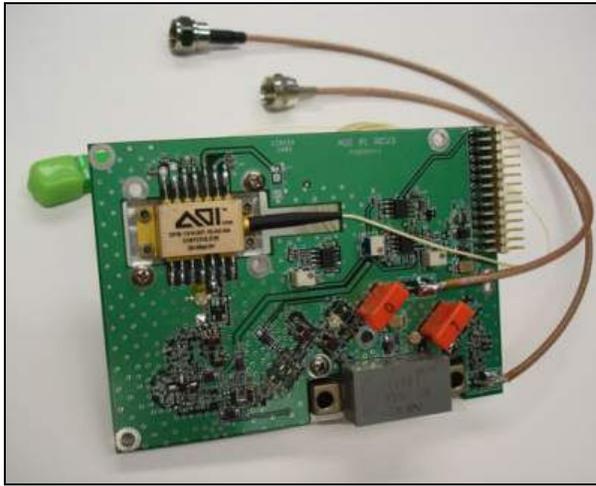


## DFB-1310-P2-xx-A3-xx Predistorted Laser Transmitter

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### Description

The DFB-1310-P2-xx-A3-xx laser transmitter is designed for high-performance forward-path analog transmission, especially in CATV Hybrid Fiber-Coax (HFC) networks.

The transmitter module combines an advanced DFB laser diode transmitter with predistortion circuitry to reduce the second and third order composite distortion signals, ensuring the highest performance CATV transmitter available.

The industry-standard pin assignment and physical layout ensure easy integration with existing head-end equipment designs.

### Features

- ❑ 2<sup>nd</sup> and 3<sup>rd</sup> order pre-distortion
- ❑ Standard 28-pin electrical connector
- ❑ Electrical fine-tuning of the predistortion
- ❑ Output power up to 31 mW
- ❑ Built-in RF amplifier

### Applications

- ❑ CATV forward-path





## DFB-1310-P2-xx-A3-xx Predistorted Laser Transmitter

### Absolute Maximum Ratings

Parameter	Symbol	Condition	Min	Max	Unit
Operating Temperature	Tc	I=Iop	-20	65	°C
Storage Temperature	Tstg	--	-40	70	°C
Laser Forward Current	If	--	--	140	mA
Laser Reverse Bias	Vr	--	--	2	V
Photodiode Reverse Bias	Vrpd	--	--	10	V
TEC Current	Itec	-20 °C < Tc < +65 °C, Top=25 °C If=100 mA	--	1.5	A

### Electrical and Optical Characteristics

Parameters are over operating temperature range unless otherwise noted.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Center Wavelength	$\lambda_c$	CW	1300	1310	1320	nm
Spectral Width (-20 dB)	$\Delta\lambda$	CW	--	0.1	1.0	nm
Optical Output Power*	Po	CW, Ti=25 °C	2.5	--	31	mW
Optical Isolation	Ic	T=25 °C	30	--	--	dB
Side-mode Suppression Ratio	SMSR	CW	30	--	--	dB
Threshold Current	Ith	Ti=25 °C	--	12	18	mA
Operating Current	Iop	CW	--	--	120	mA
Forward Voltage	Vf	CW	--	1.2	1.7	V
Monitor Current	Imon	Vrpd=5 V	10	--	150	µA/mW
Monitor Dark Current	Id	Vrpd=5 V	--	--	200	nA
Operating Temperature	T	--	-20	--	65	°C
Tracking Error	$\gamma$	Imon=const, $\gamma=10 \log(Po/Pr)$ [dB]	-0.5	--	0.5	dB
Thermistor Resistance	Rt	T=25 °C	9.5	--	10.5	K $\Omega$
Thermistor B Constant	B	T=25 °C	--	3900	--	K
TEC Current	Ic	$\Delta T=40^\circ C$	--	--	1.0	A
TEC Voltage	Vc	$\Delta T=40^\circ C$	--	--	2.0	V

\*See Ordering Options for operating powers available.

