Optoplex™ CORPORATION

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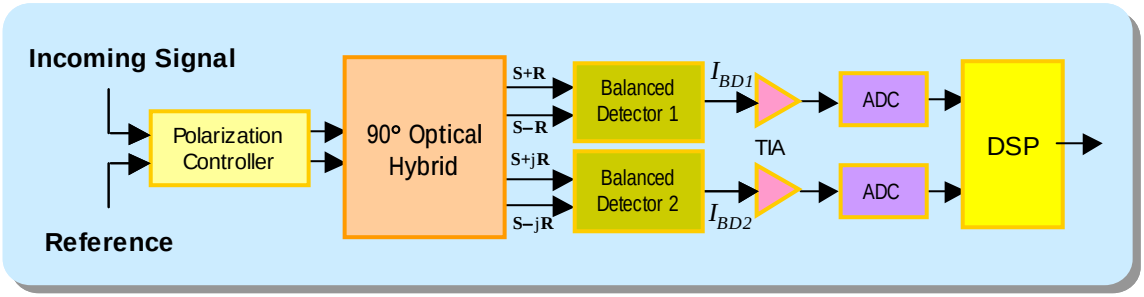
90° Optical Hybrid

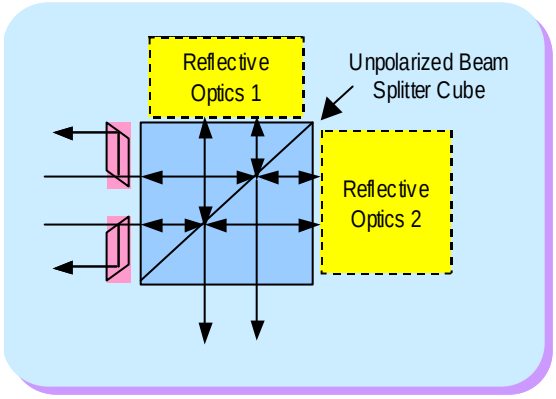
To be used for optical coherent detection, including QPSK receiver, Optoplex's six-port **90° Optical Hybrid** mixes the incoming signal with the reference signal to generate four quadratural states in the complex-field space. The optical hybrid then delivers the four light signals to two pairs of balanced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

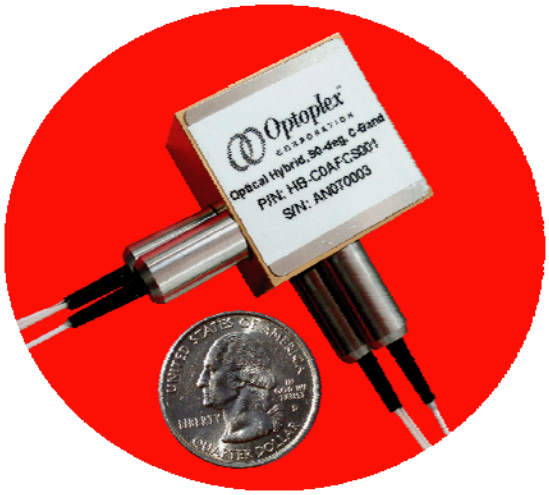


Optoplex's free-space micro-optics-based, **passive** 90º Optical Hybrid is suitable for *coherent signal demodulation*, BPSK or QPSK demodulation. The patent-pending, broadband device accepts the two optical signals (S & L) and generates four output signals: S+L, S-L, S+jL, S-jL, as shown below. When 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

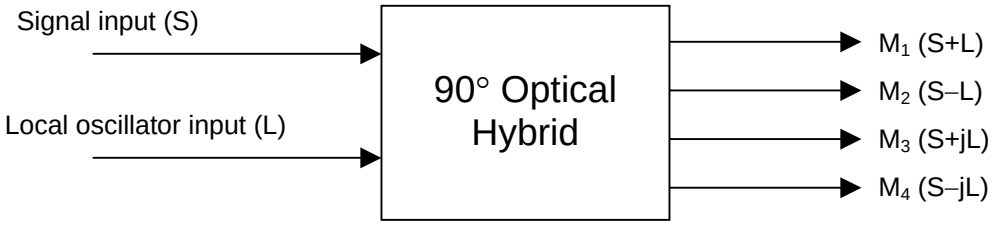




Applications

- Key component for the optical coherent detection
- QPSK demodulation

Optical Hybrid Standard Product Datasheet



Parameter		Unit	Specification
Wavelength Range (C- or L-Band)		nm	1527 ~ 1567
Phase Difference[1] (between M_1, M_2 and M_3, M_4)		deg	90 ± 5
Insertion Loss[1] (without connector)	$S \rightarrow M_i$	dB	< 8.5
	$L \rightarrow M_i$	dB	< 8.5
Insertion Loss Difference[1]	between $S \rightarrow M_1$ and $S \rightarrow M_2$	dB	< 1.2
	between $S \rightarrow M_3$ and $S \rightarrow M_4$	dB	< 1.2
	between $L \rightarrow M_1$ and $L \rightarrow M_2$	dB	< 1.2
	between $L \rightarrow M_3$ and $L \rightarrow M_4$	dB	< 1.2
Optical Return Loss		dB	> 27
Optical Path Difference (skew, between M_1 and M_2 and between M_3 and M_4)		ps	<1
Optical Path Difference (skew, between any other two outputs)		mm	<2 in fiber length
Operating Temperature		^oC	15 ~ 35
Storage Temperature		^oC	–40 ~ 85
Dimension (L×W×H)[2]		mm	30×30×15.5
Fiber Type		-	SMF-28 with 900 μm loose tube
Connector Type		-	TBD

Notes:

1. Over the stated spectral and operating temperature ranges and all polarization states.
2. Subject to change, not including collimator sleeves extending from the two adjacent sides by 21 mm.

Optoplex Corporation, located in Fremont, California, is an ISO9001:2000 certified supplier of cutting-edge photonic components and modules for dynamic wavelength management and signal conditioning. The company designs, develops, manufactures, and markets innovative fiber-optic products to communications networks, and provides customized solutions to instrument, defense, spectroscopy and sensing industries. By combining its proprietary optical design and packaging technology with its state-of-the-art optical coating expertise and facility, Optoplex supplies DPSK demodulators, DQPSK demodulators, 90° optical hybrids, 2-port tunable optical filters, 3-port reconfigurable optical add/drop multiplexers (ROADMs), optical interleavers, flat-top comb filters, optical performance monitors (OPMs), and portable spectrometers.