

## Infrared Products

### Single Fiber Duplex Modules

HOD2236-111/BBA

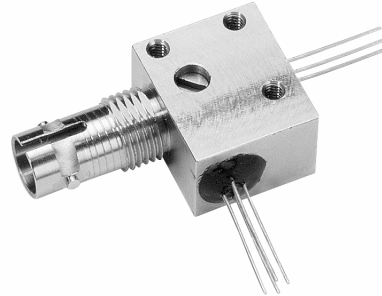
HOD4090-111/BBA

#### 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 HODXXX-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.**

# Infrared Products

## Single Fiber Duplex Modules

HOD2236-111/BBA

HOD4090-111/BBA

### ELECTRO-OPTICAL CHARACTERISTICS FOR THE HOD2236-111/BBA

#### 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)

#### 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.**

#### 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	$\mu$ W dBm	$I_F=17$ mA 50/125 $\mu$ m 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, $P_o=5$ mW
Threshold Current	$I_{TH}$		12	20	mA	CW, $P_o=5$ mW
Peak Wavelength	$\lambda_p$	1290	1310	1330	nm	CW, $P_o=5$ mW
Spectral Bandwidth	$\Delta\lambda$		2	5	nm	CW, $P_o=5$ mW
Forward Voltage	$V_F$		1.2	1.5	V	CW, $P_o=5$ mW
Response Time	$t_r/t_f$			0.5	ns	$I_{BIAS}=I_{TH}$ , 10%-90%
Photo Diode Monitor Current	$I_m$	100			$\mu$ A	CW, $P_o=5$ mW, $V_{RPD}=2$ V
Photo Diode Dark Current	$I_{DARK}$			0.1	$\mu$ A	$V_{RLD}=5$ 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	$\lambda=850$ nm
Dark Current	$I_D$		0.05	1.5	nA	$V_R=30$ V
Reverse Voltage	BVR			50	V	
Response Time						
10%-90%	$t_r$		1.2	3	ns	$V_R=3.5$ V
90%-10%	$t_f$		1.2	3		
Capacitance	C		1.5		pF	$V_R=5$ V

