



# HIGH BANDWIDTH DFB LASERS

## 7-pin k-package

### AA0701 SERIES

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The AA0701 distributed feedback laser (DFB) is an InGaAsP/InP multi-quantum well laser diode.

The module is ideal in applications where high bandwidth, mode stability, low relative intensity noise (RIN) and stable output power are needed.

AA0701 contains a thermo-electric cooler, thermistor, back facet monitor detector, and bias tee.

The module is designed and built using Gooch & Housego's high-reliability platform for defense components.



#### Key Characteristics

- C-band (1537-1565 nm) and 1310 nm wavelengths
- 10 or 18 mW ex-fiber output power options

#### Features

- 10 or 18 mW output power
- High bandwidth
- Built in isolator
- Ultrafast pulsing capability
- Laser welded, hermetically sealed
- Built in TEC, thermistor, and monitor detector
- Rugged to shock and vibration

#### Applications

- Analog RF links
- High speed pulsing

## Performance Characteristics

$T_C=25^\circ\text{C}$ , continuous wave and beginning of life unless otherwise specified

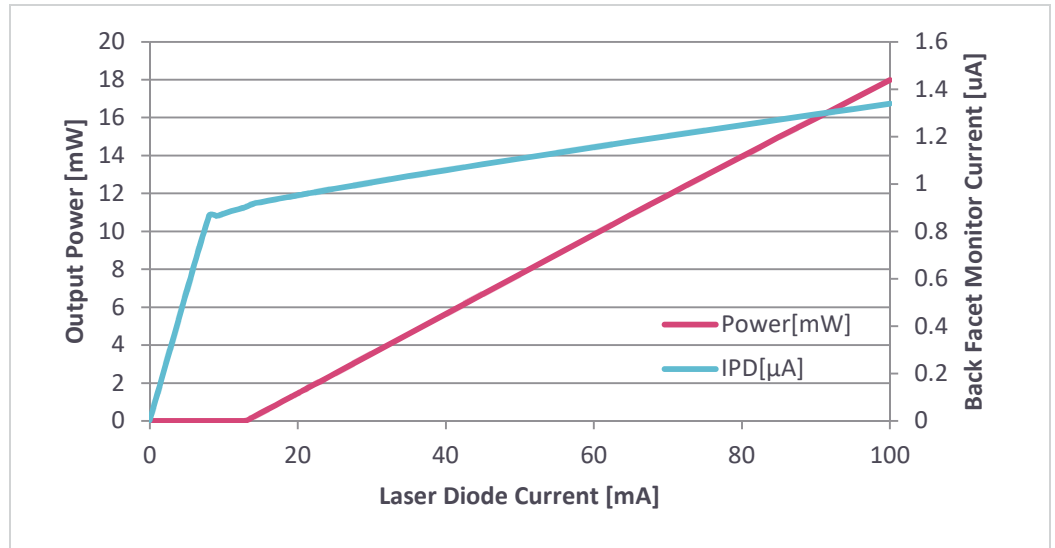
Optical characteristics	Sym	Condition	Min	Typ	Max	Unit
Operating chip temperature	$T_{\text{CHIP}}$		15		35	$^\circ\text{C}$
Center wavelength	$\lambda$	1310 nm model	-10		+10	nm
		c-band models	-1		-1	nm
Output power	$P_{\text{op}}$	1310 nm model	18			mW
		c-band models	10			mW
Linewidth	$\Delta\nu$	Source dependent		1		MHz
Relative intensity noise	RIN	$P=P_{\text{op}}$ , 0.2-3.0 GHz		-150		dBc/Hz
Side mode suppression	SMSR	$P=P_{\text{op}}$	30			dB
Optical isolation <sup>1</sup>	ISO	$F_{\text{opt}}$ within C-band	30	35		dB
Polarization extinction ratio	PER		17	19		dB
Tracking error	$\Delta\lambda / \Delta T$	$P = P_{\text{op}}$	-0.5		0.5	dB

