

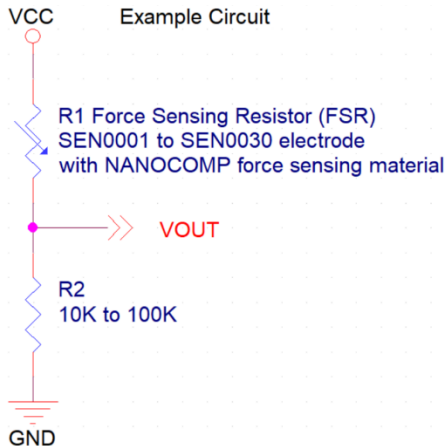
SEN Force Sensing Resistor Electrode Series



**Description**  
Electrode Flexible Printed Circuit Board (PCB) to use with Nanocomposite Force Sensitive Material (sold separately).

|                                              |                                                             |
|----------------------------------------------|-------------------------------------------------------------|
| <b>Specifications</b>                        |                                                             |
| PCB Thickness:                               | 0.085mm (0.00335") +/- 10%                                  |
| PCB Copper Thickness and Plating:            | 1oz Copper, ENIG (Electroless Nickel Immersion Gold) Finish |
| PCB construction:                            | FPC UL94V-0                                                 |
| PCB operating temperature range:             | -40°C to +130°C                                             |
| PCB reflow maximum temperature:              | +260°C                                                      |
| PCB Size:                                    | See SEN details table on page 2                             |
| Electrode Type:                              | See SEN details table on page 2                             |
| Trace/Space:                                 | See SEN details table on page 2                             |
| Pad Shape:                                   | See SEN details table on page 2                             |
| Pad Size:                                    | See SEN details table on page 2                             |
| Surface Mount Wire Connection Pad Direction: | See SEN details table on page 2                             |

**Recommended Circuit Wiring**  
In combination with a compatible NANOCOMP polymer nanocomposite force sensing sheet. Voltage divider: Electrode with force sensing material on it wired as the top resistor connected to Vcc (for example 3.3V or 5V), and the bottom resistor is a pull-down resistor of 10k ohms to 100k ohms. When the material is uncompressed, its resistance is in the megaohms range. When compressed, its resistance decreases exponentially to the kilohms range. The circuit node voltage between the resistors can be measured by any microcontroller, using a digital input for simple press detection, or with an analog input using an internal ADC to measure analog voltage and calculate resistance, and with calibration applied force.



Force Sensing Resistor (FSR) resistance can be calculated as follows:

