Honeywell

Infrared Products

Single Fiber Duplex Modules

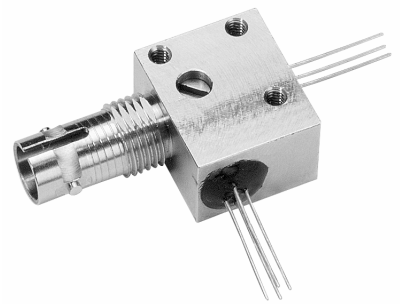
HOD2236-111/BBA
HOD4090-111/BBA

FEATURES

- Full duplex over single fiber
- DC to 160 MHz link bandwidth
- Link budgets of 2 km [1.24 miles] or greater
- 40 dB isolation
- Low profile ST housing
- Other options available
- VCSEL is Class 1 eye safe

APPLICATIONS

- Full duplex data transmission
- Multiplexing two signals to a single fiber
- LED coupled power measurements and reflected power measurements (depending upon the configuration of the duplex module)



A pair of Honeywell HODXXXX-XXX/BBA series of dual wavelength fiber duplex modules allows full duplex communication over a single fiber link. They may also be used where a dual fiber solution is neither possible nor economical. Alternatively, one duplex module may be used to double the capacity of an existing system.

Each duplex module consists of one on-axis port and one off-axis port, each configured with the appropriate devices. These devices are coupled to the single fiber via integral lenses and a 3 dB wavelength differentiating mirror within the duplex module body. In this configuration, two duplex modules can communicate in opposing directions simultaneously and independently of each other. Depending upon the receiver circuitry used, links of 2 km [1.24 miles] or greater are possible.

The following catalog listings indicate the two devices used in each duplex module.

- HOD2236-111/BBA:
  - 1300 nm multimode laser
  - 850 nm PIN diode
- HOD4090-111/BBA (corresponding duplex module):
  - 850 nm VCSEL (Vertical Cavity Emitting Surface Laser)
  - 1300 nm PIN diode

Other options are available on request. These include two LEDs or lasers in one duplex module for single fiber multiplexing, PIN+Preamp receivers (P+P) or any other preferred devices. Housing options include SC and ST optical ports or a high profile housing for mounting duplex modules side by side. Future connectors will likely include SMA, FC, LC and E2000. See the catalog listing numbering scheme on the back page for complete list of available configurations.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalog) is for reference only. DO NOT USE this document as product installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

PERSONAL INJURY

- DO NOT USE these products as safety or emergency stop devices, or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

ELECTRO-OPTICAL CHARACTERISTICS FOR THE HOD2236-111/BBA

CAUTION
STRESS DAMAGE
Functional operation of the device at or above "Absolute Maximum Ratings" for extended periods of time may affect reliability.
Failure to comply with these instructions may result in product damage.

Absolute Maximum Ratings (25 °C unless otherwise noted)

Continuous Forward Current	150 mA
Lead Solder Temperature	260 °C [500 °F], 10 sec
Operating Temperature	0 °C to 70 °C (32 °F to 158 °F)
Storage Temperature	-40°C to 85 °C (-40 °F to 185 °F)

Transmit: 1300 nm Laser (All tests made at 25 °C unless otherwise specified.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Fiber Coupled Power	P_{OC}	40 -14	65 -12	100 -10	µW dBm	I_F=17 mA 50/125 µm fiber
Laser Diode Reverse Voltage	V_{RLD}			2.0	V	
Photo Diode Reverse Voltage	V_{RPD}			10	V	
Photo Diode Forward Current	V_{FPD}			1	mA	
Slope Efficiency	SE	0.3	0.35		mW/mA	CW, Po=5 mW
Threshold Current	I_{TH}		12	20	mA	CW, Po=5 mW
Peak Wavelength	λp	1290	1310	1330	nm	CW, Po=5 mW
Spectral Bandwidth	Δλ		2	5	nm	CW, Po=5 mW
Forward Voltage	V_F		1.2	1.5	V	CW, Po=5 mW
Response Time	t_r/t_f			0.5	ns	$I_{BIAS}=I_{TH}$, 10%-90%
Photo Diode Monitor Current	Im	100			µA	CW, Po=5 mW, V_{RPD}=2 V
Photo Diode Dark Current	I_{DARK}			0.1	µA	V_{RLD}=5 V
Photo Diode Capacitance	C		6	15	pF	V_{RLD}=5 V, f=1 MHz

Receive: 850 nm PIN Diode (All tests made at 25 °C unless otherwise specified.)

