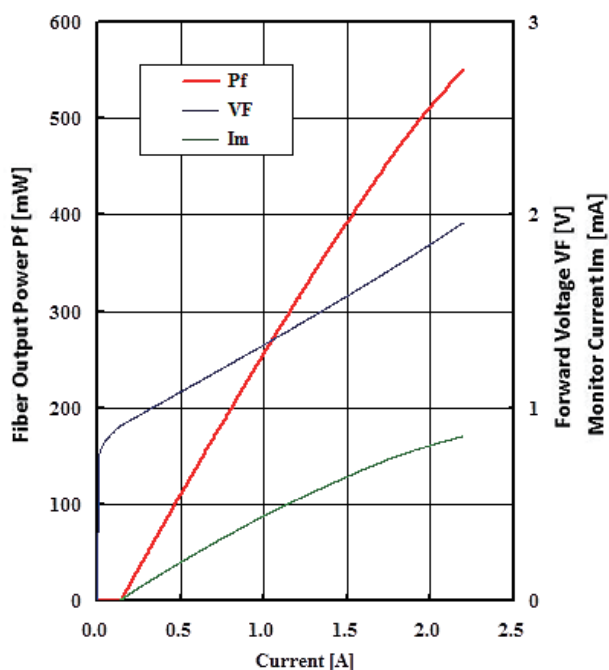
■ OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{LD}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Power	P_f	—	—	—	450	mW
Forward Voltage	V_F	$P_f=450\text{ mW}$	—	—	2.2	V
Threshold Current	I_{th}	—	—	—	180	mA
Forward Current (BOL)	I_F	$P_f=450\text{ mW}$	—	—	1800	mA
Center Wavelength	λ_C	$P_f=450\text{ mW}$, RMS (-20 dB)	1530	1550	1570	nm
Spectral Width	$\Delta\lambda$	$P_f=450\text{ mW}$, RMS (-20 dB)	—	5	10	nm
Monitor Current	I_m	$P_f=450\text{ mW}$, $V_{RD}=5\text{ V}$	100	—	2000	μA
PD Dark Current	I_d	$V_{RD}=5\text{ V}$	—	—	0.1	μA
Tracking Error	ΔP_f	$I_m=\text{const}$, $T_C=-20\text{ to }+70^{\circ}\text{C}$	-0.5	—	0.5	dB
Cooler Voltage	V_C	$I_F=*EOL$, $T_C=70^{\circ}\text{C}$	—	—	4	V
Cooler Current	I_C	$I_F=*EOL$, $T_C=70^{\circ}\text{C}$	—	—	3.5	A
Thermal Resistance	R_{th}	$T_{LD}=25^{\circ}\text{C}$, $B=3900\pm100\text{K}$	9.5	10	10.5	k Ω
Optical Isolation	R_o	$T_{LD}=25^{\circ}\text{C}$	—	30	—	dB
Extinction Ratio	X_p	$P_f=450\text{ mW}$	17	—	—	dB

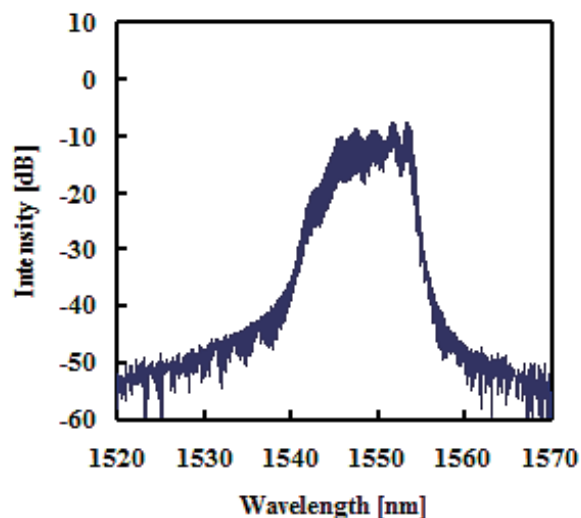
*EOL=BOL $\times$ 1.12

■ TYPICAL CHARACTERISTICS

- Output Power/Forward Voltage/Monitor Current

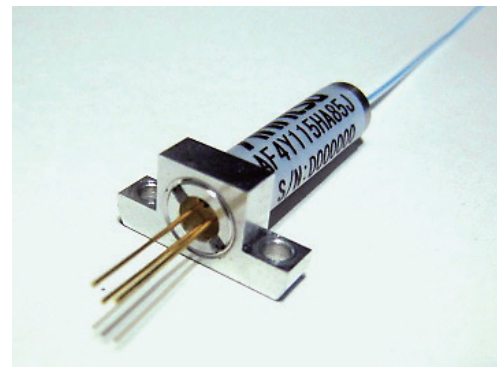


- Emission Spectrum ($P_f=450\text{ mW}$)



1.48 μm Cylindrical Module AF4Y108GA85J/AF4Y115HA85J

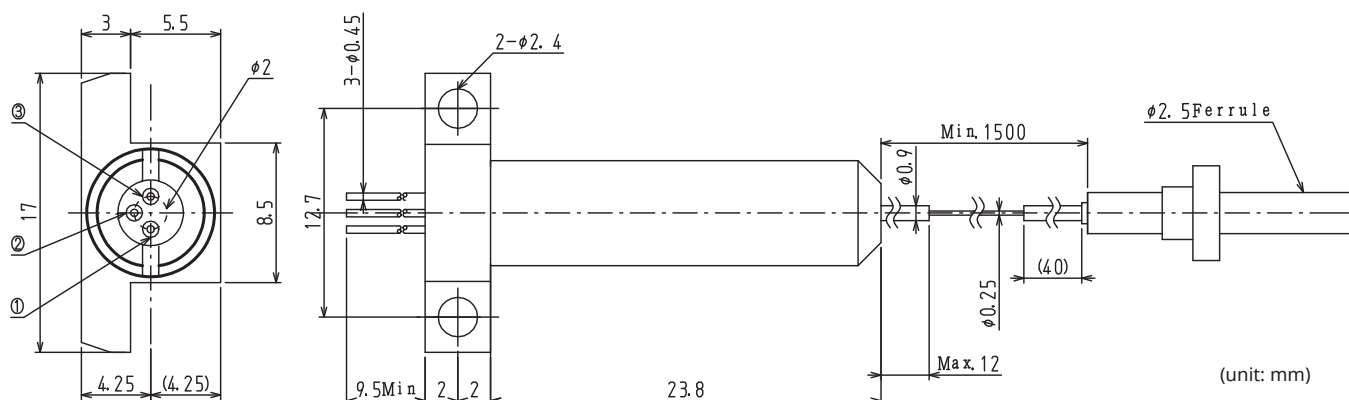
AF4Y108GA85J/AF4Y115HA85J is 1.48 μm high power laser diode module designed for Er doped fiber amplifier. The laser is packaged in a cylindrical package without isolator, monitor photodiode and thermoelectric cooler (TEC).



FEATURES

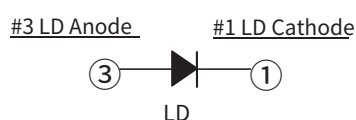
- SMF optical output power:
AF4Y108GA85J: 80 mW ($I_F < 400 \text{ mA}$)
AF4Y115HA85J: 150 mW ($I_F < 800 \text{ mA}$)
- Operation case temperature: -5 to $+70^\circ\text{C}$
- Coaxial module

DIMENSIONS



PIN CONFIGURATION

No.	FUNCTION
#1	LD Cathode
#2	NC (Case)
#3	LD Anode



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating		Unit
		AF4Y108GA85J	AF4Y115HA85J	
LD Forward Current	I_F	600	1000	mA
LD Reverse Voltage	V_R	2.0		V
Operating Case Temperature	T_C	-5^*1 to $+70$		$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to $+85$		$^\circ\text{C}$

*Excess over the absolute maximum ratings may cause device failure.

*1 No Condensation.

OPTICAL AND ELECTRICAL CHARACTERISTICS

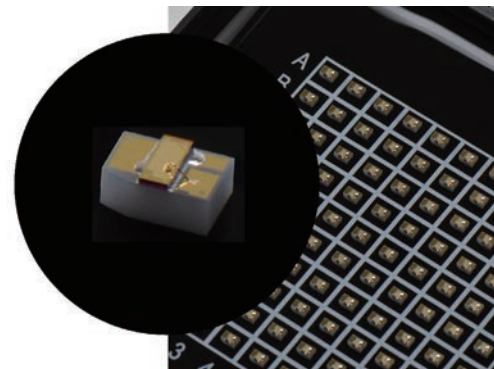
Item	Symbol	Test Condition	AF4Y108GA85J			AF4Y115HA85J			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Threshold Current	I_{th}	$T_C = 70^\circ\text{C}$	—	45	55	—	130	—	mA
Forward Current (BOL)	I_F	AF4Y108GA85J: $P_F = 80 \text{ mW}$, $T_C = 70^\circ\text{C}$ AF4Y115HA85J: $P_F = 150 \text{ mW}$, $T_C = 25$ to 70°C	—	350	400	—	—	800	mA
Center Wavelength*	λ_c	AF4Y108GA85J: $P_F = 80 \text{ mW}$, $T_C = 70^\circ\text{C}$, RMS (-20 dB) AF4Y115HA85J: $P_F = 150 \text{ mW}$, $T_C = 25$ to 70°C , RMS (-20 dB)	1478	—	1490	1450	—	1490	nm
Forward Voltage	V_F	AF4Y108GA85J: $P_F = 80 \text{ mW}$ AF4Y115HA85J: $P_F = 150 \text{ mW}$	—	1.4	1.8	—	—	2.0	V

*Center wavelength is measured under no reflected light condition.

1.5 μm Gain Chip (Chip Carrier Type)

AE5T315BY20P/AE5T310BY10P

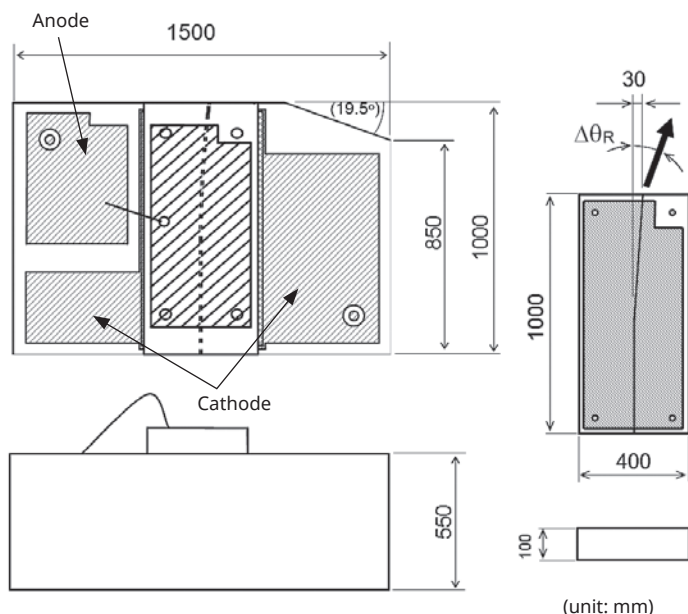
AE5T315BY20P/AE5T310BY10P is 1.5 μm InGaAsP/InP Gain Chip for External Cavity Laser developed as a light source for optical fiber communication or optical sensing.



FEATURES

- Broad band: >100 nm tuning range (Center Wavelength=1550 nm)
- High Optical Output Power: >40 mW with external cavity
- Low spectral ripple
- Bare chip shipment is also available
- Normal facet reflectance:
AE5T315BY20P: HR (95%)
AE5T310BY10P: LR (6%)

DIMENSIONS



ABSOLUTE MAXIMUM RATINGS ($T_{LD}=25^{\circ}\text{C}$)

Item	Symbol	Rating	Unit
LD Forward Current	I_F	500	mA
LD Reverse Voltage ($T_{LD}=25^{\circ}\text{C}$)	V_R	2	V
Operating Case Temperature	T_C	15 to +45	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-40 to +85	$^{\circ}\text{C}$
Process/Soldering Temp. vs Time			
Maximum duration 20 s	—	300	$^{\circ}\text{C}$
Maximum duration 2 hour	—	200	
Maximum duration 100 hour	—	120	
ESD (Human Body Model)	ESD	500	V

* Excess over the absolute maximum ratings may cause device failure.

* No Condensation.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{LD}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	AE5T315BY20P			AE5T310BY10P			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=200\text{ mA}$ pulsed ($t_w=50\text{ }\mu\text{s}$)	—	1.4	2	—	1.4	2	V
ASE Output Power	P_{ASE}	$I_F=200\text{ mA}$ pulsed ($t_w=50\text{ }\mu\text{s}$)	5	10	—	1	5	—	mW
Center Wavelength	λ_c	$I_F=100\text{ mA}$ pulsed ($t_w=50\text{ }\mu\text{s}$)	1490	—	1550	1480	—	1540	nm
ASE Ripple	M	$I_F=100\text{ mA}$ CW at $\lambda=1550\text{ nm}$	—	—	3.5	—	—	2	dB
Beam Exit Angle	$\Delta\theta_R$	$I_F=200\text{ mA}$ CW	19	20	21	19	20	21	deg.
Beam Divergence Angle Transverse (perpendicular), Normal Facet	$\theta_{t,NOR}$	$I_F=200\text{ mA}$ CW, FAHM	15	20	25	15	20	25	deg.
Beam Divergence Angle Lateral (parallel), Normal Facet	$\theta_{p,NOR}$	$I_F=200\text{ mA}$ CW, FAHM	17	20	23	17	20	23	deg.
Beam Divergence Angle Transverse (perpendicular), Angled Facet	$\theta_{t,ANG}$	$I_F=200\text{ mA}$ CW, FAHM	26	29	32	26	29	32	deg.
Beam Divergence Angle Lateral (parallel), Angled Facet	$\theta_{p,ANG}$	$I_F=200\text{ mA}$ CW, FAHM	15	18	21	15	18	21	deg.

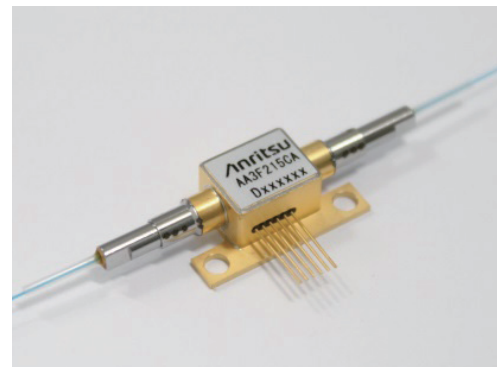
TECHNICAL SPECIFICATIONS

Item	Symbol	Test Condition	AE5T315BY20P			AE5T310BY10P			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Angled facet Reflectance	R^{ANG}	C-band	—	5×10^{-5}	10^{-4}	—	5×10^{-5}	10^{-4}	—
Normal facet Reflectance	R^{NOR}	C-band	90	95	—	5	6	7	%
Chip Length	Length		0.98	1	1.02	0.98	1	1.02	mm
Chip Width	Width		0.38	0.40	0.42	0.38	0.40	0.42	mm
Chip Height	Height		0.09	0.10	0.11	0.09	0.10	0.11	mm

1.3 μm SOA Module

AA3F215CA

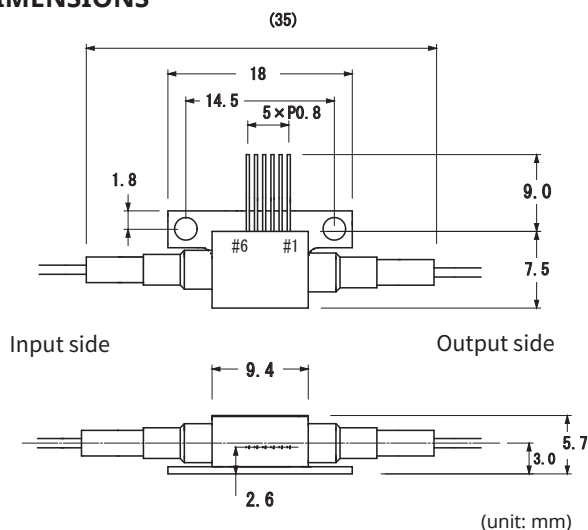
AA3F215CA is 1.3 μm high gain and low polarization dependent gain SOA (Semiconductor Optical Amplifier) module with optical isolator and thermo-electric cooler (TEC).



