ATLAS

NEURO

Passive probe catalog

August 2017

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Introduction

ATLAS Neuroengineering is a spin-off company of imec, Leuven (BE) and IMTEK, University of Freiburg (DE). Our technology originates from the successful European FP6 program “NeuroProbes”. We provide tools for the experimental neuroscience to record and stimulate neuronal activity. We offer high-density, silicon-based neural probes and peripheral. Our products are applied for small animals, such as rodents, as well as non-human primates.

Our innovative *electronic depth control* (EDC™) probes provide slender shafts carrying high-density electrode arrays with up to over 1000 electrically addressable sites. This enables to fine tune each recording channel individually to find the best recording quality and to record simultaneously from different brain regions, without the need to mechanically (re-) position of the electrodes. The reconfigurable electrodes can be used to simultaneously map different brain regions along the probe and is most often used for in-vivo electrophysiological experiments.

This new type of neural device has the power to obtain significantly more information from a single recording experiment as compared to passive electrode arrays.

In addition, we also offer traditional passive multi-site silicon probes. They are available with single and multiple shafts and a variety of spatial electrode site configuration. We offer assembly technologies making highly appropriate for both acute and chronic application.

Besides the common passive probes presented in this catalogue, we offer custom-designed passive probes. Probes with up to 64 electrodes per shaft and a shaft length up to 40 mm are possible. In urgent cases your custom-designed passive probes can be manufactured within two month.

Traditional multi-site silicon probes

We offer a variety of traditional probes, i.e. probes providing 16 electrodes (starting from page 17) and probes providing 32 electrodes (starting from page 71). Besides the standard layouts, custom-design probes can also be manufactured. More information about custom–made probes can be found on page 128.

The electrode layouts of our traditional multi-site silicon probes usually provide circular electrodes with a diameter of 35 µm or 25 µm. Our probes are typically equipped with either platinum (Pt), iridium oxide (IrOx) or gold (Au) electrodes. In Table 1 the impedances of Pt and IrOx electrodes with a diameter of 25 µm and 35 µm at 1 kHz are listed. Typically, the standard probes are available either with a thickness of 100 µm, 80 µm or 50 µm.

Table 1: Typical impedance values of different electrode types.

	Ø 25 µm	Ø 35 µm
	Impedance [MΩ] @ 1 kHz	
Platinum (Pt)	1.66 ± 0.76	0.80 ± 0.35
Iridium oxide (IrOx)	0.57 ± 0.20	0.19 ± 0.08

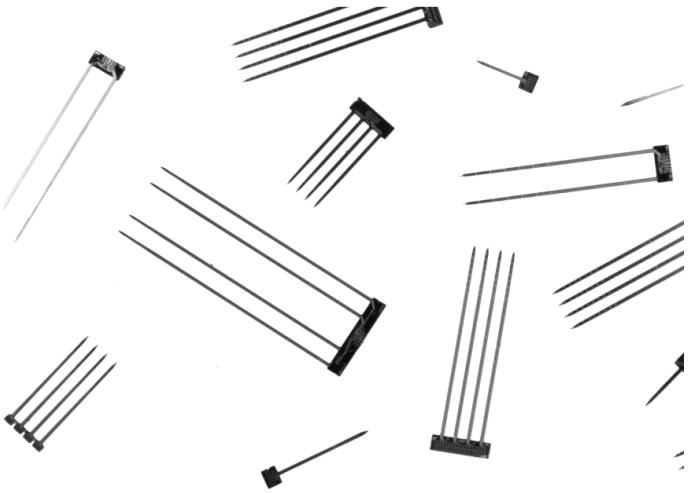


Figure 1: Standard silicon probes.

Probe assembly variants

There are varies assembly variants available for our probes. These assembly variants are tailored either to acute or chronic application. In order to connect the probes to your external instrumentations (e.g. headstages, DAQs etc.) several different adapters, printed circuit boards (PCBs) and electrode interface boards (EIBs) are available. Sine we follow an assembly-to-order-strategy, we can provide all our probes in a dedicated package on short-term. We are also open for new interface ideas and also willing to work on custom connection ideas.

Acute application

PCB assembly

For acute application, the probes are mechanically and electrically connected to a PCB. This means, the PCB serves as an implantation tool (since it can be mounted on a stereotactic device) as well as the interface to the headstage.

The 8-channel probes are mounted on a PCB which carries one 10-channel Omnetics Micro-series connector (see Figure 2).

Figure 2: Standard 8-channel probe assembled on a PCB with an Omnetics Micro-series-connector.

For the 16-channel probes, there are two different standard PCBs available. One is equipped with a common 18-channel dual-in-line (DIL) header, the other one with two 10-channel Omnetics Micro-series-connectors (see Figure 3).

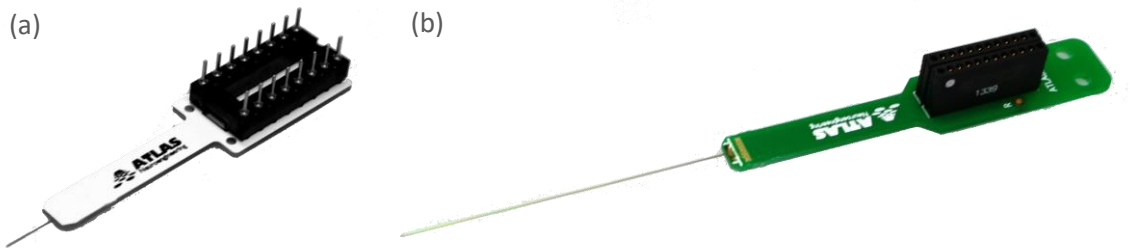


Figure 3: (a) Standard 16-channel probe assembled on a PCB with DIL-header. (b) A 40-mm-long probe assembled on a PCB with Omnetics Micro-series-connectors.

The PCBs carrying the 32-channel probes are equipped with a Samtec connector (MOLC-110-01-L-Q) in order to connect to your headstage, as illustrated in Figure 4.

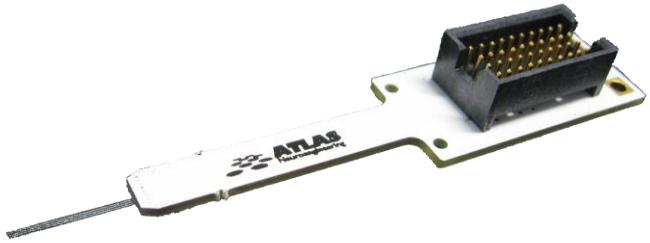


Figure 4: Acute assembly of a 32-channel probe.

The 64-channel probes are mounted on a PCB which carries two Samtec connectors (MOLC-110-01-L-Q), as shown in Figure 5.

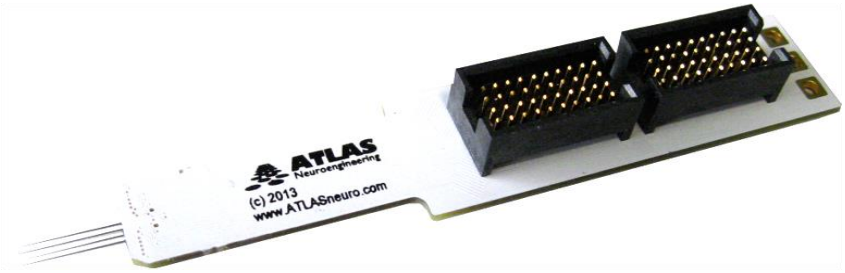


Figure 5: Acute assembly of a 64-channel probe.

Chronic application

Cable-ZIF-plug assembly

One of our assembly variants dedicated to chronic application is the cable-ZIF-plug assembly. The 16-channel probes as well as the 32-channel probes are mechanically and electrically connected to a highly-flexible polyimide-based ribbon cable (thickness ~12 µm). The polyimide (PI) cables (used for this assembly variant) have a length of ~30 mm (probe to connector distance). The advantage of this

highly-flexible PI cable is that the probe is mechanically decoupled. This means the probes is floating on the brain during experiment.

As shown in Figure 6: (a) Probe with 16 channels connected to a highly-flexible polyimide (PI) cable which is connected to a ZIF-plug, dedicated to a high-density ZIF connector. (b) Two probes with cable-ZIF-plug assembly connected to one common EIB. (c) A 32-channel probe with cable-ZIF-plug assembly.Figure 6, the flex-cable is connected to a ZIF-plug, which is dedicated to a high-density zero-insertion-force (ZIF) connector (Molex 502078). This allows for a reversible connection of the probe to an EIB (further details on EIBs can be found on page 10). This reversible connection between the low-weight probe, cable and ZIF-plug assembly (16-channel probe: ~0.02 g; 32-channel probe: ~0.06 g) and the EIB is another advantage of this assembly variant. Since there is no heavy-weight connector on the other side of the cable, insertion procedure is simplified. Furthermore it gives you more flexibility on using different connectors (headstages) with the same probe assembly.

A possible implantation procedure with a probe with cable-ZIF-plug assembly could be as follows: After craniotomy, the probe is implanted into the brain region of interest by means of the Vacuum Inserter (the Vacuum Inserter can be found on page 12). Once implanted, the probe is fixed using dental acrylic. When the acrylic is cured the probe is released from the Vacuum Inserter and completely secured with dental acrylic. The EIB is placed on the subject's skull and fixed by screws. Subsequently, the ZIF-plug is inserted into the ZIF connector and the complete setup (probe, cable, ZIF-plug and EIB) is secured as such that the connector dedicated to the headstage protrudes the acrylic.

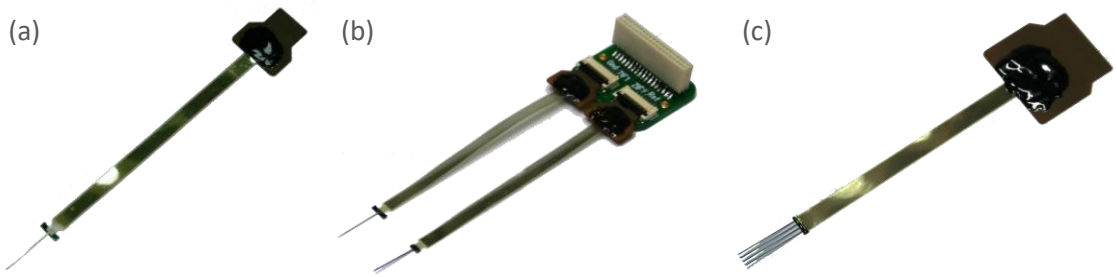


Figure 6: (a) Probe with 16 channels connected to a highly-flexible polyimide (PI) cable which is connected to a ZIF-plug, dedicated to a high-density ZIF connector. (b) Two probes with cable-ZIF-plug assembly connected to one common EIB. (c) A 32-channel probe with cable-ZIF-plug assembly.

