Keysight Technologies
Beamsplitter Family
Precision beam control for demanding Optical applications

Technical Overview

- Parallel or orthogonal output beams
- Near-distortionless beam splitting
- Multiple geometries
- Standard and custom products available
Keysight beamsplitter family

Overview

The Keysight Technology, Inc. family of high-performance beamsplitters offers industry-leading polarization and beam control with low wavefront distortion. For more than 35 years, Keysight has designed and produced beamsplitters exclusively for the most demanding custom interferometry applications. Today, optics produced using these high-precision design and manufacturing techniques are available in a variety of standard and custom products.

Keysight’s family of precision beamsplitters split light by polarization, amplitude, or wavelength. They are available in cube, plate, and displacement geometries. In both standard and custom models, Keysight beamsplitters deliver a high-level of performance and consistency that optical designers can count on. They offer a range of choices to meet current and emerging applications in aerospace and defense, homeland security, biotechnology, scientific instrumentation, and nanotechnology measurement.

Flexibility

Keysight’s beamsplitter product family is designed with the flexibility to meet unique system requirements. Keysight’s standard beamsplitters separate an input beam into two or more output beams based on polarization, amplitude, or wavelength. Standard products are available at laser wavelengths from 193 to 1550 nm. For applications requiring orthogonal output beams, Keysight offers cube and plate geometries. For applications requiring a precise parallel or lateral displacement of output beams, Keysight’s standard displacement beamsplitters are available with arcsecond accuracy. Custom beamsplitters are also available for applications requiring non-standard wavelengths or geometries.

Proven reliability

More than 10,000 Keysight optical assemblies have shipped, attesting to our ability to design, fabricate, and deliver high-quality optical products and assemblies. Keysight optics are used by leading semiconductor equipment, aerospace and defense, and test and measurement companies for precise beam control.

Applications

– Distance interferometry
– Polarization recovery
– Beam steering

Key benefits

– Convenient splitter geometries
– Large clear aperture
– Precise beam positioning

Cube beamsplitters are designed to separate an input beam into two beams accurately exiting at a 90° angle to each other.

Keysight’s plate beamsplitters offer compact size and thermal mass with lower wavefront distortion; arcsecond wedge tolerance ensures a precise 90° separation between the output beams.

Keysight’s displacement beamsplitters accurately split an input beam into two or more output beams with arcsecond parallelism.
Polarizing beamsplitters

Keysight’s polarization beamsplitters are designed to transmit p-polarized light, and reflect or displace s-polarized light. Standard and custom configurations are available for optical instrumentation, laser interferometry, and biomedical applications. Geometries that separate the output beams by 90° (cube beamsplitters) are available, as are geometries that displace the output beams, which remain parallel (displacement beamsplitters); other geometries are available on a custom basis.

Polarizing cube beamsplitters
Keysight’s standard polarization beam splitting cubes separate the orthogonally-polarized output beams by 90° with an accuracy of five arcminutes; custom models are available with arcsecond accuracy. Keysight’s proprietary bonding and coating procedures ensure each output has a very high contrast (1,000:1) and low transmitted wavefront distortion (TWD) of \( \lambda/8 \).

Polarizing displacement beamsplitters
Where applications require parallel output beams, Keysight’s standard displacement beamsplitters provide the same industry-leading contrast ratio and TWD in a compact optic that displaces the beam with 25 arcsecond parallelism. Keysight’s BK7 displacement beamsplitters offer the functionality of crystal beam displacers and are more durable, withstanding scratches and stains. In addition, Keysight’s displacement beamsplitters are more compact, as the size is not a function of the beam separation.

As a result, Keysight’s standard beamsplitters are offered with the small separations enabled by crystal beam displacers, or large separations that are impractical with the traditional materials.

Applications
- Available with parallel or orthogonally propagating output beams
- 1,000:1 contrast in both output beams
- \( \lambda/8 \) TWD in both output beams
- Arcsecond beam parallelism

Benefits
- Compact size
- Near-distortionless output
- Accurate output beam placement
- Symmetrical performance

Call for standard and custom product availability

Standard non-polarizing beamsplitters are available in displacement, cube and plate configurations; custom geometries are available upon request
Non-polarizing beamsplitters

Keysight’s standard non-polarizing beamsplitter configurations separate the input beam into two output beams; custom configurations can split the input beam into three or more output beams. Non-polarizing beamsplitters are used in a variety of applications in optical instrumentation to distribute fractions of an input beam to other optical sub-assemblies. Standard 50/50 beamsplitters are available in cube, plate, and displacement configurations. Custom beamsplitters are available with the specific split ratios that your application requires.

Non-polarizing cube beamsplitters

Keysight’s non-polarizing beamsplitter cubes accurately separate the output beams by 90°, while Keysight’s proprietary coating processes ensure that each output beam maintains the polarization of the input beam and maintains a low wavefront distortion of λ/8.

Non-polarizing plate beamsplitters

Keysight’s Standard plate beamsplitters also separate the output beams by 90° and offer a λ/10 wavefront distortion.

Non-polarizing displacement beamsplitters

Where applications require the output beams to be parallel, Keysight’s standard displacement beamsplitters offer industry-leading parallelism, accurate to 25 arcseconds.