FEATURES

- Gain: ≥ 15 dB
- Polarization Dependent Gain (PDG): ≤ 1.5 dB
- Built-in optical isolator (input side)
- Low power consumption: 1.0 W typ. ($T_C=75^\circ\text{C}$)

DIMENSIONS



APPLICATIONS

- 100GBASE-ER4 CFP/CFP2 transceiver
- Preamplifier

PIN CONFIGURATION

No.	FUNCTION
1	Cooler Ccathode
2	Cooler Anode
3	Thermistor
4	Thermistor
5	SOA Cathode
6	SOA Anode

Fiber Characteristics	
Fiber type	SMF
Diameter of Fiber	$\phi 0.25$
Minimum Fiber bend radius	7.5 mm
Fiber length	1,000 mm
Connectors (both sides)	LC Connector

ABSOLUTE MAXIMUM RATINGS ($T_{SOA}=25^\circ\text{C}$)

Item	Symbol	Rating	Unit
SOA Forward Current	I_F	150	mA
SOA Reverse Voltage	V_R	2	V
Operating Case Temperature	T_C	-5 to $+75$	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to $+85$	$^\circ\text{C}$
Cooler Current	I_C	1.0	A
Cooler Voltage	V_C	2.5	V

*Excess over the absolute maximum ratings may cause device failure.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{SOA}=25^\circ\text{C}$, $T_C=25^\circ\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Optical Gain	G	$I_F=120$ mA*1, *2, *3	15	—	—	dB
Polarization Dependent Gain	PDG	$I_F=120$ mA*1, *2, *3	—	—	1.5	dB
Forward Current	I_F	—	100	—	150	mA
Forward Voltage	V_F	$I_F=120$ mA	—	—	2.0	V
Wavelength Range	λ	$I_F=120$ mA	1294	—	1311	nm
Saturation Power	P_S	$I_F=120$ mA*4	—	7	—	dBm
Noise Figure	NF	$I_F=120$ mA*1, *2, *3, *5	—	7	—	dB
Cooler Current	I_C	$G=(BOL)$, $T_C=75^\circ\text{C}$	—	—	0.6	A
Cooler Voltage	V_C	$G=(BOL)$, $T_C=75^\circ\text{C}$	—	—	2.2	V
Thermistor Resistance	R_{th}	$T_{SOA}=25^\circ\text{C}$, $B=3435 \pm 105\text{K}$	9.5	10	10.5	k Ω

*1 Optical input signal condition: Continuous Wave (CW)

*2 Optical input signals are 4 ranges of wavelength listed below. Characteristics are measured for each wavelength range.

Wavelength range of optical input signals are as follows:

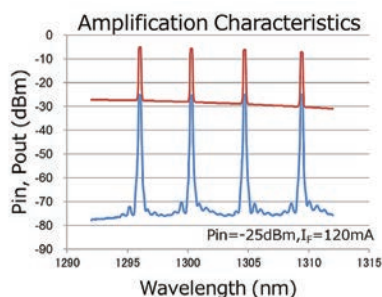
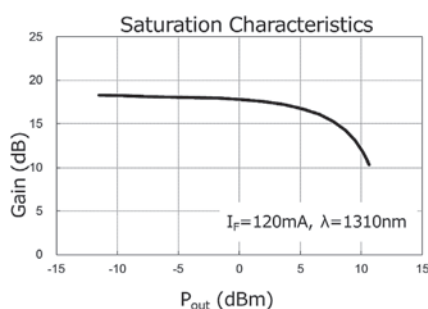
$\lambda 0$: 1294.5 to 1296.6 nm $\lambda 1$: 1299.0 to 1301.1 nm $\lambda 2$: 1303.5 to 1305.7 nm $\lambda 3$: 1308.0 to 1310.2 nm

*3 Optical Input signal Power (P_{in}) = -25 dBm

*4 Saturation power is measured by using single wavelength ($\lambda=1310$ nm).

*5 Without polarization adjustment.

TYPICAL CHARACTERISTICS



1.3 μm SOA (Chip Carrier Type) AA3T115CY

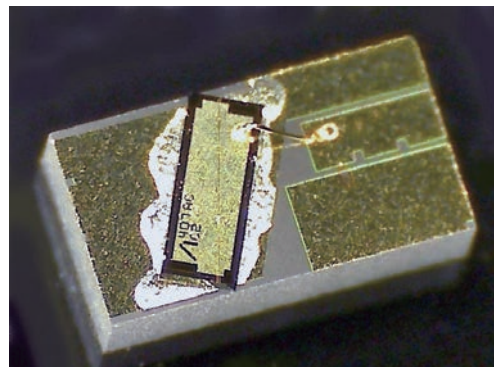
AA3T115CY is 1.31 μm high gain and low polarization dependent gain SOA (Semiconductor Optical Amplifier) chip on carrier. The SOA chip is p-side up mounted on an AlN sub-mount of the size of $1.1 \times 2.0 \text{ mm}$.

FEATURES

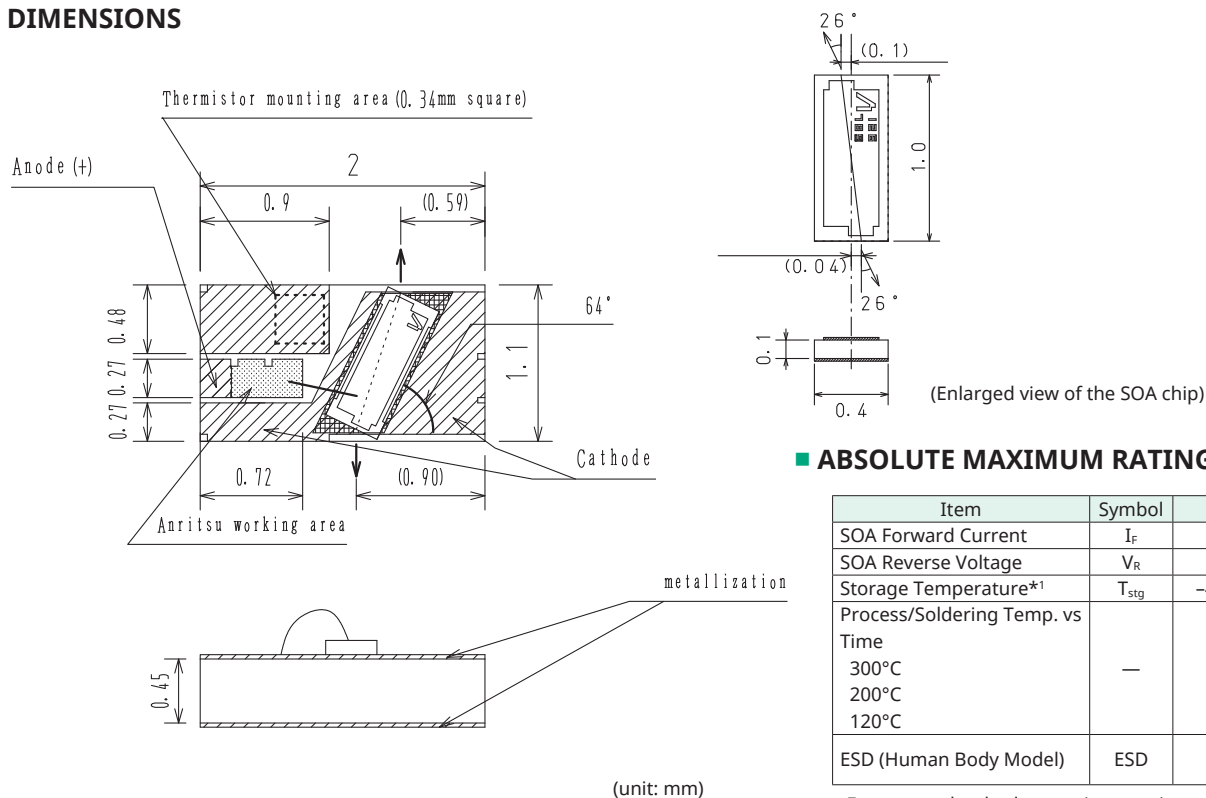
- Gain: 18 dB
- Polarization Dependent Gain (PDG): 1.5 dB
- Low Power Consumption: 0.18 W

APPLICATIONS

- Optical transceiver
- Preamplifier



DIMENSIONS



ABSOLUTE MAXIMUM RATINGS ($T_{\text{Sub}}=25^\circ\text{C}$)

Item	Symbol	Rating	Unit
SOA Forward Current	I_F	350	mA
SOA Reverse Voltage	V_R	2	V
Storage Temperature*1	T_{stg}	-40 to +85	$^\circ\text{C}$
Process/Soldering Temp. vs Time	—	<20 <2 <100	s hour hour
ESD (Human Body Model)	ESD	500	V

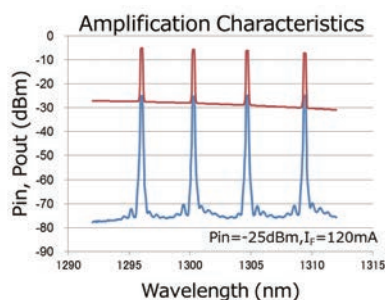
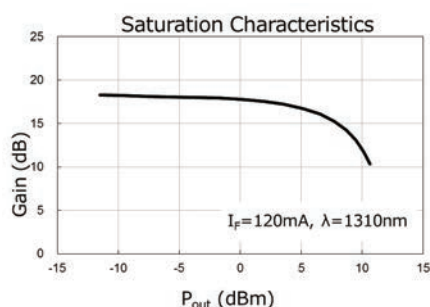
* Excess over the absolute maximum ratings may cause device failure.
*1 No Condensation.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{\text{Sub}}=25^\circ\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Optical Gain	G	$I_F=120 \text{ mA}$, $\lambda_{\text{in}}=1310 \text{ nm}$, $P_{\text{in}}=-25 \text{ dBm}$	—	18	—	dB
Polarization Dependent Gain	PDG	$I_F=120 \text{ mA}$, $\lambda_{\text{in}}=1310 \text{ nm}$, $P_{\text{in}}=-25 \text{ dBm}$	—	1.5	—	dB
Saturation Power	P_S	$I_F=120 \text{ mA}$, -3 dB, $\lambda_{\text{in}}=1310 \text{ nm}$	—	7	—	dBm
Noise Figure	NF	$I_F=120 \text{ mA}$, $\lambda_{\text{in}}=1310 \text{ nm}$, $P_{\text{in}}=-25 \text{ dBm}$	—	7	—	dB
Beam Divergence Angle Lateral (Parallel)	θ_t	$I_F=120 \text{ mA}$, FAHM	—	21	—	deg.
Beam Divergence Angle Transverse (Perpendicular)	θ_p	$I_F=120 \text{ mA}$, FAHM	—	29	—	deg.
Optical output	P_{ASE}	$I_F=120 \text{ mA}$	0.7	0.9	1.9	mW
Forward Voltage	V_F	$I_F=120 \text{ mA}$	1.0	1.1	1.5	V

* The measured data may be different with these specifications depending on the measurement settings. Hermetic sealing is recommended for long term reliability.

TYPICAL CHARACTERISTICS



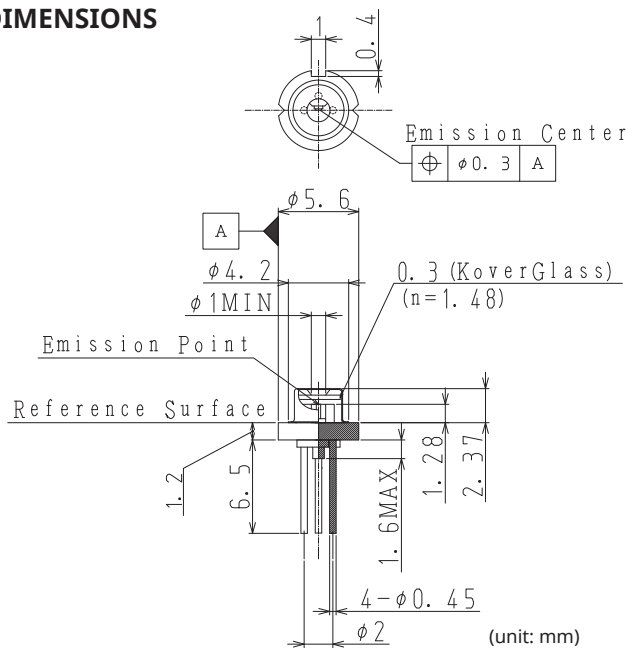
0.8 μm SLD CAN AS8K215GY30M

AS8K215GY30M is SLD (Super Luminescent Diode) module developed as incoherent light sources for various optical measurements including Optical Coherence Tomography (OCT). The device emits wide spectral incoherent light. High intensity in a narrow radiation angle makes high efficient optical coupling to a single mode fiber.

FEATURES

- $\varnothing 5.6$ CAN package
- High optical output $P_o=5$ mW
- Wide spectral half width $\Delta\lambda=15$ nm (Typ.)
- Built-in monitor photo diode

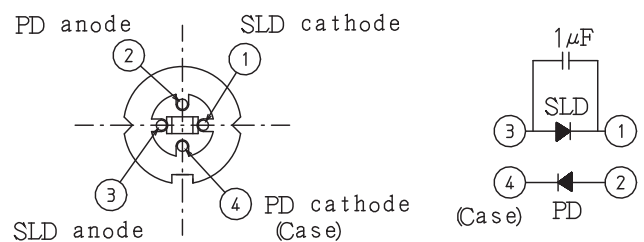
DIMENSIONS



APPLICATIONS

- Optical sensor/Optical encoder
- Optical Coherence Tomography (OCT)
- Optical measurement

BOTTOM/PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
SLD Reverse Voltage	V_R	2	V
Optical Output Power	P_o	6	mW
SLD Forward Current	I_F	120	mA
PD Reverse Voltage	V_{RD}	15	V
Operating Case Temperature	T_C	-20 to +70	$^{\circ}\text{C}$
Storage Temperature*1	T_{stg}	-40 to +80	$^{\circ}\text{C}$

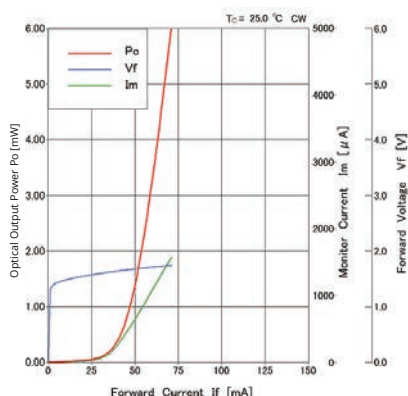
* Excess over the absolute maximum ratings may cause device failure.
*1 No Condensation.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$)

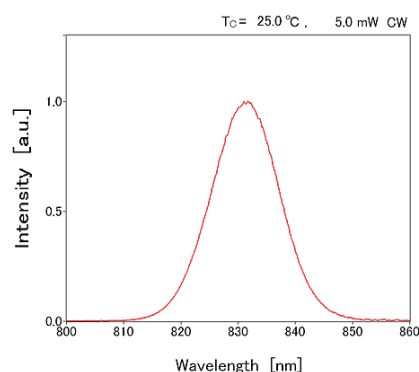
Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
SLD Forward Current	I_F	$P_o=5$ mW	—	70	100	mA
SLD Forward Voltage	V_F	$P_o=5$ mW	—	2	2.5	V
Center Wavelength	λ_c	$P_o=5$ mW	810	830	850	nm
Spectral Half Width	$\Delta\lambda$	$P_o=5$ mW	10	15	—	nm
Spectral Modulation	M_d	$P_o=5$ mW	—	2	10	%
PD Monitor Current	I_m	$P_o=5$ mW, $V_{RD}=5$ V	0.2	1.5	2.2	mA
Parallel Beam Divergence	$\theta_{//}$	$P_o=5$ mW	—	15	—	deg
Perpendicular Beam Divergence	$\theta_{\perp}$	$P_o=5$ mW	—	45	—	deg

TYPICAL CHARACTERISTICS

- Output Power/Forward Voltage/Monitor Current

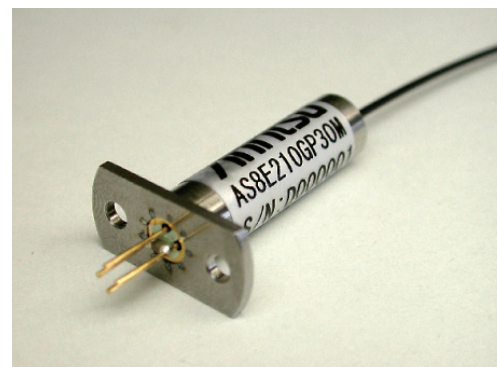


- Emission spectrum



0.8 μm SLD Cylindrical Module AS8E210GP30M

AS8E210GP30M is SLD (Super Luminescent Diode) module developed as incoherent and broad spectrum profile light sources for various optical measurements. The device emits incoherent light having wide spectral half width and high optical output power from PMF (polarization-maintaining fiber).