Cable-strip-connector assembly

Another assembly variant dedicated to chronic application of 16-channel probes provides also a PI cable (length: ~18 mm; probe to connector distance) that is directly soldered to a common strip connector (Preci-Dip 853-series), as shown in Figure 7. This connector has a pin-to-pin-distance of 1.27 mm and a row-to-row-distance of 2.54 mm.

Figure 7: Probe and cable directly soldered to a common strip connector.

Cable-Omnetics assembly

We also fabricate probe variants with Omnetics connectors directly connected via a PI-based ribbon cable to the probe (see Figure 8). These connectors fit to almost all commercially available headstages. This assembly variant is also meant for chronic application and is available for 16- as well as 32-channel probes.

Figure 8: (a) A 16-channel probe connected to Omnetics A79038-001. (b) A 32-channel probe connected to Omnetics A8828-001. (c) A 32-channel probe connected to Omnetics A9435-001.

Semi-chronic assembly

The semi-chronic assembly variant can be used for acute as well as chronic application. The probe is mounted on a rigid PCB which allows the use of the probe for acute experiments. Since the PCB is quite small, this assembly variant is also applicable for chronic experiments with small animal models (small brain movement). The PCBs are equipped with Omnetics connectors, so they can be directly connectd to common headstages. As shown in Figure 9, the semi-chronic assembly available for 32- and 16-channel probes.

(a) (b) (c)

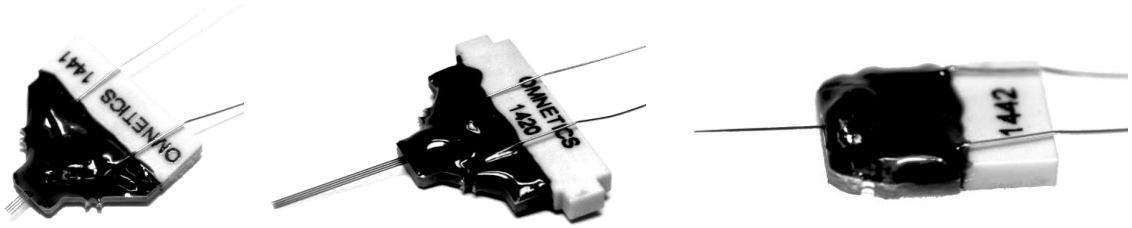


Figure 9: (a) 32-channel, semi-chronic probe equipped with Omnetics A8828-001. (b) 32-channel, semi-chronic probe with Omnetics A9435-001. (c) 16-channel, semi-chronic probe with Omnetics A79038-001.

Pointy tip feature

One of our unique selling points is the pointy tip feature. The implantation procedure is simplified with pointy tips compared to regular chisel-shaped probe tips. With a 100-µm-thick probe comprising the pointy tip feature, it is even possible to pierce through the dura of bigger animal models. A comparison between the regular chisel-shaped tip and the pointy tip is illustrated in Figure 10.

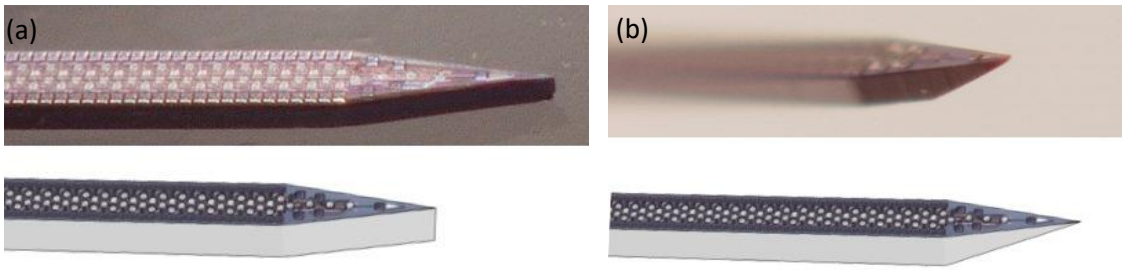


Figure 10: (a) Regular chisel-shaped probe tip. (b) Probe tip comprising pointy tip feature.

EIBs and adapter boards

In order to connect our probes with cable-ZIF-plug assembly to external instrumentation (e.g. headstages etc.), an EIB is needed. We provide standard EIBs with 16, 32, 64, 96 and 128 channels (see Figure 11). Of course we can also provide custom-designed EIBs dedicated to your experiment setup. The EIBs dedicated to cable-ZIF-plug probes usually can be used for several experiments, since the connection between probe and EIB is reversible.

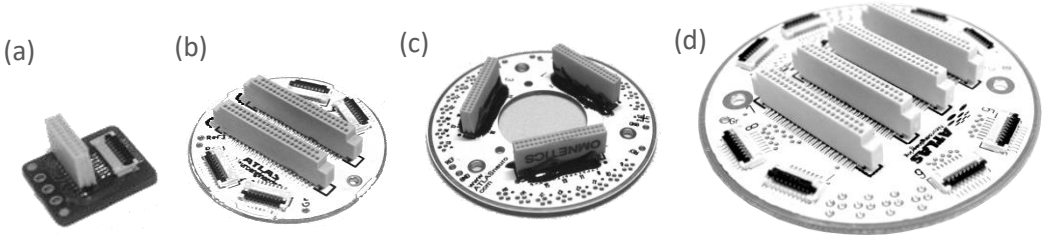


Figure 11: (a) A 16-channel EIB (10.0 × 11.3 mm²), dedicated to one 16-channel probe with cable-ZIF-plug assembly. (b) A 64-channel EIB (Ø 25.6 mm), dedicated to four 16-channel probes with cable-ZIF-plug assembly. (c) A 96-channel EIB (Ø 36.0 mm), dedicated to wire electrodes. (d) A 128-channel EIB (Ø 40.0 mm), dedicated to eight 16-channel probes and optional wire electrodes.

We also provide EIBs to connect to wire electrodes (see Figure 11 c). In order to load wires to these wire-EIBs, the small wire pins by Neuralynx are used.

To connect also wire electrodes to an EIB equipped with ZIF connectors, a wire-ZIF-adapter board is available (see Figure 12). These adapter boards (size 9.0 × 5.9 mm²) allow loading wire electrodes and can be connected to a ZIF-connector.

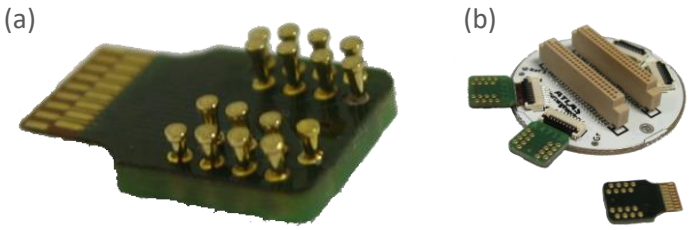


Figure 12: (a) Wire-ZIF-adapter board with loaded wires. (b) Wire-ZIF-adapters connected to a 64-channel EIB.

In order to test our probes with cable-ZIF-plug with the NanoZ a dedicated adapter board is available, as shown in Figure 13**Error! Reference source not found.**.

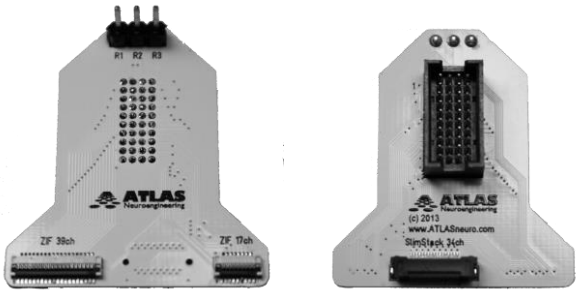


Figure 13: Adapter board to connect the cable-ZIF-plug probes to the NanoZ.

Vacuum Inserter

The Vacuum Inserter is dedicated to carry and mechanically stabilize the chronic probes during the surgical implantation procedure. The cable of the probe is fixed by vacuum. The probe itself protrudes over the edge of the Inserter. During piercing into the tissue, this edge stabilizes the probe.

Furthermore, the Inserter can carry a dedicated EIB enabling to record during implantation. Another interesting possibility which is enabled by having an EIB on the inserter is to perform acute experiments with a chronic probe. After implantation, the vacuum is turned off. The probe is released from the Vacuum inserter. Due to the highly-flexible cable, the probe is now floating on the brain. So you can perform acute experiments with a mechanically decoupled probe.

The Vacuum Inserter can be used for 16- as well as 32-channel probes.

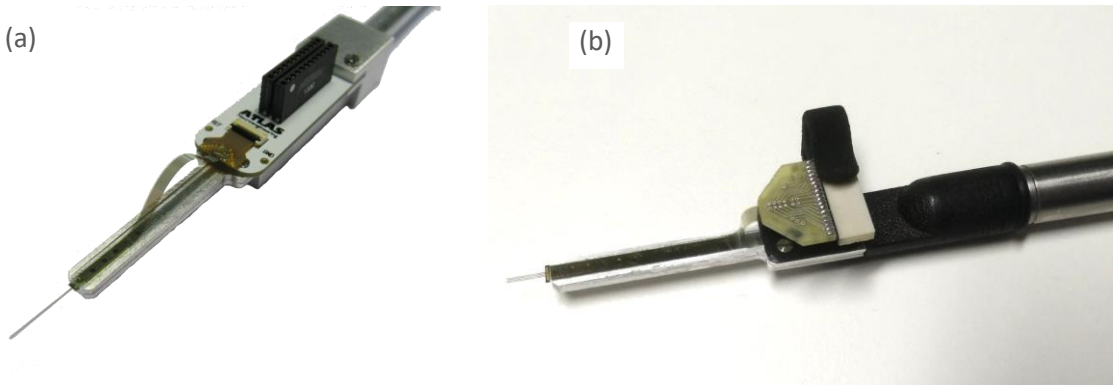


Figure 14: (a) Vacuum Inserter carrying an EIB. (b) Vacuum Inserter carrying a ZIF-plug holder.

