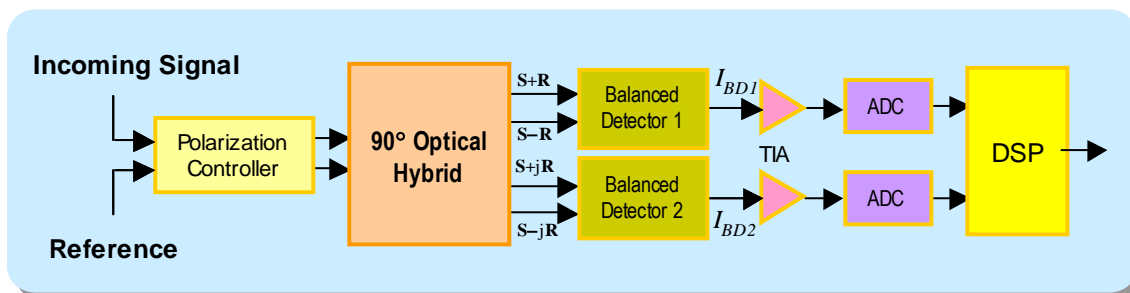


90° Optical Hybrid

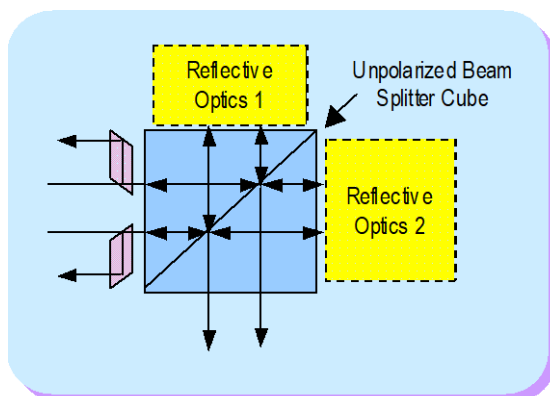
To be used for optical coherent detection, including QPSK receiver, Optoplex's six-port **90° Optical Hybrid** mixes the incoming signal with the reference signal to generate four quadratural states in the complex-field space. The optical hybrid then delivers the four light signals to two pairs of balanced detectors. See the block diagram below for the application of 90° Optical Hybrid in a coherent receiver.



Optoplex's free-space micro-optics-based, **passive** 90° Optical Hybrid is suitable for *coherent signal demodulation*, BPSK or QPSK demodulation. The patent-pending, broadband device accepts the two optical signals (S & L) and generates four output signals: S+L, S-L, S+jL, S-jL, as shown below. When these signals are detected by two balanced receivers, both the amplitude and the relative phase information between the input signals can be extracted via differential detection and digital signal processing. Moreover, in a coherent system, the preservation of the optical phase can be used to cost-effectively compensate optical transmission impairments in the electrical domain.

Key Features and Benefits

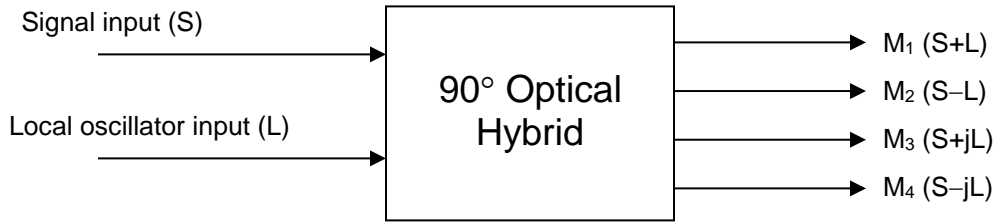
- Purely passive (no need for external electric power)
- Compact size
- Based on free-space bulk-optics design
- Polarization diversified version also available



