

## Flowing Magnetic Bead Detector

**Description:** Diagnostic Biosensors' SENP2D6 is a magnetic sensor detector for detecting, counting, and measuring small magnetic beads in a microfluidic stream.

Its Giant Magnetoresistive (GMR) sensors are situated under a thin insulating layer. When micro-scale magnetic beads pass over the sensors in flow, they generate a predictable magnetic field vs. time signature. Multiple sensors from up- to downstream enable velocity analysis.

It is designed for use with a straight fluidic channel that is ~100 um wide. These may be purchased with the sensor die bare, or with microfluidic channels attached. Also, custom designed fluidic channels can be provided.

### Features:

- Four of Wheatstone bridge GMR magnetic bead detectors in-line under flow-channel
- Buried “gather” electromagnetic wire for concentrating flowing beads at channel center
- Buried “director” electromagnetic wire for keeping flowing beads at channel center
- 2 exposed electrodes for applying electric fields in-channel
- 200 nm nominal electrical insulation on GMR sensor
- Optional flexible printed circuit with edge contacts for ZIF connector, and wire terminals
- Mechanical alignment holes for registry with magnetic field generator (separate item)
- Up to 4 flexible tube input and output, can go to standard syringe or Luer lock fitting

### Applications:

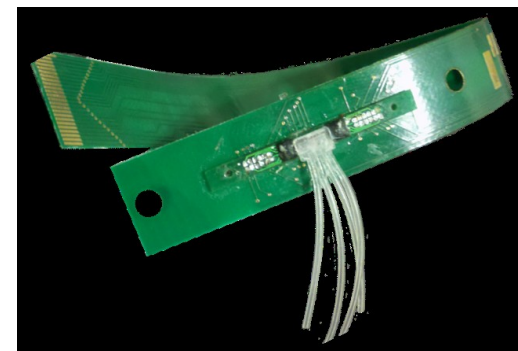
- Flowing bead sorting and counting
- Flow cytometer
- Nanowire counting and monitor

### Related Products:

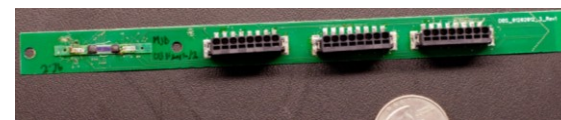
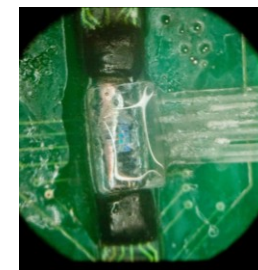
- Magnetic field generator fixture
- Data acquisition system
- 4-Tube adapter

## SENP2D6

**Photo of flex-circuit, sensor chip, and four-tube fluidic connections**



**Microfluidic flow channel and Fluidic Connections using 4-Tube Adapter**



**24 – pin electrical interconnection – optional wire terminal sockets**



**Ordering Information**

<b>Part number</b>	<b>Part Description</b>	<b>Package Description</b>	<b>Features</b>	<b>Shipping</b>
110611R	SENP2D6	Chip-on-board + Flex Circuit	Exposed sensor chip	single
		I-channel fluidic cover	Straight fluidic channel, 4 top ports	single
		4 – tube adapter	Right angle fitting, 4 flex tubes	single
		Mag field generator and interface	PCB + field coil + ZIF socket	single

**How to purchase:**

- Go to our website [www.DiagnosticBiosensors.com](http://www.DiagnosticBiosensors.com)
- In the Keyword search box at the top of the page, enter the Part Number 110611R , or enter SENP2D6

**How to obtain sales support:**

- Go to our website [www.DiagnosticBiosensors.com/sales\\_support/](http://www.DiagnosticBiosensors.com/sales_support/)
- Enter your text query there.
- OR, send an email to [Sales@DiagnosticBiosensors.com](mailto:Sales@DiagnosticBiosensors.com)

**How to obtain technical support:**

- Go to our website [www.DiagnosticBiosensors.com/technical\\_support/](http://www.DiagnosticBiosensors.com/technical_support/)
- Enter your text query there.
- OR, send an email to [Support@DiagnosticBiosensors.com](mailto:Support@DiagnosticBiosensors.com)