### RF Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Impedance	Z	--	--	75	--	Ohms
Frequency Range	F	--	45	--	1000	MHz
Input Carrier Level*		Po=6mW - 31mW OMI = 3.2% T=25 °C	--	25	--	dBmV/CH
EO Response		T=25 °C	--	$\pm 0.5$	--	dB
Input Return Loss	S11	T=25 °C	--	--	-16	dB
Test Point Level*	S21	T=25 °C, relative to input	--	-10	--	dB
Test Point Response		T=25 °C	--	$\pm 1$	--	dB
Test Point Return Loss	S22	T=25 °C	--	--	-16	dB

\* Adjustable via pluggable attenuators. Contact customer service for more input and test point level options.

### Distortion (NTSC)

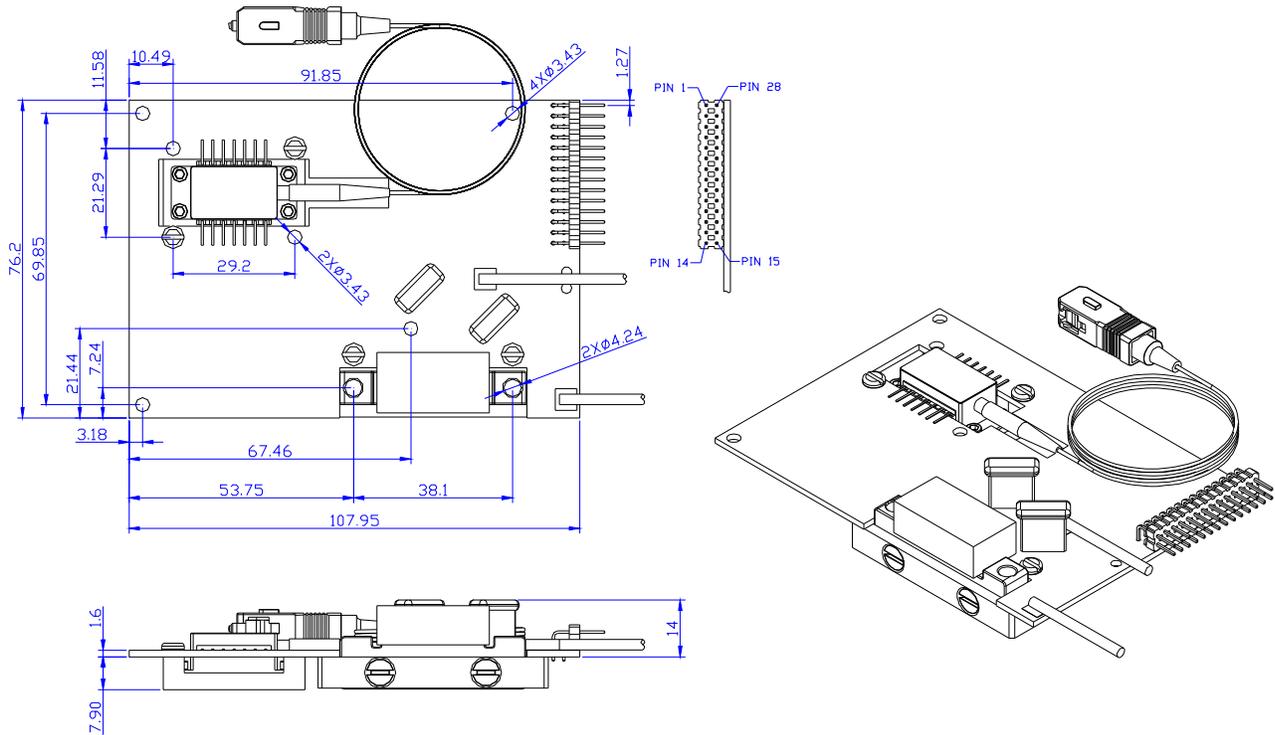
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Carrier to Noise Ratio	CNR	Note 1	51	--	--	dB
Composite Second Order	CSO	Note 1	--	--	-64	dBc
Composite Triple Beat	CTB	Note 1	--	--	-70	dBc

Note 1: Test condition: Po= Pr, OMI 2.8%, 77 unmodulated carriers (50 to 550 MHz), Received Power=-1 dBm.