$R1 = R2 (VCC / VOUT - 1)$

## SEN Force Sensing Resistor Electrode Orderable Part Numbers

| Part Number | PCB Size                  | Electrode Type           | Electrode Trace/Space    | Pad Shape | Pad Size | Solder Pad Direction | Compatible NANOCOMP Part Number |
|-------------|---------------------------|--------------------------|--------------------------|-----------|----------|----------------------|---------------------------------|
| SEN0001     | 0.5"x0.4" (12.7x10.16mm)  | Interdigitated (Fingers) | 0.254mm, Tight           | Square    | 10x10mm  | Across (Compact)     | NANOCOMP-SQR-10X10              |
| SEN0002     | 0.7"x0.6" (17.78x15.24mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Square    | 15x15mm  | Across (Compact)     | NANOCOMP-SQR-15X15              |
| SEN0003     | 0.9"x0.8" (22.86x20.32mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Square    | 20x20mm  | Across (Compact)     | NANOCOMP-SQR-20X20              |
| SEN0004     | 0.8"x0.4" (20.32x10.16mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Square    | 10x10mm  | Long                 | NANOCOMP-SQR-10X10              |
| SEN0005     | 1"x0.6" (25.4x15.24mm)    | Interdigitated (Fingers) | 0.254mm, Tight           | Square    | 15x15mm  | Long                 | NANOCOMP-SQR-15X15              |
| SEN0006     | 1.2"x0.8" (30.48x20.32mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Square    | 20x20mm  | Long                 | NANOCOMP-SQR-20X20              |
| SEN0007     | 0.5"x0.4" (12.7x10.16mm)  | Interdigitated (Fingers) | 0.508mm, Wide            | Square    | 10x10mm  | Across (Compact)     | NANOCOMP-SQR-10X10              |
| SEN0008     | 0.7"x0.6" (17.78x15.24mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Square    | 15x15mm  | Across (Compact)     | NANOCOMP-SQR-15X15              |
| SEN0009     | 0.9"x0.8" (22.86x20.32mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Square    | 20x20mm  | Across (Compact)     | NANOCOMP-SQR-20X20              |
| SEN0010     | 0.8"x0.4" (20.32x10.16mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Square    | 10x10mm  | Long                 | NANOCOMP-SQR-10X10              |
| SEN0011     | 1"x0.6" (25.4x15.24mm)    | Interdigitated (Fingers) | 0.508mm, Wide            | Square    | 15x15mm  | Long                 | NANOCOMP-SQR-15X15              |
| SEN0012     | 1.2"x0.8" (30.48x20.32mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Square    | 20x20mm  | Long                 | NANOCOMP-SQR-20X20              |
| SEN0013     | 0.5"x0.4" (12.7x10.16mm)  | Interdigitated (Fingers) | 0.254mm, Tight           | Round     | 10x10mm  | Across (Compact)     | NANOCOMP-CRC-10X10              |
| SEN0014     | 0.7"x0.6" (17.78x15.24mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Round     | 15x15mm  | Across (Compact)     | NANOCOMP-CRC-15X15              |
| SEN0015     | 0.9"x0.8" (22.86x20.32mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Round     | 20x20mm  | Across (Compact)     | NANOCOMP-CRC-20X20              |
| SEN0016     | 0.8"x0.4" (20.32x10.16mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Round     | 10x10mm  | Long                 | NANOCOMP-CRC-10X10              |
| SEN0017     | 1"x0.6" (25.4x15.24mm)    | Interdigitated (Fingers) | 0.254mm, Tight           | Round     | 15x15mm  | Long                 | NANOCOMP-CRC-15X15              |
| SEN0018     | 1.2"x0.8" (30.48x20.32mm) | Interdigitated (Fingers) | 0.254mm, Tight           | Round     | 20x20mm  | Long                 | NANOCOMP-CRC-20X20              |
| SEN0019     | 0.5"x0.4" (12.7x10.16mm)  | Interdigitated (Fingers) | 0.508mm, Wide            | Round     | 10x10mm  | Across (Compact)     | NANOCOMP-CRC-10X10              |
| SEN0020     | 0.7"x0.6" (17.78x15.24mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Round     | 15x15mm  | Across (Compact)     | NANOCOMP-CRC-15X15              |
| SEN0021     | 0.9"x0.8" (22.86x20.32mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Round     | 20x20mm  | Across (Compact)     | NANOCOMP-CRC-20X20              |
| SEN0022     | 0.8"x0.4" (20.32x10.16mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Round     | 10x10mm  | Long                 | NANOCOMP-CRC-10X10              |
| SEN0023     | 1"x0.6" (25.4x15.24mm)    | Interdigitated (Fingers) | 0.508mm, Wide            | Round     | 15x15mm  | Long                 | NANOCOMP-CRC-15X15              |
| SEN0024     | 1.2"x0.8" (30.48x20.32mm) | Interdigitated (Fingers) | 0.508mm, Wide            | Round     | 20x20mm  | Long                 | NANOCOMP-CRC-20X20              |
| SEN0025     | 0.8"x1" (20.32x25.4mm)    | Parallel Plates          | Full Pad, fold over flex | Square    | 10x10mm  | Long                 | NANOCOMP-SQR-10X10              |
| SEN0026     | 1"x1.4" (25.4x35.56mm)    | Parallel Plates          | Full Pad, fold over flex | Square    | 15x15mm  | Long                 | NANOCOMP-SQR-15X15              |
| SEN0027     | 1.2"x1.8" (30.48x45.72mm) | Parallel Plates          | Full Pad, fold over flex | Square    | 20x20mm  | Long                 | NANOCOMP-SQR-20X20              |
| SEN0028     | 0.8"x1" (20.32x25.4mm)    | Parallel Plates          | Full Pad, fold over flex | Round     | 10x10mm  | Long                 | NANOCOMP-CRC-10X10              |
| SEN0029     | 1"x1.4" (25.4x35.56mm)    | Parallel Plates          | Full Pad, fold over flex | Round     | 15x15mm  | Long                 | NANOCOMP-CRC-15X15              |
| SEN0030     | 1.2"x1.8" (30.48x45.72mm) | Parallel Plates          | Full Pad, fold over flex | Round     | 20x20mm  | Long                 | NANOCOMP-CRC-20X20              |