Probe naming convention

E16+R-150-S2-L5-400

- Distance between shafts P_{Shaft} in micrometers, multiple values are separated with a dash (-).
- Shaft length L_{Total} in millimeters initiated by “L”, multiple values are separated with a dash (-).
- Number of shafts N_{Shaft} initiated by “S”.
- Electrodes pitch P_{El} in micrometers, multiple values are separated with a dash (-).
- Number of electrodes N_{El} initiated by “E”. There are several affixes: “+R” indicates an additional reference electrode, “R” indicates electrodes at the rim, “T” indicates tetrodes, “Ste” indicates a dual electrode row, “RD” indicates a dual electrode row at the rim, “B” indicates electrodes distributed around the tip. Also combinations of these affixes are possible.

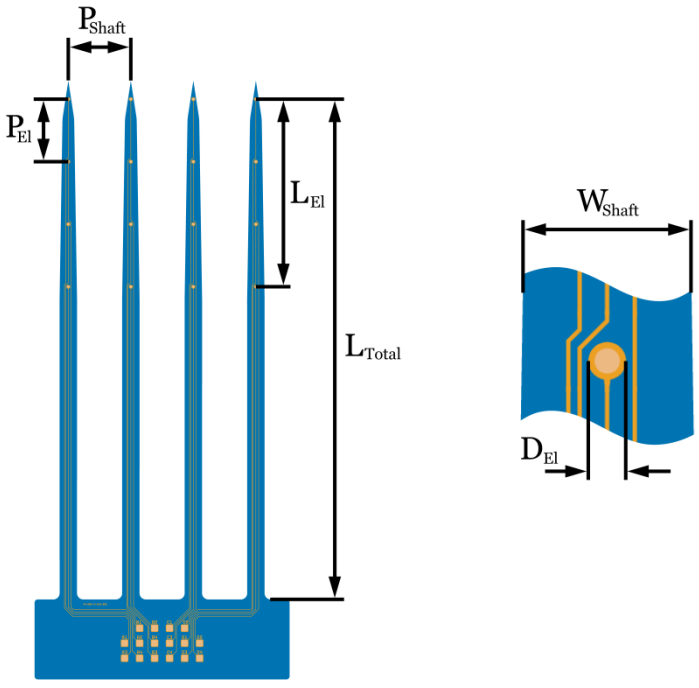
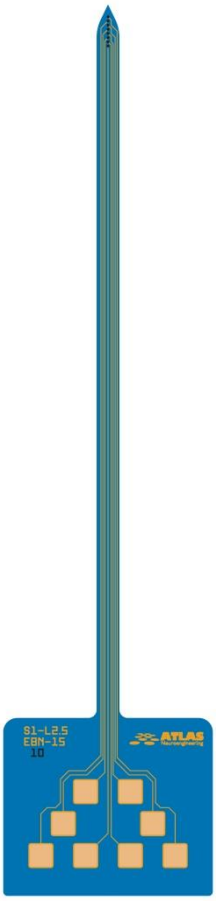


Figure 15: Design parameters of the probes.

Passive Probes

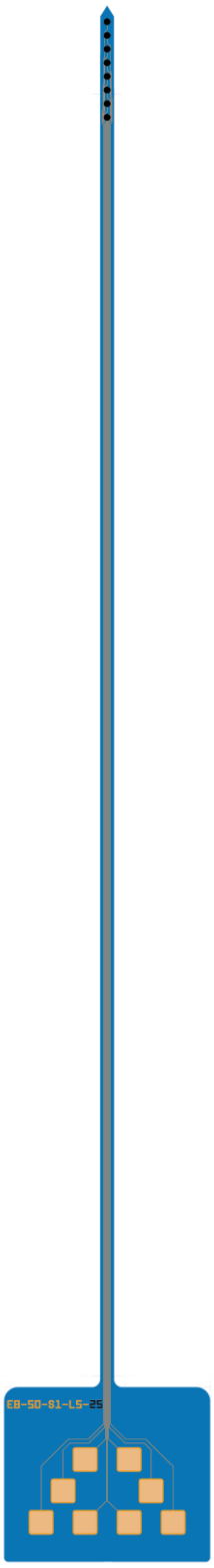
8-channel probes

E8-15-S1-L2.5



Shaft length (L_{Total})	2.50 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	82 µm
Number of electrodes (N_{El})	8
Electrode pitch (P_{El})	15 µm
Electrode length (L_{El})	105 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 10 µm, Pt, 50 µm Ø 10 µm, IrOx, 50 µm Ø 10 µm, Au, 50 µm

E8-50-S1-L5 (new technology)

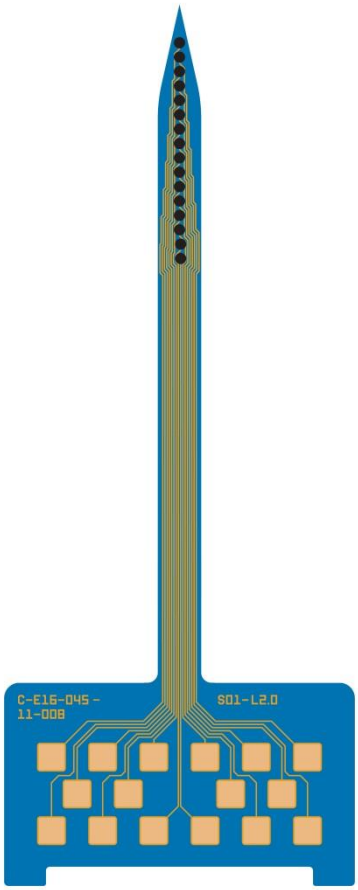


Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{El})	8
Electrode pitch (P_{El})	50 µm
Electrode length (L_{El})	350 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 50 µm Ø 15 µm, Pt, 100 µm

Passive Probes

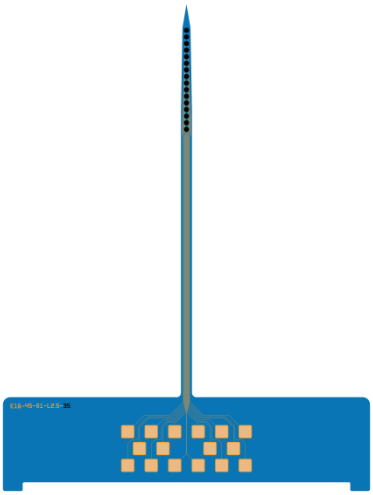
16-channel probes

E16-45-S1-L2



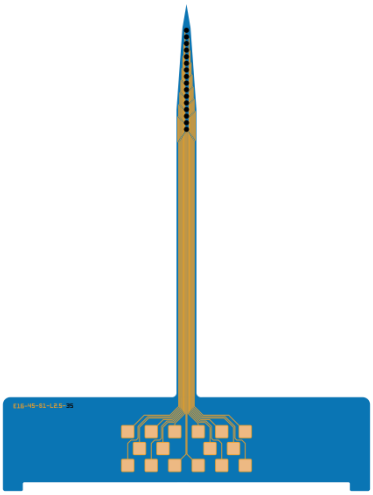
Shaft length (L_{Total})	2.00 mm
Number of shafts (N_{shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	45 µm
Electrode length (L_{EI})	675 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, Au, 50 µm

E16-45-S1-L2.5 (new technology)



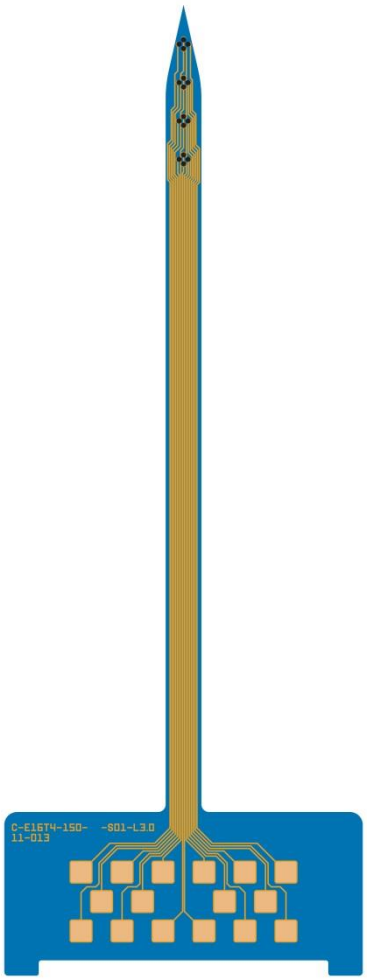
Shaft length (L_{Total})	2.50 mm
Number of shafts (N_{shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm (new technology)
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	45 µm
Electrode length (L_{EI})	675 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, IrOx, 50 µm

E16-45-S1-L2.5



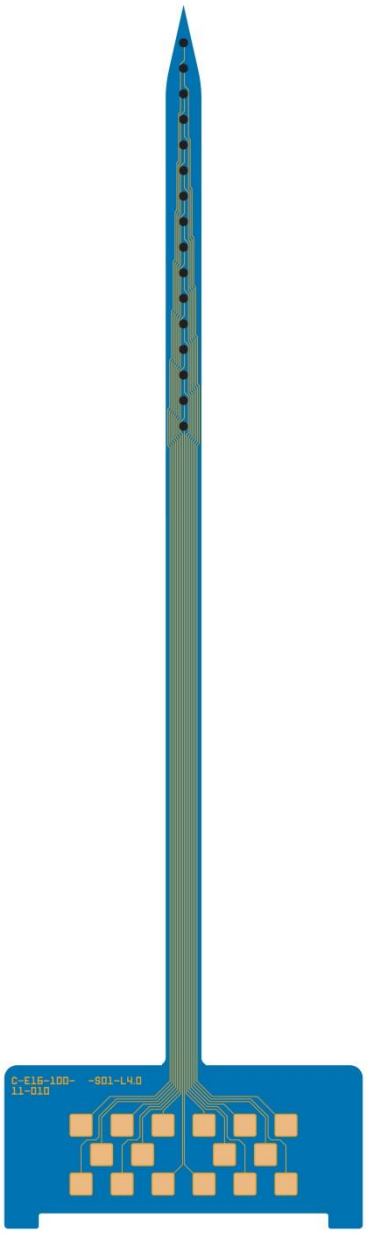
Shaft length (L_{Total})	2.50 mm
Number of shafts (N_{shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	136 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	45 µm
Electrode length (L_{EI})	675 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, IrOx, 50 µm

