

TECHSPEC<sup>®</sup> 20mm Dia. x 2mm Thick, 3-5μm AR Coating, Ge Window



Germanium (Ge) Windows

Stock **#89-562** 14 In Stock

-

1

+

£548<sup>00</sup>

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| Qty 1+         | £548.00 each                  |
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General

Type:

Protective Window

Physical & Mechanical Properties

Clear Aperture CA (mm):

18.00

Diameter (mm):

20.00 +0.0/-0.1

Thickness (mm):

|                      |                             |
|----------------------|-----------------------------|
| 2.00 ±0.1            |                             |
| <1                   | Parallelism (arcmin):       |
| +0.0/-0.1            | Dimensional Tolerance (mm): |
| Protective as needed | Bevel:                      |
| 90.00                | Clear Aperture (%):         |
| Fine Ground          | Edges:                      |
| 0.28                 | Poisson's Ratio:            |
| 102.7                | Young's Modulus (GPa):      |
| 780.00               | Knoop Hardness (kg/mm²):    |

|                                |                                        |
|--------------------------------|----------------------------------------|
| Optical Properties             |                                        |
| BBAR (3000-5000nm)             | Coating:                               |
| Germanium (Ge)                 | Substrate: <input type="checkbox"/>    |
| 4.002 @ 11µm                   | Index of Refraction (n <sub>d</sub> ): |
| 60-40                          | Surface Quality:                       |
| R <sub>avg</sub> <3% @ 3 - 5µm | Coating Specification:                 |
| 3000 - 5000                    | Wavelength Range (nm):                 |
| N10 @ 10.6µm                   | Surface Flatness (P-V):                |

|                     |                                                              |
|---------------------|--------------------------------------------------------------|
| Material Properties |                                                              |
| 5.33                | Density (g/cm³):                                             |
| 6.1                 | Coefficient of Thermal Expansion CTE (10 <sup>-6</sup> /°C): |

|                       |                             |
|-----------------------|-----------------------------|
| Regulatory Compliance |                             |
| Compliant             | RoHS 2015:                  |
| View                  | Certificate of Conformance: |
| Compliant             | REACH 241:                  |

## Product Details

- Uncoated or with AR Coatings Designed for a Variety of IR Ranges
- Mnnimal Chromatic Aberration Due to Low Dispersion
- Ideal for Infrared Applications Requiring Rugged Optics
- [DLC Coated Germanium Windows](#) are also Available
- Due to material supply chain disruptions with germanium, there may be increased lead times and price changes on our germanium products. For more information, please contact our [customer service team](#).
- Edmund Optics has limited remaining inventory of this part number and no raw material available to supply more once this is depleted. Please contact our Product Support Engineers to help with an alternate solution for your needs. Customer Service can provide you the latest price and availability.

TECHSPEC® Germanium (Ge) Windows are available off-the-shelf with three anti-reflection coating options: 3 - 5µm for mid-infrared applications, 3 - 12µm for broadband multispectral applications, or 8 - 12µm for thermal imaging applications. Due to its high index of refraction (around 4.0 from 2 - 14µm), an anti-reflection coating is recommended on these germanium windows for sufficient transmission in the region of interest. Germanium is subject to thermal runaway, meaning the transmission decreases as temperature increases. As such, TECHSPEC Germanium (Ge) Windows should be used at temperatures below 100°C. Germanium's high density (5.33 g/cm3) should be considered when designing for weight-sensitive systems. The Knoop Hardness of germanium (780) is approximately twice that of magnesium fluoride, making it ideal for infrared applications requiring rugged optics.

## Technical Information



| AR COATED GERMANIUM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|---|----|---|----|---|----|---|----|---|----|---|----|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| <div><p>Ge with 3-5μm AR Coating<br/>Typical Transmission</p><table border="1"><thead><tr><th>λ (μm)</th><th>T (%)</th></tr></thead><tbody><tr><td>2</td><td>20</td></tr><tr><td>3</td><td>95</td></tr><tr><td>4</td><td>98</td></tr><tr><td>5</td><td>98</td></tr><tr><td>6</td><td>95</td></tr><tr><td>7</td><td>90</td></tr><tr><td>8</td><td>85</td></tr><tr><td>9</td><td>80</td></tr><tr><td>10</td><td>75</td></tr><tr><td>11</td><td>70</td></tr><tr><td>12</td><td>65</td></tr><tr><td>13</td><td>60</td></tr><tr><td>14</td><td>55</td></tr><tr><td>15</td><td>50</td></tr><tr><td>16</td><td>40</td></tr></tbody></table></div> <div><p>Typical transmission of a 3mm thick Ge window with BBAR (3000-5000nm) coating at 0° AOI.</p><p>The blue shaded region indicates the coating design wavelength range, with the following specification:</p><p><math>R_{avg} &lt; 3\%</math> @ 3000 - 5000nm</p><p>Data outside this range is not guaranteed and is for reference only.</p><p><a href="#">Click Here to Download Data</a></p></div> | λ (μm) | T (%) | 2 | 20 | 3 | 95 | 4 | 98 | 5 | 98 | 6 | 95 | 7 | 90 | 8 | 85 | 9 | 80 | 10 | 75 | 11 | 70 | 12 | 65 | 13 | 60 | 14 | 55 | 15 | 50 | 16 | 40 |  |
| λ (μm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | T (%)  |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 95     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 95     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 90     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 85     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 80     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 75     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 70     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 65     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 60     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 55     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 40     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
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| λ (μm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | T (%)  |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 80     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 95     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 85     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 80     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 75     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 60     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
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| λ (μm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | T (%)  |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 50     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 90     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 30     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 40     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 60     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 95     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 98     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 95     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 85     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 80     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 65     |       |   |    |   |    |   |    |   |    |   |    |   |    |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

## Special Handling

### Germanium Optics Handling and Cleaning Guidelines

Germanium optics require special handling and cleaning procedures. Always wear gloves during handling to prevent contamination, and wash hands afterward. Avoid contact between Germanium dust and the eyes, skin, or clothing. When not in use, store optics sealed and covered at temperatures between 20°C and 25°C. Do not expose them to temperatures exceeding 100°C when in use.

#### Handling Guidelines

- Always wear [gloves](#) to prevent damage from skin oils.
- If Germanium dust is present, take the following precautions:
  - Wear safety glasses to protect eyes.
  - Use a dust mask or face mask to avoid inhalation.
  - Wear [gloves](#) to prevent skin contact.

- Maintain storage temperature between 20°C and 25°C with humidity below 30%.
- Wrap Germanium optics in a [lens cloth](#) or [pouch](#) and seal in a [container](#) when not in use.
- Germanium is brittle and heavy—always place it on soft surfaces and avoid dropping it.

Approved Cleaning Solvents

- Ethanol
- Isopropyl Alcohol
- Methanol
- Reagent-Grade Acetone
- Liquid CO<sub>2</sub>
- [Shop Now](#)

Custom

Edmund Optics offers comprehensive custom manufacturing services for optical and imaging components tailored to your specific application requirements. Whether in the prototyping phase or preparing for full-scale production, we provide flexible solutions to meet your needs. Our experienced engineers are here to assist—from concept to completion.

Our capabilities include:

- Custom dimensions, materials, coatings, and more
- High-precision surface quality and flatness
- Tight tolerances and complex geometries
- Scalable production—from prototype to volume

Learn more about our [custom manufacturing capabilities](#) or submit an inquiry [here](#).

Compatible Mounts