## NANOCOMP Polymer Nanocomposite Force Sensing Material Orderable Part Numbers

| Part Number          | Shape  | Dimensions    | Compatible SEN Electrode Board Part Numbers       |
|----------------------|--------|---------------|---------------------------------------------------|
| NANOCOMP-SQR-10X10   | Square | 10x10x0.4mm   | SEN0001, SEN0004, SEN0007, SEN0010, SEN0025       |
| NANOCOMP-SQR-15X15   | Square | 15x15x0.4mm   | SEN0002, SEN0005, SEN0008, SEN0011, SEN0026       |
| NANOCOMP-SQR-20X20   | Square | 20x20x0.4mm   | SEN0003, SEN0006, SEN0009, SEN0012, SEN0027       |
| NANOCOMP-CRC-10X10   | Round  | 10x10x0.4mm   | SEN0013, SEN0016, SEN0019, SEN0022, SEN0028       |
| NANOCOMP-CRC-15X15   | Round  | 15x15x0.4mm   | SEN0014, SEN0017, SEN0020, SEN0023, SEN0029       |
| NANOCOMP-CRC-20X20   | Round  | 20x20x0.4mm   | SEN0015, SEN0018, SEN0021, SEN0024, SEN0030       |
| NANOCOMP-SQR-50X50   | Square | 50x50x0.4mm   | Bulk material, cut or punch to make custom shapes |
| NANOCOMP-SQR-100X100 | Square | 100x100x0.4mm | Bulk material, cut or punch to make custom shapes |
| NANOCOMP-SQR-150X150 | Square | 150x150x0.4mm | Bulk material, cut or punch to make custom shapes |

## Photos / What's Included

Each SEN part number includes 1x SEN interdigitated electrode flex PCB.

Some photos show the electrode PCB with NANOCOMP force sensitive material for illustrative purposes only, not included, sold separately.

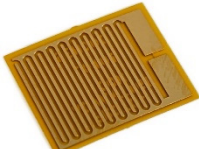
## Material Cutting

NANOCOMP force sensitive material should be cut using mechanical tools only, such as a knife, plotter, scissors or cutting dies. It should not be cut using lasers or waterjet.

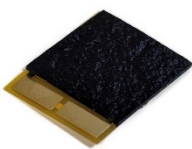
SEN0001 to SEN0030 Force Sensing Resistor Electrode Series: SEN0001-SEN0006 Photos



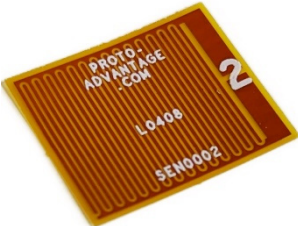
SEN0001 top



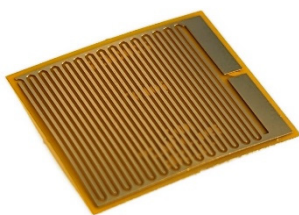
SEN0001 bottom



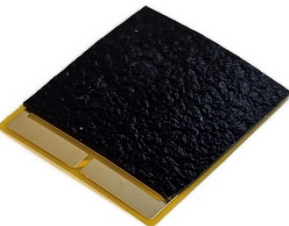
SEN0001 with NANOCOMP-SQR-10X10 material