E16T4-150-S1-L3



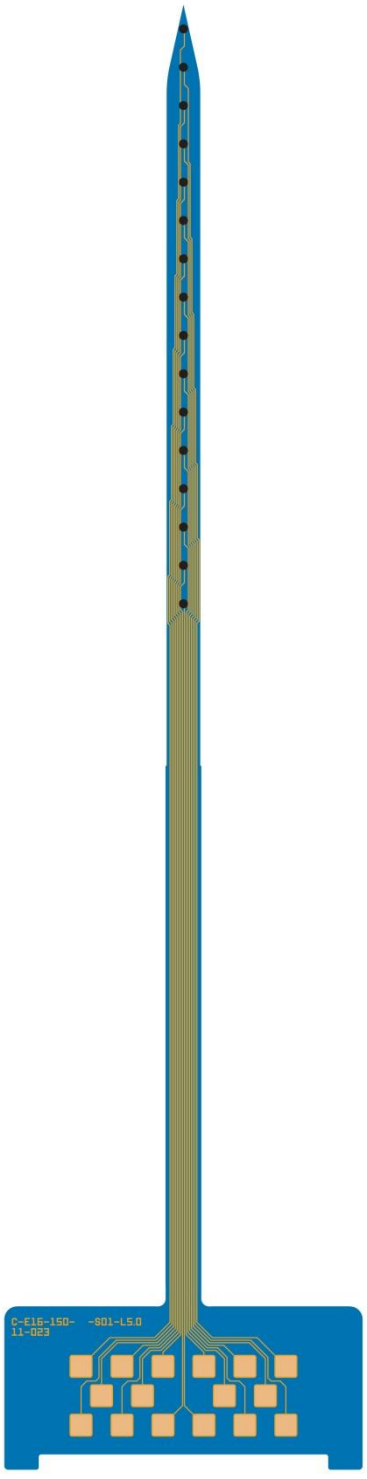
Shaft length (L_{Total})	3.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16 (4 × Tetrode)
Tetrode pitch (P_{Tet})	150 µm
Tetrode length (L_{Tet})	450 µm
Electrode pitch (P_{EI})	35 µm (for Ø 20 µm) 40 µm (for Ø 15 µm)
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, Pt, 50 µm Ø 15 µm, Pt, 100 µm Ø 15 µm, Pt, 50 µm Ø 20 µm, IrOx, 100 µm Ø 15 µm, IrOx, 50 µm Ø 20 µm, Au, 50 µm Ø 15 µm, Au, 50 µm

E16-100-S1-L4



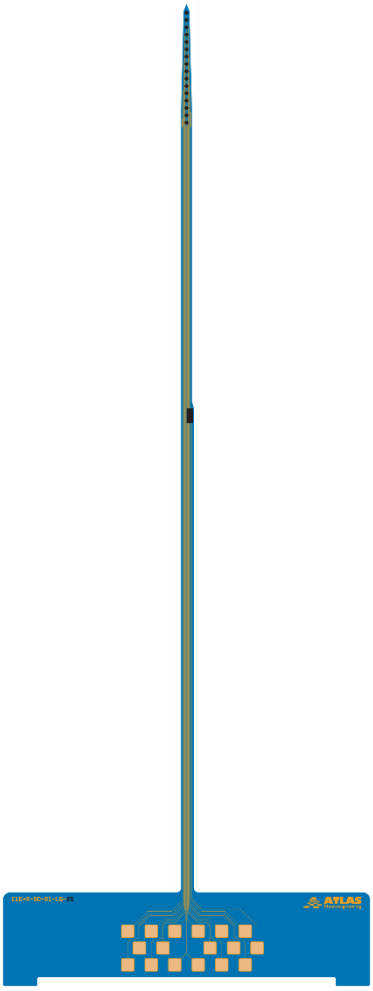
Shaft length (L_{Total})	4.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{El})	16
Electrode pitch (P_{El})	100 µm
Electrode length (L_{El})	1500 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, IrOx, 100 µm Ø 35 µm, Au, 50 µm

E16-150-S1-L5



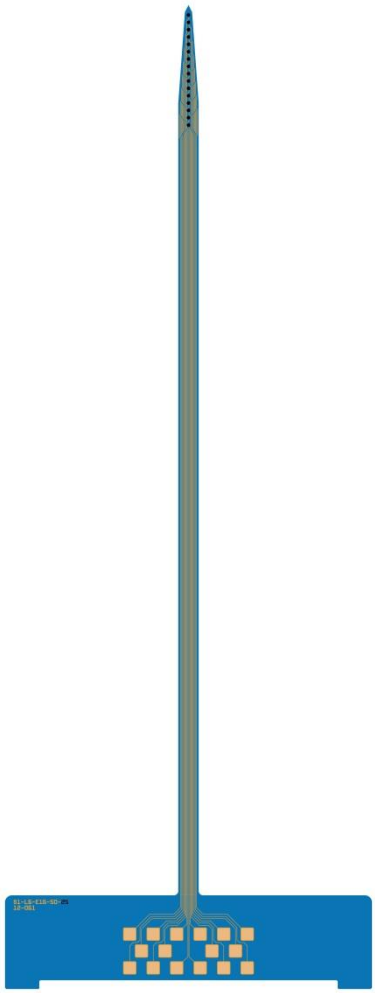
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, IrOx, 100 µm Ø 35 µm, Au, 50 µm

E16+R-50-S1-L6 (new technology)



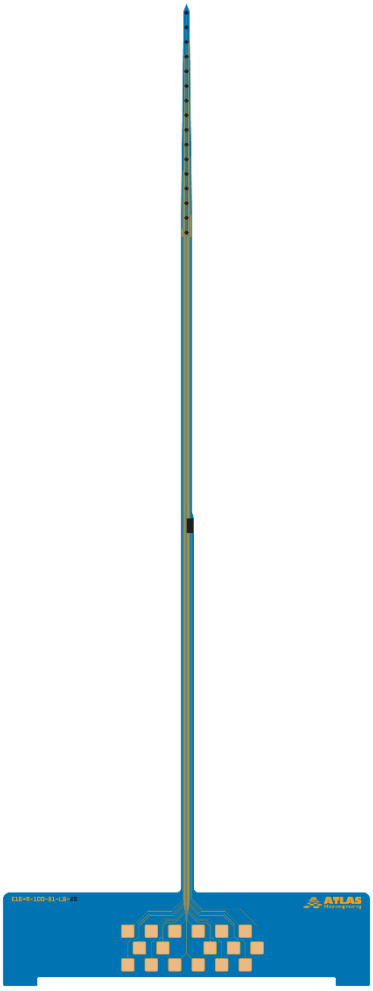
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-50-S1-L6



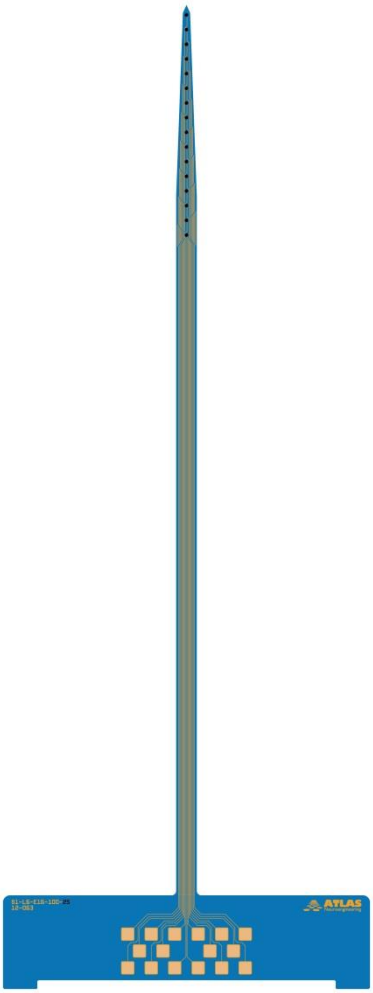
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E16+R-100-S1-L6 (new technology)



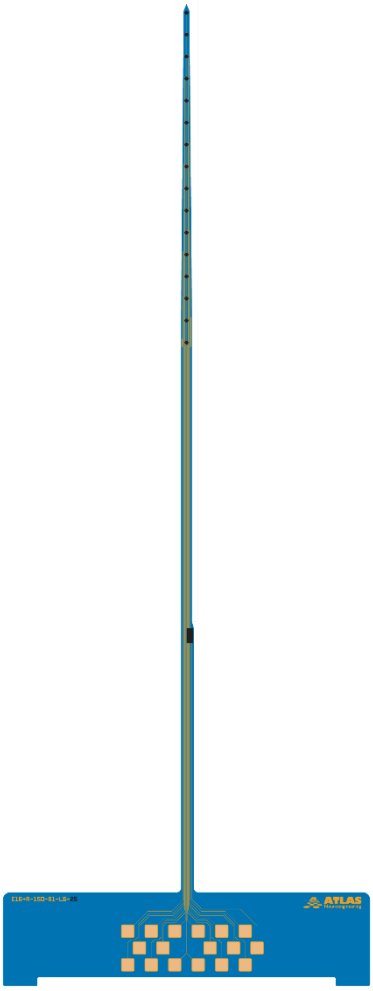
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-100-S1-L6



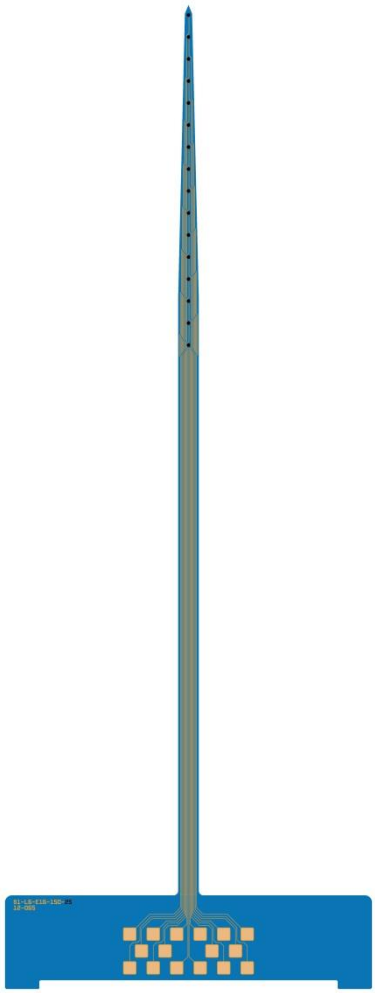
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, Pt, 50 µm Ø 35 µm, IrOx, 100 µm Ø 25 µm, IrOx, 50 µm Ø 35 µm, Au, 50 µm