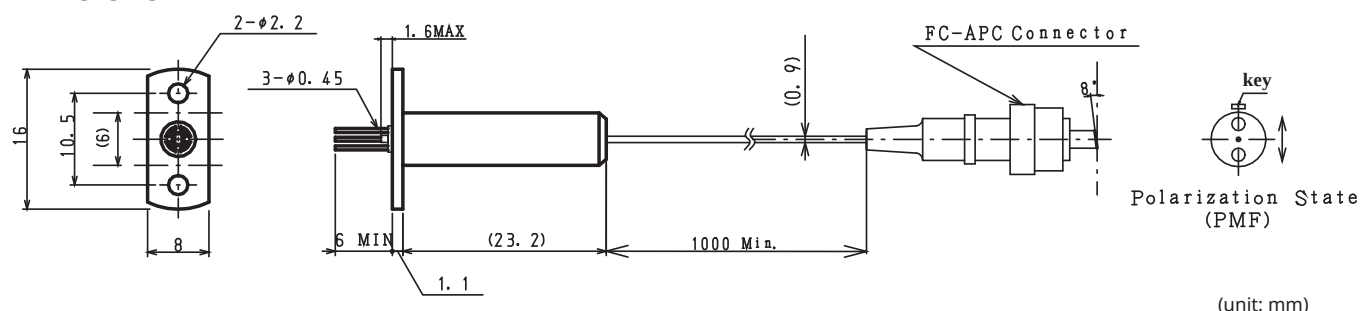
FEATURES

- PMF output
- Uncooled operation is available
- High optical output power $P_f = 1\text{ mW}$
- Wide spectral half width $\Delta\lambda = 15\text{ nm}$ (typ.)
- Built-in monitor photo diode

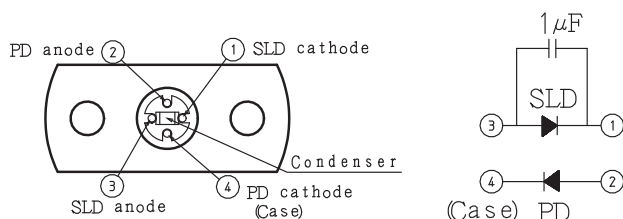
APPLICATIONS

- Optical sensor/Optical encoder
- Optical Coherence Tomography (OCT)
- Optical measurement

DIMENSIONS



BOTTOM/PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Optical Output Power	P_f	1.2	mW
SLD Forward Current	I_f	120	mA
SLD Reverse Voltage	V_R	2	V
PD Reverse Voltage	V_{RD}	15	V
Operating Case Temperature	T_C	-20 to +70	$^{\circ}\text{C}$
Storage Temperature*1	T_{stg}	-40 to +80	$^{\circ}\text{C}$

* Excess over the absolute maximum ratings may cause device failure.

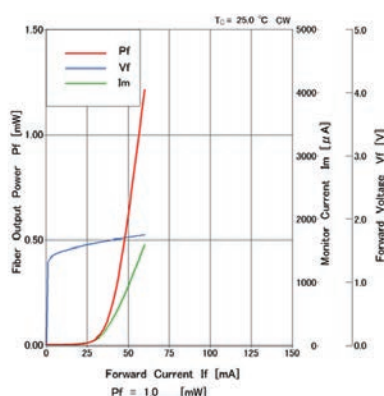
*1 No Condensation.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$)

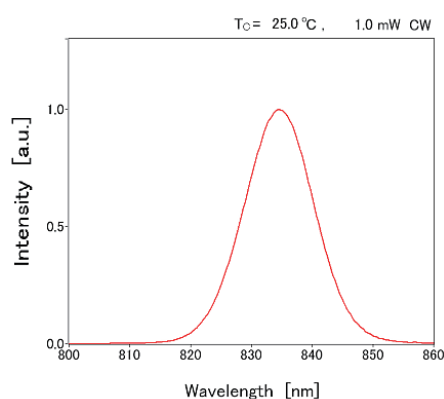
Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
SLD Forward Current	I_f	$P_f=1\text{ mW}$	—	70	100	mA
SLD Forward Voltage	V_f	$P_f=1\text{ mW}$	—	2	2.5	V
Center Wavelength	λ_c	$P_f=1\text{ mW}$	810	830	850	nm
Spectral Half Width	$\Delta\lambda$	$P_f=1\text{ mW}$	10	15	—	nm
Spectral Modulation	M_d	$P_f=1\text{ mW}$	—	2	10	%
PD Monitor Current	I_m	$P_f=1\text{ mW}$, $V_{RD}=5\text{ V}$	0.2	1.5	—	mA
Tracking Error	ΔP_f	$I_m=\text{const}$, $T_C=-20\text{ to }+70^{\circ}\text{C}$	-2	—	2	dB

TYPICAL CHARACTERISTICS

- Output Power/Forward Voltage/Monitor Current



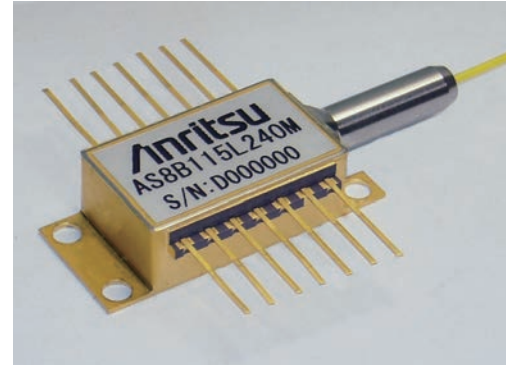
- Emission spectrum



0.8 μm SLD Module

AS8B112G230M/AS8B115G230M/AS8B115L240M

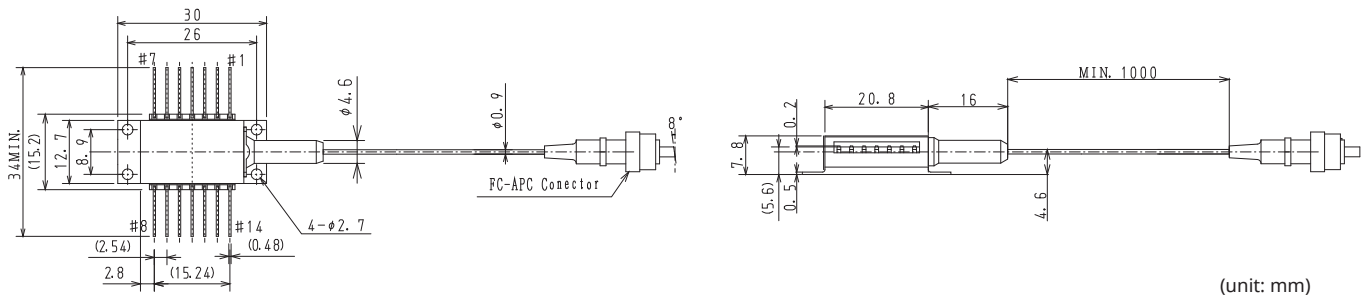
AS8B series is Super Luminescent Diode (SLD) modules which is developed for the light source of Optical Coherence Tomography (OCT) and the inCoherence optical measurement equipment.



FEATURES

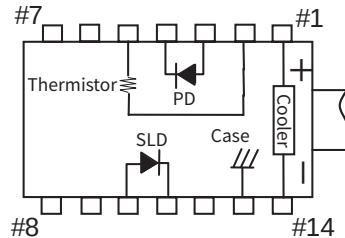
- Spectral half width/Optical output power
AS8B112G230M: 14 nm/2 mW
AS8B115G230M: 14 nm/5 mW
AS8B115L240M: 50 nm/5 mW
- Internal Monitor PD and TEC (Thermo-electric cooler)
- FC-APC connector

DIMENSIONS



PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Cooler Anode	8	NC
2	Thermistor	9	NC
3	PD Anode	10	SLD Anode
4	PD Cathode	11	SLD Cathode
5	Thermistor	12	NC
6	NC	13	Case
7	NC	14	Cooler Cathode



ABSOLUTE MAXIMUM RATINGS ($T_{\text{SLD}}=25^{\circ}\text{C}$)

Item	Symbol	Rating			Unit
		AS8B112G230M	AS8B115G230M	AS8B115L240M	
Optical Output Power	P_f	2.5	6.0	7.0	mW
SLD Forward Current	I_f	180	220	220	mA
SLD Reverse Voltage	V_R	2.0			V
PD Reverse Voltage	V_R	20			V
Operating Case Temperature	T_c	-20 to +75			$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to +85			$^{\circ}\text{C}$
Cooler Current	I_c	2.0			A

* Excess over the absolute maximum ratings may cause device failure.

OPTICAL CHARACTERISTICS ($T_{\text{SLD}}=25^{\circ}\text{C}$, $T_c=25^{\circ}\text{C}$)

Item	Symbol	AS8B112G230M			AS8B115G230M			AS8B115L240M			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Optical Output Power	P_f	2.0	—	—	5.0	—	—	5.0	—	—	mW
Forward Voltage	V_f	—	2.0	2.5	—	2.0	2.5	—	2.0	2.5	V
Forward Current (BOL)	I_f	—	—	120	—	—	150	—	150	180	mA
Center Wavelength	λ_c	810	830	850	810	830	850	820	840	860	nm
Spectral Half Width	$\Delta\lambda$	10	14	—	10	14	—	45	50	—	nm
Monitor Current	I_m	0.2	—	—	0.2	—	—	0.05	—	2.0	mA

Note 1: Each value are specified at the rating output power.

Note 2: Condition of monitor current measuring condition ($V_R=5\text{ V}$).

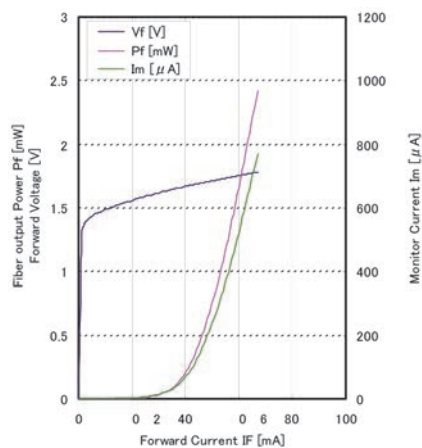
ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
PD Dark Current	I_d	$V_R=5\text{ V}$	—	—	0.1	μA
Tracking Error	ΔP_f	$I_m=\text{const}$, $T_c=-20\text{ to }+75^\circ\text{C}$	-1.0	—	1.0	dB
Cooler Voltage	V_c	$I_F=I_F(\text{EOL})$, $T_c=75^\circ\text{C}$	—	—	2.5	V
Cooler Current	I_c	$I_F=I_F(\text{EOL})$, $T_c=75^\circ\text{C}$	—	—	1.0	A
Thermistor Resistance	R_{th}	$T_{SLD}=25^\circ\text{C}$, $B=3900\pm 100\text{K}$	9.5	10.0	10.5	k Ω

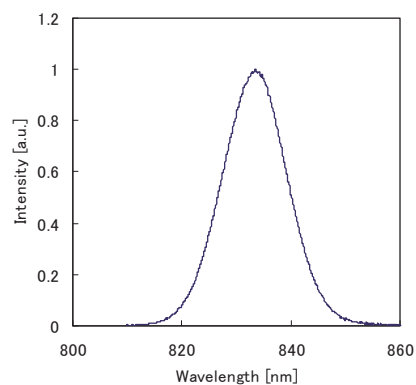
*EOL=BOL $\times$ 1.2

TYPICAL CHARACTERISTICS

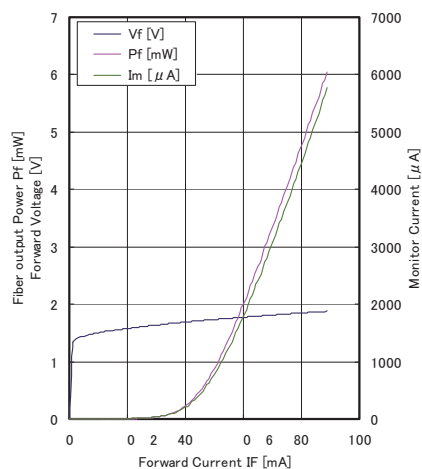
- Output Power/Forward Voltage/Monitor Current
[AS8B112G230M]



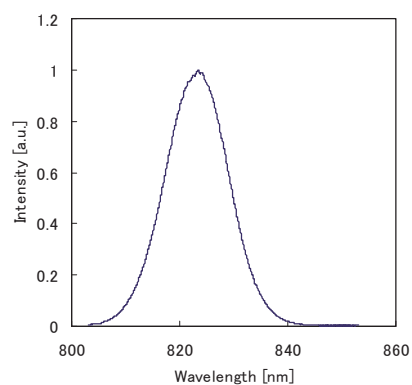
- Emission spectrum
[AS8B112G230M]



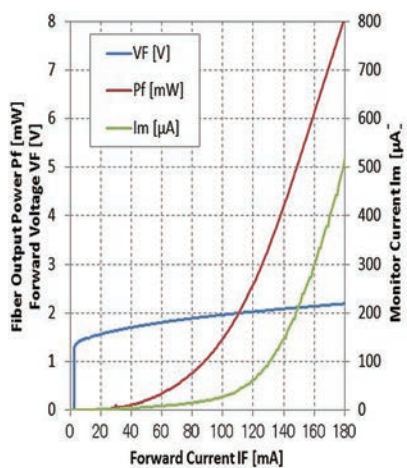
[AS8B115G230M]



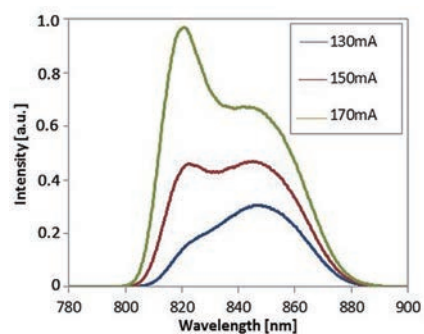
[AS8B115G230M]



[AS8B115L240M]



[AS8B115L240M]



1.31 μm /1.65 μm SLD Module AS3B119GM10M/AS6B118GM50M

AS3B119GM10M/AS6B118GM50M is 1.31 μm /1.65 μm SLD (Super Luminescent Diode) module developed as incoherent light sources for various optical measurements. The device emits incoherent light having wide spectral half width and high output power from PMF (polarization-maintaining fiber).