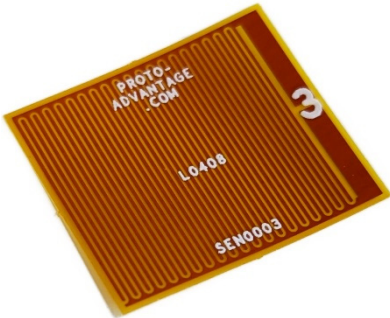
SEN0002 top



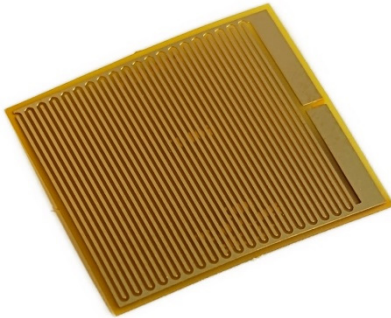
SEN0002 bottom



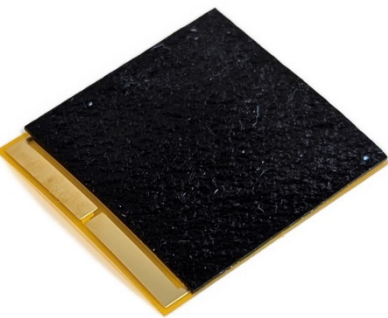
SEN0002 with NANOCOMP-SQR-15X15 material



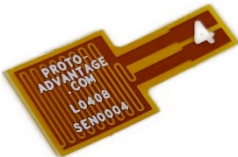
SEN0003 top



SEN0003 bottom



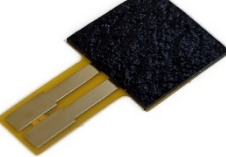
SEN0003 with NANOCOMP-SQR-20X20 material



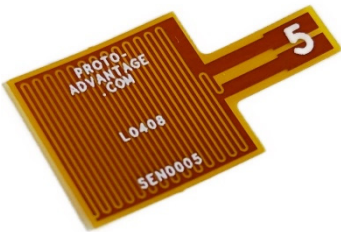
SEN0004 top



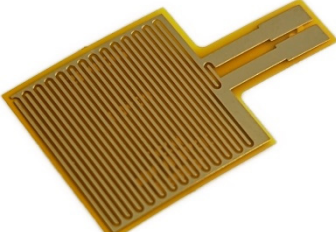
SEN0004 bottom



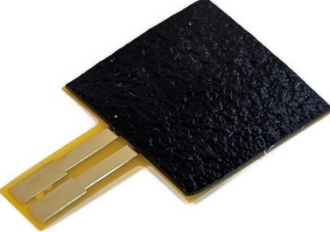
SEN0004 with NANOCOMP-SQR-10X10 material



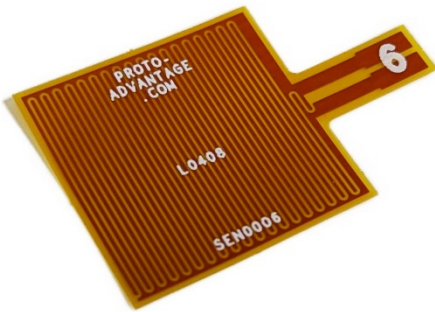
SEN0005 top



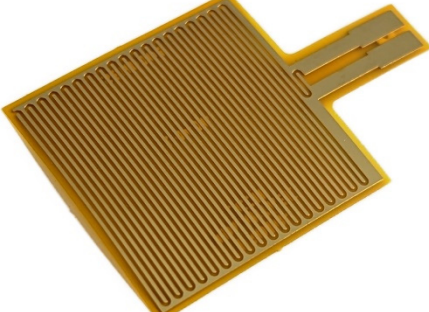
SEN0005 bottom



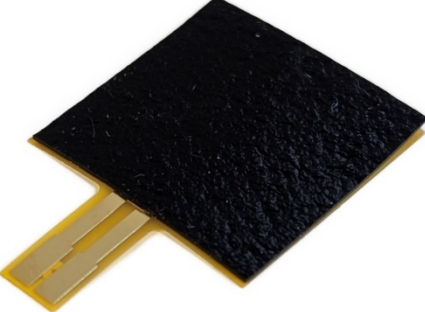
SEN0005 with NANOCOMP-SQR-15X15 material



SEN0006 top



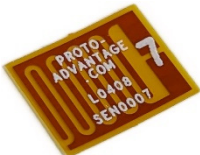
SEN0006 bottom



SEN0006 with NANOCOMP-SQR-20X20 material



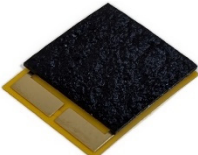
SEN0001 to SEN0030 Force Sensing Resistor Electrode Series: SEN0007-SEN0012 Photos



