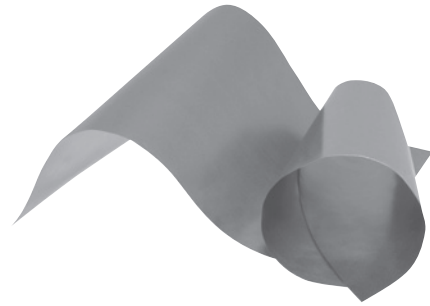


## “PGS” Graphite Sheets

Type: **EYG**

“PGS (Pyrolytic Graphite Sheet)” is a thermal interface material which is very thin, synthetically made, has high thermal conductivity, and is made from a highly oriented graphite polymer film. It is ideal for providing thermal management/heat-sinking in limited spaces or to provide supplemental heat-sinking in addition to conventional means. This material is flexible and can be cut into customizable shapes.

“SSM(Semi-Sealing Material)” is the product which is compounding PGS Graphite sheet and High thermal conductive Elastomer resin. It has a function to absorb heat by resin and release the heat by utilizing high thermal conductivity of PGS Graphite sheet. It also enables taking better attachment to the component which has different height on the electronic board, reducing stress to the electronic board.



### Features

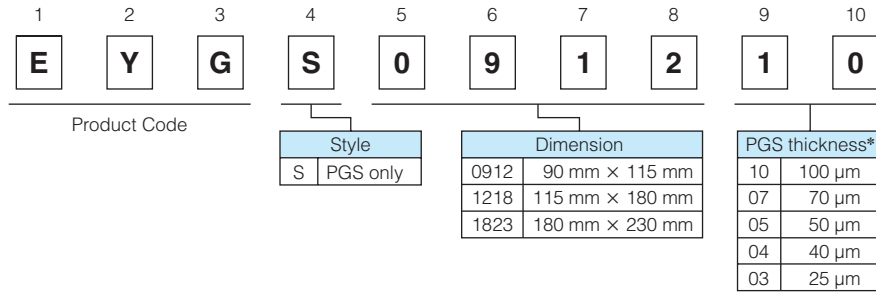
- Excellent thermal conductivity : 700 to 1950 W/(m·K)  
(2 to 5 times as high as copper, 3 to 8 times as high as aluminum)
- Lightweight: Specific gravity : 0.85 to 2.13 g/cm<sup>3</sup>  
(1/4 to 1/10 of copper, 1/1.3 to 1/3 of aluminum in density)
- Flexible and easy to be cut or trimmed. (withstands repeated bending)
- Low thermal resistance
- Low heat resistance with flexible Graphite sheet (SSM)
- Low repulsion and easy to keep the product's shape after attaching (SSM)
- Siloxane Free(SSM)
- High dielectric voltage : 17 kVac/mm (SSM)
- RoHS compliant

### Recommended applications

- Smart phones, Mobile phones, DSC, DVC, Tablet PCs, PCs and peripherals, LED Devices
- Semiconductor manufacturing equipment (Sputtering, Dry etching, Steppers)
- Optical communications equipment