Applications

- Key component for the optical coherent detection
- QPSK demodulation

Optical Hybrid Standard Product Datasheet

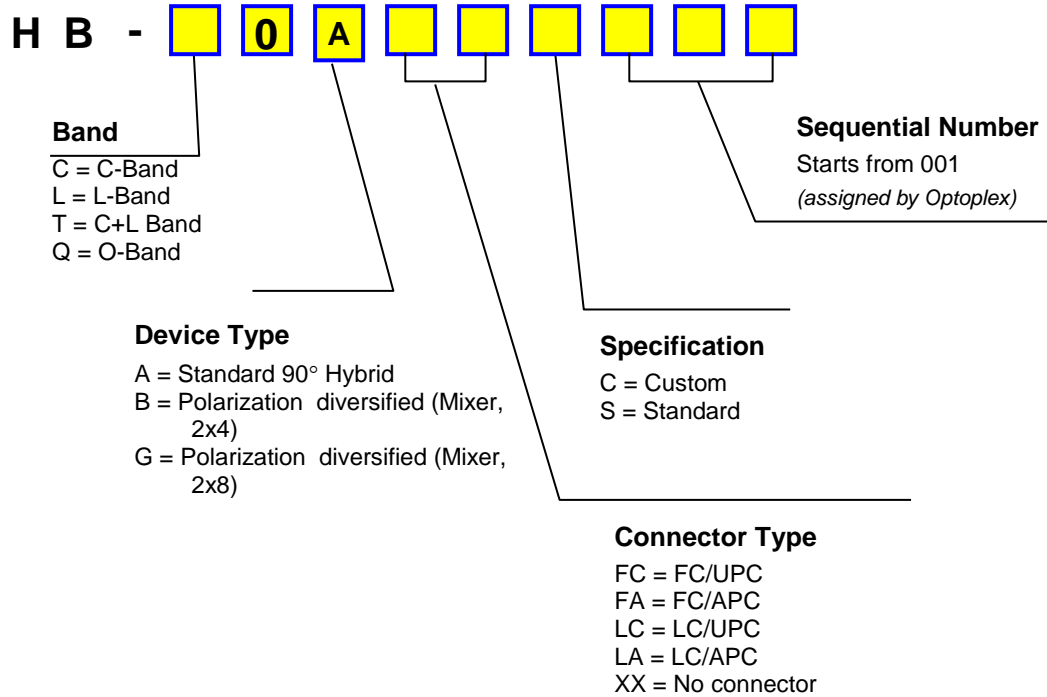


Parameter		Unit	Specification
Wavelength Range ¹	C- Band	<i>nm</i>	1525 ~ 1570
	L - Band	<i>nm</i>	1570 ~ 1610
	C+L Band	<i>nm</i>	1525 ~ 1610
	O-Band	<i>nm</i>	1310 +/-30
Phase Difference ^{1,2} (between M ₁ , M ₂ and M ₃ , M ₄)		<i>deg</i>	90 ± 10
Insertion Loss ¹ (without connector)	S→M _i	<i>dB</i>	< 9.0
	L→M _i	<i>dB</i>	< 9.0
Insertion Loss Difference ¹	between S→M ₁ and S→M ₂	<i>dB</i>	< 1.2
	between S→M ₃ and S→M ₄	<i>dB</i>	< 1.2
	between L→M ₁ and L→M ₂	<i>dB</i>	< 1.2
	between L→M ₃ and L→M ₄	<i>dB</i>	< 1.2
Optical Return Loss		<i>dB</i>	> 27
Optical Path Difference (skew, between M ₁ and M ₂ and between M ₃ and M ₄)		<i>ps</i>	< 1
Operating Temperature		<i>°C</i>	-5 ~ +65
Storage Temperature		<i>°C</i>	-40 ~ 85
Dimension (L×W×H) ³		<i>mm</i>	30×30×15.5
Fiber Type ⁴		-	SMF-28e with 900 μm loose tube
Connector Type ⁵		-	FC/APC

Notes:

1. Over the stated spectral and operating temperature ranges and all polarization states.
2. Premium grade with Phase Error 90 +/-5 deg available. Contact Optoplex for details.
3. Subject to change, not including collimator sleeves extending from the two adjacent sides by 21 mm.
4. Standard design with SMF for all-ports. Other options available upon request.
5. Standard connector, FC/APC. Other types available. See ordering information.

90deg Optical Hybrid Part Number Scheme and Ordering Information



Notes:

- 1) In the standard design of 90deg Optical Hybrid, the type of fiber for both inputs and outputs is SMF-28e or equivalent single mode fiber.
- 2) Options for the type of fibers in 90deg Optical Hybrid are available. Contact sales@optoplex.com for details.

Examples of Part Numbers of Typical Configurations

P/N	Description	Special Note
HB-COAFCS001	90-degree Optical Hybrid, C-Band, SMF for All Ports, FC/UPC for All-Ports	Std design, FC/UPC
HB-COAFAS002	90-degree Optical Hybrid, C-Band, SMF for All Ports, FC/APC for All-Ports	Std. design, FC/APC
HB-COAFAS013	90-degree Optical Hybrid, C-Band, SMF for All Ports, FC/APC, Phase 90±5°	
HB-COAFAC016	90-degree Optical Hybrid, C-Band, PMF for Input Ports (both Signal- and Lo-), SMF for All Output Ports , FC/APC for All Ports	
HB-COAFAC057	90-degree Optical Hybrid, C-Band, PMF for Input Ports (both Signal- and Lo-), SMF for All Output Ports , FC/APC for All Ports, Phase 90±5°	
HB-COAFAC055	90-degree Optical Hybrid, C-Band, PMF for All Input and Output Ports ,	
HB-COAFAS066	90-degree Optical Hybrid, C-Band, PMF for All Input and Output Ports , Phase 90±5°	

Note: Unless otherwise specified, the phase is 90 +/- 10deg.