

Diplexer Pigtailed Optical Subassembly



Description

The DFB-1310-DP-1.4-4AT-A12 series of Bi-Directional modules have been designed specifically for full-duplex communication over a single fiber.

The devices are particularly suited for ONU application with 1310nm DFB transmit and 1490nm receive functionality over one single mode optical fiber.

The modules are designed to be compliant with FSAN PON applications.

Features

- ❑ 1310-nm DFB Laser Diode with Multi-Quantum Well structure, suitable for burst-mode transmission
- ❑ 1490-nm APD Photodiode with integrated TIA for Voice/Data
- ❑ Operation over wide temperature range
- ❑ Cost-effective Uncooled Laser Technology

Applications

- ❑ 1.25 Gbps upstream and 2.5Gbps downstream FTTx ONU application





DFB-1310-DP-1.4-4AT-A12-SC-x-C

Absolute Maximum Ratings

Parameter		Symbol	Condition	Min	Max	Unit
Operating Case Temperature	Industrial-Temp	Tc	I=Iop	-40	85	°C
	Comm.-Temp.			0	70	
Storage Temperature		Tstg	--	-40	85	°C
Lead Soldering Temperature		T _s	Max. 10 sec	--	260	°C
Operating relative humidity			Non condensing	--	95	%RH
DFB laser Forward Current		IfL	--	--	150	mA
DFB laser Reverse Bias Voltage		VrL	--	--	2	V
DFB laser output power		PfL	--	--	10	dBm
MPD Forward Current (LD-monitoring-PD)		IfMP	--	--	2	mA
MPD Reverse Voltage (LD-monitoring-PD)		VrMP	--	--	15	V
MPD Reverse Current		IrMP	--	--	5	mA
Input Optical Power (analog PD)		PfPD	--	--	10	dBm
Forward Current (Analog PD)		IfAP	--	--	2	mA
Reverse Voltage (Analog PD)		VrAP	--	--	15	V
TIA Supply Voltage		VTIA			4	V
APD Reverse Voltage (Digital PD)		VrAPD	--	--	Vbr	V
APD Reverse Current (Digital PD)		IrAPD	--	--	3	mA
APD Forward Current (Digital PD)		IfAPD	--	--	1	mA

Electrical and Optical Characteristics

Optical Characteristics

Unless otherwise noted, all parameters shall meet the specified requirements over the entire operating temperature and humidity ranges.

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Isolation, 1555nm to 1490nm Rx	ISO1			-34	dB	From external source
Isolation, 1310nm to 1490nm Rx	ISO2			-30	dB	From external source
Crosstalk, 1310nm to 1490nm Rx	ISO3			-47	dB	Between internal source
Crosstalk, 1310nm to 1555nm VRx	ISO4			-47	dB	Between internal source
Digital Rx 1480-1500nm band pass filter Isolation	ISO5	20			dB	$\lambda < 1450$ and $\lambda > 1530$ $\lambda < 1441$ and $\lambda > 1539$
		35			dB	
Optical return loss @ 1310 nm	RL1			-6	dB	
Optical Return Loss @1490nm	RL2			-20	dB	

Note: Bandpass filter will be G984.5 standard compliant

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Digital ReceiverParameters are over $T_c = -40 \sim +85^\circ\text{C}$ unless otherwise noted, $V_{cc} = 3.3\text{V}$.