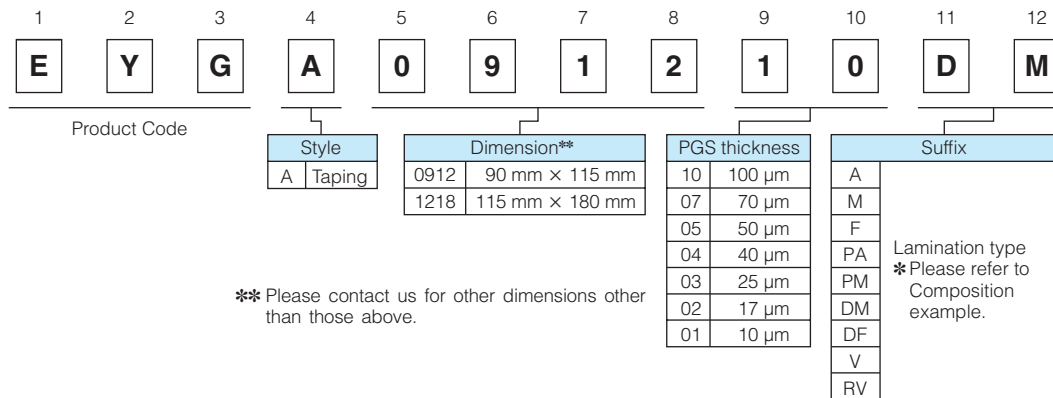
## Explanation of Part Numbers

### ● PGS only (EYGS\*\*\*\*\*)



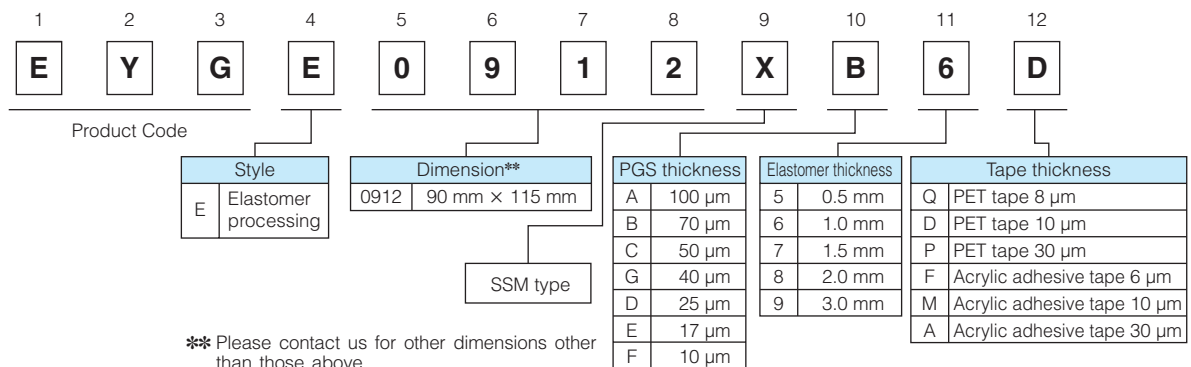
\* PGS thickness of 17 μm, 10 μm does not support as single item.

### ● Taping (EYGA\*\*\*\*\*)



\*\* Please contact us for other dimensions other than those above.

### ● Thermally conductive elastomer processing (EYGE\*\*\*\*\*)



\*\* Please contact us for other dimensions other than those above.

## Characteristics of PGS Graphite Sheets

| Thickness               |           | 100 μm                   | 70 μm                    | 50 μm                    | 40 μm                    |
|-------------------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|
|                         |           | 0.10±0.03 mm             | 0.07±0.015 mm            | 0.050±0.015 mm           | 0.040±0.012 mm           |
| Density                 |           | 0.85 g/cm <sup>3</sup>   | 1.21 g/cm <sup>3</sup>   | 1.70 g/cm <sup>3</sup>   | 1.80 g/cm <sup>3</sup>   |
| Thermal conductivity    | a-b plane | 700 W/(m·K)              | 1000 W/(m·K)             | 1300 W/(m·K)             | 1350 W/(m·K)             |
| Electrical conductivity |           | 10000 S/cm               | 10000 S/cm               | 10000 S/cm               | 10000 S/cm               |
| Extensional strength    |           | 20.0 MPa                 | 20.0 MPa                 | 20.0 MPa                 | 25.0 MPa                 |
| Expansion coefficient   | a-b plane | 9.3×10 <sup>-7</sup> 1/K | 9.3×10 <sup>-7</sup> 1/K | 9.3×10 <sup>-7</sup> 1/K | 9.3×10 <sup>-7</sup> 1/K |
|                         | c axis    | 3.2×10 <sup>-5</sup> 1/K | 3.2×10 <sup>-5</sup> 1/K | 3.2×10 <sup>-5</sup> 1/K | 3.2×10 <sup>-5</sup> 1/K |
| Heat resistance*        |           | 400 °C                   |                          |                          |                          |
| Bending(angle 180,R5)   |           | 10000 cycles             |                          |                          |                          |