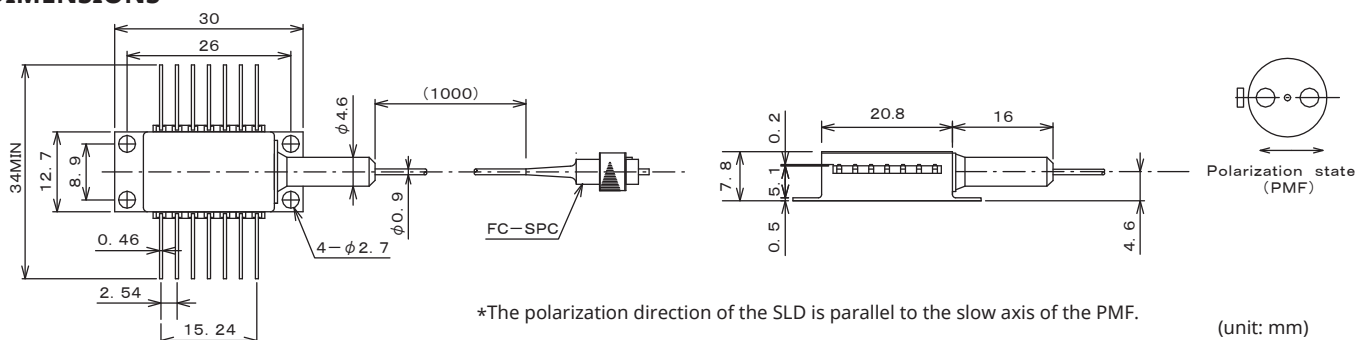
FEATURES

- Center Wavelength/Spectral half width/
Optical output power:
AS3B119GM10M: 1.31 μm /55 nm/15 mW
AS6B118GM50M: 1.65 μm /70 nm/10 mW
- Built-in optical isolator
- Internal monitor PD and TEC

APPLICATIONS

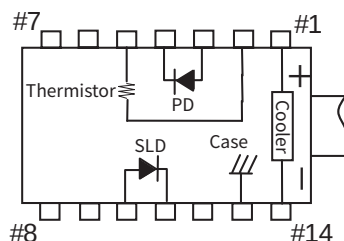
- Optical sensor
- Optical Coherence Tomography (OCT)
- Optical measurement

DIMENSIONS



PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Cooler Anode	8	NC
2	Thermistor	9	NC
3	PD Anode	10	SLD Anode
4	PD Cathode	11	SLD Cathode
5	Thermistor	12	NC
6	NC	13	Case
7	NC	14	Cooler Cathode



ABSOLUTE MAXIMUM RATINGS ($T_{\text{SLD}}=25^{\circ}\text{C}$)

Item	Symbol	Rating		Unit
		AS3B119GM10M	AS6B118GM50M	
SLD Forward Current	I_F	480	420	mA
SLD Reverse Voltage	V_R	2.0		V
PD Forward Current	I_{FD}	10		mA
PD Reverse Voltage	V_{RD}	10		V
Operating Case Temperature	T_C	-20 to +75		$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to +85		$^{\circ}\text{C}$
Cooler Current	I_C	2.0		A

* Excess over the absolute maximum ratings may cause device failure.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{\text{SLD}}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	AS3B119GM10M			AS6B118GM50M			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Forward Voltage	V_F	Rated Power	—	—	2.5	—	—	2.5	V
Forward Current	I_F	Rated Power (BOL)	—	—	400	—	—	350	mA
Center Wavelength	λ_C	Rated Power, -3 dB	1290	1310	1330	1630	1650	1670	nm
Spectral Width	$\Delta\lambda$	Rated Power, -3 dB	50	55	—	65	70	—	nm
Spectral Ripple	M	Rated Power, res=0.1 nm	—	—	0.6	—	—	0.8	dB
Monitor Current	I_m	Rated Power, $V_{RD}=5\text{ V}$	100	—	2000	100	—	2000	μA
PD Dark Current	I_d	$V_{RD}=5\text{ V}$	—	—	0.1	—	—	0.1	μA
Tracking Error	ΔP_i	$I_m=\text{const}$, $T_C=-20\text{ to }75^{\circ}\text{C}$	-0.5	—	0.5	-0.5	—	0.5	dB
Cooler Voltage	V_C	$I_F=I_F(\text{EOL})$, $T_C=75^{\circ}\text{C}$	—	—	3.5	—	—	3.5	V
Cooler Current	I_C	$I_F=I_F(\text{EOL})$, $T_C=75^{\circ}\text{C}$	—	—	1.2	—	—	1.2	A
Thermistor Resistance	R_{th}	$T_{\text{SLD}}=25^{\circ}\text{C}$, $B=3900\pm100\text{K}$	9.5	10	10.5	9.5	10	10.5	k Ω
Optical Isolation	R_o	$\lambda=1310\text{ nm}$, $T_{\text{SLD}}=25^{\circ}\text{C}$	—	30	—	—	30	—	dB

Note: Rated Power: AS3B119GM10M $P_F=15\text{ mW}$, AS5B125EM50M $P_F=10\text{ mW}$

Note: BOL: Begin of Life/EOL: End of Life *EOL=BOL $\times$ 1.2

1.55 μm SLD Module

AS5B310KM50M/AS5B320EM50M

AS5B310KM50M/AS5B320EM50M is 1.55 μm SLD (Super Luminescent Diode) module developed as incoherent light sources for various optical measurement. The device emits incoherent light having wide spectral half width and high output power from PMF (polarization-maintaining fiber).



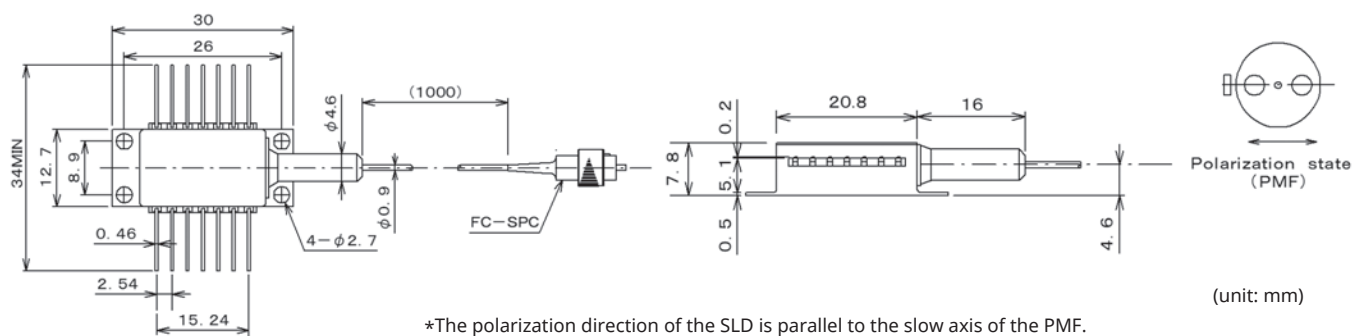
FEATURES

- Center Wavelength/Spectral half width/ Output Power:
AS5B310KM50M: 1.55 μm /60 nm/3 mW
AS5B320EM50M: 1.55 μm /55 nm/25 mW
- Built-in optical isolator
- Internal monitor PD and TEC

APPLICATIONS

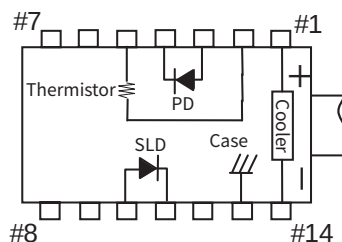
- Optical fiber sensor
- Optical Coherence Tomography (OCT)
- Optical measurement

DIMENSIONS



PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Cooler Anode	8	NC
2	Thermistor	9	NC
3	PD Anode	10	SLD Anode
4	PD Cathode	11	SLD Cathode
5	Thermistor	12	NC
6	NC	13	Case
7	NC	14	Cooler Cathode



ABSOLUTE MAXIMUM RATINGS ($T_{\text{SLD}}=25^{\circ}\text{C}$)

Item	Symbol	Rating		Unit
		AS5B310KM50M	AS5B320EM50M	
SLD Forward Current	I_F	250	600	mA
SLD Reverse Voltage	V_R	2.0		V
PD Forward Current	I_{FD}	10		mA
PD Reverse Voltage	V_{RD}	10		V
Operating Case Temperature	T_C	-20 to +75		$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to +85		$^{\circ}\text{C}$
Cooler current	I_C	2.0		A

* Excess over the absolute maximum ratings may cause device failure.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{\text{SLD}}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	AS5B310KM50M			AS5B320EM50M			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Forward Voltage	V_F	Rated Current	—	—	2.0	—	—	2.4	V
Optical Output Power	P_F	Rated Current	1	3	—	20	25	—	mW
Center Wavelength	λ_c	Rated Current, -3 dB	1530	1550	1570	1530	1550	1570	nm
Spectral Bandwidth	$\Delta\lambda$	Rated Current, -3 dB	40	60	—	50	55	—	nm
Spectral Ripple	M	Rated Current, res=0.1 nm	—	—	0.6	—	—	0.6	dB
Monitor Current	I_m	Rated Current, $V_{RD}=5\text{ V}$	200	—	1500	400	—	2000	μA
PD Dark Current	I_d	$V_{RD}=5\text{ V}$	—	—	0.1	—	—	0.1	μA
Tracking Error	ΔP_F	Rated Current, $T_C=-20$ to $+75^{\circ}\text{C}$	-0.5	—	0.5	-0.5	—	0.5	dB
Cooler Voltage	V_C	Rated Current, $T_C=75^{\circ}\text{C}$	—	—	3.5	—	—	3.5	V
Cooler Current	I_C	Rated Current, $T_C=75^{\circ}\text{C}$	—	—	1.2	—	—	1.2	A
Thermistor Resistance	R_{th}	$T_{\text{SLD}}=25^{\circ}\text{C}$, $B=3900\pm 100\text{K}$	9.5	10	10.5	9.5	10	10.5	k Ω
Optical Isolation	R_o	$\lambda=1550\text{ nm}$, $T_{\text{SLD}}=25^{\circ}\text{C}$	—	30	—	—	30	—	dB

Note: Rated Current: AS5B310KM50M $I_F=200\text{ mA}$, AS5B320EM50M $I_F=500\text{ mA}$

SLD unit with Drive Circuits AM8P8006SL45G

AM8P8006SL45G is 880 nm SLD unit with drive circuits developed as light sources for ophthalmology OCT. It has built in both SLD light source and drive circuits so that it is suitable for embedding.



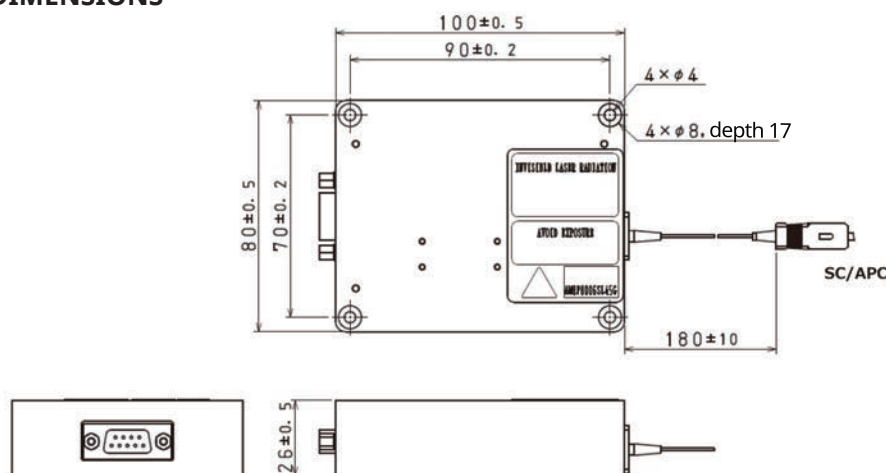
FEATURES

- Center wavelength/Spectrum half width: 880 nm/50 nm
- Built in SLD source and drive circuits
- SMF output
- D-sub 9pins female connector

APPLICATIONS

- Light source for ophthalmology OCT
- Optical measurement

DIMENSIONS



(unit: mm)

PIN CONFIGURATION

No.	FUNCTION	IN/OUT
1	+5 V DC	IN
2	N/C	—
3	SLD Enable	IN
4	Alarm	OUT
5	Vset	IN
6	GND	—
7	N/C	—
8	N/C	—
9	V _{PD}	OUT

ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit
Input Voltage (+5 V DC)	4.5	5.5	V
Input Voltage (Vset)	—	2.75	V
Storage Temperature	-20	+65	°C
Storage Humidity	—	95*	%

*No condensation

OPERATING CONDITIONS

Item	Min.	Max.	Unit
Input Voltage (+5 V DC)	4.75	5.25	V
Input Voltage (Vset)	0	2.5	V
Operating Temperature	+10	+55	°C
Operating Humidity	—	90*	%

*No condensation

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_c=25°C)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Maximum Optical Output	P _{max}	Vset=2.5 V	6.0	—	7.0	mW
Center Wavelength (@-3 dB)	λ _c	Vset=2.5 V	870	880	890	nm
Half Spectrum Width (@-3 dB)	Δλ	Vset=2.5 V	45	50	—	nm
Supply Current	—	Output P _{max} , +55°C	—	0.4	2.0	A
Power Consumption	—	Output P _{max} , +55°C	—	2.0	10.0	W
Input Voltage (Vset)	Vset	Control from P _{min} to P _{max}	0.0	—	2.5	V
Vset Input Impedance	—	—	5	—	—	kΩ
V _{PD} Output (Open circuit voltage at output end)	V _{PD}	V _{PD} =0 to 3 V (±0.3 V) in P _I =P _{min} to P _{max}	0.0	—	3.3	V
V _{PD} Output Impedance	—	—	—	100	—	Ω
SLD Enable Signal TTL/High	V _H	V _H : SLD ON	3.80	—	—	V
SLD Enable Signal TTL/Low	V _L	V _L : SLD OFF	—	—	1.02	V

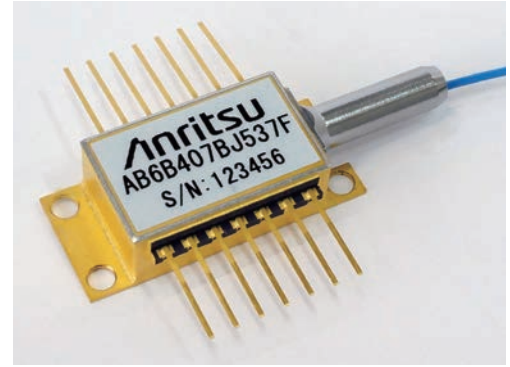
Note: Optical output or spectrum may be changed, due to the optical feedback.

Note: P_{min}: <0.1 mW, P_{max}: 6 to 7 mW

Note: Please contact us, if any requests such as other center wavelength.