Electrical characteristics	Sym	Condition	Min	Typ	Max	Unit
Threshold current	$I_{\text{TH}}$		8		20	mA
Laser drive current <sup>2</sup>	$I_{\text{op}}$			75	100	mA
Laser forward voltage	$V_F$	$I=I_{\text{op}}$ , max		1.6	2	V
Monitor photo diode current	$I_{\text{PD}}$	$P=P_{\text{OP}}$	50			$\mu\text{A}$
Monitor photo diode dark current	$I_D$				100	nA
Modulation bandwidth	F	3dB from low frequency avg	10			GHz
Electrical back reflection	$S^{11}$				-10	dB
Modulation input matching	$Z_{\text{IN}}$			50		$\Omega$
TEC current		$T_{\text{amb}}=25^\circ\text{C}$ for typ $T_{\text{amb}}=70^\circ\text{C}$ for max		0.1	2.0	A
TEC voltage		$P=P_{\text{op}}$ , $T_{\text{CHIP}}=25^\circ\text{C}$		0.1	2.5	V
Thermistor resistance	$R_{\text{TH}}$	$T = 25^\circ\text{C}$	9500	10000	10500	$\Omega$
Thermistor $\beta$ coefficient	$\beta$	0 / $50^\circ\text{C}$		3892		
Thermistor Steinhart-Hart coefficients		$A = 1.1291e^{-3}$ $B = 2.3413e^{-4}$ $C = 8.7674e^{-8}$				

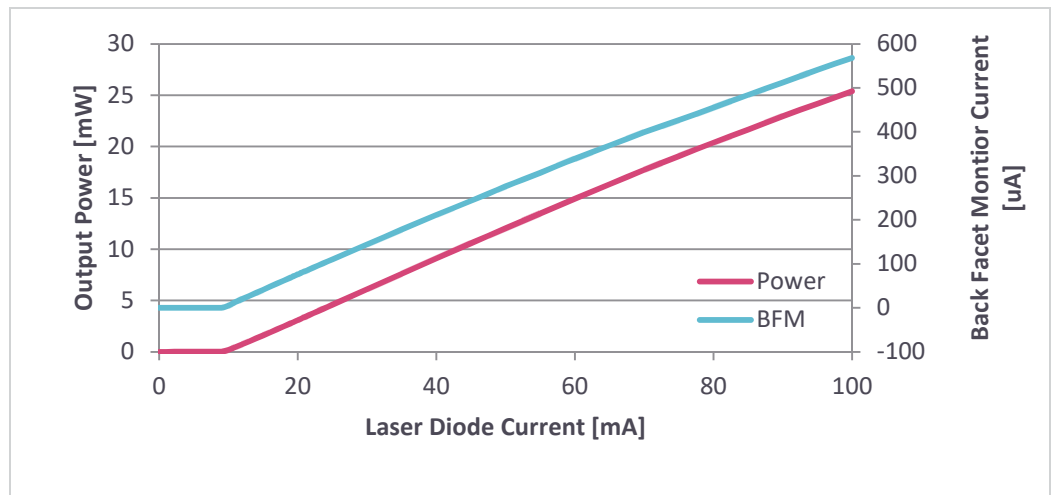
<sup>1</sup> Reference model number AA0702 for units without internal isolator. SMSR not specified for this model.