| Thickness               |           | 25 μm                    | 17 μm                    | 10 μm                    |
|-------------------------|-----------|--------------------------|--------------------------|--------------------------|
|                         |           | 0.025±0.010 mm           | 0.017±0.005 mm           | 0.010±0.002 mm           |
| Density                 |           | 1.90 g/cm <sup>3</sup>   | 2.10 g/cm <sup>3</sup>   | 2.13 g/cm <sup>3</sup>   |
| Thermal conductivity    | a-b plane | 1600 W/(m·K)             | 1850 W/(m·K)             | 1950 W/(m·K)             |
| Electrical conductivity |           | 20000 S/cm               | 20000 S/cm               | 20000 S/cm               |
| Extensional strength    |           | 30.0 MPa                 | 40.0 MPa                 | 40.0 MPa                 |
| Expansion coefficient   | a-b plane | 9.3×10 <sup>-7</sup> 1/K | 9.3×10 <sup>-7</sup> 1/K | 9.3×10 <sup>-7</sup> 1/K |
|                         | c axis    | 3.2×10 <sup>-5</sup> 1/K | 3.2×10 <sup>-5</sup> 1/K | 3.2×10 <sup>-5</sup> 1/K |
| Heat resistance*        |           | 400 °C                   |                          |                          |
| Bending(angle 180,R5)   |           | 10000 cycles             |                          |                          |

\* Withstand temperature refers to PGS only.  
(Lamination material such as PET tape etc. is not included)

\*\* Values are for reference, not guaranteed.

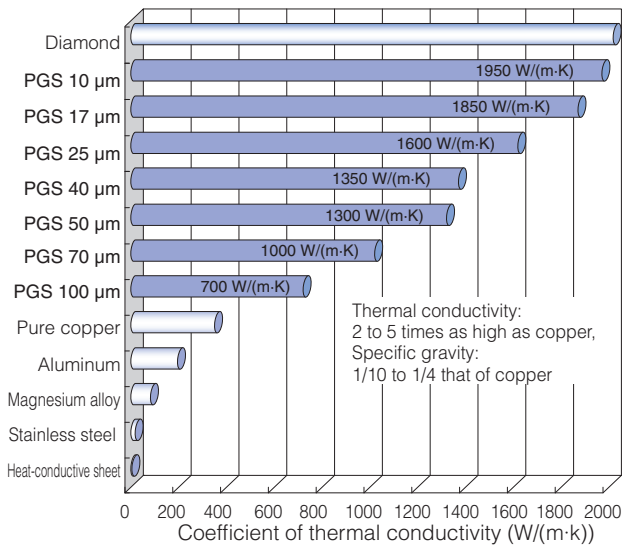
## Characteristics of SSM (Elastomer)

| Thickness            |          | 1 mm                        | 2 mm                         | 3 mm                         |
|----------------------|----------|-----------------------------|------------------------------|------------------------------|
| Specific heat        |          | 1.4 J/(g·C)                 |                              |                              |
| Density              |          | 1.88 g/cm <sup>3</sup>      |                              |                              |
| Thermal conductivity |          | 1.6 W/(m·K)**               |                              |                              |
| Thermal resistance   | 100 kPa  | 7.53 (C·cm <sup>2</sup> )/W | 14.82 (C·cm <sup>2</sup> )/W | 19.48 (C·cm <sup>2</sup> )/W |
|                      | 200 kPa  | 6.71 (C·cm <sup>2</sup> )/W | 13.17 (C·cm <sup>2</sup> )/W | 16.01 (C·cm <sup>2</sup> )/W |
|                      | 300 kPa  | 5.90 (C·cm <sup>2</sup> )/W | 10.73 (C·cm <sup>2</sup> )/W | 11.38 (C·cm <sup>2</sup> )/W |
| Compressibility      | 100 kPa  | 4.93 %                      | 4.05 %                       | 4.43 %                       |
|                      | 200 kPa  | 9.58 %                      | 8.66 %                       | 14.04 %                      |
|                      | 300 kPa  | 18.41 %                     | 22.13 %                      | 40.49 %                      |
| Resistivity          |          | > 10×10 <sup>14</sup> Ω·cm  |                              |                              |
| Dielectric voltage   |          | > 17 kVac/mm                |                              |                              |
| Hardness (Type E)    |          | 39                          |                              |                              |
| Adhesive force       | SUS      | 39 mN/cm                    |                              |                              |
|                      | Aluminum | 31 mN/cm                    |                              |                              |
|                      | Glass    | 38 mN/cm                    |                              |                              |