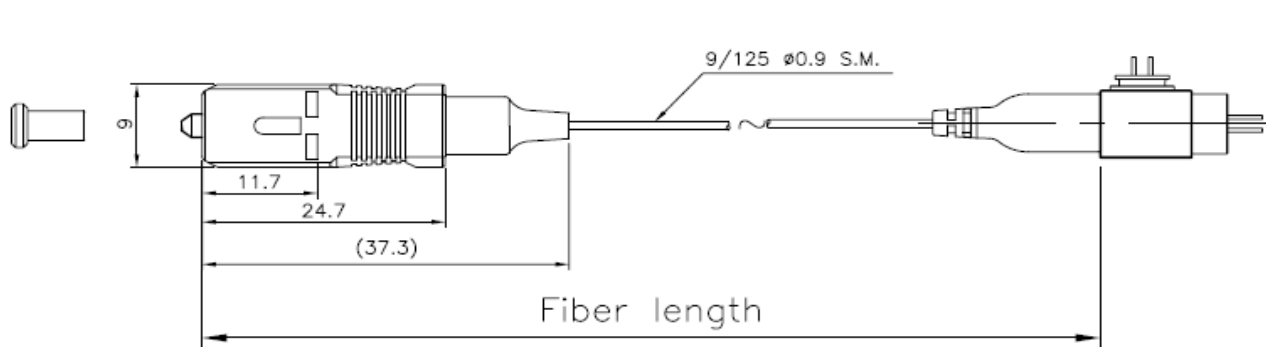
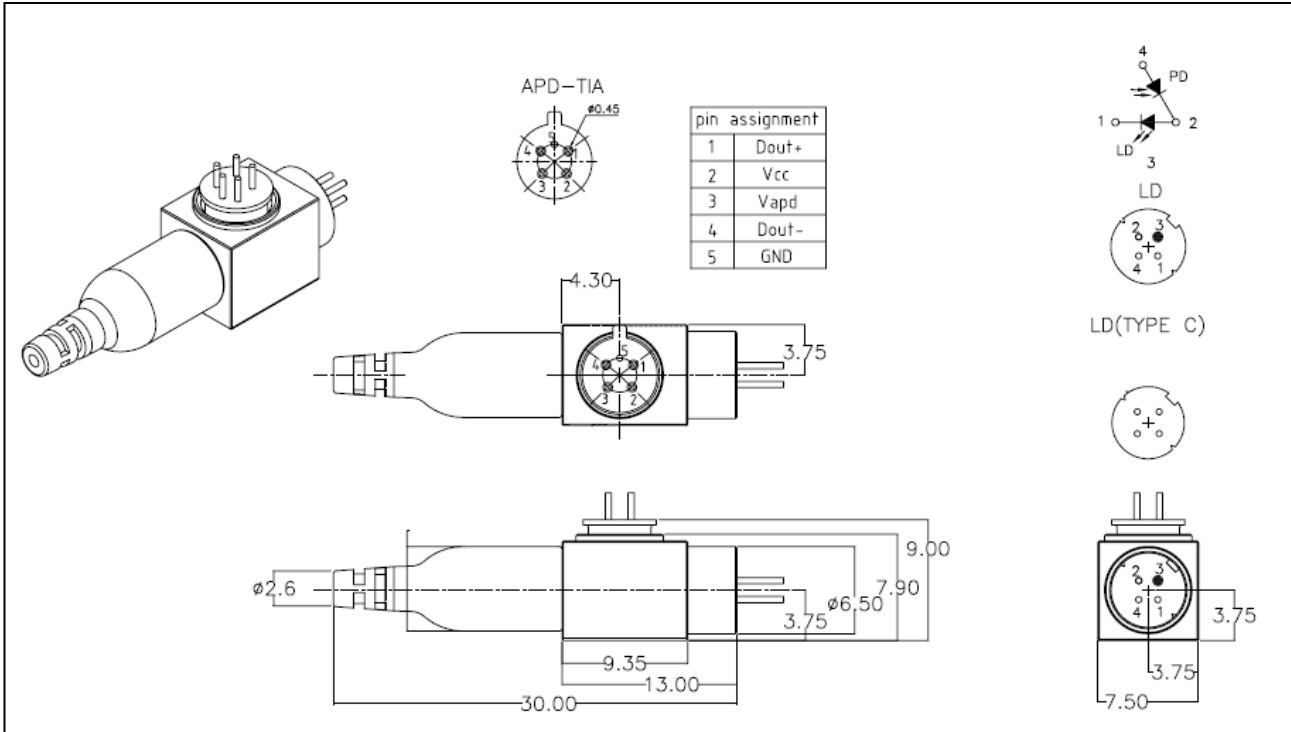
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Receiving Wavelength	λ	1480	1490	1500	nm	
Sensitivity at 2488Mbps	Smin	--	-29	-26	dBm	Continuous mode, $\lambda = 1490\text{nm}$, BER = 10^{-10} , M=6
		--	-31	-28		Continuous mode, $\lambda = 1490\text{nm}$, BER = 10^{10} , M=10
APD Gain	M	4	6	10	--	
APD Breakdown Voltage	Vbr	30		55	V	$I_d = 10 \mu\text{A}$ @ 25°C
APD Operating Voltage	Vop	Vbr - 2			V	$V_{cc} = 3.3\text{V}$
APD Temperature Profile		0.04		0.17	V/ $^\circ\text{C}$	For minimum Gain (M)
Optical Overload	Prmax	-8	--	--	dBm	
Optical Crosstalk	Xopt	--	--	-47	dB	From 1310nm laser
Optical Return Loss	ORL	--	--	-20	dB	$\lambda = 1490\text{nm}$
		--	--	-12		$\lambda = 1310\text{nm}$
Small Signal 3dB Bandwidth		1.5	--	--	GHz	Optical input power through TIA output
Output Voltage		6	--	1200	mV	Differential
Output Resistance		--	50	--	Ohm	Single Ended
Power Supply (Vcc)		3.15	3.3	3.45	V	APD-TIA
Power Supply (Icc)		40	--	70	mA	APD-TIA

Laser TransmitterParameters are at 25°C unless otherwise noted

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Output Optical Power ($I_{op} = I_{th} + 20\text{mA}$)	Pf	0.5	1.5	5	dBm	CW, $T_c = -40 \sim +85^\circ\text{C}$
Threshold Current	Ith	--	8	15	mA	CW
		--	--	50	mA	CW, $T_c = -40 \sim 85^\circ\text{C}$
Center Wavelength	λ	1300	1310	1320	nm	CW
		1290	--	1330	nm	CW, $T_c = -40 \sim 85^\circ\text{C}$
Side-mode suppression ratio	SMSR	30	--	--	dB	CW, $T_c = -40 \sim 85^\circ\text{C}$
Operating Voltage	Vop	--	--	1.6	V	CW, $T_c = -40 \sim 85^\circ\text{C}$
Monitor Current	I _{mon}	50	--	--	μA	CW, $V_r = 5\text{V}$, $T_c = -40 \sim +85^\circ\text{C}$
Monitor Dark Current	I_d	--	--	200	nA	$V_{RD} = 5\text{V}$
Tracking Error	TE	-1		+1	dB	I_m @ Pf=3dBm(25 $^\circ\text{C}$), CW, $T_c = -40 \sim +85^\circ\text{C}$