**Related Documentation**

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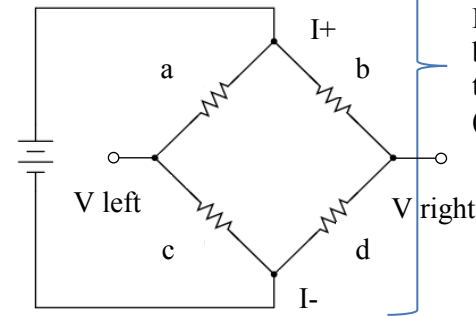
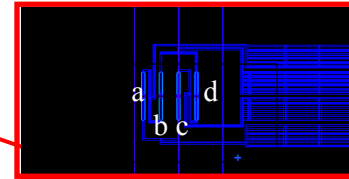
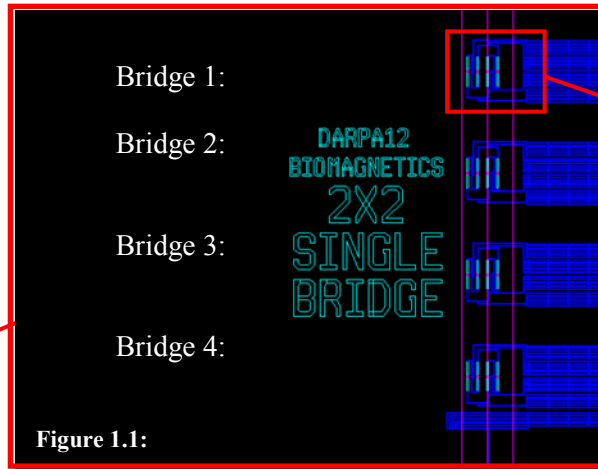
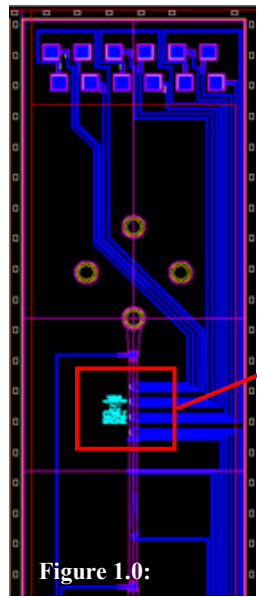
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## Related Documentation

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### 1. Sensor chip and flow channel physical layout

Die 6; 4 of [2 X 2 Single Bridge], electrodes, directors, gatherers



**Figure 1.2:** Resistor 'c' of all four bridges is directly under the channel center (purple guide line).

### 2. FPC Electrical interface design

Figure 2: Top Side

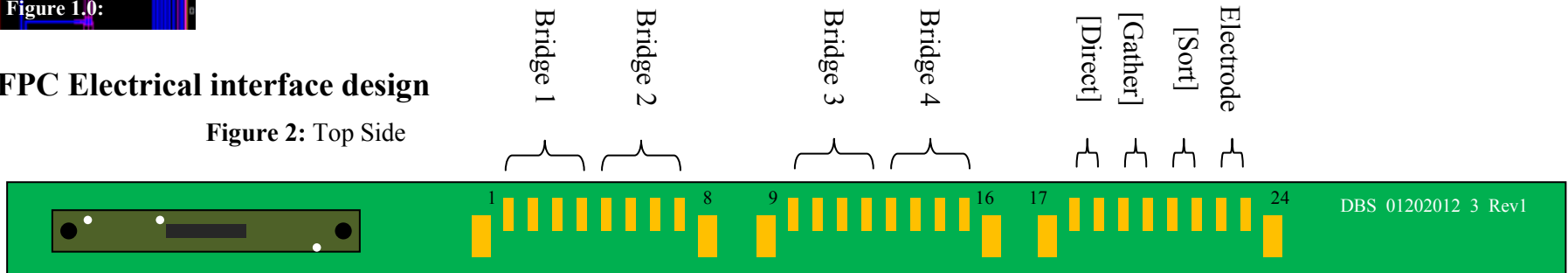


Figure 3: Bottom Side



24

1

### 3. Electrical functional description, Pin description, Magnetic director functional description and location

Table 1 shows in detail the function of each contact on the integrated flexible printed circuit (FPC) board. The pictures to the far right detail the directors, gatherers, and electrodes.

**Bridge:** Each bridge has 4 magneto-resistive sensor resistors connected in a Wheatstone bridge configuration.

**Direct:** This is a wire buried <1000 nm beneath the flow channel surface. The force is proportional to the electrical current magnitude

**Gather:** This is a wire buried beneath the flow channel. The wire splits to make a “V” shaped pair. It “gathers” beads towards the channel center.

**Electrodes:** These are two electrical pads that are exposed to the fluid in the channel. Electrical fields can be applied to drive fluids with electrical forces.

**Flow Channel:** The one shown here, at 50 μm wide X 50 μm deep, is typical. Custom channel dimensions are available.

**Table 1:**

Contact	Function	Subfunction
1	Bridge 1	I+
2	Bridge 1	I-
3	Bridge 1	V right
4	Bridge 1	V left
5	Bridge 2	I+
6	Bridge 2	I-
7	Bridge 2	V right
8	Bridge 2	V left
9	Bridge 3	I+
10	Bridge 3	I-
11	Bridge 3	V right
12	Bridge 3	V left
13	Bridge 4	I+
14	Bridge 4	I-
15	Bridge 4	V right
16	Bridge 4	V left
17	Direct	+
18	Direct	-
19	Gather	-
20	Gather	+
21	Electrode	E1
22	Electrode	E2
23	n/a	n/a
24	n/a	n/a