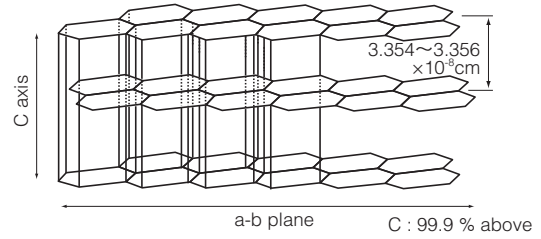
\* Characteristics refer to Elastomer resin only.

\*\* Typical values, not guaranteed.

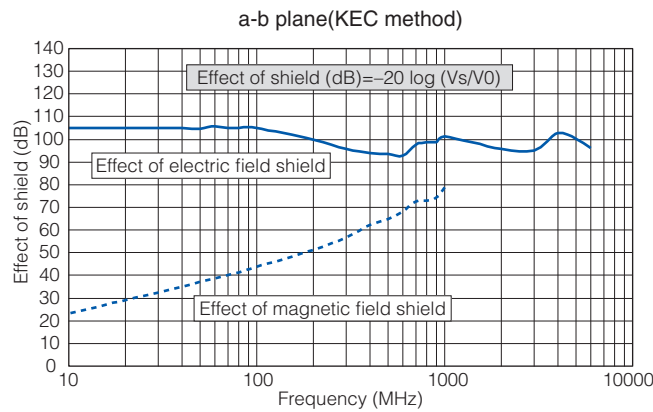
## Comparison of thermal conductivity (a-b plane)



## Layered structure of PGS

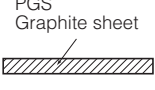
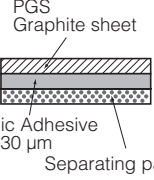
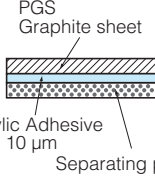
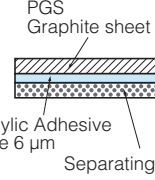


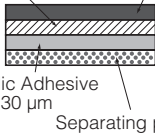
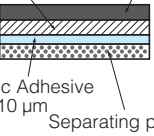
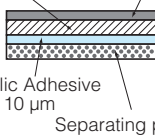
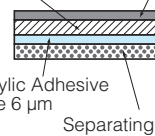
## Electric field shield performance



## Lamination type/Composition example

- Standard series ( PGS 100, 70, 50, 40, 25, 17, 10 μm)