E16+R-150-S1-L6 (new technology)



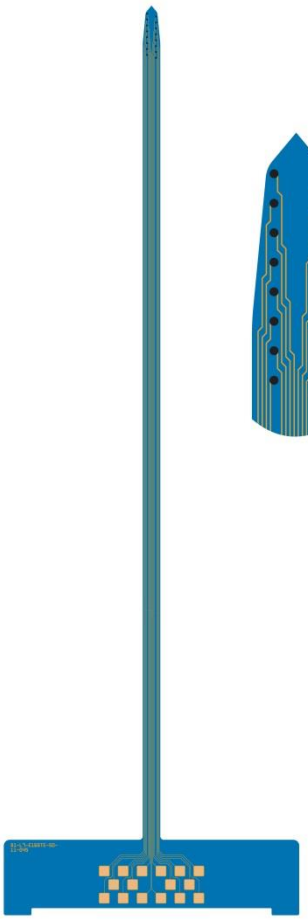
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-150-S1-L6



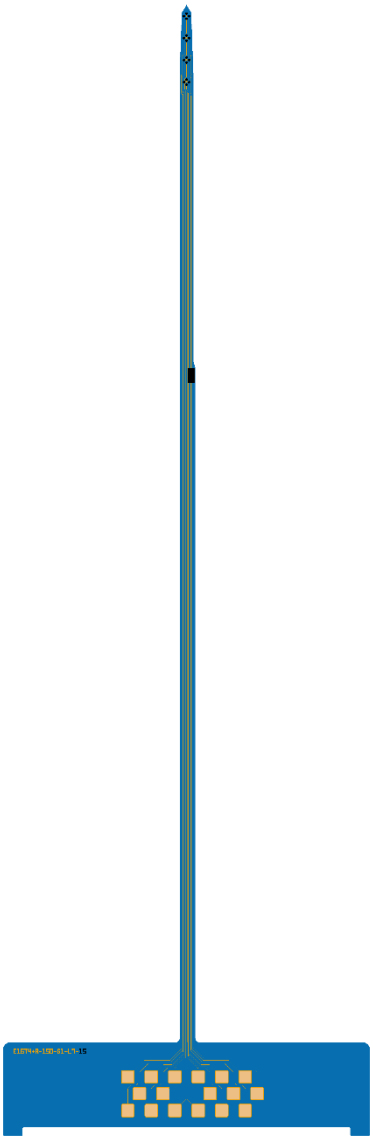
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16Ste-50-S1-L7



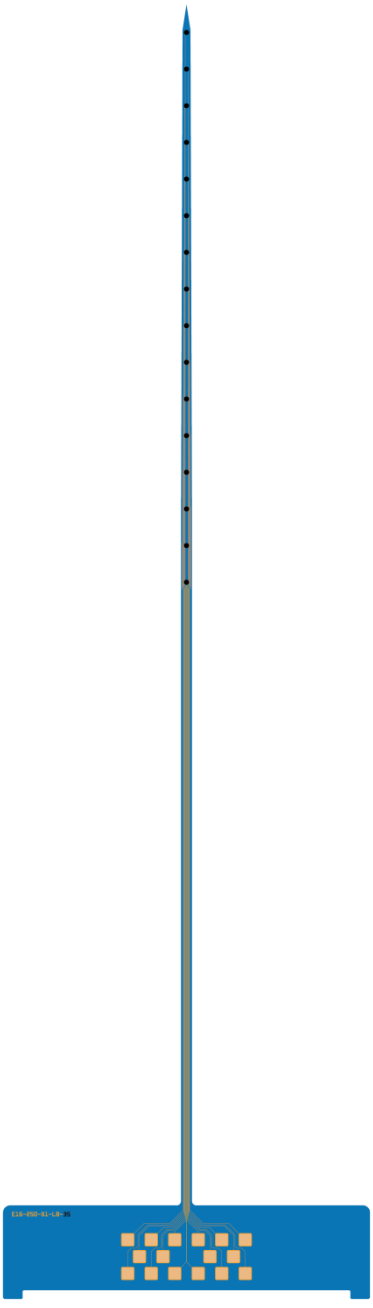
Shaft length (L_{Total})	7.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	150 µm
Number of electrodes (N_{EI})	16 (stereo)
Electrode pitch (P_{EI})	50 µm (y-direction) 75 µm (x-direction)
Electrode length (L_{EI})	375 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, IrOx, 80 µm Ø 15 µm, IrOx, 50 µm

E16T4+R-150-S1-L7 (new technology)



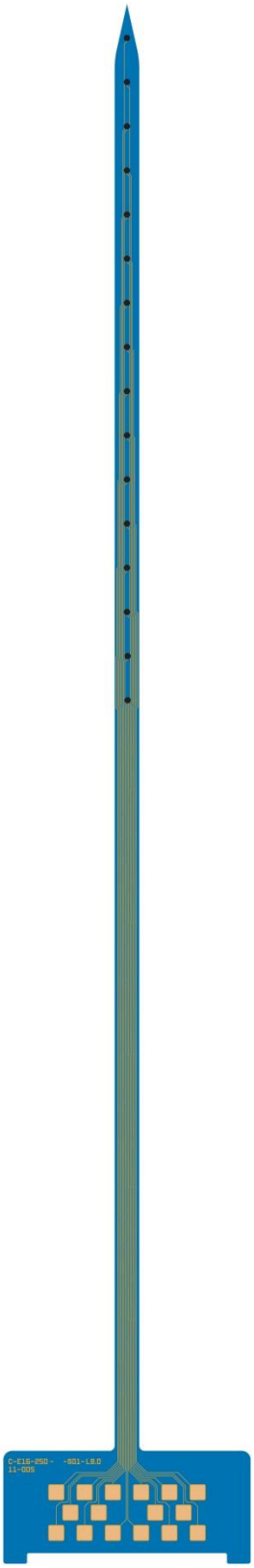
Shaft length (L_{Total})	7.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	95 µm
Number of electrodes (N_{El})	16 (4 × Tetrode)
Tetrode pitch (P_{Tet})	150 µm
Tetrode length (L_{Tet})	450 µm
Electrode pitch (P_{El})	35 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 50 µm Ø 15 µm, Pt, 100 µm
Reference electrode size	42 × 100 µm²

E16-250-S1-L8 (new technology)



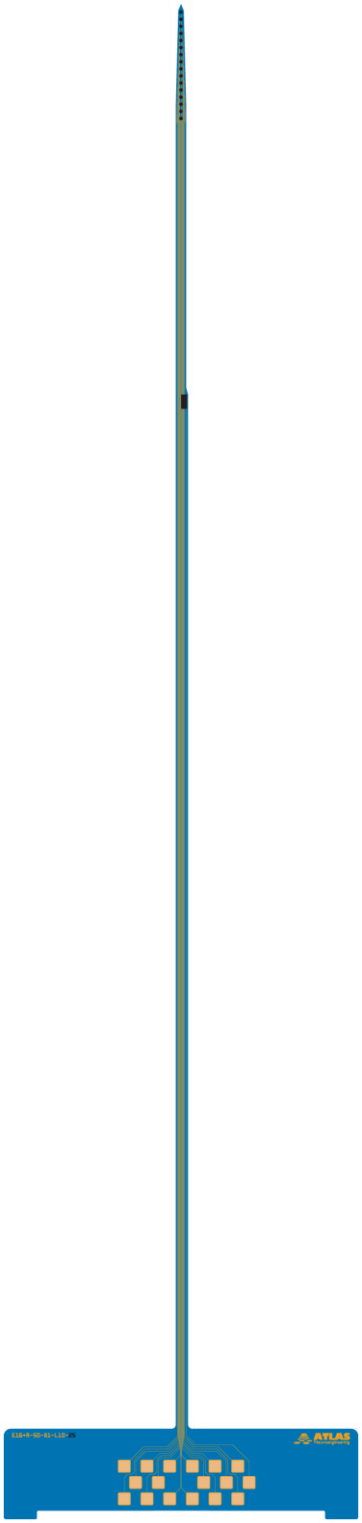
Shaft length (L_{Total})	8.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	250 µm
Electrode length (L_{EI})	3750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, IrOx, 50 µm

E16-250-S1-L8



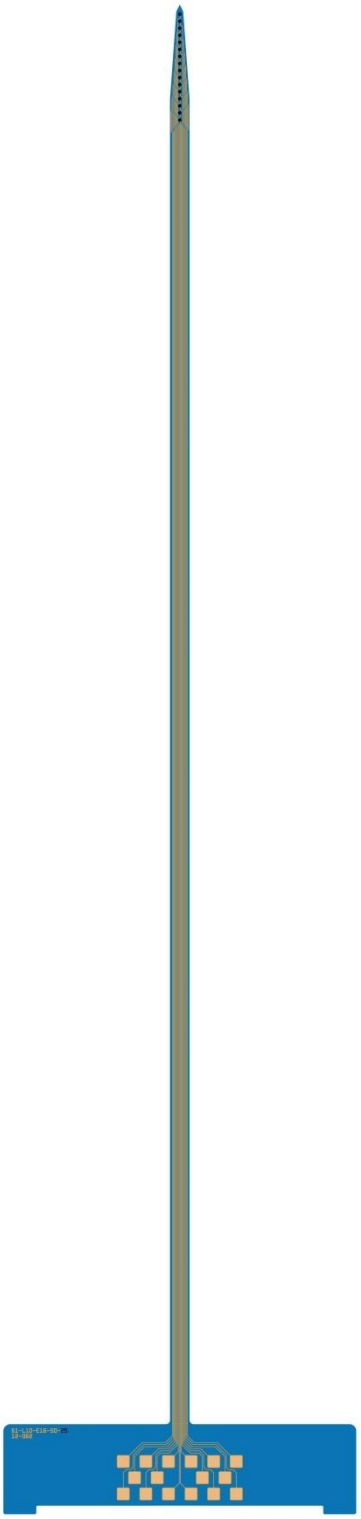
Shaft length (L_{Total})	8.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	250 µm
Electrode length (L_{EI})	3750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, IrOx, 100 µm Ø 35 µm, Au, 50 µm