## Data Tables

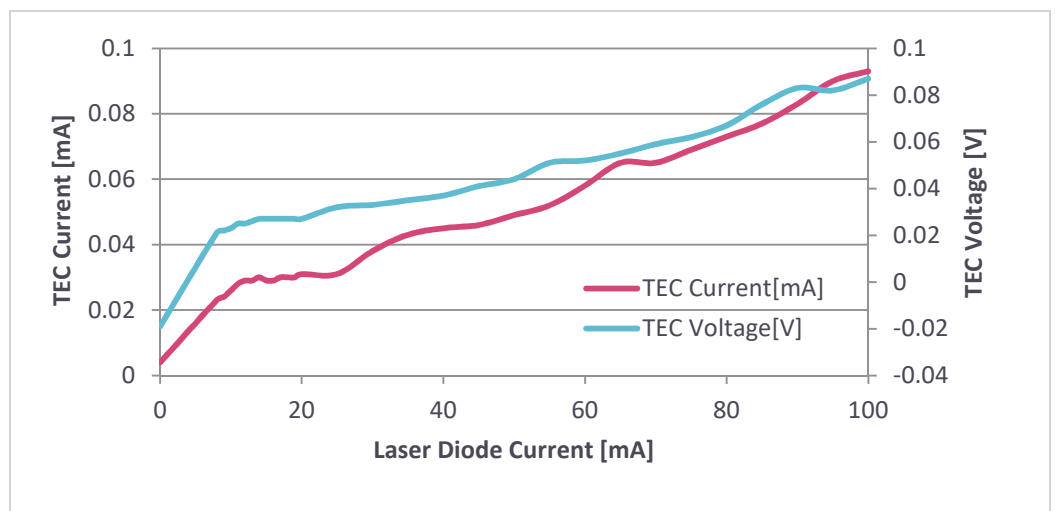
Typical output power and back facet monitor current vs input current (1550nm)



Typical output power and back facet monitor current vs input current (1310nm)

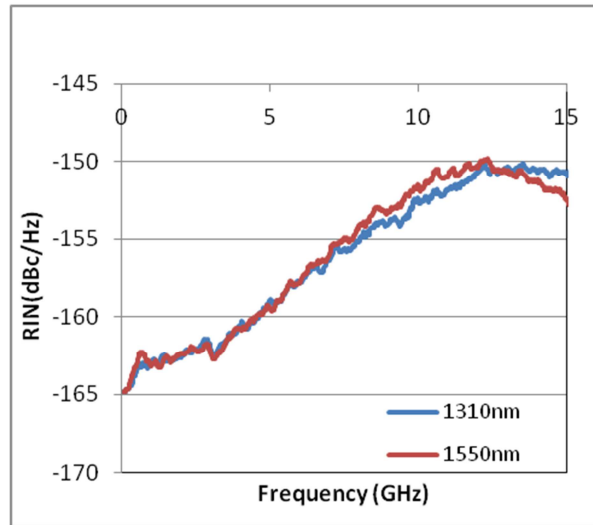


Typical TEC performance  
 $T_{chip} = 25^{\circ}C$

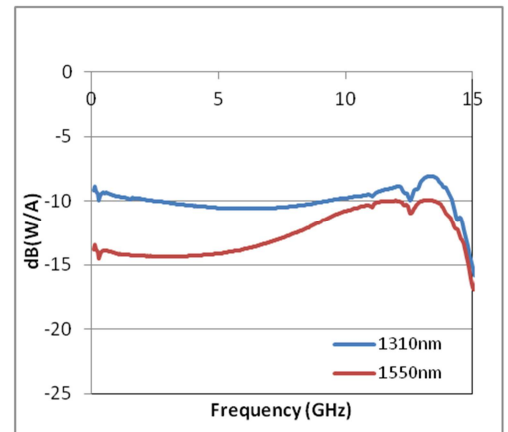
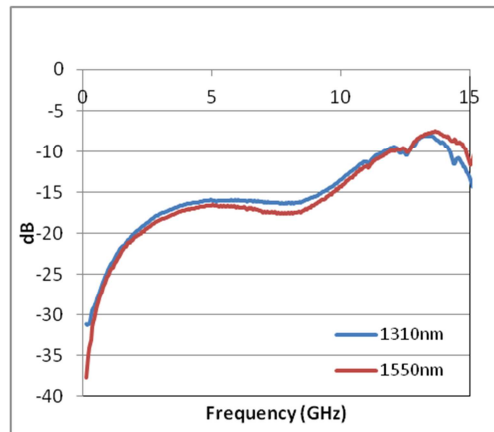