| Type                  | Adhesive Type  |  |  |   |             |
|-----------------------|--|--|--|---|-------------|
|                       | PGS Only<br>S type   | A-A type   | A-M type   | A-F type  |             |
| Front face            | –  | –  | –  | –   |             |
| Rear face             | –  | Insulative adhesion type 30 μm   | Insulative thin adhesion type 10 μm  | Insulative thin adhesion type 6 μm  |             |
| Structure             |   |   |    |    |             |
| Features              | <ul style="list-style-type: none"> <li>· High Thermal Conductivity</li> <li>· High Flexibility</li> <li>· Low Thermal Resistance</li> <li>· Available up to 400 °C</li> <li>· Conductive Material</li> </ul> | <ul style="list-style-type: none"> <li>· With insulation material on one side</li> <li>· With strong adhesive tape for putting chassis</li> <li>· Withstanding Voltage : 2 kV</li> </ul> | <ul style="list-style-type: none"> <li>· With insulation material on one side</li> <li>· Low thermal resistance comparison with A-A type</li> <li>· Withstanding Voltage : 1 kV</li> </ul> | <ul style="list-style-type: none"> <li>· With insulation material on one side</li> <li>· Low thermal resistance comparison with A-A type</li> </ul> |             |
| Withstand temperature | 400 °C   | 100 °C   | 100 °C   | 100 °C  |             |
| Standard size         | 115 × 180 mm   | 90 × 115 mm  | 90 × 115 mm  | 90 × 115 mm   |             |
| Maximum size          | 180 × 230 mm (25 μm to)  | 115 × 180 mm   | 115 × 180 mm   | 115 × 180 mm  |             |
| 100 μm                | Part No.   | EYGS121810   | EYGA091210A  | EYGA091210M   | EYGA091210F |
|                       | Thickness  | 100 μm   | 130 μm   | 110 μm  | 106 μm      |
| 70 μm                 | Part No.   | EYGS121807   | EYGA091207A  | EYGA091207M   | EYGA091207F |
|                       | Thickness  | 70 μm  | 100 μm   | 80 μm   | 76 μm       |
| 50 μm                 | Part No.   | EYGS121805   | EYGA091205A  | EYGA091205M   | EYGA091205F |
|                       | Thickness  | 50 μm  | 80 μm  | 60 μm   | 56 μm       |
| 40 μm                 | Part No.   | EYGS121804   | EYGA091204A  | EYGA091204M   | EYGA091204F |
|                       | Thickness  | 40 μm  | 70 μm  | 50 μm   | 46 μm       |
| 25 μm                 | Part No.   | EYGS121803   | EYGA091203A  | EYGA091203M   | EYGA091203F |
|                       | Thickness  | 25 μm  | 55 μm  | 35 μm   | 31 μm       |
| 17 μm                 | Part No.   | –  | EYGA091202A  | EYGA091202M   | EYGA091202F |
|                       | Thickness  | –  | 47 μm  | 27 μm   | 23 μm       |
| 10 μm                 | Part No.   | –  | EYGA091201A  | EYGA091201M   | EYGA091201F |
|                       | Thickness  | –  | 40 μm  | 20 μm   | 16 μm       |

| Type                  | Laminated type (Insulation & Adhesive)  |   |   |   |              |
|-----------------------|---|---|---|---|--------------|
|                       | A-PA type   | A-PM type   | A-DM type   | A-DF type   |              |
| Front face            | Polyester tape standard type 30 μm  | Polyester tape standard type 30 μm  | Polyester tape thin type 10 μm  | Polyester tape thin type 10 μm  |              |
| Rear face             | Insulative adhesion type 30 μm  | Insulative thin adhesion type 10 μm   | Insulative thin adhesion type 10 μm   | Insulative thin adhesion type 6 μm  |              |
| Structure             |    |    |   |    |              |
| Features              | <ul style="list-style-type: none"> <li>· With insulation material on both side</li> <li>· Withstanding Voltage PET tape : 4 kV</li> <li>· Adhesive Tape : 2 kV</li> </ul> | <ul style="list-style-type: none"> <li>· With insulation material on both side</li> <li>· Withstanding Voltage PET tape : 4 kV</li> <li>· Adhesive Tape : 1 kV</li> </ul> | <ul style="list-style-type: none"> <li>· With insulation material on both side</li> <li>· Withstanding Voltage PET tape : 1 kV</li> <li>· Adhesive Tape : 1 kV</li> </ul> | <ul style="list-style-type: none"> <li>· With insulation material on both side</li> <li>· Withstanding Voltage PET tape : 1 kV</li> </ul> |              |
| Withstand temperature | 100 °C  | 100 °C  | 100 °C  | 100 °C  |              |
| Standard size         | 90 × 115 mm   | 90 × 115 mm   | 90 × 115 mm   | 90 × 115 mm   |              |
| Maximum size          | 115 × 180 mm  | 115 × 180 mm  | 115 × 180 mm  | 115 × 180 mm  |              |
| 100 μm                | Part No.  | EYGA091210PA  | EYGA091210PM  | EYGA091210DM  | EYGA091210DF |
|                       | Thickness   | 160 μm  | 140 μm  | 120 μm  | 116 μm       |
| 70 μm                 | Part No.  | EYGA091207PA  | EYGA091207PM  | EYGA091207DM  | EYGA091207DF |
|                       | Thickness   | 130 μm  | 110 μm  | 90 μm   | 86 μm        |
| 50 μm                 | Part No.  | EYGA091205PA  | EYGA091205PM  | EYGA091205DM  | EYGA091205DF |
|                       | Thickness   | 110 μm  | 90 μm   | 70 μm   | 66 μm        |
| 40 μm                 | Part No.  | EYGA091204PA  | EYGA091204PM  | EYGA091204DM  | EYGA091204DF |
|                       | Thickness   | 100 μm  | 80 μm   | 60 μm   | 56 μm        |
| 25 μm                 | Part No.  | EYGA091203PA  | EYGA091203PM  | EYGA091203DM  | EYGA091203DF |
|                       | Thickness   | 85 μm   | 65 μm   | 45 μm   | 41 μm        |
| 17 μm                 | Part No.  | EYGA091202PA  | EYGA091202PM  | EYGA091202DM  | EYGA091202DF |
|                       | Thickness   | 77 μm   | 57 μm   | 37 μm   | 33 μm        |
| 10 μm                 | Part No.  | EYGA091201PA  | EYGA091201PM  | EYGA091201DM  | EYGA091201DF |
|                       | Thickness   | 70 μm   | 50 μm   | 30 μm   | 26 μm        |