E16+R-50-S1-L10 (new technology)



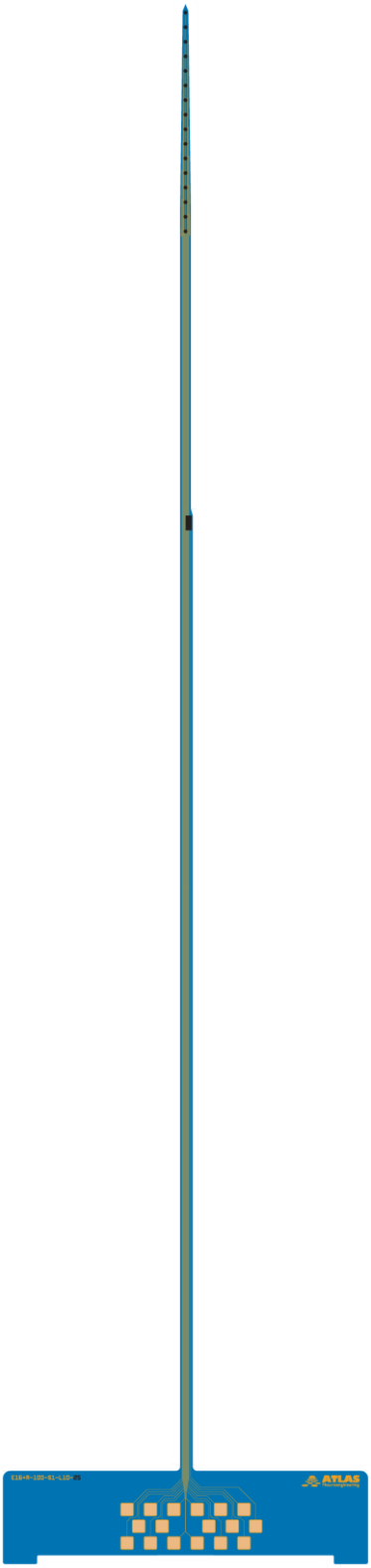
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-50-S1-L10



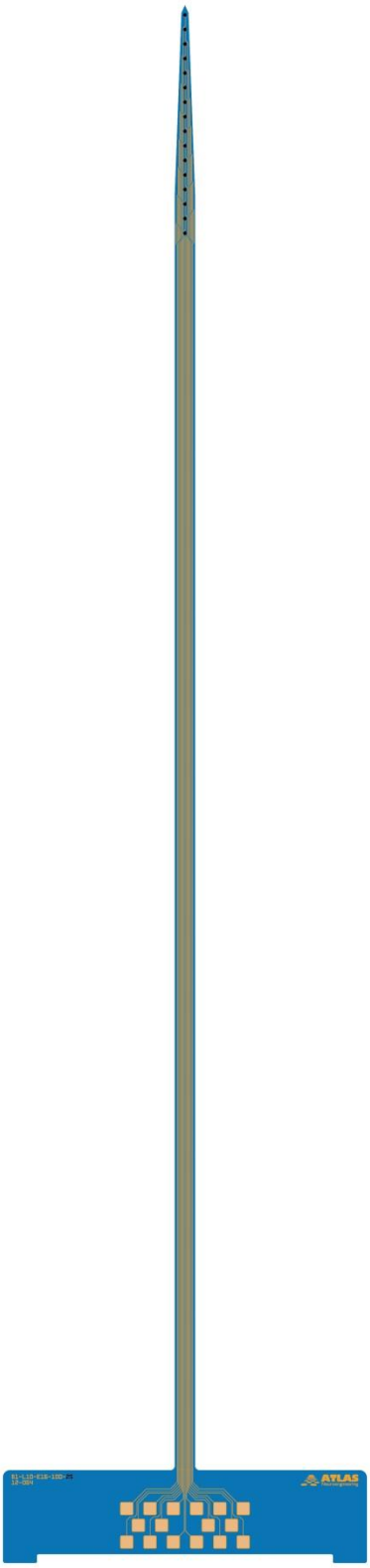
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E16+R-100-S1-L10 (new technology)



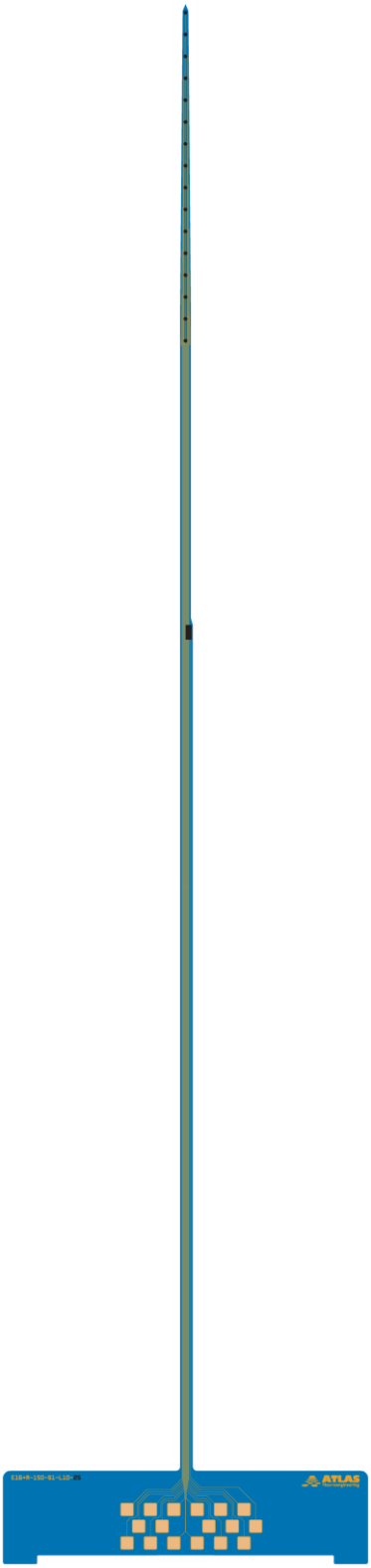
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-100-S1-L10



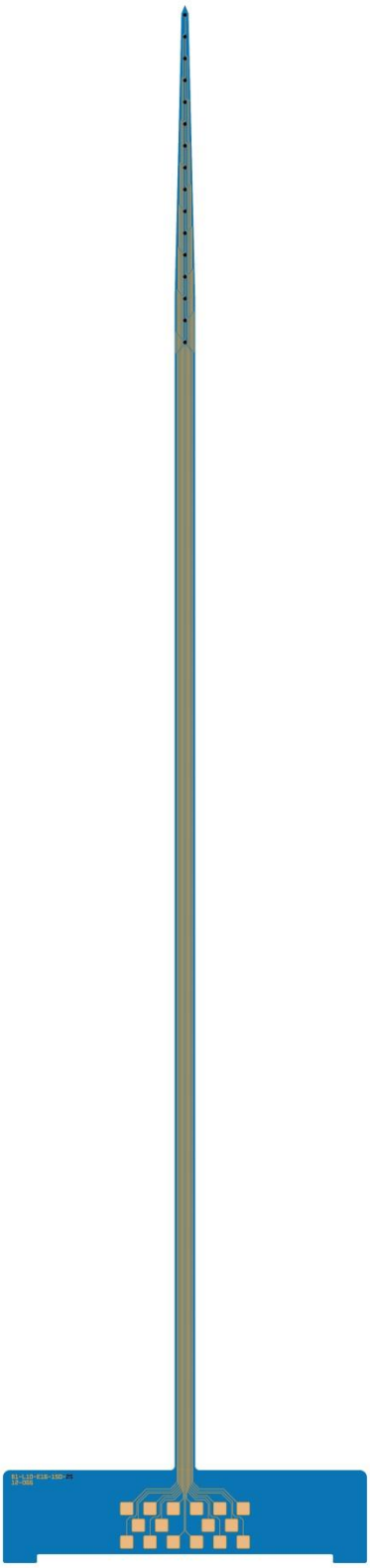
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E16+R-150-S1-L10 (new technology)



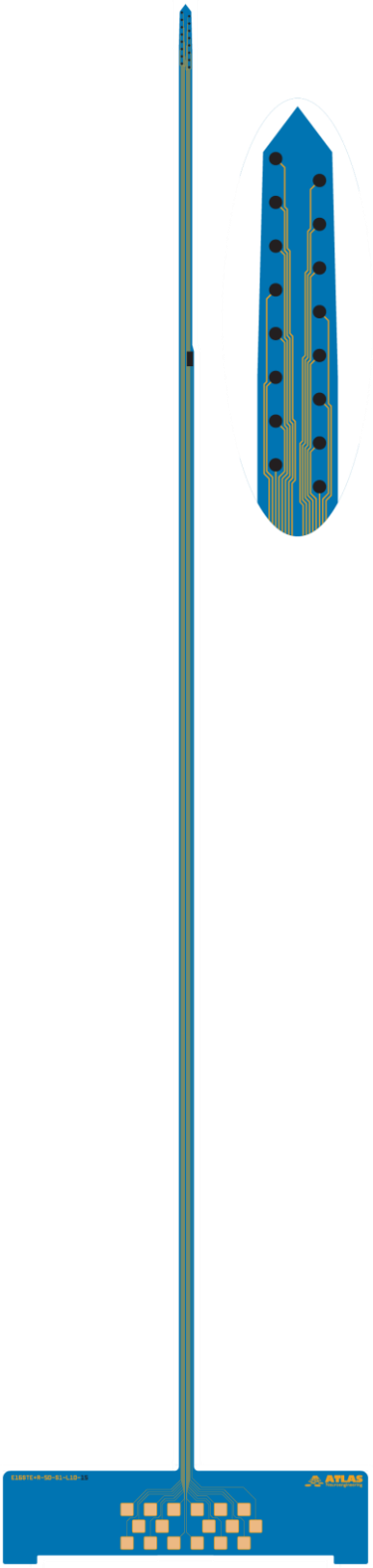
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-150-S1-L10