<table>
<thead>
<tr>
<th>Wavelength (nm)</th>
<th>Transmittance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>60</td>
</tr>
<tr>
<td>610</td>
<td>58</td>
</tr>
<tr>
<td>620</td>
<td>56</td>
</tr>
<tr>
<td>630</td>
<td>54</td>
</tr>
<tr>
<td>640</td>
<td>52</td>
</tr>
<tr>
<td>650</td>
<td>50</td>
</tr>
<tr>
<td>660</td>
<td>48</td>
</tr>
</tbody>
</table>

Measured data (45° incidence in glass)

Benefits

- Compact size
- Accurate output beam placement
- Near-distortionless output
- Symmetrical performance

Applications

- Available with parallel or orthogonally propagating output beams
- Accurate polarization preservation in output beams
- λ/8 to λ/10 TWD in both beams
- 50/50, 33/66, and other split ratios available

Immersed non-polarizing 50/50 beamsplitter

Non-polarizing cube beamsplitter at 633 nm
Dichroic Filters and Mirrors

Keysight’s chromatic beamsplitters separate the input light into two output beams. Standard products are available as plate beamsplitters and transmit a narrow wavelength band (bandpass filters); custom beamsplitters are available that reflect a specific bandwidth (notch filters), or transmit all wavelengths above a specific center wavelength (long-wave pass) or below a specific center wavelength (short-wave pass), while reflecting the rest.

Features
- High pass-band transmission/Low stop-band transmission
- Sharp spectral transitions
- Environmentally robust
- Thin substrate for minimal beam displacement
- Arcsecond wedge
- λ/10 TWD in both output beams

Benefits
- Convenient size for integration in standard mechanical mounts
- Near-distortionless output

Sample low-pass filter, band-pass filter, and high-pass filter transmission curves for RGB separation.

Call for standard and custom product availability.
Experience you can count on

For over 35 years, Keysight Precision Optics has developed and manufactured optical components, monolithic assemblies, and complex optomechanical assemblies for market-leading laser interferometry systems. Combining experienced craftsmanship with deterministic manufacturing process control for volume production, Keysight now serves aerospace and defense and commercial markets with cutting-edge metrology and world-class design, fabrication and thin film coatings in a vertically integrated factory.

Keysight’s staff of optical engineers is ready to apply their many years of leading-edge optical design experience to your project. Whether it’s a coating design to exacting specifications, the design of a new optic, consultation on an optical fabrication question, or help with a metrology or process control problem, we can provide specific state-of-the-art expertise to rapidly and efficiently solve your problem.

Services available

- Optical design
- Thin-film coating design
- Optical fabrication consulting
- Monolithic opto-mechanical assembly design
- Optical metrology consulting and design
- Process control consulting
- Environmental test

And, Keysight offers comprehensive and proven services from initial concept through volume production under one roof. The result: faster turnaround, clear accountability, and the benefits of decades of real world manufacturing experience.

Coating technologies

Evaporation and Sputtering are examples of Physical Vapor Deposition (PVD) coating technologies. In PVD, the thin film materials are converted to a vapor state through energy transfer (in evaporation) or momentum transfer (in sputtering) prior to condensing on the substrates.

Evaporated coatings enable deposition of low-stress coatings, and are ideal where wavefront is a primary design goal.

Sputtered coatings have higher packing densities enabling a more spectrally stable performance in a variety of operational environments and where spectral accuracy is a primary design goal.

Keysight Precision Optics’ engineers utilize both evaporation and sputtering chambers to design coatings that best meet the customer’s needs and requirements.
Evolving Since 1939
Our unique combination of hardware, software, services, and people can help you reach your next breakthrough. We are unlocking the future of technology.
From Hewlett-Packard to Agilent to Keysight.

myKeysight
www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

www.keysight.com/find/emt_product_registration
Register your products to get up-to-date product information and find warranty information.

Keysight Services
www.keysight.com/find/service
Keysight Services can help from acquisition to renewal across your instrument’s lifecycle. Our comprehensive service offerings—one-stop calibration, repair, asset management, technology refresh, consulting, training and more—helps you improve product quality and lower costs.

Keysight Assurance Plans
www.keysight.com/find/AssurancePlans
Up to ten years of protection and no budgetary surprises to ensure your instruments are operating to specification, so you can rely on accurate measurements.

Keysight Channel Partners
www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight’s measurement expertise and product breadth, combined with channel partner convenience.

For more information on Keysight Technologies’ products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

Americas
Canada (877) 894 4414
Brazil 55 11 3351 7010
Mexico 001 800 254 2440
United States (800) 829 4444

Asia Pacific
Australia 1 800 629 485
China 800 810 0189
Hong Kong 800 938 693
India 1 800 11 2626
Japan 0120 (421) 345
Korea 080 769 0800
Malaysia 1 800 888 848
Singapore 1 800 375 8100
Taiwan 0800 047 886
Other AP Countries (65) 8375 8100

Europe & Middle East
Austria 0800 001 122
Belgium 0800 58580
Finland 0800 523252
France 0805 980333
Germany 0800 6270999
Ireland 1800 832700
Israel 1 809 343051
Italy 800 599100
Luxembourg +32 800 58580
Netherlands 0800 0233200
Russia 8800 5009286
Spain 800 000154
Sweden 0200 882255
Switzerland 0800 805353
Opt. 1 (DE)
Opt. 2 (FR)
Opt. 3 (IT)
United Kingdom 0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-9-7-17)

DEKRA Certified
ISO9001 Quality Management System

www.keysight.com/go/quality
Keysight Technologies, Inc.
DEKRA Certified ISO 9001:2015
Quality Management System

This information is subject to change without notice.
© Keysight Technologies, 2017
Published in USA, December 1, 2017
5989-6180EN
www.keysight.com