\* Please contact us for other lamination type product.

\*\* Withstanding Voltages are for reference, not guaranteed.

## Lamination type/Composition example

- High heat resistance series ( PGS 100, 70, 50, 40, 25, 17, 10 μm)

| Type                  | High heat resistance type  |   |              |
|-----------------------|--|---|--------------|
|                       | A-V type   | A-RV type   |              |
| Front face            | –  | High heat resistance and insulation type 13 μm  |              |
| Rear face             | High heat resistance and insulation adhesion type 18 μm  | High heat resistance and insulation adhesion type 18 μm   |              |
| Structure             |  |   |              |
| Features              | <ul style="list-style-type: none"> <li>· With high heat resistance and insulation tape on one side</li> <li>· Withstanding Voltage Adhesive tape : 2 kV</li> </ul> | <ul style="list-style-type: none"> <li>· With high heat resistance and insulation tape on both side</li> <li>· Withstanding Voltage PEEK tape : 2 kV</li> <li>· Adhesive tape : 2 kV</li> </ul> |              |
| Withstand temperature | 150 °C   | 150 °C  |              |
| Standard Size         | 90 × 115 mm  | 90 × 115 mm   |              |
| Maximum size          | 115 × 180 mm   | 115 × 180 mm  |              |
| 100 μm                | Part No.   | EYGA091210V   | EYGA091210RV |
|                       | Thickness  | 118 μm  | 131 μm       |
| 70 μm                 | Part No.   | EYGA091207V   | EYGA091207RV |
|                       | Thickness  | 88 μm   | 101 μm       |
| 50 μm                 | Part No.   | EYGA091205V   | EYGA091205RV |
|                       | Thickness  | 68 μm   | 81 μm        |
| 40 μm                 | Part No.   | EYGA091204V   | EYGA091204RV |
|                       | Thickness  | 58 μm   | 71 μm        |
| 25 μm                 | Part No.   | EYGA091203V   | EYGA091203RV |
|                       | Thickness  | 43 μm   | 56 μm        |
| 17 μm                 | Part No.   | EYGA091202V   | EYGA091202RV |
|                       | Thickness  | 35 μm   | 48 μm        |
| 10 μm                 | Part No.   | EYGA091201V   | EYGA091201RV |
|                       | Thickness  | 28 μm   | 41 μm        |

\* Please contact us for other lamination type product.

\*\* Withstanding Voltages are for reference, not guaranteed.