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### CAUTION

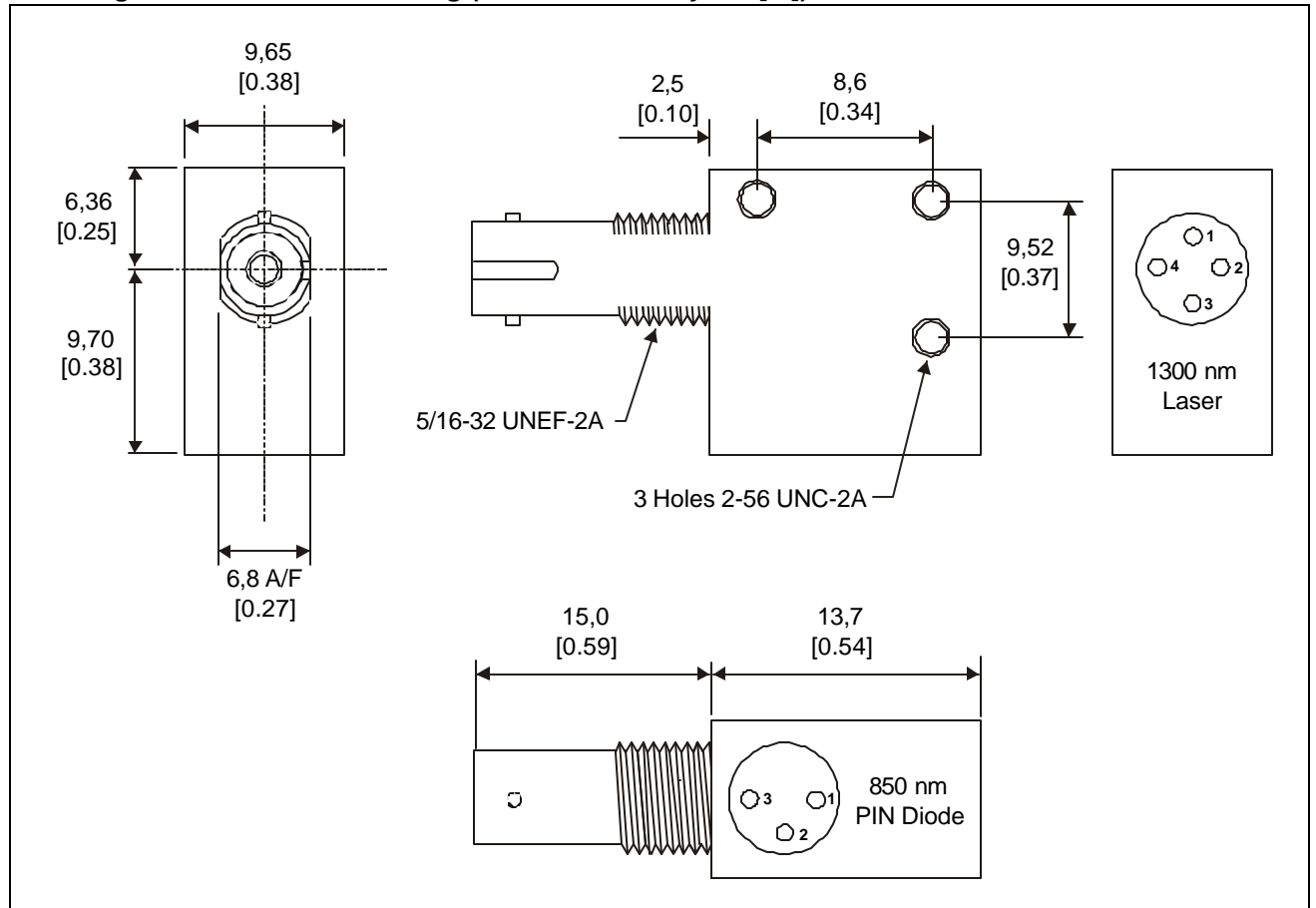
#### PRODUCT DAMAGE DUE TO ESD

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

# Infrared Products

## Single Fiber Duplex Modules

HOD2236-111/BBA

HOD4090-111/BBA

### ELECTRO-OPTICAL CHARACTERISTICS FOR THE HOD4090-111/BBA

#### 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)

#### 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.**

#### 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	$\mu$ W	$I_F=12$ mA 50/125 $\mu$ m fiber
Laser Classification				Class 1		$I_F < 15$ mA dc
Threshold Current	$I_{TH}$		3.6	6	mA	
$I_{TH}$ Temperature Variation	$\Delta I_{TH}$	-1		1	mA	$T_A=0$ °C to 70 °C
Slope Efficiency	$\eta$	0.1	0.2	0.4	mW/mA	$P_O=1.3$ mW
$\eta$ Temperature Variation	$\Delta \eta$		-0.4		%/°C	$T_A=0$ °C to 70 °C
Peak Wavelength	$\lambda_p$	820	850	860	nm	$I_F=12$ mA dc
$\lambda_p$ Temperature Coefficient	$\Delta \lambda_p / \Delta T$		0.06		nm/°C	$I_F=12$ mA
Spectral Bandwidth	$\Delta \lambda$			0.85	nm	$I_F=12$ mA
Laser Forward Voltage	$V_F$	1.6	1.8	2.2	V	$I_F=12$ mA
Laser Reverse Voltage	$BVR_{LD}$	5	10		V	$I_R=10$ $\mu$ A
Response Time						
-40 °C < T < 100 °C, 10%-90%	$t_r$		100	300	ps	Bias above threshold
-40 °C < T < 100 °C, 90%-10%	$t_f$		100	300		
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	$P_O=1.3$ mW
$I_{PD}$ Temperature Variation	$\Delta I_{PD} / \Delta T$		0.2		%/°C	$P_O=0.5$ mW
Dark Current	$I_D$			20	NA	$P_O=0$ mW, $V_R=3$ V
PD Reverse Voltage	$BVR_{PD}$	30	115		V	$P_O=0$ mW, $I_R=10$ $\mu$ A
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	$\lambda=1300$ nm
Dark Current	$I_D$		2.0	5.0	nA	$V_R=5$ V, f=1 MHz
Response Time						
10%-90%	$t_r$			1	ns	$\lambda=1300$ nm
90%-10%	$t_f$			1		
Cut Off Frequency	FC		1500		MHz	$V_R=5$ V, $R_L=50$ $\Omega$
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