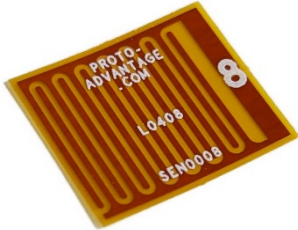
SEN0007 top



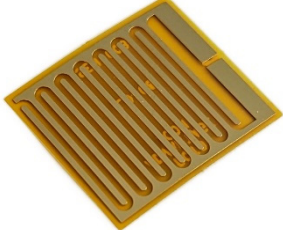
SEN0007 bottom



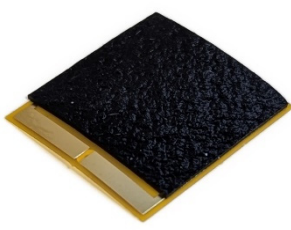
SEN0007 with NANOCOMP-SQR-10X10 material



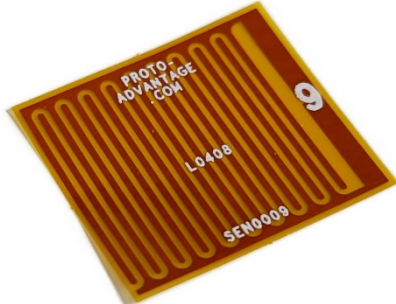
SEN0008 top



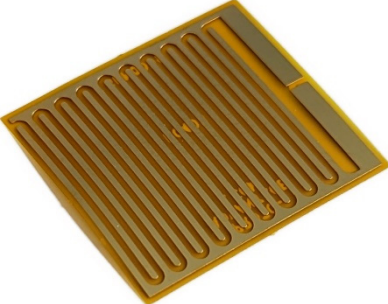
SEN0008 bottom



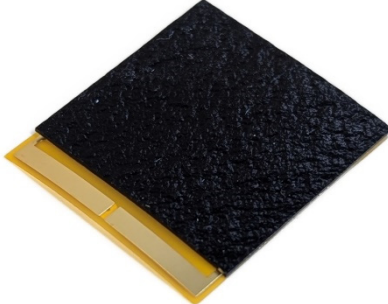
SEN0008 with NANOCOMP-SQR-15X15 material



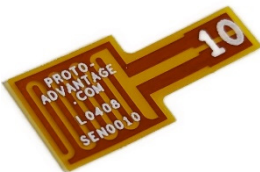
SEN0009 top



SEN0009 bottom



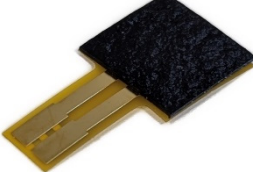
SEN0009 with NANOCOMP-SQR-20X20 material



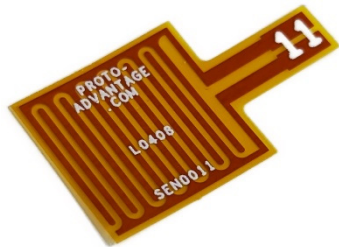
SEN0010 top



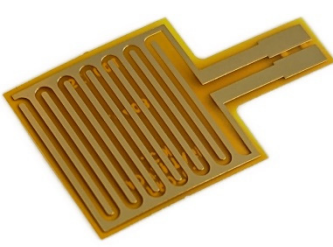
SEN0010 bottom



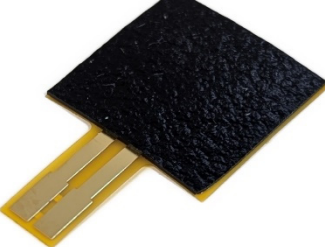
SEN0010 with NANOCOMP-SQR-10X10 material