- Standard series (SSM)

| Type                  | E-6 type  | E-8 type  | E-9 type  |              |
|-----------------------|---|---|---|--------------|
| Elastomer thickness   | 1.0 mm  | 2.0 mm  | 3.0 mm  |              |
| Structure             |   |   |   |              |
| Features              | <ul style="list-style-type: none"> <li>· Soft and low thermal resistance (Elastomer)</li> <li>· Low repulsion</li> <li>· Withstanding Voltage : 1.7 kV</li> </ul> | <ul style="list-style-type: none"> <li>· Soft and low thermal resistance (Elastomer)</li> <li>· Low repulsion</li> <li>· Withstanding Voltage : 1.7 kV</li> </ul> | <ul style="list-style-type: none"> <li>· Soft and low thermal resistance (Elastomer)</li> <li>· Low repulsion</li> <li>· Withstanding Voltage : 1.7 kV</li> </ul> |              |
| Withstand temperature | 100 °C  | 100 °C  | 100 °C  |              |
| Standard Size         | 90 × 115 mm   | 90 × 115 mm   | 90 × 115 mm   |              |
| 70 μm                 | Part No.  | EYGE0912XB6D  | EYGE0912XB8D  | EYGE0912XB9D |
|                       | Thickness   | 1.09 mm   | 2.09 mm   | 3.09 mm      |
| 25 μm                 | Part No.  | EYGE0912XD6D  | EYGE0912XD8D  | EYGE0912XD9D |
|                       | Thickness   | 1.05 mm   | 2.05 mm   | 3.05 mm      |

## Minimum order

| Item   | Type               | Part No.     | Size       | Minimum order |
|--|--------------------|--------------|------------|---------------|
| PGS Graphite Sheet Only  | S type<br>100 μm   | EYGS091210   | 90×115 mm  | 20            |
|  |                    | EYGS121810   | 115×180 mm | 10            |
|  |                    | EYGS182310   | 180×230 mm | 10            |
|  | S type<br>70 μm    | EYGS091207   | 90×115 mm  | 20            |
|  |                    | EYGS121807   | 115×180 mm | 10            |
|  |                    | EYGS182307   | 180×230 mm | 10            |
|  | S type<br>50 μm    | EYGS091205   | 90×115 mm  | 20            |
|  |                    | EYGS121805   | 115×180 mm | 10            |
|  |                    | EYGS182305   | 180×230 mm | 10            |
|  | S type<br>40 μm    | EYGS091204   | 90×115 mm  | 20            |
|  |                    | EYGS121804   | 115×180 mm | 10            |
|  |                    | EYGS182304   | 180×230 mm | 10            |
|  | S type<br>25 μm    | EYGS091203   | 90×115 mm  | 20            |
|  |                    | EYGS121803   | 115×180 mm | 10            |
|  |                    | EYGS182303   | 180×230 mm | 10            |
| PGS 70, 25, 17 μm Adhesive Type [Standard series]                          | A-A type<br>70 μm  | EYGA091207A  | 90×115 mm  | 20            |
|  |                    | EYGA121807A  | 115×180 mm | 10            |
|  | A-A type<br>25 μm  | EYGA091203A  | 90×115 mm  | 20            |
|  |                    | EYGA121803A  | 115×180 mm | 10            |
|  | A-A type<br>17 μm  | EYGA091202A  | 90×115 mm  | 20            |
|  |                    | EYGA121802A  | 115×180 mm | 10            |
|  | A-M type<br>70 μm  | EYGA091207M  | 90×115 mm  | 20            |
|  |                    | EYGA121807M  | 115×180 mm | 10            |
|  | A-M type<br>25 μm  | EYGA091203M  | 90×115 mm  | 20            |
|  |                    | EYGA121803M  | 115×180 mm | 10            |
|  | A-M type<br>17 μm  | EYGA091202M  | 90×115 mm  | 20            |
|  |                    | EYGA121802M  | 115×180 mm | 10            |
| PGS 70, 25, 17 μm Laminated Type (Insulation & Adhesive) [Standard series] | A-PA type<br>70 μm | EYGA091207PA | 90×115 mm  | 20            |
|  |                    | EYGA121807PA | 115×180 mm | 10            |
|  | A-PA type<br>25 μm | EYGA091203PA | 90×115 mm  | 20            |
|  |                    | EYGA121803PA | 115×180 mm | 10            |
|  | A-PA type<br>17 μm | EYGA091202PA | 90×115 mm  | 20            |
|  |                    | EYGA121802PA | 115×180 mm | 10            |
|  | A-PM type<br>70 μm | EYGA091207PM | 90×115 mm  | 20            |
|  |                    | EYGA121807PM | 115×180 mm | 10            |
|  | A-PM type<br>25 μm | EYGA091203PM | 90×115 mm  | 20            |
|  |                    | EYGA121803PM | 115×180 mm | 10            |
|  | A-PM type<br>17 μm | EYGA091202PM | 90×115 mm  | 20            |
|  |                    | EYGA121802PM | 115×180 mm | 10            |
|  | A-DM type<br>70 μm | EYGA091207DM | 90×115 mm  | 20            |
|  |                    | EYGA121807DM | 115×180 mm | 10            |
|  | A-DM type<br>25 μm | EYGA091203DM | 90×115 mm  | 20            |
|  |                    | EYGA121803DM | 115×180 mm | 10            |
|  | A-DM type<br>17 μm | EYGA091202DM | 90×115 mm  | 20            |
|  |                    | EYGA121802DM | 115×180 mm | 10            |