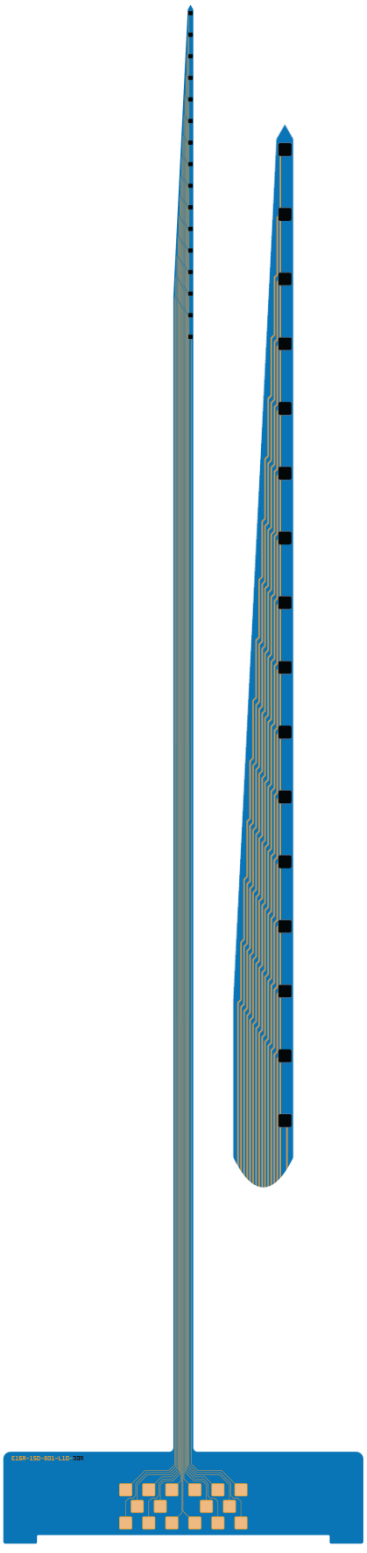
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E16Ste+R-50-S1-L10 (new technology)



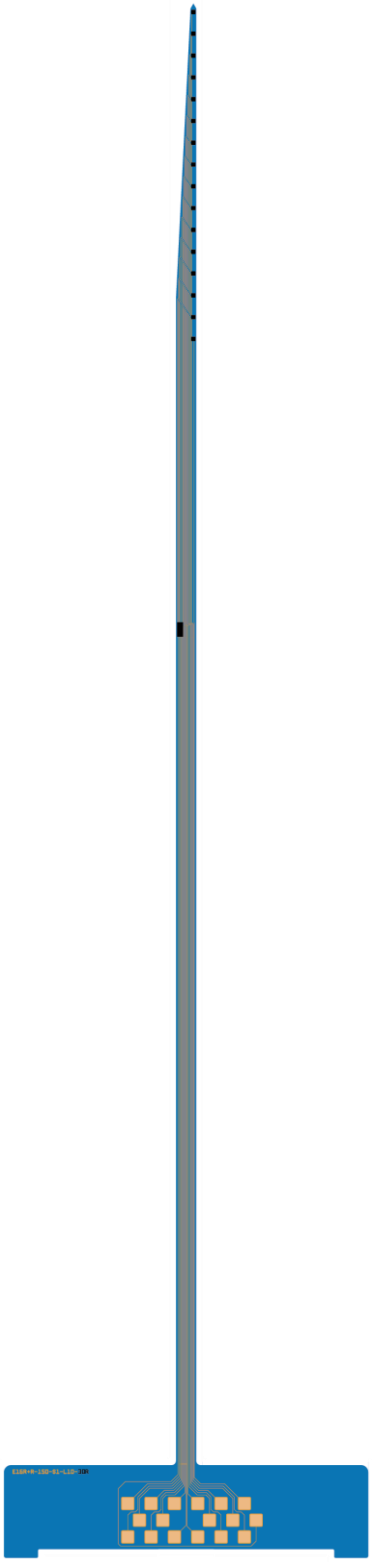
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	92 µm
Number of electrodes (N_{EI})	16 (stereo)
Electrode pitch (P_{EI})	50 µm (x and y-direction)
Electrode length (L_{EI})	375 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 50 µm Ø 15 µm, Pt, 100 µm Ø 15 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16R-150-S1-L10



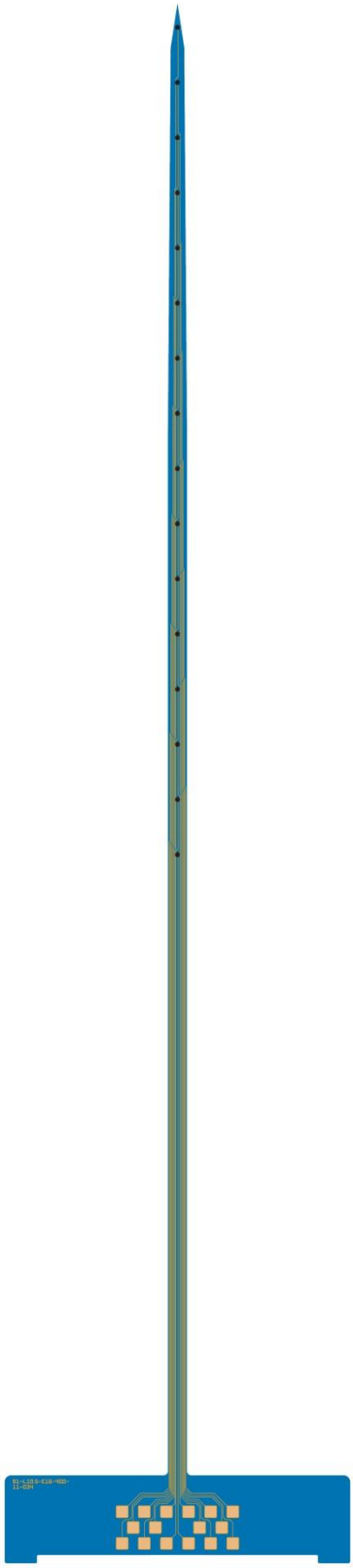
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16 (rim)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	30 × 30 µm², Pt, 100 µm 30 × 30 µm², IrOx, 50 µm

E16R+R-150-S1-L10



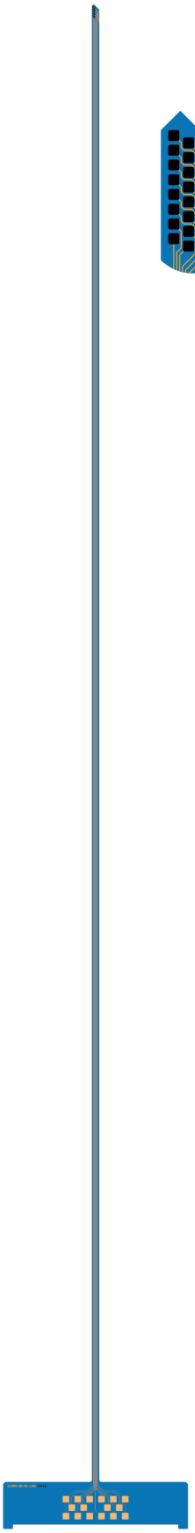
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16 (rim)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	30 × 30 µm², Pt, 50 µm 30 × 30 µm², Pt, 100 µm 30 × 30 µm², IrOx, 50 µm
Reference electrode size	42 × 100 µm²

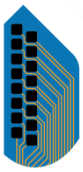
E16-400-S1-L10.5



Shaft length (L_{Total})	10.50 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	400 µm
Electrode length (L_{EI})	6000 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm Ø 35 µm, IrOx, 50 µm

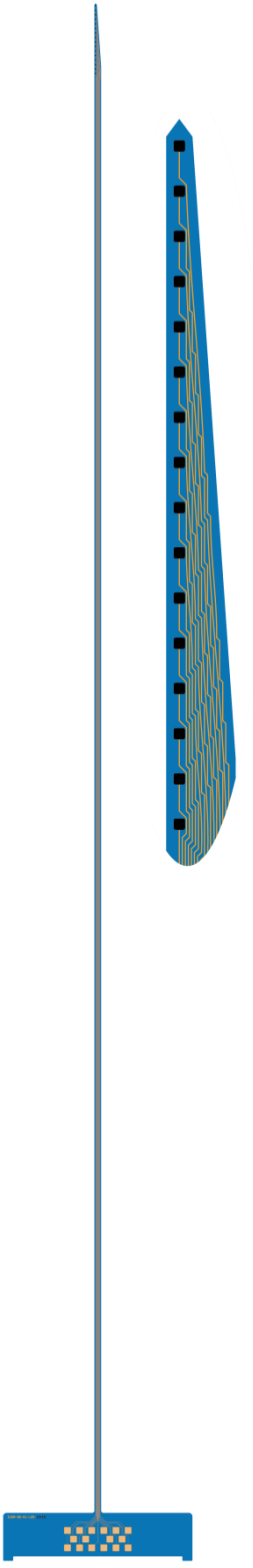
E16RD-20-S1-L20 (new technology)





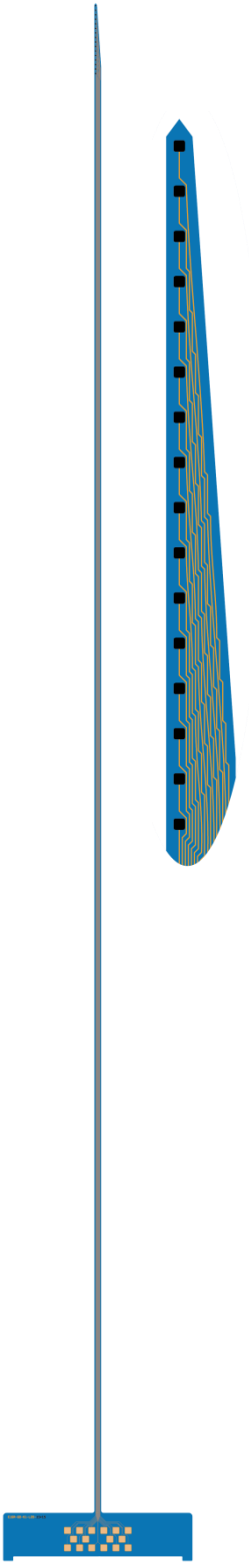
Shaft length (L_{Total})	20.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	102 µm
Number of electrodes (N_{EI})	16 (dual row)
Electrode pitch (P_{EI})	20 µm (y- and x-direction)
Electrode length (L_{EI})	140 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	15 × 15 µm², Pt, 100 µm 15 × 15 µm², IrOx, 50 µm