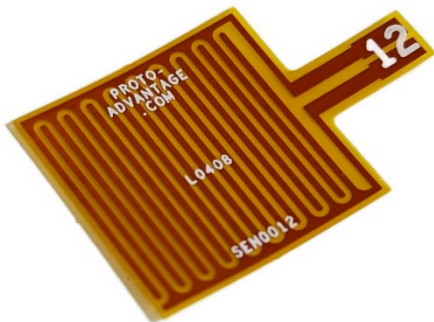
SEN0011 top



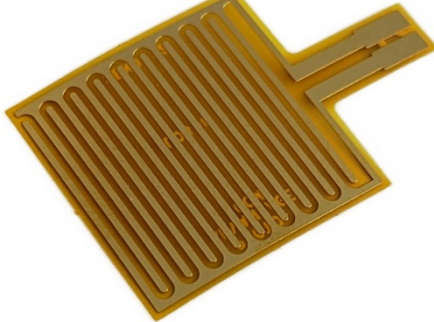
SEN0011 bottom



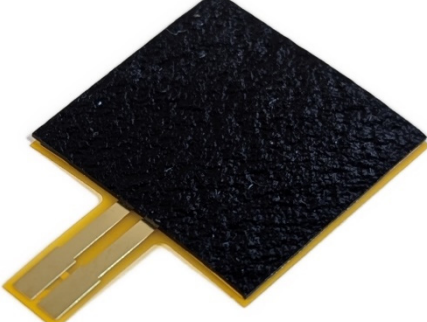
SEN0011 with NANOCOMP-SQR-15X15 material



SEN0012 top



SEN0012 bottom



SEN0012 with NANOCOMP-SQR-20X20 material

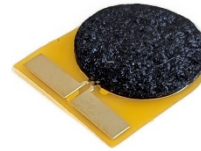
## SEN0001 to SEN0030 Force Sensing Resistor Electrode Series: SEN0013-SEN0018 Photos



SEN0013 top



SEN0013 bottom



SEN0013 with NANOCOMP-CRC-10X10 material



SEN0014 top



SEN0014 bottom



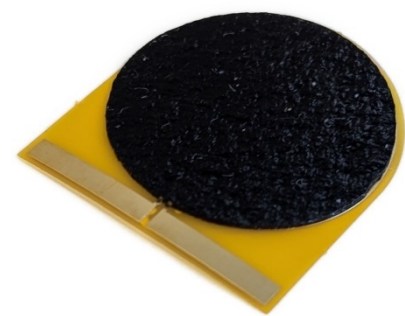
SEN0014 with NANOCOMP-CRC-15X15 material



SEN0015 top



SEN0015 bottom



SEN0015 with NANOCOMP-CRC-20X20 material



SEN0016 top



SEN0016 bottom



SEN0016 with NANOCOMP-CRC-10X10 material



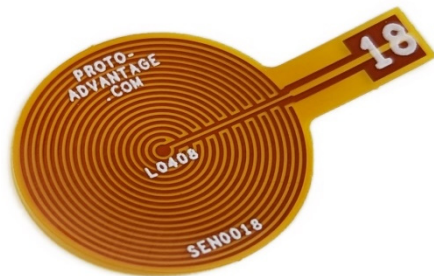
SEN0017 top



SEN0017 bottom



SEN0017 with NANOCOMP-CRC-15X15 material



SEN0018 top



SEN0018 bottom



SEN0018 with NANOCOMP-CRC-20X20 material



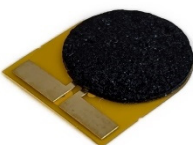
SEN0001 to SEN0030 Force Sensing Resistor Electrode Series: SEN0019-SEN0024 Photos



SEN0019 top



SEN0019 bottom



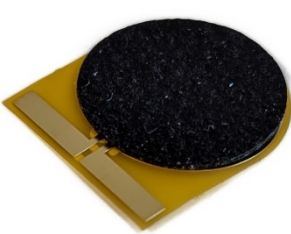
SEN0019 with NANOCOMP-CRC-10X10 material



SEN0020 top



SEN0020 bottom



SEN0020 with NANOCOMP-CRC-15X15 material



SEN0021 top



SEN0021 bottom



SEN0021 with NANOCOMP-CRC-20X20 material



SEN0022 top



SEN0022 bottom



SEN0022 with NANOCOMP-CRC-10X10 material



SEN0023 top



SEN0023 bottom



SEN0023 with NANOCOMP-CRC-15X15 material



SEN0024 top

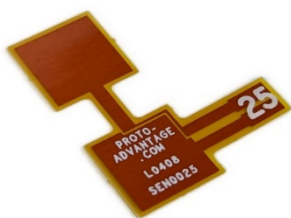


SEN0024 bottom

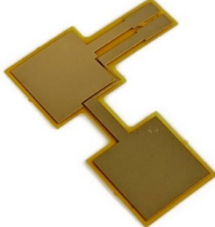


SEN0024 with NANOCOMP-CRC-20X20 material

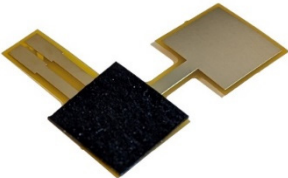
SEN0001 to SEN0030 Force Sensing Resistor Electrode Series: SEN0025-SEN0030 Photos