1.65 μm DFB LD Module AB6B407BJ537F

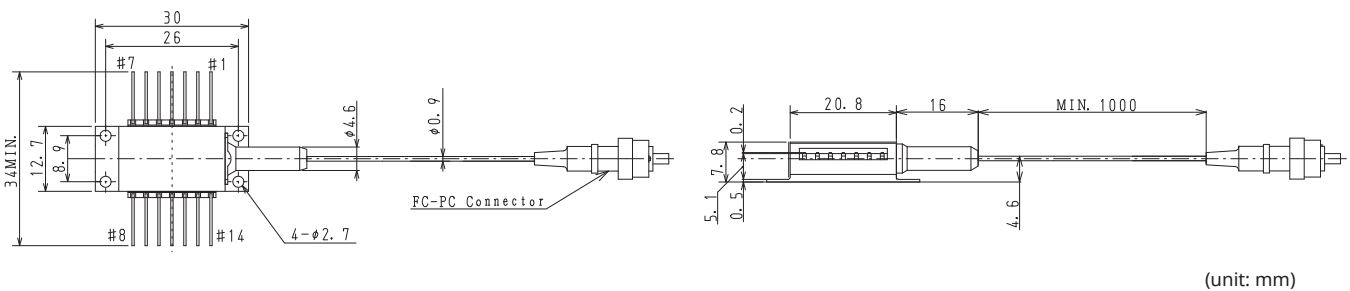
AB6B407BJ537F is 1.65 μm InGaAsP/InP distributed feedback (DFB) laser diodes developed as a light source for methane sensing.



FEATURES

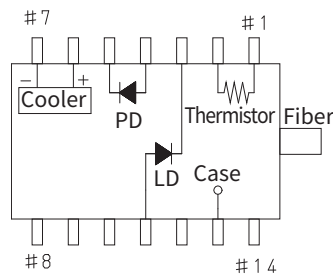
- Optical output power: Typ. 10 mW
- Fiber: Single mode fiber
- Built-in optical isolator (30 dB)
- Internal monitor PD and TEC
- FC/PC connector

DIMENSIONS



PIN CONFIGURATION/TOP VIEW

No.	FUNCTION	No.	FUNCTION
1	Thermistor	8	Case
2	Thermistor	9	NC
3	LD Cathode	10	NC
4	PD Anode	11	LD Anode
5	PD Cathode	12	NC
6	Cooler Anode	13	Case
7	Cooler Cathode	14	NC



ABSOLUTE MAXIMUM RATINGS ($T_{LD}=25^{\circ}\text{C}$)

Item	Symbol	Rating	Unit
LD Forward Current	I_F	150	mA
LD Reverse Voltage	V_R	2	V
PD Forward Current	I_{FD}	10	mA
PD Reverse Voltage	V_{RD}	10	V
Operating Case Temperature	T_C	-20 to +70	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to +85	$^{\circ}\text{C}$
Cooler current	I_C	2	A

* Excess over the absolute maximum ratings may cause device failure.

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{LD}=25^{\circ}\text{C}$, $T_C=25^{\circ}\text{C}$)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	$I_F=100\text{ mA}$	—	—	2.5	V
Threshold Current	I_{th}	—	—	10	25	mA
Optical Output Power	P_f	$I_F=100\text{ mA}$	7	10	—	mW
Peak Wavelength	λ_p	$I_F=100\text{ mA}$	1652.7	1653.7	1654.7	nm
Side Mode Suppression Ratio	SMSR	$I_F=100\text{ mA}$	33	40	—	dB
Spectral Linewidth	Δf	$I_F=100\text{ mA}$	—	3	15	MHz
PD Dark Current	I_d	$V_{RD}=5\text{ V}$	—	—	0.1	μA
Tracking Error	ΔP_f	$I_m=\text{const}$, $T_C=-20\text{ to }+70^{\circ}\text{C}$	-0.5	—	0.5	dB
Cooler Voltage	V_C	$I_F=100\text{ mA}$, $T_C=70^{\circ}\text{C}$	—	—	2.5	V
Cooler Current	I_C	$I_F=100\text{ mA}$, $T_C=70^{\circ}\text{C}$	—	—	1	A
Thermistor Resistance	R_{th}	$T_{LD}=25^{\circ}\text{C}$, $B=3900\pm 100\text{K}$	9.5	10	10.5	k Ω
Optical isolation	R_o	$\lambda=1650\text{ nm}$	—	30	—	dB
Current dependency of peak wavelength	$d\lambda/dI$	$I_F=100\text{ mA}$	—	0.009	—	nm/mA
Temperature dependency of peak wavelength	$d\lambda/dT$	$I_F=100\text{ mA}$	—	0.09	—	nm/deg

Wavelength Swept Light Source

AQA5500P/AQB5500P

AQA5500P/AQB5500P Wavelength Swept Light Source outputs single-longitudinal-mode laser light that wavelength is swept phase-continuously without mode hopping. Since the output light with narrow line width has high coherence, it is suitable for optical interferometry-based dimensional metrology for precise and wide distance range measurement.

FEATURES

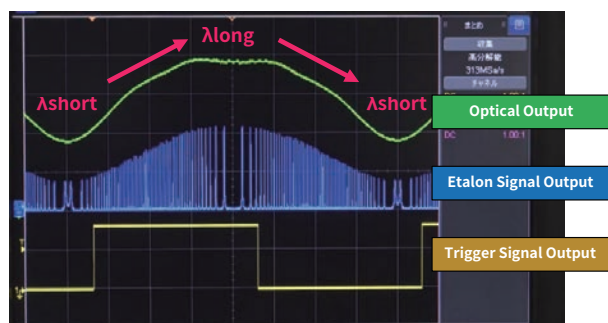
- 1550 nm band swept laser
Single-longitudinal-mode oscillation without mode hopping
- Coherence length of more than 100 m (AQB5500P, $\Delta\lambda=25$ nm)
- Wavelength sweep width setting via USB from PC
- Wavelength trigger position setting via USB from PC

WAVELENGTH SWEPT OPTICAL OUTPUT

The output wavelength of this light source changes sinusoidally over time. The optical output changes periodically according to the wavelength sweep as indicated by green waveform. The wavelength changes from the short-wavelength end λ_{short} to the long-wavelength end λ_{long} in the half period and then returns to λ_{short} in the remaining half period as shown by the red arrows. Blue and yellow waveforms are the etalon signal and the trigger-signal that output on the front panel. They can be used for wavelength calibration or as a reference signal when connecting external equipment.

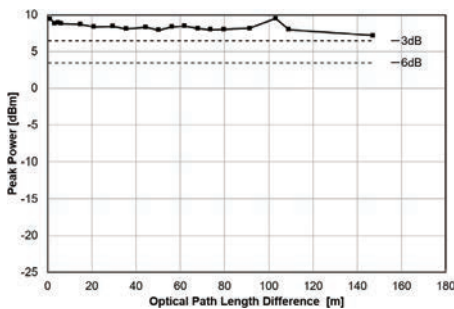
APPLICATIONS

- Precision and wide range dimensional metrology using optical interferometry
- OCT for internal structure measurement
*OCT: Optical Coherence Tomography
- Temperature, torsion, deformation, and vibration measurement using optical fiber sensing
- Inspecting optical-device wavelength characteristics

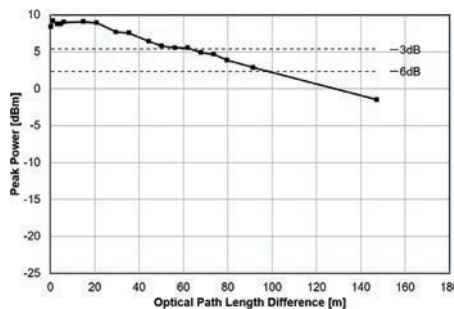


OUTPUT LIGHT COHERENCE LENGTH

The following graphs show the FFT spectrum peak power versus the optical path length difference at interferometry measurement to demonstrate the coherence length of the AQB5500P at each wavelength sweep width of 25 nm and 50 nm.



(a) Wavelength Sweep Width 25 nm



(b) Wavelength Sweep Width 50 nm

OPTICAL AND ELECTRICAL SPECIFICATIONS

Item	AQA5500P	AQB5500P	Remarks
Optical Connector	FC/APC		Internal optical fiber: Single Mode Fiber (SMF)
Oscillation Mode	Single longitudinal and mode-hop-free		Monitoring range: approximately 70% of wavelength sweep range centered on the sweep center wavelength.
Optical Output Wavelength Change Method	Sinusoidal		—
Center Wavelength	1550±5 nm		AQA5500P: at 110 nm sweep AQB5500P: at 70 nm sweep
Wavelength Sweep Range	30 nm to 110 nm	15 nm to 70 nm	Wavelength sweep setting resolution: 1 pm
Sweep Frequency	1250±50 Hz	150±20 Hz	Not adjustable
Average Optical Output	≥10 mW		CW Output: Class 1 ¹⁾
Trigger Signal Output	LVTTTL		Interface: SMA Trigger signal output setting resolution: 1 pm
Etalon Signal Output	Analog signal		Interface: SMA
Power Supply	DC+12 V±0.5 V		Maximum consumption current: 3.2 A max.
Control Interface	USB 2.0 (type mini-B)		—
Dimensions	137.4 (W) × 131.4 (H) × 219.4 (D) mm		Excluding protrusions
Mass	<2.0 kg		—
Operating Conditions	Temperature: 0°C to 50°C, Relative Humidity: ≤85%		No condensation
Storage Environment	Temperature: -20°C to +60°C, Relative Humidity: ≤95%		No condensation or icing

*About 30-minutes warmup

1) This product complies with the IEC 60825-1:2014, 21 CFR1040.10, and 1040.11 laser safety regulations; the following safety labels are affixed to the product.

Wavelength Swept Light Source

AQA5500D/AQB5500D

AQA5500D/AQB5500D Wavelength Swept Light Source outputs single-longitudinal-mode laser light that wavelength is swept phase-continuously without mode hopping. The compact, lightweight assembly with built-in light-source has the same performance as the bench-top AQA5500P/AQB5500P models.



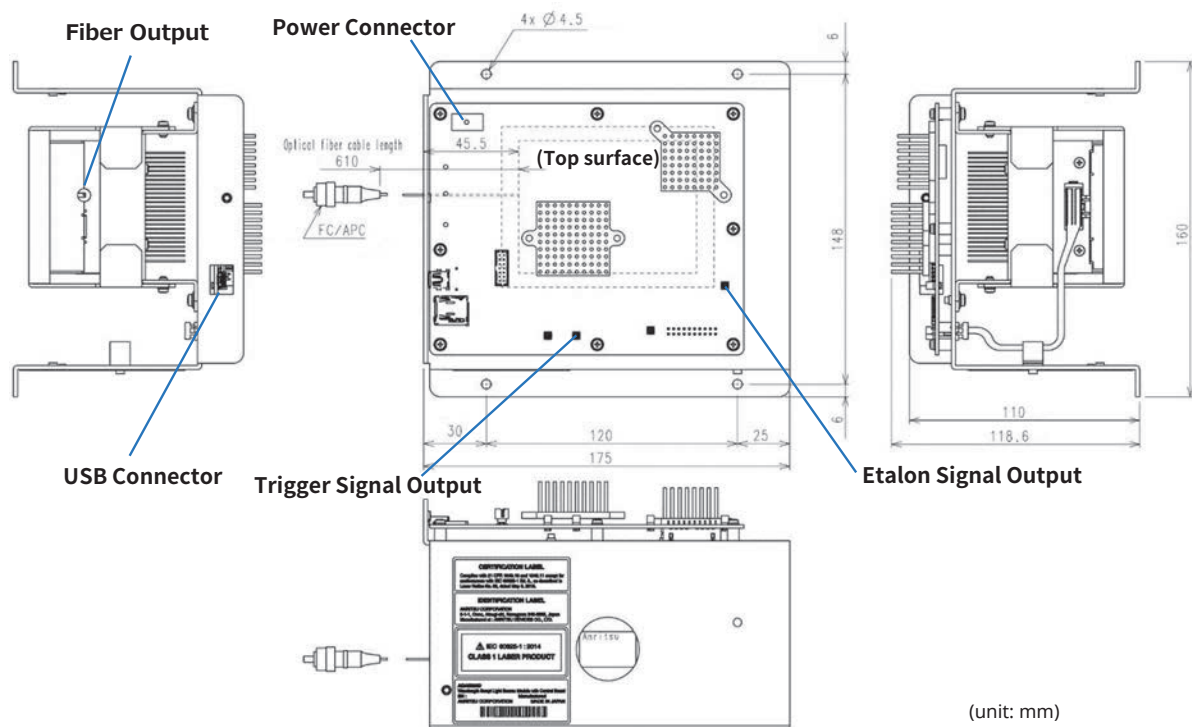
FEATURES

- 1550 nm band swept laser
Single-longitudinal-mode oscillation without mode hopping
- Sweep frequency: 1,250 Hz (AQA5500D)/150 Hz (AQB5500D)
- Wavelength sweep setting width via USB I/F from PC
- Wavelength trigger position setting via USB I/F from PC

APPLICATIONS

- Precision dimensional metrology using optical interferometry
- In combination with optical coherence tomography (OCT) equipment
- Temperature, torsion, deformation, and vibration measurements using optical fiber sensing
- Inspecting optical-device wavelength characteristics, etc.

DIMENSIONS



OPTICAL AND ELECTRICAL SPECIFICATIONS

Item	AQA5500D	AQB5500D	Remarks
Optical Connector	FC/APC		Internal optical fiber: Single Mode Fiber (SMF)
Optical Fiber Length	610±50 mm		—
Oscillation Mode	Single longitudinal and mode-hop-free		Monitoring range: approximately 70% of wavelength sweep range centered on the sweep center wavelength.
Optical Output Wavelength Change Method	Sinusoidal		—
Center Wavelength	1550±5 nm		AQA5500D: at 110 nm sweep AQB5500D: at 70 nm sweep
Wavelength Sweep Range	30 nm to 110 nm	15 nm to 70 nm	Wavelength sweep setting resolution: 1 pm
Sweep Frequency	1250±50 Hz	150±20 Hz	Not adjustable
Average Optical Output	≥10 mW		CW Output: Class 1 ¹⁾
Trigger Signal Output	LVTTTL		Interface: MMCX-R-PC (40) Trigger signal output setting resolution: 1 pm
Etalon Signal Output	Analog signal		Interface: MMCX-R-PC (40)
Power Supply	DC+12±0.5V, maximum current consumption: 3.2 A		Interface: B4P-VH-B (LF) (SN)
Control Interface	USB 2.0 (type mini-B)		—
Dimensions	160 (W) × 118.6 (H) × 175 (D) mm		Excluding protrusions
Mass	<1.0 kg		—
Operating Conditions	Temperature: 0°C to 50°C, Relative Humidity: ≤85%		No condensation, requires air-cooling ²⁾
Storage Environment	Temperature: -20°C to +60°C, Relative Humidity: ≤95%		No condensation or icing

*About 30-minutes warmup

1) This product complies with the IEC 60825-1:2014, 21 CFR1040.10, and 1040.11 laser safety regulations; the following safety labels are affixed to the product.