**Table 2:**

Contacts	Function	Nominal Resistance (Ohms)
4,1	B1 I-/Vright	65
4,2	B1 I-/Vleft	65
4,3	B1 I-/I+	65
1,2	B1 Vright/Vleft	65
1,3	B1 Vright/I+	65
2,3	B1 Vleft/I+	65
6,7	B2 I-/Vright	65
6,8	B2 I-/Vleft	65
6,5	B2 I-/I+	65
7,8	B2 Vright/Vleft	65
7,5	B2 Vright/I+	65
8,5	B2 Vleft/I+	65
12,9	B3 I-/Vright	65
12,10	B3 I-/Vleft	65
12,11	B3 I-/I+	65
9,10	B3 Vright/Vleft	65
9,11	B3 Vright/I+	65
10,11	B3 Vleft/I+	65
16,15	B4 I-/Vright	65
16,14	B4 I-/Vleft	65
16,13	B4 I-/I+	65
15,14	B4 Vright/Vleft	65
15,13	B4 Vright/I+	65
14,13	B4 Vleft/I+	65
18,17	Direct-/Direct+	55
20,19	Gather+/Gather-	55
22,21	E2/E1	55

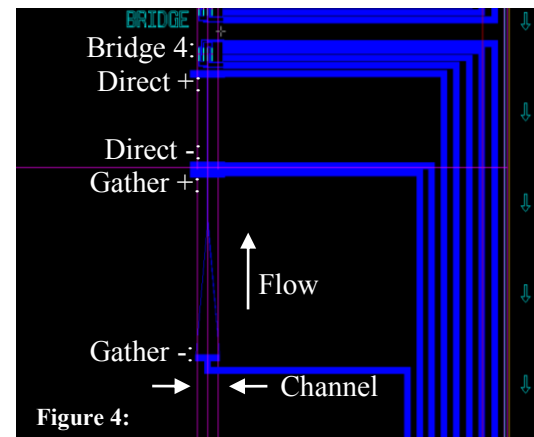


Figure 4:

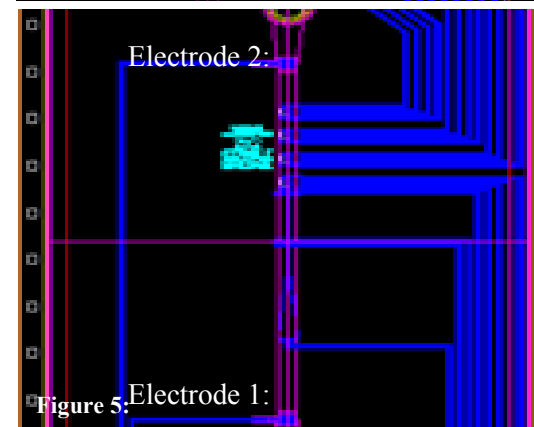


Figure 5:

### 3.4. Microfluidic flow channel dimensions and design

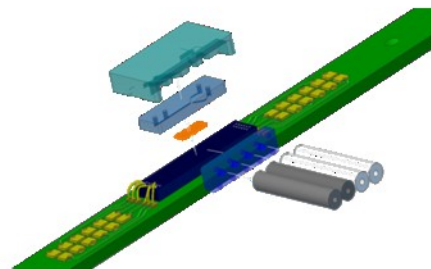
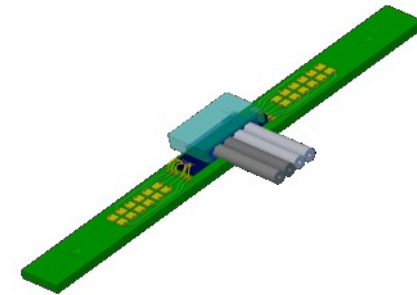
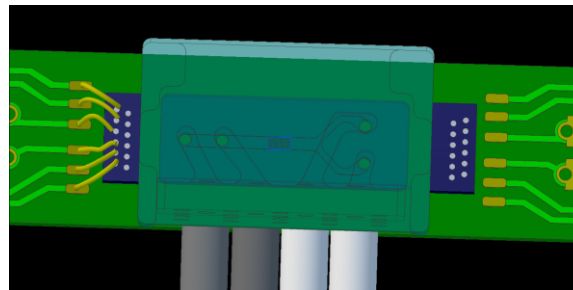
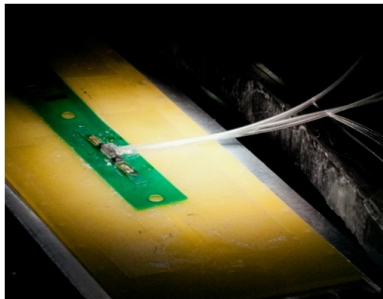




Table 3

<b>Revision History</b>		
<b>Revision number</b>	<b>Revision Date</b>	<b>Description of changes</b>
0	2012-08-01	Original Proto2 template
1	2012-10-09	Added technical information about die 6. MT