# DFB-1310-P2-xx-A3-xx Predistorted Laser Transmitter

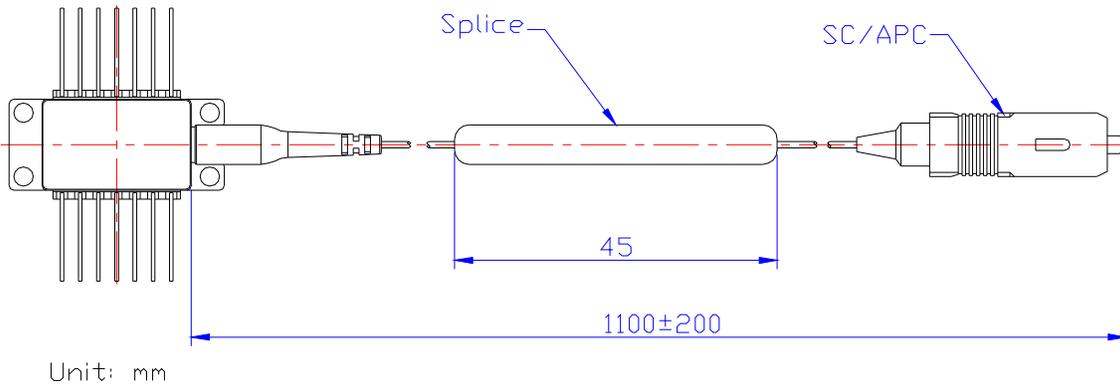
## Outline Diagram

Dimensions are in millimeters



## Outline Diagram including splice (for $P_o < 10\text{mW}$ )

Dimensions are in millimeters

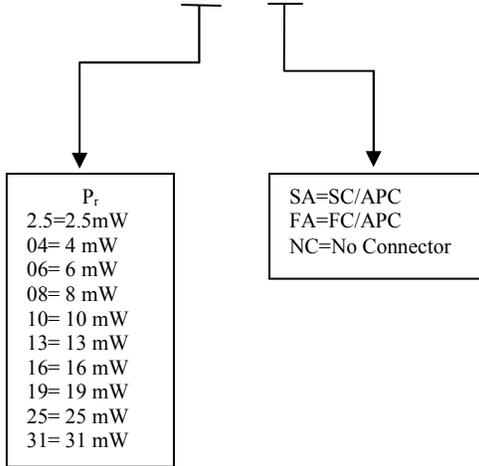




**DFB-1310-P2-xx-A3-xx Predistorted Laser Transmitter**

**Ordering Options**

DFB-1310-P2-xx-A3-xx



**Pin Information**

Pin No.	I/O	Description
1	Out	2.5 VDC Reference Voltage
2	NA	N/C
3	In	TEC -
4	In	TEC -
5	In	TEC +
6	In	TEC +
7	I/O	Monitor PD + (Anode)
8	I/O	Monitor PD - (Cathode)
9	In	Laser bias -
10	I/O	Thermistor
11	I/O	Thermistor
12	In	+12 VDC (100 mA max current)
13	In	Ground
14	In	+24 VDC (400 mA max current)
15	In	CSO Tune 1*
16	In	CSO Tune 2*
17	In	CSO Tune 3*
18	In	CTB Tune 1*
19	In	CTB Tune 2*
20	In	CTB Tune 3*
21	In	Ground
22-28	NA	N/C

\* Tune Voltage = 0 to +5V. If not used, should be tied to pin 1.

## DFB-1310-P2-xx-A3-xx Predistorted Laser Transmitter

### Safety Information

All versions of this laser are Class 1M laser products per IEC<sup>1</sup>/EN<sup>2</sup> 60825-1:2001-08. Users should observe safety precautions such as those recommended by ANSI<sup>3</sup> 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.

#### IEC<sup>1</sup>/EN<sup>2</sup> 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/cm<sup>2</sup> 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.