## Data Tables, Continued

### Typical RIN (Relative Intensity Noise)



### S11 & S21



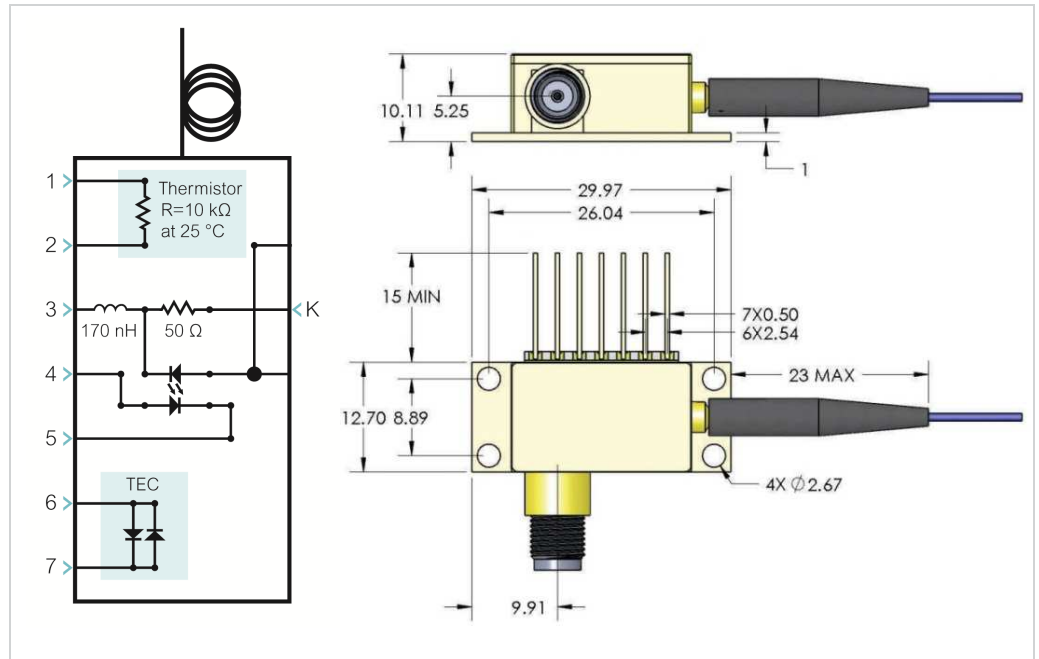
Fiber Characteristics	
Fiber type	Single-mode, PM or non-PM
Core diameter	8 $\mu\text{m}$
Outer diameter	125 $\mu\text{m}$
Buffer diameter <sup>4</sup>	250 $\mu\text{m}$
Buffer material <sup>4</sup>	Acrylate
Minimum length	1 m
Minimum bend radius	35 mm
Output polarization	Parallel to slow axis
Connector <sup>5</sup>	FC/APC

<sup>4</sup> Optional 900  $\mu\text{m}$  loose-tube PVDF buffer recommended for laboratory use.

<sup>5</sup> Other connector options available, contact sales for more information.

## Pinout and Mechanical Drawing

Pin	Description
1	Thermistor
2	Thermistor
3	Laser cathode (Bias)
4	Monitor PD anode
5	Monitor PD cathode
6	TEC+
7	TEC-
Pkg/ Shield	Laser anode
K	RF Input



Absolute Maximum Ratings	Sym	Min	Max	Unit
Storage temperature	$T_{STG}$	-40	+85	°C
Operating case temperature	$T_{OP}$	-20	+70	°C
Laser forward current	$I_F$		120	mA
Laser reverse voltage	$V_R$		2	V
Photo diode photo current	$I_{PD}$		10	mA
Photo diode reverse voltage	$V_{PD}$		20	V
TEC current	$I_{TEC}$		3	A
TEC voltage	$V_{TEC}$		4	V
Thermistor current			2	mA
Thermistor voltage			5	V
Lead soldering time			10	S
Lead soldering temperature			250	°C
RF input power			20	dBm

\* Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and operation of the device at or beyond these conditions is not implied. Exposure to absolute maximum ratings for extended periods of time may affect device reliability.