2) To keep the light source module and control boards in the nominal operating temperature range, use air cooling/conditioning matching the usage environment (recommended airflow of 2 m/s in +50°C operating environment)

Ultrafast Electron Devices



Communication Networks

- Differential Linear Amplifier
- 4-Way Power Divider

Application

— MMIC —

Chip
Package

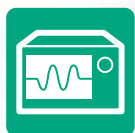
Circuit Design

Micro Fabrication

Mounting of High-frequency Module

— Module —

Metal Package



Measurement Instruments

- Optical Receiver
- Filter



■ Ultrafast Electron Devices: Selection Guide

List of Ultrafast Electron Devices products

MMIC

Product Name	Series/Model Number	Page No	Operating Range	Features
56 Gbaud Differential Linear Amplifier	AG5PB6P	30	56 Gbaud	Linear differential output voltage: 3.0 Vp-p Gain control range: -12 dB to +15 dB

Amplifier

Product Name	Series/Model Number	Page No	Operating Range	Features
56 Gbaud Differential Linear Amplifier	AH54192A	32	56 Gbaud	Differential output: 4 Vp-p (diff) typ., Wideband: 100 kHz to 40 GHz

Optical Receiver

Product Name	Series/Model Number	Page No	Operating Range	Features
56 Gbaud Wideband OE Converter	AD44198A	34	56 Gbaud	Wideband: 30 kHz to 45 GHz Responsivity: 0.7A/W

Bessel Filter

Product Name	Series/Model Number	Page No	Operating Range	Features
Bessel Filter	AN14165A/B/C	36	f0: 1.6 GHz	Low reflection, Low group delay deviation, Metal PKG with K-connectors
Bessel Filter	AN14166A/B/C		f0: 3.2 GHz	Low reflection, Low group delay deviation, Metal PKG with K-connectors
Bessel Filter	AN14167A/B/C		f0: 7.5 GHz	Low reflection, Low group delay deviation, Metal PKG with K-connectors
Bessel Filter	AN44168A/B/C		f0: 30 GHz	Low reflection, Low group delay deviation, Metal PKG with V-connectors
Bessel Filter	AN44169A/B/C		f0: 35 GHz	Low reflection, Low group delay deviation, Metal PKG with V-connectors
Bessel Filter	AN44170A/B/C		f0: 40 GHz	Low reflection, Low group delay deviation, Metal PKG with V-connectors

Power Divider

Product Name	Series/Model Number	Page No	Operating Range	Features
4-way Power Divider	AN44182A	—	DC to 40 GHz	Insertion loss: 12 dB typ, Skew Between the channels: <3 ps
Low Reflection 4-way Power Divider	AN44187A	38	DC to 40 GHz	Low reflection: >15 dB, Insertion loss: 12 dB typ, Skew Between the channels: <3 ps



56 Gbaud Differential Linear Amplifier AG5PB6P

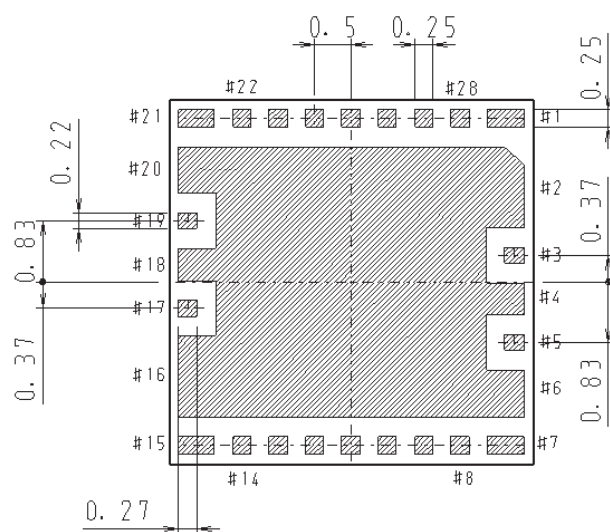
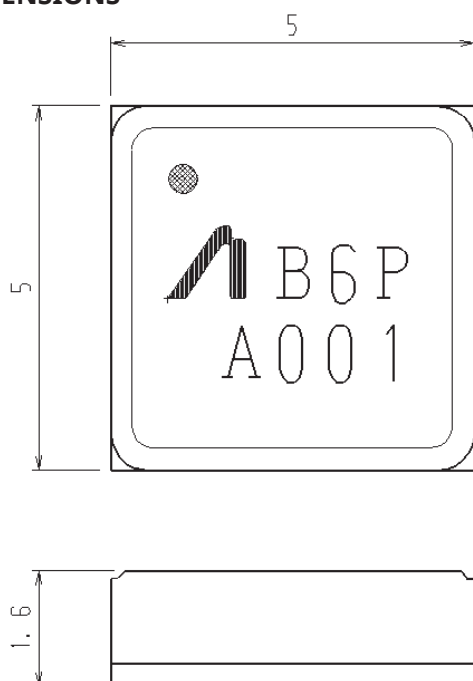
FEATURES

- Operating baud rate: 56 Gbaud
- Linear differential output voltage: 3.0 Vp-p (diff.)
- Gain control range: -12 dB to +15 dB
- Peaking control range: 15 dB
- Power consumption: 1.8W typ.
- 28pin QFN Package: 5 mm × 5 mm × 1.6 mm
- Input/Output DC block capacitors included

APPLICATIONS

- Booster amplifier for measuring equipment
- Driver for 400GbE (PAM4) optical modulators etc.

DIMENSIONS



(unit: mm)

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating		Unit
		Min.	Max.	
Input Voltage (single-ended input voltage to each input port (IN/INb))	V_{IN}	—	1.0	Vp-p
Supply Voltage	V_{CC1}	-0.5	6.0	V
	V_{CC2}	-0.5	5.0	
	V_T	-0.5	7.5	
Output Amplitude Control Bias	V_{amp}	-0.5	2.5	V
Gain/Peaking Control Bias	V_{gG}	-1.5	7.0	V
	V_{gP}	-1.5	7.0	
Current Source Bias	V_{CSG}	-0.5	5.0	V
	V_{CSP}	-0.5	5.0	
Input DC Voltage	V_{INDC}	-7.0	10.0	V
Output DC Voltage	V_{OUTDC}	-4.0	10.0	V
Operating Temperature	T_C	5	85	°C
Storage Temperature	T_{stg}	-40	90	°C

RECOMMENDED CONDITIONS

Item	Symbol	Condition	Specification			Unit
			Min.	Typ.	Max.	
Supply Voltage	V_{CC1}	—	—	4.7	—	V
	V_{CC2}	—	—	4.0	—	
	V_T	—	—	6.2	—	
Output Amplitude Control Bias	V_{amp}	—	0.0	2.0	2.2	V
Gain/peaking Control Bias	V_{gG}	—	0.9	—	5.0	V
	V_{gP}	—	-1.0	—	5.0	
Current Source Bias	V_{CSG}	—	0.0	4.0	—	V
	V_{CSP}	—	0.0	4.2	—	
Differential Input Signal Level	V_{in}	—	—	—	0.8	Vppd
Input/Output Interface	AC coupled (DC block capacitors are included in PKG)					
Case Temperature Backside	T_C	—	5	—	50	°C

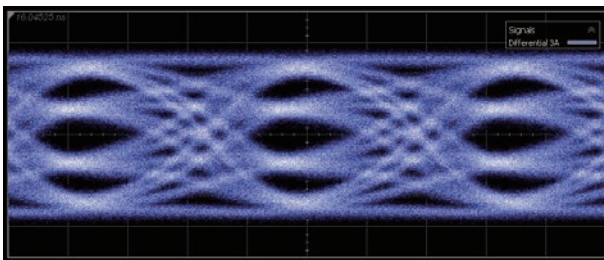
■ ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$, $V_{CC1}=4.7\text{ V}$, $V_{CC2}=4.0\text{ V}$, $V_T=6.2\text{ V}$, $V_{CSG}=4.0\text{ V}$, $V_{CSP}=0.0\text{ V}$, $Z_{in}=50\Omega$, $Z_{out}=50\Omega$)

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Baud Rate	—	—	56	—	Gbaud
Differential Output Voltage	$V_{GG}=5.0\text{ V}$, $V_{amp}=2.0\text{ V}$	—	3.0	—	Vppd
Gain Control Range (@1 GHz)	$V_{GG}=0\text{ V}$ to 5.0 V , $V_{amp}=2.0\text{ V}$	-5	—	15	dB
	$V_{GG}=0\text{ V}$ to 5.0 V , $V_{amp}=0.0\text{ V}$	-12	—	5	dB
Peaking Control Range (SDD21@43 GHz/SDD21@1 GHz)	$V_{GG}=5.0\text{ V}$, $V_{amp}=2.0\text{ V}$, $V_{CSP}=4.2\text{ V}$, $V_{CSG}=0.0\text{ V}$	—	15	—	dB
Bandwidth	-3 dB (low end)	—	250	—	kHz
	$V_{GG}=5.0\text{ V}$, $V_{amp}=2.0\text{ V}$	—	45	—	GHz
	-3 dB (high end)	—	—	—	—
Input Return Loss (40 M to 20 GHz)	$V_{GG}=5.0\text{ V}$, $V_{amp}=2.0\text{ V}$	—	10	—	dB
Output Return Loss (40 M to 20 GHz)	$V_{GG}=5.0\text{ V}$, $V_{amp}=2.0\text{ V}$	—	10	—	dB
Temperature monitor Thermistor resistance	$T_C=25^{\circ}\text{C}$ $B=3930\pm 50\text{K}$	9.5	10	10.5	k Ω

■ ELECTRICAL CHARACTERISTICS

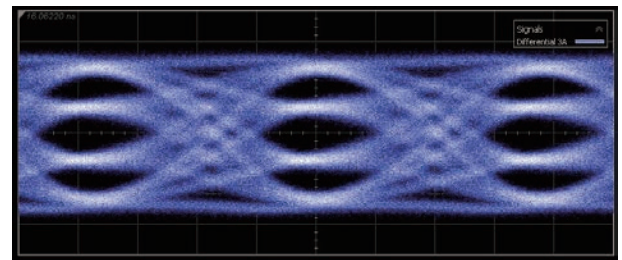
- Typical output waveform (at maximum gain)

56Gbaud PAM4



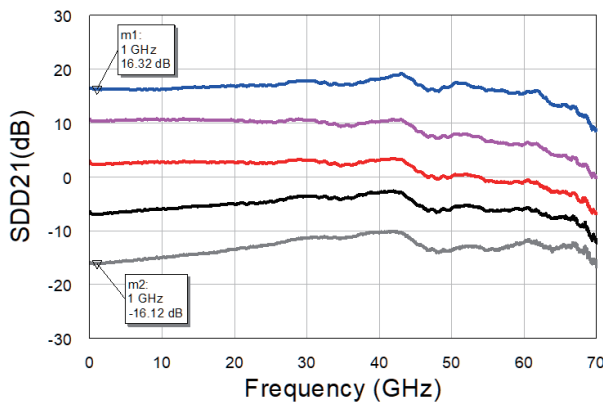
Vout: 3.05 Vp-p(diff.) Linearity: 0.89

53Gbaud PAM4

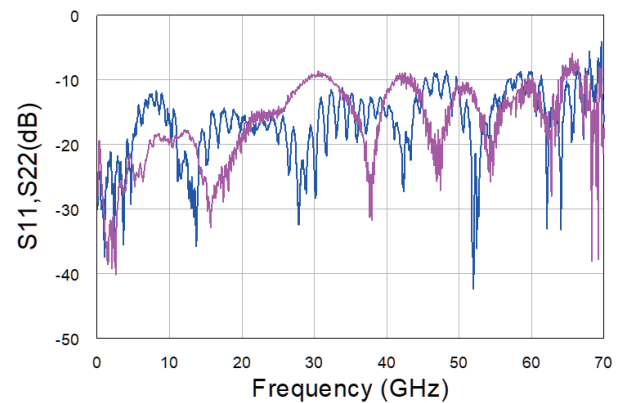


Vout: 2.99 Vp-p(diff.) Linearity: 0.91

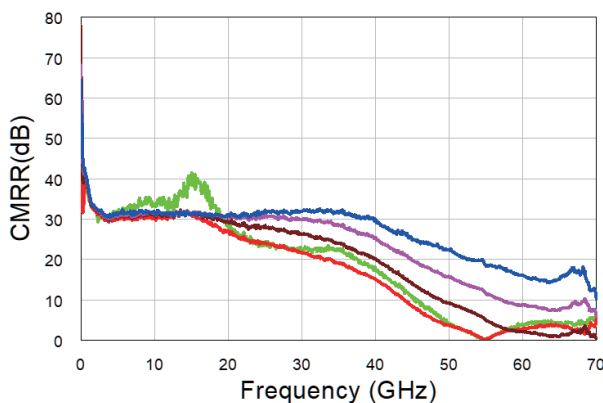
■ FREQUENCY RESPONSE



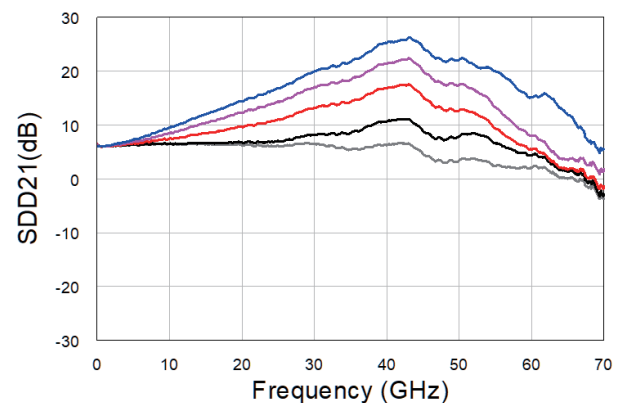
Differential mode gain at adjusting gain
(SDD21)



Reflection characteristics at maximum gain
(Red line: S11, Blue line: S22)



CMRR at adjusting gain



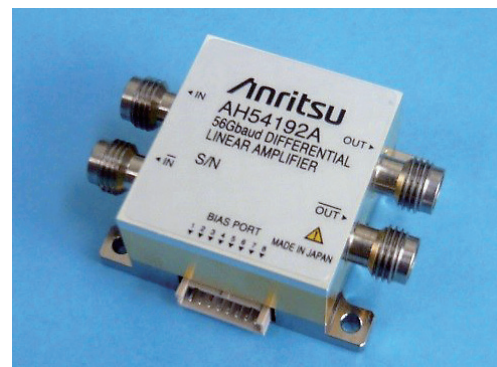
Differential mode gain during peaking adjustment
(SDD21)



56 Gbaud Differential Linear Amplifier AH54192A

FEATURES

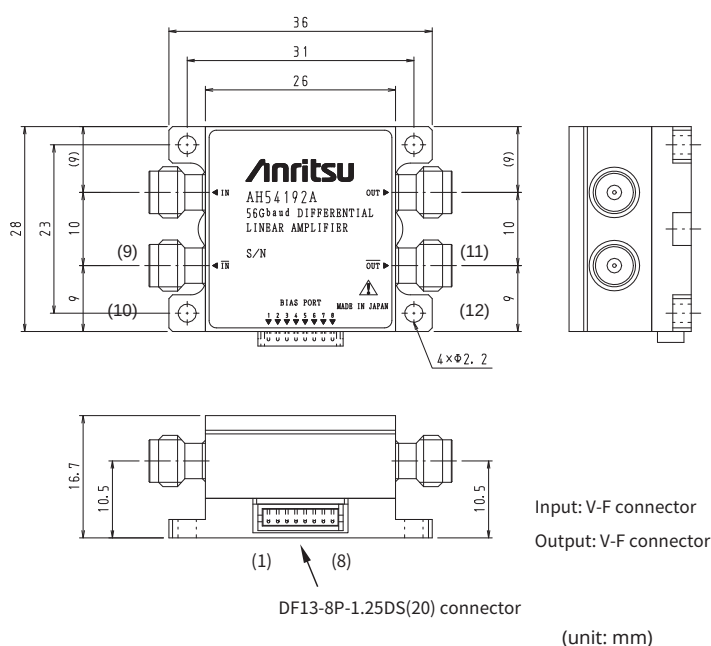
- Operating baud rate: up to 56Gbaud
- Differential output: 4 V_{p-p} (diff) typ.
- Wideband: 100 kHz to 40 GHz
- Power consumption: 0.9W typ.
- I/O interface: Differential
- Package size: 28 mm × 36 mm × 17 mm
- Standard accessory with dedicated power supply



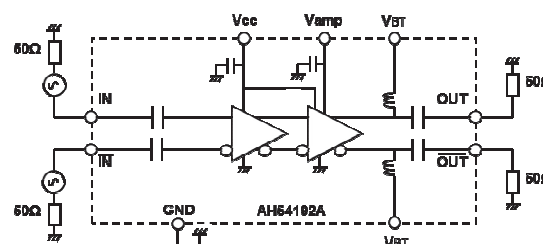
APPLICATIONS

- Driver for 400G coherent MZ modulator
- Booster amplifier for measuring equipment

DIMENSIONS



BLOCK DIAGRAM



PIN CONFIGURATION

No.	Symbol	Function	Remark
1	NC	—	—
2	NC	—	—
3	NC	—	—
4	GND	Ground	—
5	V _{CC}	Power supply	+3 V
6	V _{amp}	Power supply	+3 V
7	V _{BT}	Choke bias	+4.2 V
8	V _{BT}	Choke bias	+4.2 V
9	IN	Input port (non-invert)	AC coupled
10	IN	Input port (invert)	
11	OUT	Output port (non-invert)	AC coupled
12	OUT	Output port (invert)	

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating		Unit
			Min.	Max.	
Input Signal Voltage	V _{in}	—	-1	+0.7	V
Supply Voltage	V _{BT}	—	-0.5	+5	V
	V _{CC}	—	-0.5	+3.5	
	V _{amp}	—	-0.5	+3.5	
Operating Temperature	T _a	Ambient temperature No dew condensation	+5	+50	°C
Storage Temperature	T _{stg}	No dew condensation	0	+60	°C

ELECTRICAL CHARACTERISTICS (T_a=25°C, V_{BT}=+4.2 V, V_{CC}=+3 V, V_{amp}=+3 V, Z_{in}=50Ω, Z_{out}=50Ω)

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Baud Rate	—	56	—	—	Gbaud
Differential Input Voltage*1	—	—	1	—	V _{p-p} (diff)
Linear Output Voltage*2	—	—	4	—	V _{p-p} (diff)
Small Signal Gain	@1 GHz	—	12	—	dB
Bandwidth	-3 dB (low end)	—	100	—	kHz
	-3 dB (high end)	—	40	—	GHz
Input Return Loss	10 MHz to 30 GHz	—	10	—	dB
Output Return Loss	10 MHz to 30 GHz	—	10	—	dB
Output Polarity	—	Inverted			—

*1: The data input condition is differential only.