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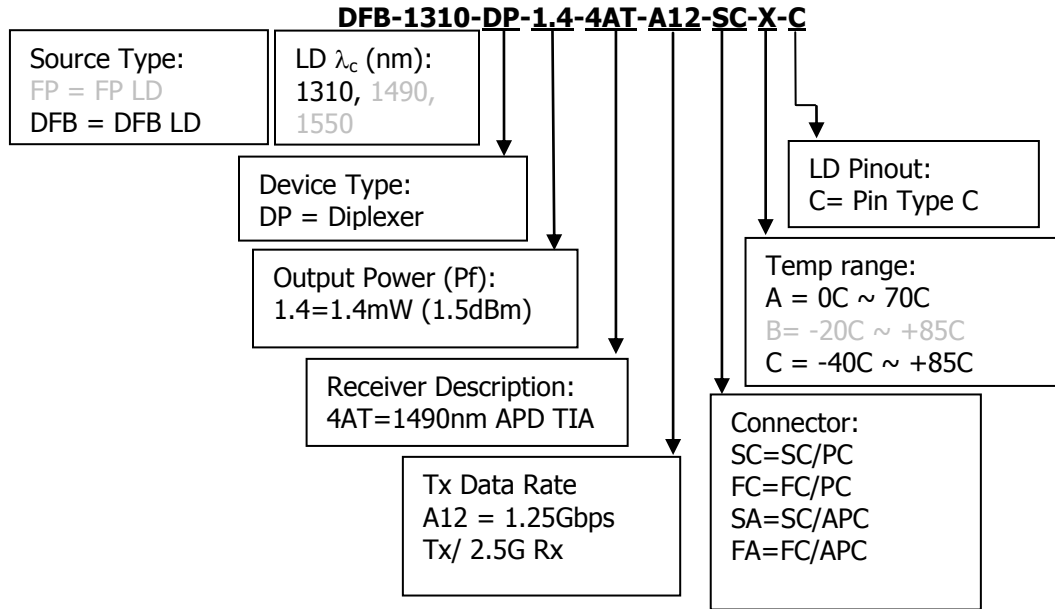
Dimensions and Pin assignment (in mm)
 (Tolerance: = ± 0.05 mm)





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Ordering Options



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Safety Information

All versions of this laser are Class 1M laser products per IEC¹/EN² 60825-1:2001-08. Users should observe safety precautions such as those recommended by ANSI³ Z136.1-2000, ANSI Z36.2-1997 and IEC 60825-1:2001-08.

Notes about Laser Safety Class:

The Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) in the USA has decided to harmonize their requirements with 21 CFR 1040.10 and 1040.11 with the IEC/EN 60825-1 and IEC/EN 60601-2-22 standards. This process has not yet happened and in the interim, the CDRH agency has released '[Laser Notice No.50](#)' to reduce the regulatory burden. This notice allows IEC/EN classification and labeling of lasers within the USA.

IEC¹/EN² 60825-1 Laser Class

Class 1M: laser is safe for all conditions of use except when passed through magnifying optics such as microscopes and telescopes. Class 1M lasers produce large-diameter beams, or beams that are divergent. The MPE for a Class 1M laser cannot normally be exceeded unless focusing or imaging optics are used to narrow the beam. If the beam is refocused, the hazard of Class 1M lasers may be increased and the product class may be changed. A laser can be classified as Class 1M if the total output power is below (IEC/EN) class 3B but the power that can pass through the pupil of the eye is within Class 1.

FDA Laser Class

Class IIIB: moderate power lasers (cw: 5-500 mW, pulsed: 10 J/cm² or the diffuse reflection limit, whichever is lower). In general Class IIIB lasers will not be a fire hazard, nor are they generally capable of producing a hazardous diffuse reflection. Specific controls are recommended.

This product does not conform to 21 CFR 1040.10 and 1040.11. Consequently, this laser module is only intended for use as a component by manufacturers of electronic products and equipment.

Wavelength = 1270 – 1610 nm
 Maximum Power = 75mW
 Single-mode fiber pigtail
 Fiber Numerical Aperture = 0.14

Labeling is not affixed to the laser module due to size constraints; rather, labeling is placed on the outside of the shipping box.

This product is not shipped with a power supply.

Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



classified in accordance with IEC 60825-1: 2001-08

(1) IEC is a registered trademark of the International Electrotechnical Commission

(2) Within Europe the IEC standard has been adopted as a European Normative standard known as EN 60825, and each European country will have its own version of this standard, for example, the British Standards version known as BS EN 60825. There can be small differences between the different countries versions of EN 60825, and these are in part caused by the process of translating the standard into the native language of that country.

(3) ANSI is a registered trademark of the American National Standards Institute