## Ordering Information

Example part number: AA0701-193414-010-SM900-FCA-50

		①	②	③	④	⑤	⑥
<b>A</b>	<b>A</b>						
		-					
						<b>F</b>	<b>C</b>
							<b>A</b>
							-
							<b>5</b>
							<b>0</b>
①	<b>Model</b>	<b>Standard (with internal isolator)</b>			<b>Without Internal Isolator<sup>1</sup></b>		
	Code	0701			0702		
②	<b>Wavelength</b>	<b>1310nm</b>			<b>C-band options</b>		
	Code	228849			XXXXXX (see chart below)		
③	<b>Power</b>	<b>10 mW</b>			<b>18 mW</b>		
	Code	010 (for c-band lasers)			018 (for 1310 nm lasers)		
④	<b>Fiber</b>	<b>SM fiber, 900 um loose buffer</b>	<b>PM fiber, 900 um tight buffer</b>		<b>PM fiber, 900 um loose buffer</b>		
	Code	SM900	PM250		PM900		
⑤	<b>Connector<sup>2</sup></b>	<b>FC/APC<sup>2</sup></b>					
	Code	FCA					
⑥	<b>Bias T</b>	<b>50 Ω</b>					
	Code	50					

<sup>1</sup> SMSR not specified for lasers without isolators.

<sup>2</sup> Other connector options available, contact sales for more information.

### Available C-band channel frequencies (wavelengths)

Standard center C-band option in **bold**.

Frequency	Wavelength	Frequency	Wavelength	Frequency	Wavelength
196.300 THz	1527.22 nm	194.700 THz	1539.77 nm	193.100 THz	1552.52 nm
196.200 THz	1527.99 nm	194.600 THz	1540.56 nm	193.000 THz	1553.33 nm
196.100 THz	1528.77 nm	194.500 THz	1541.35 nm	192.900 THz	1554.13 nm
196.000 THz	1529.55 nm	194.400 THz	1542.14 nm	192.800 THz	1554.94 nm
195.900 THz	1530.33 nm	194.300 THz	1542.94 nm	192.700 THz	1555.75 nm
195.800 THz	1531.12 nm	194.200 THz	1543.73 nm	192.600 THz	1556.55 nm
195.700 THz	1531.90 nm	194.100 THz	1544.53 nm	192.500 THz	1557.36 nm
195.600 THz	1532.68 nm	194.000 THz	1545.32 nm	192.400 THz	1558.17 nm
195.500 THz	1533.47 nm	193.900 THz	1546.12 nm	192.300 THz	1558.98 nm
195.400 THz	1534.25 nm	193.800 THz	1546.92 nm	192.200 THz	1559.79 nm
195.300 THz	1535.04 nm	193.700 THz	1547.72 nm	192.100 THz	1560.61 nm
195.200 THz	1535.82 nm	193.600 THz	1548.51 nm	192.000 THz	1561.42 nm
195.100 THz	1536.61 nm	193.500 THz	1549.32 nm	191.900 THz	1562.23 nm
195.000 THz	1537.40 nm	<b>193.400 THz</b>	<b>1550.12 nm</b>	191.800 THz	1563.05 nm
194.900 THz	1538.19 nm	193.300 THz	1550.92 nm	191.700 THz	1563.86 nm
194.800 THz	1538.98 nm	193.200 THz	1551.72 nm	191.600 THz	1564.68 nm

### For further information

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