*2: In the case of being measured in the following conditions.

- Connect 15 cm V-type coaxial cable to the output of AH54192A.
- Measured by the Keysight 86118A 70 GHz remote sampling head with 86107A precision time base.
- Operated by AH54192A-01 dedicated power supply.

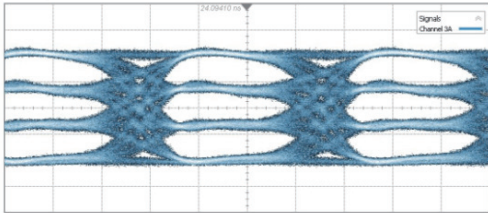
■ POWER SUPPLIES

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Supply Voltage	V_{BT}	—	+4.2	+4.4	V
	V_{CC}	—	+3	—	
	V_{amp}	—	+3	—	
Supply Current	IBT (×2)	—	160	180	mA
	I_{CC}	—	65	80	
	I_{amp}	—	10	20	
Power Consumption	—	—	0.9	—	W

■ ELECTRICAL CHARACTERISTICS

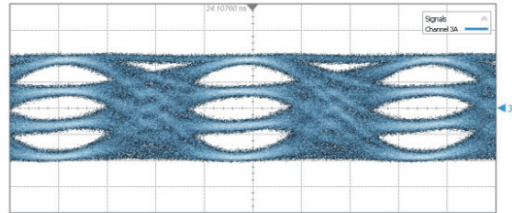
● Pulse response (single-ended output)

26Gbaud PAM4



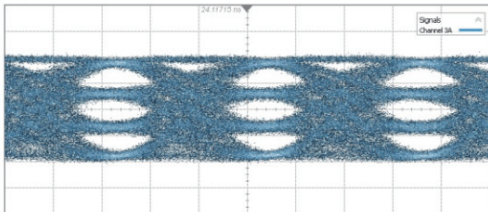
V: 0.5 V/div H: 10 ps/div

53Gbaud PAM4



V: 0.5 V/div H: 5 ps/div

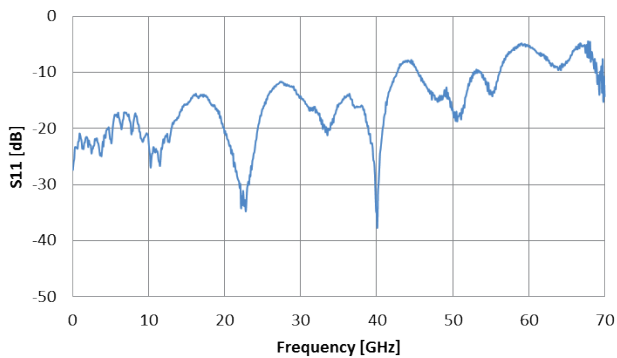
64Gbaud PAM4



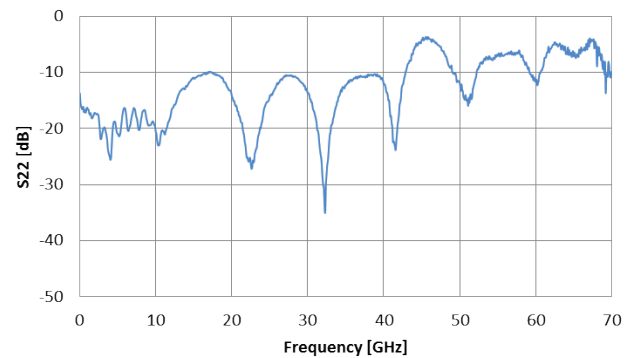
V: 0.5 V/div H: 5 ps/div

Differential input signals had been taken from the PAM4 PPG adjusted with emphasis.

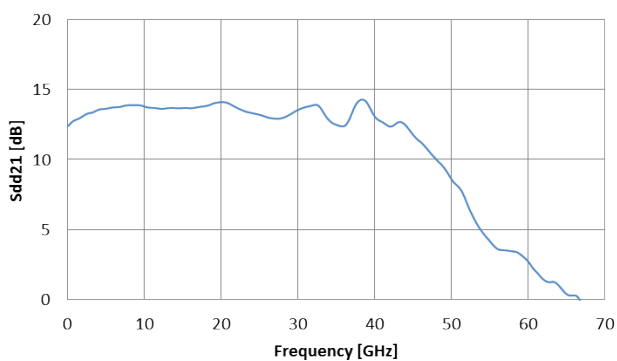
■ FREQUENCY RESPONSE



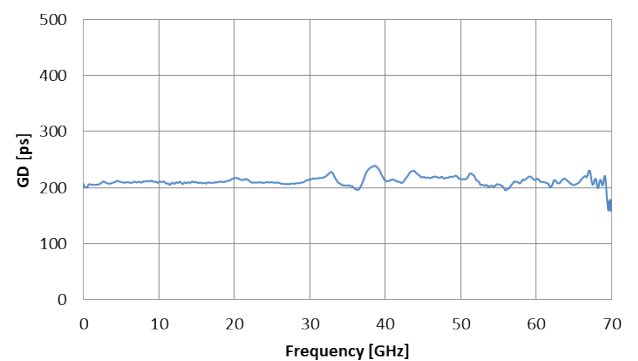
S11



S22



Sdd21



Group Delay



56 Gbaud Wideband OE Converter

AD44198A

AD44198A has wide frequency characteristics of 45 GHz in the -3 dB band, supports OE conversion of PAM4 optical signals between 28 and 56 Gbaud.



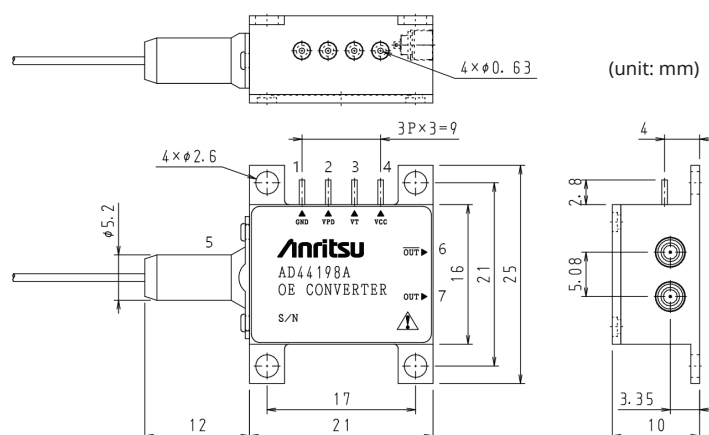
FEATURES

- Operating wavelength: 1260 to 1620 nm
- Wideband: 30 kHz to 45 GHz
- Responsivity: 0.7 A/W
- Conversion gain: 250 V/W
- Power consumption: 0.7 W typ.
- Output interface: Differential
- Package size: 25 mm × 21 mm × 10 mm

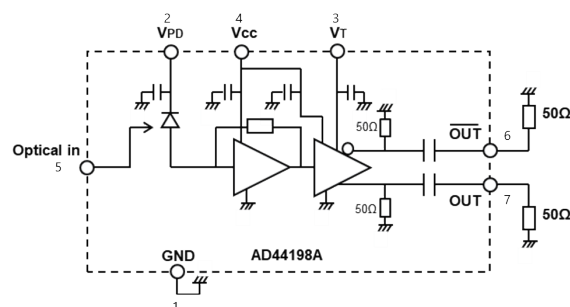
APPLICATION

- Receiver for optical modulator

DIMENSIONS



BLOCK DIAGRAM



PIN CONFIGURATION

No.	Symbol	Function	Remarks
1	GND	Ground	—
2	V _{PD}	Photodiode power supply	+4 V
3	V _T	Amplifier power supply	+4.5 V
4	V _{CC}	Amplifier power supply	+4.5 V
5	IN	Optical input	SM fiber / FC connector
6	OUT _I	Electrical output port (invert)	GPPO connector
7	OUT	Electrical output port (non-invert)	GPPO connector

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating		Unit
			Min.	Max.	
Optical Input Power	P _{IN}	CW Input	—	+6	dBm
Supply Voltage	V _{PD}	—	0	+6	V
	V _{CC}	—	0	+6	
	V _T	—	0	+6	
Operating Temperature	T _a	Ambient temperature No condensation	5	45	°C
Storage Temperature	T _{stg}	No condensation	-20	70	°C

* Excess over the absolute maximum ratings may cause device failure.

SPECIFICATIONS

- Optical characteristics (T_a=25°C)

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Wavelength Range	CW Input	1260	1310	1620	nm
Responsivity	@1310 nm	-	0.7	-	A/W
Conversion Gain	@1310 nm, Single-ended	-	250	-	V/W
Optical Return Loss	@1310 nm	-	-30	-24	dB
Dark Current	@25°C	-	1	20	nA

• Electrical characteristics ($T_a=25^{\circ}\text{C}$)

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Bandwidth	-3 dBe (low end)	—	30	—	kHz
	-3 dBe (high end)	35	45	—	GHz
Output Swing	Single-ended	—	300	—	mVpp
Output Return Loss	40 MHz to 30 GHz	—	-10	—	dB
Internal Output Coupling	—	AC-coupled			—

• Power supplies

Item	Symbol	Specification			Unit
		Min.	Typ.	Max.	
Photodiode Supply Voltage	V_{PD}	3	4	5	V
Amplifier Supply Voltage	V_{CC}	—	4.5	—	V
	V_T	—	4.5	5	V
Amplifier Supply Current	I_{CC}	—	100	—	mA
	I_T	—	50	—	mA
Power Consumption	—	—	0.7	—	W

Turn on/off Sequence (V_{PD} , V_T , V_{CC})

For Turn on - Supply voltage V_{PD} first or turn on all three at the same time.

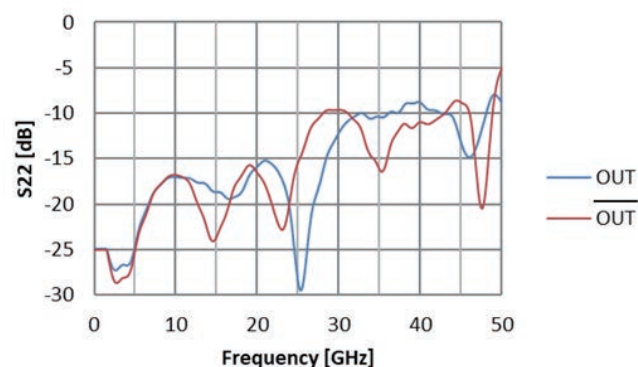
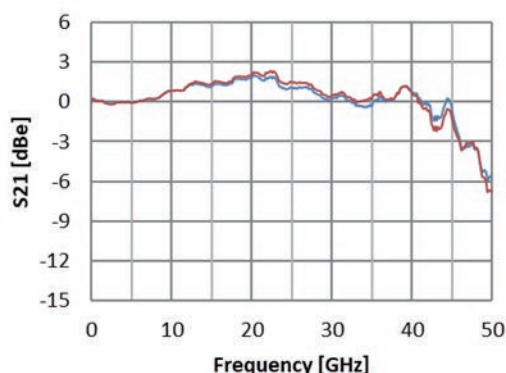
For Turn off - Turn off all three at the same time or turn off V_{PD} at last.

Note: Incorrect turn on and off sequence can cause PD failure.

• Mechanical characteristics

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Package Style	—	4-pin coaxial			—
Output Connector	—	Dual GPPO			—
Fiber Type	—	Single-Mode			—
Fiber Connector	—	FC/SPC			—
Fiber Length	—	120	—	—	cm
Fiber Bend Radius	—	3	—	—	cm
Lead Soldering	Soldering iron	350°C, 5 sec max.			—

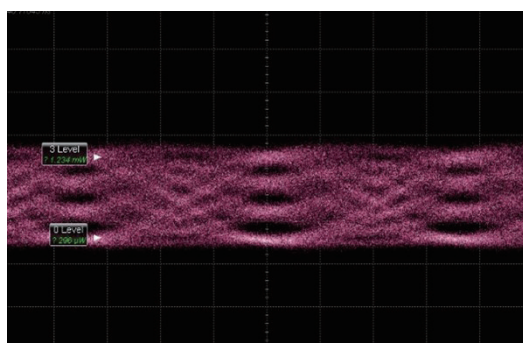
■ FREQUENCY RESPONSE



■ ELECTRICAL CHARACTERISTICS

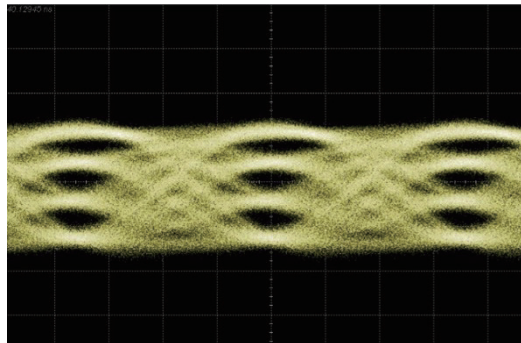
• Pulse response (single-ended output)

56Gbaud PAM4



V: 500 $\mu\text{W}/\text{div}$ H: 5 ps/div

Input Waveform (Pin=1 mW)



V: 100 mV/div H: 5 ps/div

Output Waveform (Vout=230 mVpp)

Output waveform has been optimized with equalizer of oscilloscope.



Bessel Filter

AN14 series/AN44 series

AN series filters are low reflection Bessel low pass filters which have superior characteristics for group delay deviation. The frequency ranges from 1.6 GHz to 40 GHz are available.