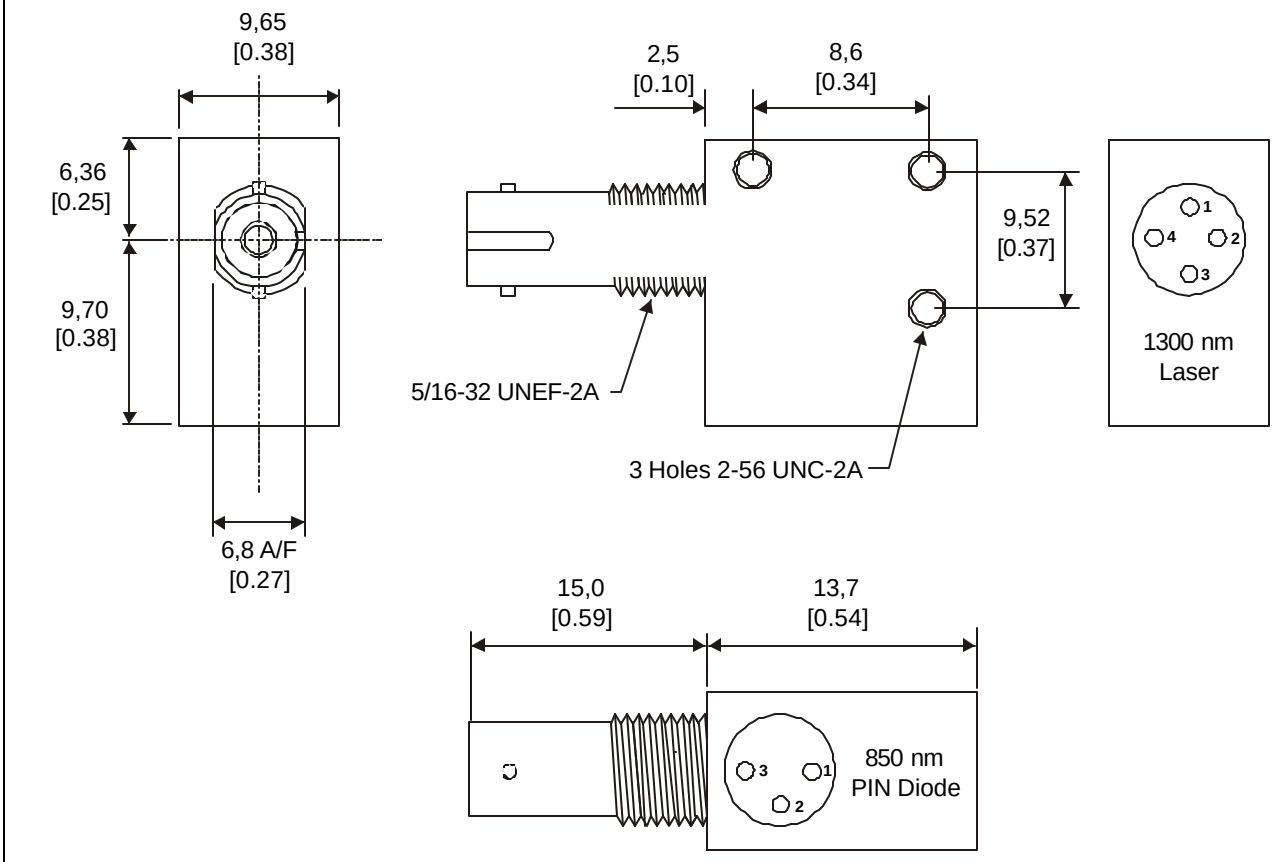
Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Flux Responsivity	R	0.2	0.3		A/W	λ=850 nm
Dark Current	I_D		0.05	1.5	nA	V_R=30 V
Reverse Voltage	BVR			50	V	
Response Time 10%-90% 90%-10%	 t_r t_f		 1.2 1.2	 3 3	 ns	 V_R=3.5 V
Capacitance	C		1.5		pF	V_R=5 V

CAUTION

PRODUCT DAMAGE DUE TO ESD

Ensure normal ESD (Electrostatic Discharge) precautions are followed when handling this product.
Failure to comply with these instructions may result in product damage.

HOD2236-111/BBA Duplex Module
Mounting and Dimensional Drawing (for reference only mm[in])



PINOUTS			
850 nm PIN Diode		**1300 nm Laser**	
1	Anode	1	LD Anode
2	Cathode	2	PD Anode
3	Case (Ground)	3	PD Cathode
		4	LD Cathode

ELECTRO-OPTICAL CHARACTERISTICS FOR THE HOD4090-111/BBA

CAUTION
STRESS DAMAGE
Functional operation of the device at or above "Absolute Maximum Ratings" for extended periods of time may affect reliability.
Failure to comply with these instructions may result in product damage.