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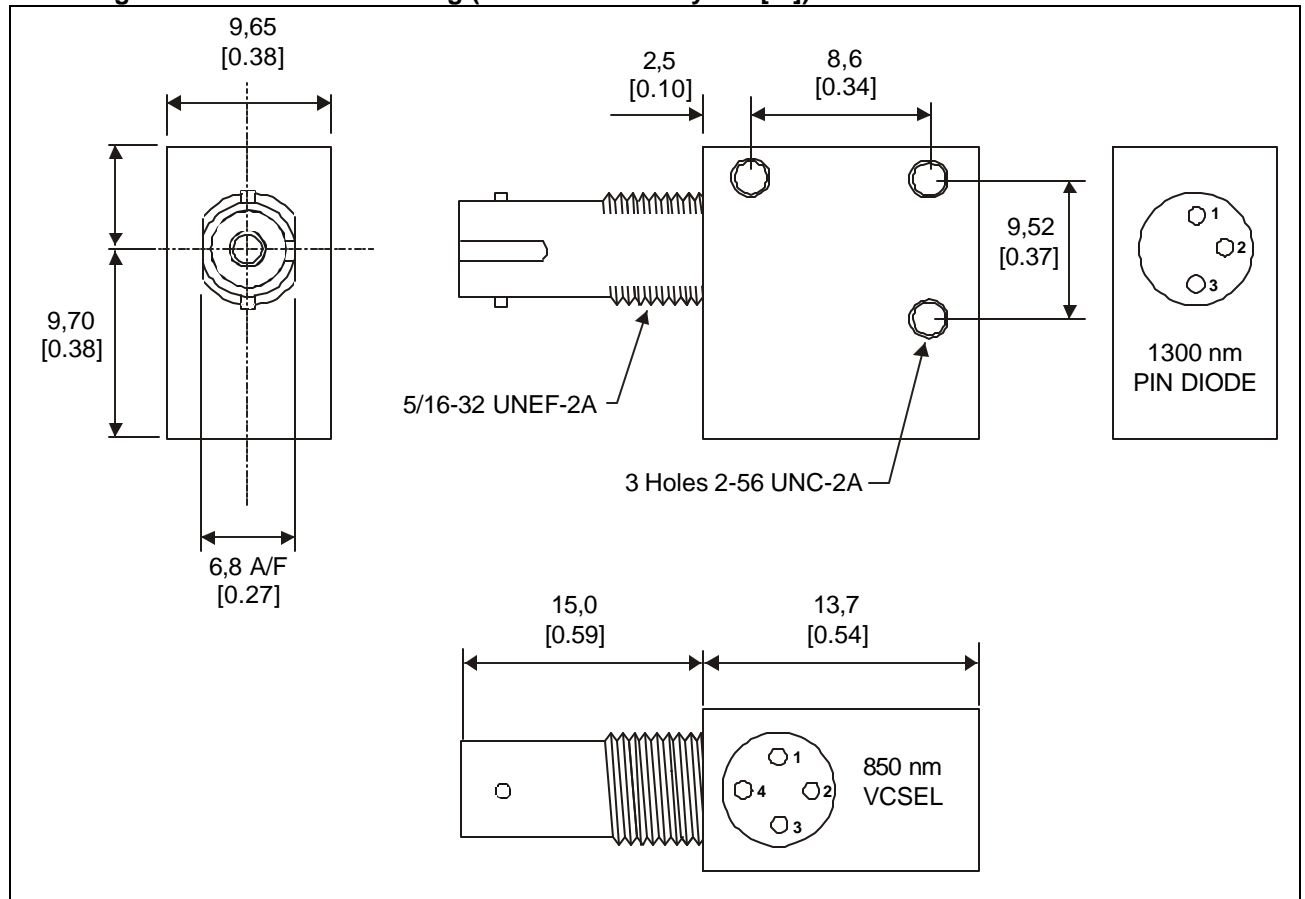
### CAUTION

#### 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		

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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:

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

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

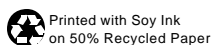
For application assistance, current specifications, or name of the nearest Authorized Distributor, check the Honeywell web site or call:

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