FEATURES

- AN14165□ f0: 1.6 GHz, K connector
- AN14166□ f0: 3.2 GHz, K connector
- AN14167□ f0: 7.5 GHz, K connector
- AN44168□ f0: 30 GHz, V connector
- AN44169□ f0: 35 GHz, V connector
- AN44170□ f0: 40 GHz, V connector
- Low reflection, Low group delay deviation*3

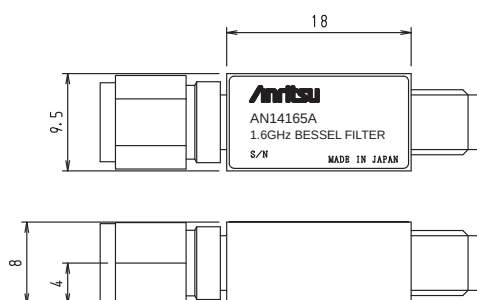
APPLICATIONS

- Optical tele-communication
- Measurement equipment,
- Others

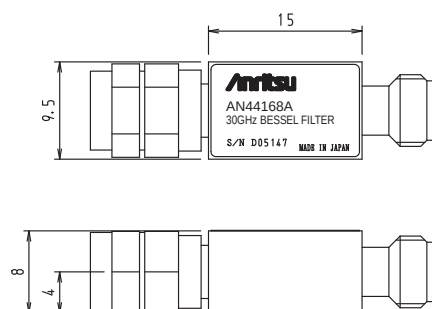


DIMENSIONS

AN14165 to 14167□



AN44168 to 44170□



(unit: mm)

MODEL NUMBER

AN14165□

Connector type Example: AN14165A

Connector Type	In/Out
A	M-F
B	F-F
C	M-M

ABSOLUTE MAXIMUM RATINGS

Item	Specification		Unit
	AN14165 to AN14167□	AN44168 to AN44170□	
Maximum Input Power	17	20	dBm
Operation Temperature	+5 to +60	+5 to +60	°C

SPECIFICATIONS (T_a=25°C, Z_{in}=50Ω, Z_{out}=50Ω)

Item	Condition	AN14165□			AN14166□			AN14167□			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Cut-off Frequency f ₀		—	1.6	—	—	3.2	—	—	7.5	—	GHz
Correspondence Bit-rate		—	2.125	—	—	4.25	—	—	10	—	Gbit/s
Return Loss (S ₁₁ /S ₂₂)	DC to f ₀	15	—	—	15	—	—	15	—	—	dB
	to 3f ₀	8	—	—	8	—	—	8	—	—	
Insertion Loss	100 MHz	—	1.0	1.5	—	0.7	1.2	—	0.5	1.0	dB
Insertion Loss*1	0.2f ₀	-0.4	0.1	0.6	-0.4	0.1	0.6	-0.4	0.1	0.6	dB
	0.4f ₀	-0.1	0.4	0.9	-0.1	0.4	0.9	-0.1	0.4	0.9	
	0.6f ₀	0.5	1.0	1.5	0.5	1.0	1.5	0.5	1.0	1.5	
	0.8f ₀	1.4	1.9	2.4	1.4	1.9	2.4	1.4	1.9	2.4	
	1.0f ₀	2.5	3.0	3.5	2.5	3.0	3.5	2.5	3.0	3.5	
	1.2f ₀	3.34	4.5	5.66	3.34	4.5	5.66	3.34	4.5	5.66	
	1.33f ₀	4.16	5.7	7.24	4.16	5.7	7.24	4.16	5.7	7.24	
	1.4f ₀	4.69	6.4	8.11	4.69	6.4	8.11	4.69	6.4	8.11	
	1.6f ₀	6.3	8.5	10.7	6.3	8.5	10.7	6.3	8.5	10.7	
Group Delay Deviation*2	1.8f ₀	8.28	10.9	13.52	8.28	10.9	13.52	8.28	10.9	13.52	mUI
	2.0f ₀	10.4	13.4	16.4	10.4	13.4	16.4	10.4	13.4	16.4	
	DC to f ₀	—	—	Δ100	—	—	Δ100	—	—	Δ100	

*1 Reference is prescribed with the insertion loss at 100 MHz.

*2 Reference frequency of UI: Correspondence bit-rate.

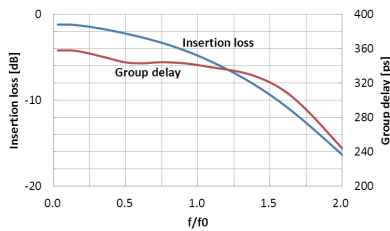
Item	Condition	AN44168□			AN44169□			AN44170□			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Cut-off Frequency f_0	-3 dB	—	30	—	—	35	—	—	40	—	GHz
Return Loss (S11/S22)	DC to f_0	10	15	—	10	15	—	10	15	—	dB
	to 65 GHz	5	10	—	5	10	—	5	10	—	
Insertion Loss 1	@100 MHz	—	0.2	0.7	—	0.2	0.7	—	0.2	0.7	dB
Insertion Loss 2	0.2 f_0	-0.6	0.1	0.8	-0.6	0.1	0.8	-0.6	0.1	0.8	dB
	0.4 f_0	-0.2	0.5	1.2	-0.2	0.5	1.2	-0.2	0.5	1.2	
	0.6 f_0	0.3	1.0	1.7	0.3	1.0	1.7	0.3	1.0	1.7	
	0.8 f_0	1.2	1.9	2.6	1.2	1.9	2.6	1.2	1.9	2.6	
	1.0 f_0	2.3	3.0	3.7	2.3	3.0	3.7	2.3	3.0	3.7	
	1.2 f_0	3.4	4.5	5.7	3.4	4.5	5.7	3.4	4.5	5.7	
	1.3 f_0	4.3	5.7	7.1	4.3	5.7	7.1	4.3	5.7	7.1	
	1.4 f_0	4.9	6.4	7.9	4.9	6.4	7.9	4.9	6.4	7.9	
	1.6 f_0	6.7	8.6	10.5	6.7	8.6	10.5	6.7	8.6	10.5	
	(1.8 f_0)	8.8	10.9	13.0	8.8	10.9	13.0	8.8	10.9	13.0	dB
	(2.0 f_0)	11.0	13.4	15.8	11.0	13.4	15.8	11.0	13.4	15.8	
Group Delay Deviation*3	DC to f_0	—	—	$\Delta 300$	—	—	$\Delta 300$	—	—	$\Delta 300$	mUI

*3 Reference frequency: 1.3 f_0

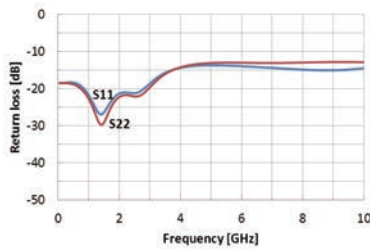
ELECTRICAL CHARACTERISTICS

● AN14165A

Transmission characteristics

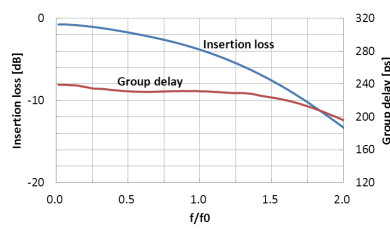


Reflection characteristics

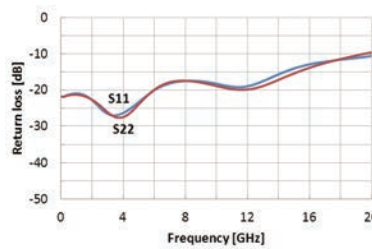


● AN14166A

Transmission characteristics

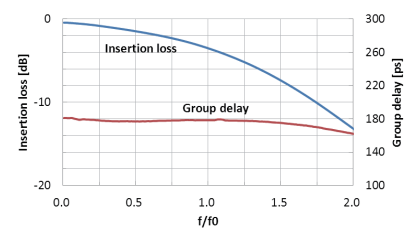


Reflection characteristics

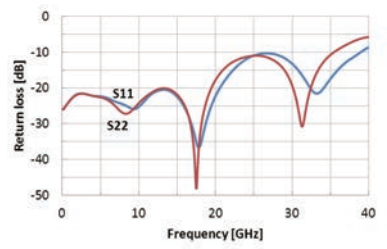


● AN14167A

Transmission characteristics

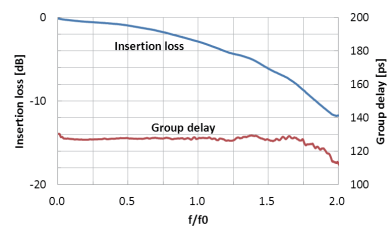


Reflection characteristics

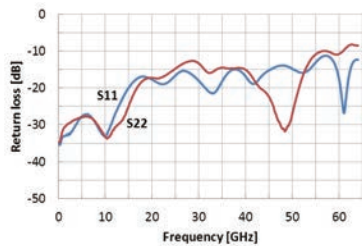


● AN44168A

Transmission characteristics

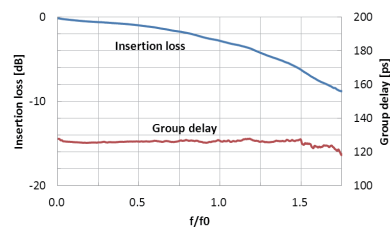


Reflection characteristics

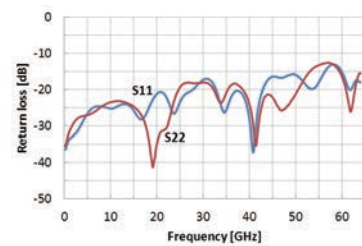


● AN44169A

Transmission characteristics

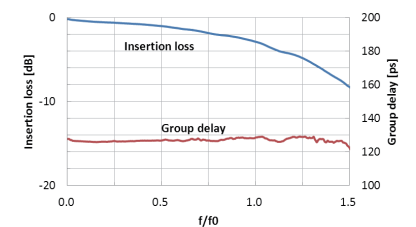


Reflection characteristics

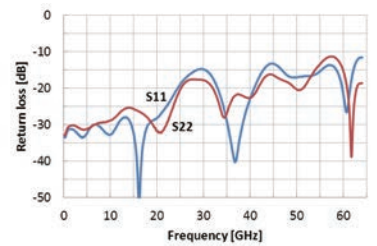


● AN44170A

Transmission characteristics



Reflection characteristics





Low Reflection 4-way Power Divider

AN44187A

AN44187A is Low Reflection 4-Way Power Divider for distributing signals in the multi-channel evaluation system and during the comparative evaluation.

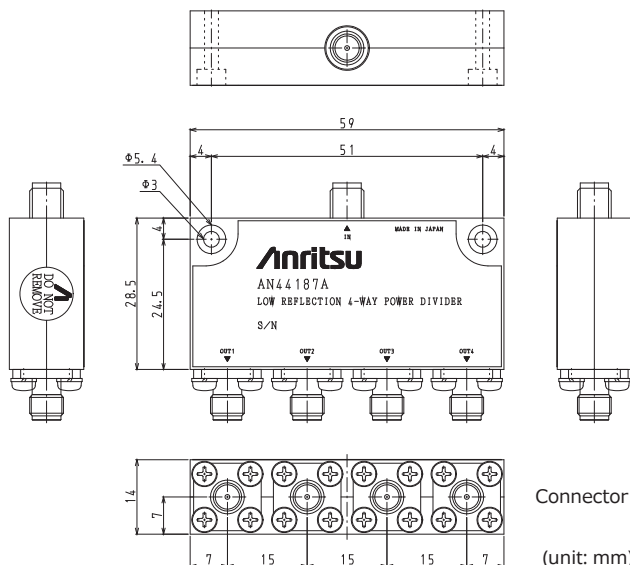
FEATURES

- Output Port: 4-outputs
- Wideband: DC to 40 GHz
- Insertion loss: 12 dB typ.
- Low reflection: >15 dB

APPLICATION

- Signal distribution at the multi-channels system/Comparison with characteristics

DIMENSIONS



Connector type: K

(unit: mm)

PIN CONFIGURATION

No.	Symbol	FUNCTION	Remark
1	IN	Signal input	K-Female connector
2	OUT1	Signal output 1	K-Female connector
3	OUT2	Signal output 2	K-Female connector
4	OUT3	Signal output 3	K-Female connector
5	OUT4	Signal output 4	K-Female connector

ABSOLUTE MAXIMUM RATINGS

Item	Specification		Unit
	Min.	Max.	
Input Power	-1	+0.7	V
Operation Temperature	-3.6	+0.5	V
Storage Temperature	+5	+50	°C

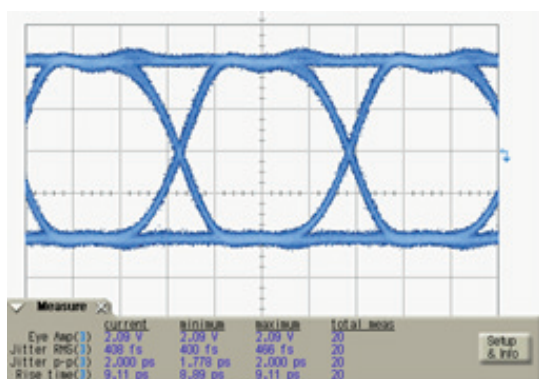
SPECIFICATIONS ($T_a=25^{\circ}\text{C}$, $Z_{in}=50\Omega$, $Z_{out}=50\Omega$)

Item	Condition	Specification			Unit
		Min.	Typ.	Max.	
Frequency Range	—	DC	—	40	GHz
Insertion Loss	@DC	—	12	14	dB
	@40 GHz	—	13	15	
Input Return Loss	DC to 20 GHz	15	20	—	dB
	20 GHz to 40 GHz	10	15	—	
Output Return Loss	DC to 40 GHz	7	10	—	dB
	20 GHz to 40 GHz	10	15	—	
Group Delay	DC to 40 GHz	—	± 50	—	ps
Isolation	OUT1(3) to OUT2(4)	—	12	—	dB
	Between ports other than above	—	18	—	
Skew Between the Channels	—	—	3	—	ps

ELECTRICAL CHARACTERISTICS

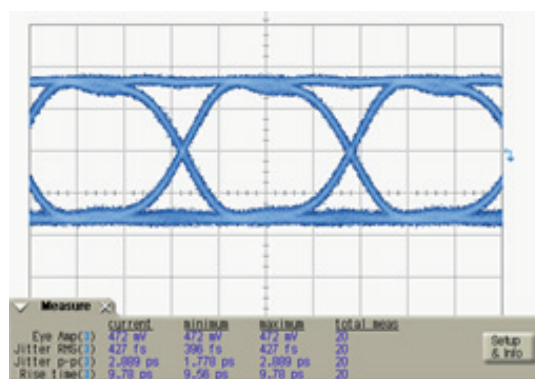
Pulse Response characteristics @28 Gbit/s

Input Waveform



V: 0.50 V/div H: 10 ps/div

Output Waveform



V: 0.15 V/div H: 10 ps/div

● Company Information

The Anritsu Corporation Sensing & Device Company develops, manufactures, and sells optical devices and electronic devices, and our products are used as key components in optical communication systems and devices used in the medical, measurement, and disaster prevention fields.

Our Optical Device Business segment supplies high output lasers and external resonance lasers essential to fiber amps and high capacity optical communication systems, and superluminescent diodes used in and optical tomography.

Our Electronic Device Business segment supplies optical modulator drivers, amps, and filters for use in ultra-high speed communication networks, and ultra-high speed digital ICs and related modules for use in measurement devices.

● ISO9001/14001

Anritsu Products are manufactured under the quality and environmental management systems in conformity with ISO international standard.

Factory	Conformance standard	Registration certificate Number	Registration date	Accreditation Body
Headquarter (Atsugi)	ISO9001	JQA-0316	15th/November/1993	Japan Quality Assurance Organization
	ISO14001	JQA-EM0210	28th/August/1998	

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items, the products / manuals need to be broken / shredded so as not to be
unlawfully used for military purpose.