Absolute Maximum Ratings (25 °C unless otherwise noted)

Continuous Forward Current	100 mA
Lead Solder Temperature	260 °C [500 °F], 10 sec
Operating Temperature	-0 °C to 70 °C (32 °F to 158 °F)
Storage Temperature	-45 °C to 85 °C (-49 °F to 185 °F)

Transmit: 850 nm VCSEL (All tests made at 25 °C unless otherwise specified.)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Fiber Coupled Power	P_{OC}	200 -7	300 -5.2	400 -4	µW	I_F=12 mA 50/125 µm fiber
Laser Classification				Class 1		If<15 mA dc
Threshold Current	I_{TH}		3.6	6	mA	
I_{TH} Temperature Variation	ΔI_{TH}	-1		1	mA	T_A=0 °C to 70 °C
Slope Efficiency	η	0.1	0.2	0.4	mW/mA	Po=1.3 mW
η Temperature Variation	Δη		-0.4		%/°C	T_A=0 °C to 70 °C
Peak Wavelength	λp	820	850	860	nm	I_F=12 mA dc
λp Temperature Coefficient	Δλp/ΔT		0.06		nm/°C	I_F=12 mA
Spectral Bandwidth	Δλ			0.85	nm	I_F=12mA
Laser Forward Voltage	V_F	1.6	1.8	2.2	V	I_F=12mA
Laser Reverse Voltage	BVR_{LD}	5	10		V	I_R=10µA
Response Time -40 °C<T<100 °C, 10%-90% -40 °C<T<100 °C, 90%-10%	 t_r t_f		 100 100	 300 300	ps	Bias above threshold
Relative Intensity Noise	RIN		-128	-122	dB/Hz	1 GHz BW
Series Resistance	R_S	15	25	50	Ohms	I_F=12 mA
Monitor Current	I_{PD}	0.020		0.044	mA	Po=1.3 mW
I_{PD} Temperature Variation	$\Delta I_{PD}/\Delta T$		0.2		%/°C	Po= 0.5 mW
Dark Current	I_D			20	NA	Po=0 mW, V_R=3 V
PD Reverse Voltage	BVR_{PD}	30	115		V	Po=0 mW, I_R=10 µA
PD Capacitance	C		100 55		pF	V_R=0 V, Freq=1 MHz V_R=3 V, Freq=1 MHz

Receive: 1300 nm PIN Diode (All tests made at 25 °C unless otherwise specified.)

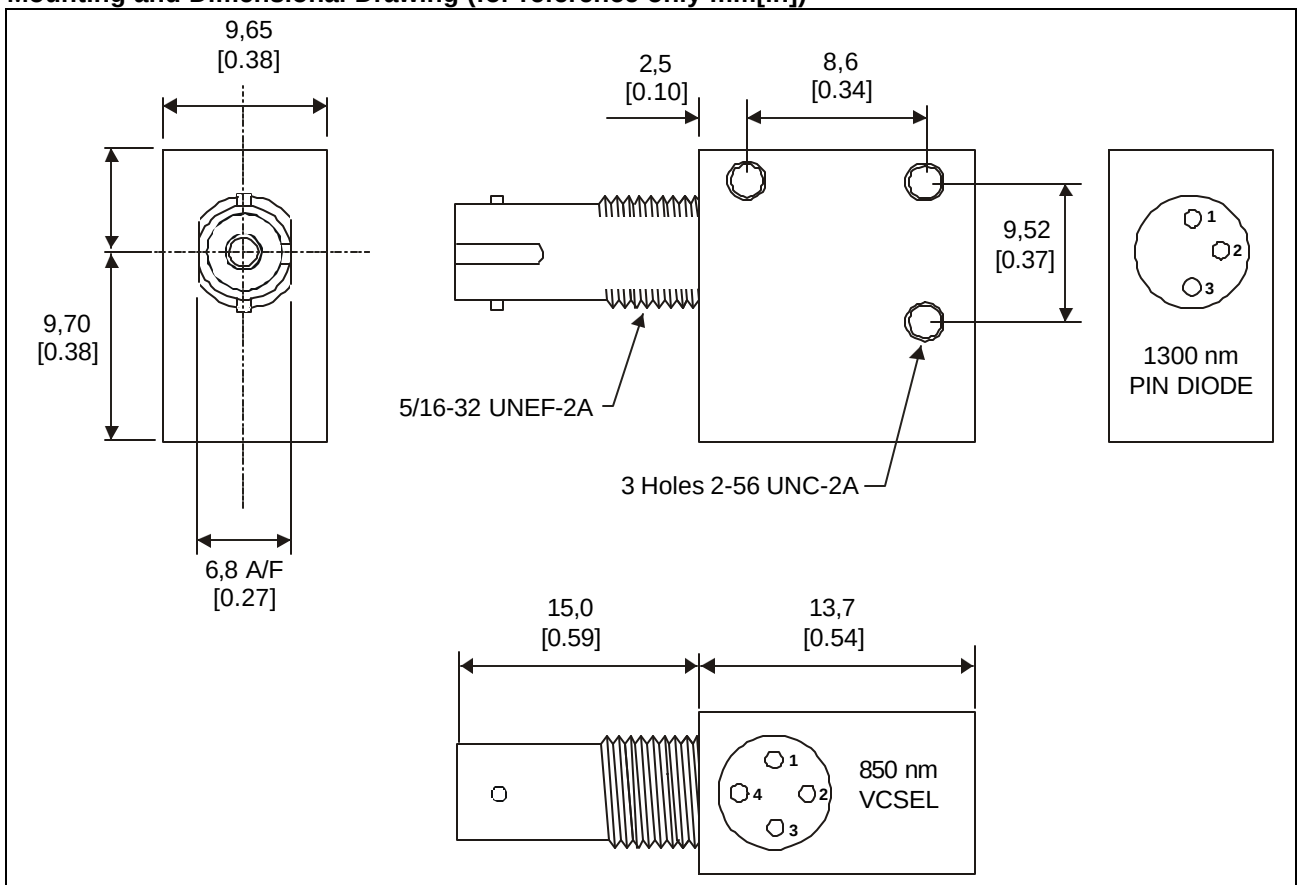
Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Flux Responsivity	R	0.45	0.50		A/W	λ=1300 nm
Dark Current	I_D		2.0	5.0	nA	V_R=5 V, f=1 MHz
Response Time 10%-90% 90%-10%	 t_r t_f			 1 1	ns	λ=1300 nm
Cut Off Frequency	FC		1500		MHz	V_R= 5 V, RL=50 Ω
Capacitance	C		1.5	1.7	pF	V_R= 5 V, f=1 MHz
Maximum Reverse Voltage	V_{Rmax}			20	V	
Isolation	I_{CX}		40		dB	I_F (LED)=100 mA dc