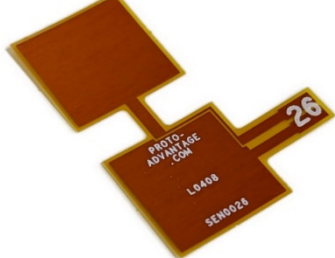
SEN0025 top



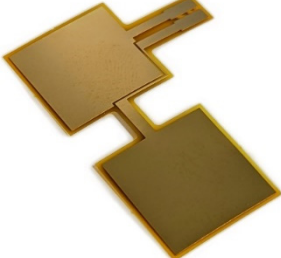
SEN0025 bottom



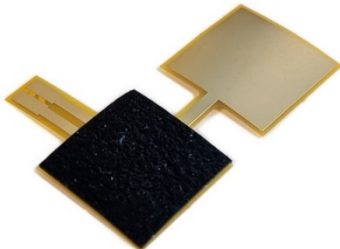
SEN0025 with NANOCOMP-SQR-10X10 material



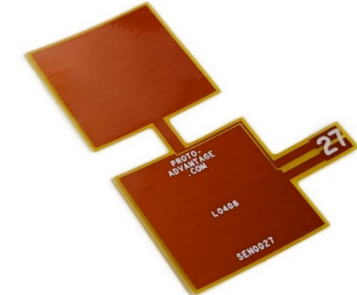
SEN0026 top



SEN0026 bottom



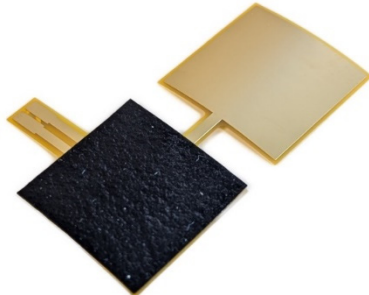
SEN0026 with NANOCOMP-SQR-15X15 material



SEN0027 top



SEN0027 bottom



SEN0027 with NANOCOMP-SQR-20X20 material



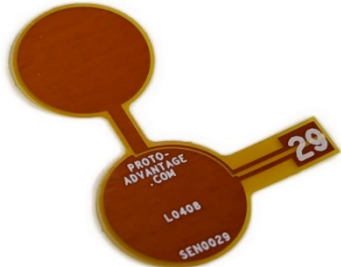
SEN0028 top



SEN0028 bottom



SEN0028 with NANOCOMP-CRC-10X10 material



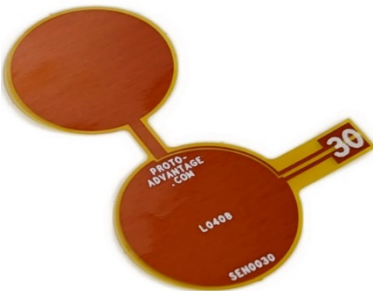
SEN0029 top



SEN0029 bottom



SEN0029 with NANOCOMP-CRC-15X15 material



SEN0030 top



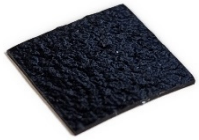
SEN0030 bottom



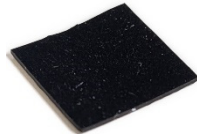
SEN0030 with NANOCOMP-CRC-20X20 material



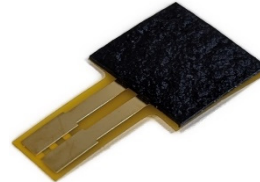
## NANOCOMP Polymer Nanocomposite Force Sensing Product Photos