\* Only S type supports 180×230 mm size.

(PGS thickness of 17 μm, 10μm does not support as single item)

\*\* PGS of 10 μm, 40 μm, 50 μm type is also possible to be made as lamination type.

\*\*\* The above-listed part number is sample part number for testing.

\*\*\*\* Please contact us about your request of custom part number which will be arranged separately.

\*\*\*\*\* Please contact us if quantity is below Minimum Order Quantity.

## Minimum order

| Item  | Type                                       | Part No.     | Size       | Minimum order |
|---|--|--------------|------------|---------------|
| PGS 70, 25, 17 μm<br>[High heat resistance type]      | A-V type<br>70 μm                          | EYGA091207V  | 90×115 mm  | 20            |
|   |  | EYGA121807V  | 115×180 mm | 10            |
|   | A-V type<br>25 μm                          | EYGA091203V  | 90×115 mm  | 20            |
|   |  | EYGA121803V  | 115×180 mm | 10            |
|   | A-V type<br>17 μm                          | EYGA091202V  | 90×115 mm  | 20            |
|   |  | EYGA121802V  | 115×180 mm | 10            |
|   | A-RV type<br>70 μm                         | EYGA091207RV | 90×115 mm  | 20            |
|   |  | EYGA121807RV | 115×180 mm | 10            |
|   | A-RV type<br>25 μm                         | EYGA091203RV | 90×115 mm  | 20            |
|   |  | EYGA121803RV | 115×180 mm | 10            |
|   | A-RV type<br>17 μm                         | EYGA091202RV | 90×115 mm  | 20            |
|   |  | EYGA121802RV | 115×180 mm | 10            |
| SSM<br>Elastomer<br>3.0, 2.0, 1.0 mm<br>PGS 70, 25 μm | E-9 type<br>Elastomer 3.0 mm,<br>PGS 70 μm | EYGE0912XB9D | 90×115 mm  | 5             |
|   | E-9 type<br>Elastomer 3.0 mm,<br>PGS 25 μm | EYGE0912XD9D | 90×115 mm  | 5             |
|   | E-8 type<br>Elastomer 2.0 mm,<br>PGS 70 μm | EYGE0912XB8D | 90×115 mm  | 5             |
|   | E-8 type<br>Elastomer 2.0 mm,<br>PGS 25 μm | EYGE0912XD8D | 90×115 mm  | 5             |
|   | E-6 type<br>Elastomer 1.0 mm,<br>PGS 70 μm | EYGE0912XB6D | 90×115 mm  | 5             |
|   | E-6 type<br>Elastomer 1.0 mm,<br>PGS 25 μm | EYGE0912XD6D | 90×115 mm  | 5             |

\* Only S type supports 180×230 mm size.

(PGS thickness of 17 μm, 10μm does not support as single item)

\*\* PGS of 10 μm, 40 μm, 50 μm type is also possible to be made as lamination type.

\*\*\* The above-listed part number is sample part number for testing.

\*\*\*\* Please contact us about your request of custom part number which will be arranged separately.

\*\*\*\*\* Please contact us if quantity is below Minimum Order Quantity.