CAUTION

PRODUCT DAMAGE DUE TO ESD

Ensure normal ESD (Electrostatic Discharge) precautions are followed when handling this product.
Failure to comply with these instructions may result in product damage.

HOD4090-111/BBA Duplex Module
Mounting and Dimensional Drawing (for reference only mm[in])



PINOUTS			
850 nm VCSEL		**1300 nm PIN Diode**	
1	Case (Ground)	1	Anode
2	Cathode	2	Cathode
3	Anode	3	Case (Ground)
4	Cathode		

Infrared Products

Single Fiber Duplex Modules

HOD2236-111/BBA

HOD4090-111/BBA

Duplex Module Catalog Listing Numbering Scheme

HOD	XX*	XX*	-	X	X	X	/	X	X	X
	Port 1 Device	**Port 2 Device**		**Port 1 Speed (Rise/Fall Time)**	**Port 2 Speed (Rise/Fall Time)**	**Optical Budget**		**Connector**	**Mounting**	**Leads**
	1x 850 nm LED	**1x** 850 nm LED		**1** <3 ns	**1** <3 ns	**1** <10 dB		**A** SMA	**B** PCB	**A** Normal
	2x 1300 nm LED/Laser	**2x** 1300 nm LED/Laser		**2** <6 ns	**2** <6 ns	**2** <20 dB		**B** ST Low Profile	**X** Special	**B** Formed
	3x 850 nm PIN	**3x** 850 nm PIN		**3** <10 ns	**3** <10 ns	**3** <30 dB		**C** FC		**C** Special
	4x 1300 nm PIN	**4x** 1300 nm PIN		**4** <20 ns	**4** <20 ns	**4** <40 dB		**D** ST Close Mount		
	5x 850 nm P+P	**5x** 850 nm P+P						**E** SC		
	6x 1300 nm P+P	**6x** 1300 nm P+P						**F** LC		
	7x Future	**7x** Future						**G** E2000		
	8x Future	**8x** Future						**X** Special		
	9x Honeywell VCSEL	**9x** Honeywell VCSEL								

*The second digit of each pair of port device numbers corresponds to the specific device used.

Example: HOD4013-132/BBA defines:

40	1300 nm PIN in Port 1 (on axis)
13	850 nm LED in Port 2 (perpendicular axis)
-	
1	<3 ns Rise/Fall Time (1300 nm PIN)
3	<10 ns Rise/Fall Time (850 nm LED)
2	20 dB link budget when used with corresponding duplexer
/	
B	ST Low profile connector
B	PCB mounting
A	Normal leads

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

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