NANOCOMP-SQR-10X10 top



NANOCOMP-SQR-10X10 bottom



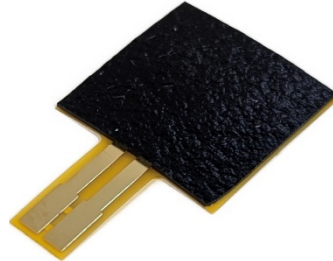
SEN0010 with NANOCOMP-SQR-10X10 material



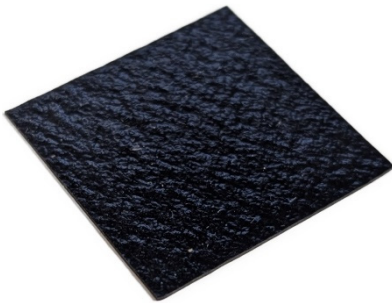
NANOCOMP-SQR-15X15 top



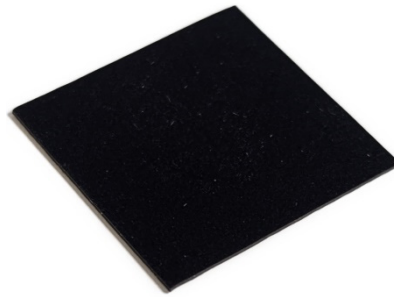
NANOCOMP-SQR-15X15 bottom



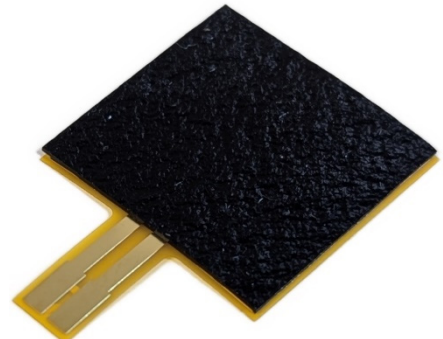
SEN0011 with NANOCOMP-SQR-15X15 material



NANOCOMP-SQR-20X20 top



NANOCOMP-SQR-20X20 bottom



SEN0012 with NANOCOMP-SQR-20X20 material



NANOCOMP-CRC-10X10 top



NANOCOMP-CRC-10X10 bottom



SEN0022 with NANOCOMP-CRC-10X10 material



NANOCOMP-CRC-15X15 top



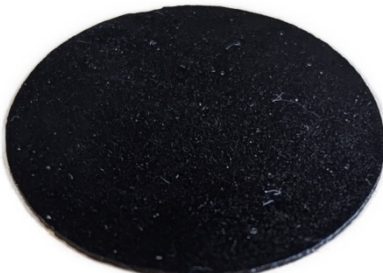
NANOCOMP-CRC-15X15 bottom



SEN0023 with NANOCOMP-CRC-15X15 material



NANOCOMP-CRC-20X20 top



NANOCOMP-CRC-20X20 bottom



SEN0024 with NANOCOMP-CRC-20X20 material



## NANOCOMP Polymer Nanocomposite Force Sensing Product Photos (Large Size Sheets)



NANOCOMP-SQR-50X50 top



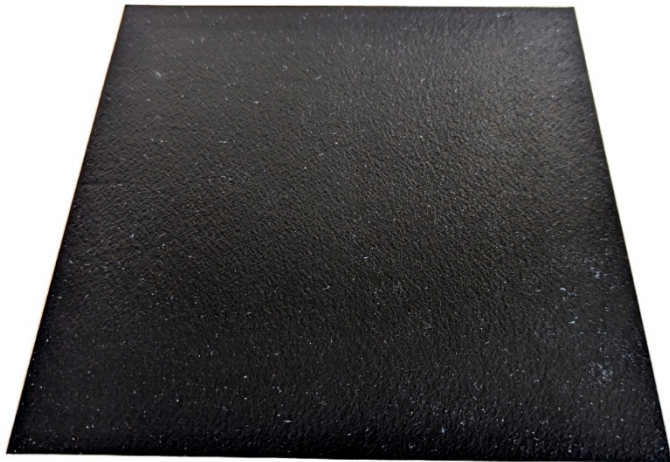
NANOCOMP-SQR-50X50 bottom



NANOCOMP-SQR-100X100 top



NANOCOMP-SQR-100X100 bottom



NANOCOMP-SQR-150X150 top



NANOCOMP-SQR-150X150 bottom

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