E16R-60-S1-L20 (new technology)



Shaft length (L_{Total})	20.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	92 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	60 µm
Electrode length (L_{EI})	900 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	15 × 15 µm², Pt, 100 µm 15 × 15 µm², IrOx, 50 µm

E16R-100-S1-L20 (new technology)

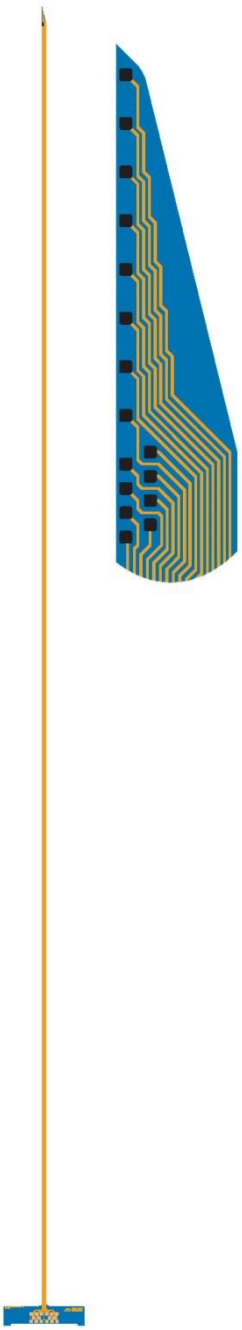


Shaft length (L_{Total})	20.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	92 µm
Number of electrodes (N_{EI})	16
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	15 × 15 µm², Pt, 100 µm 15 × 15 µm², IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16RD-30-S1-L40

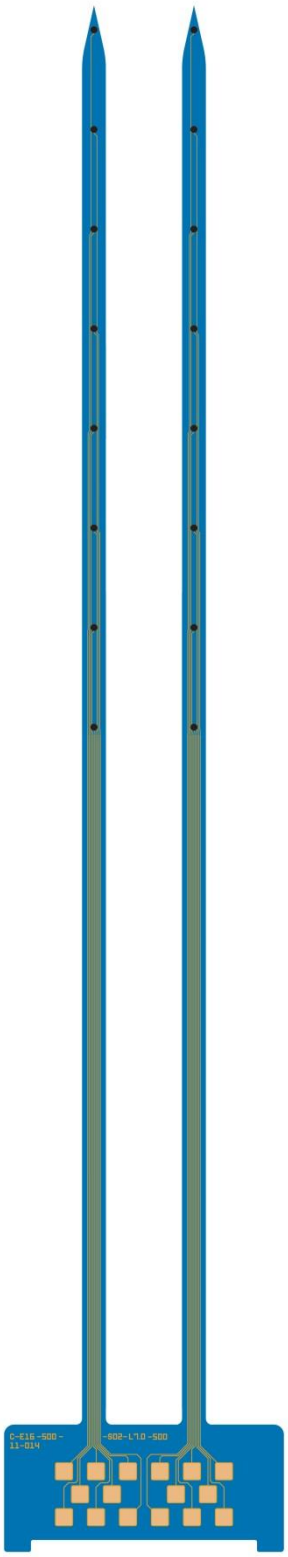
Shaft length (L_{Total})	40.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	150 µm
Number of electrodes (N_{EI})	16 (dual row)
Electrode pitch (P_{EI})	30 µm (y- and x-direction)
Electrode length (L_{EI})	225 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	15 × 15 µm², Pt, 100 µm 10 × 10 µm², Pt, 100 µm 15 × 15 µm², Pt, 50 µm 10 × 10 µm², Pt, 50 µm 15 × 15 µm², IrOx, 50 µm 10 × 10 µm², IrOx, 50 µm 15 × 15 µm², Au, 100 µm 10 × 10 µm², Au, 100 µm 15 × 15 µm², Au, 50 µm 10 × 10 µm², Au, 50 µm

E16RT3-60-30-S1-L40



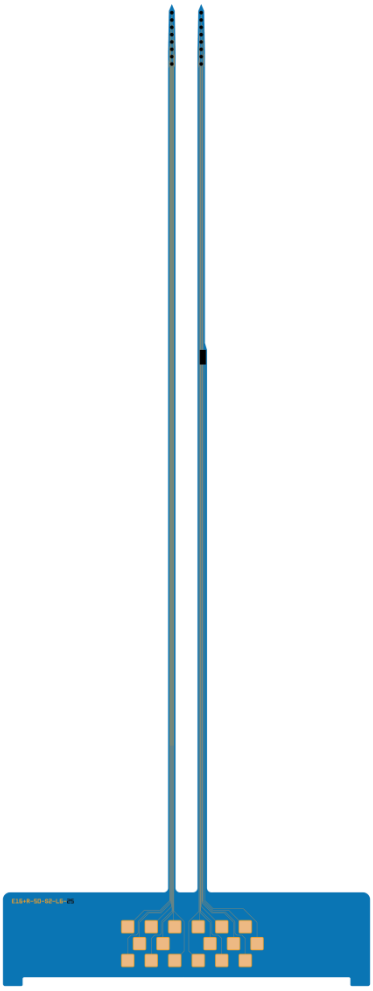
Shaft length (L_{Total})	40.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	150 µm
Number of electrodes (N_{EI})	16 (8 electrodes + 3 tetrodes)
Electrode pitch (P_{EI})	60 / 30 µm (y-direction) 30 µm (x-direction)
Electrode length (L_{EI})	570 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	15 × 15 µm², Pt, 100 µm 15 × 15 µm², Pt, 50 µm 10 × 10 µm², Pt, 50 µm 15 × 15 µm², IrOx, 50 µm 10 × 10 µm², IrOx, 50 µm 15 × 15 µm², Au, 100 µm 15 × 15 µm², Au, 50 µm 10 × 10 µm², Au, 50 µm

E16-500-S2-L7-500



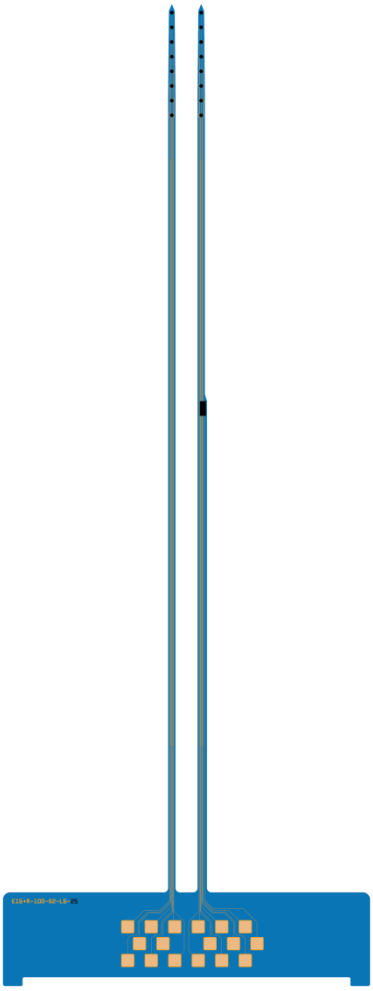
Shaft length (L_{Total})	7.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	500 µm
Shaft width (W_{Shaft})	120 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	500 µm
Electrode length (L_{EI})	3500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, Au, 50 µm

E16+R-50-S2-L6-200 (new technology)



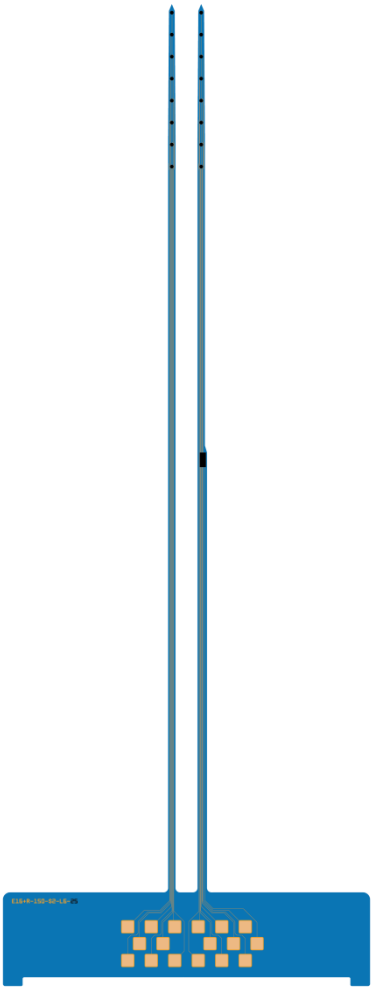
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-100-S2-L6-200 (new technology)



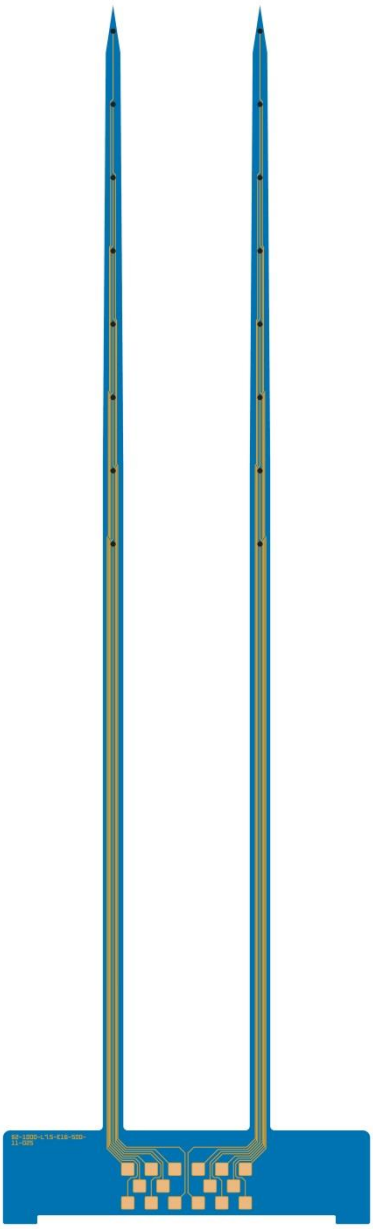
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	700 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-150-S2-L6-200 (new technology)



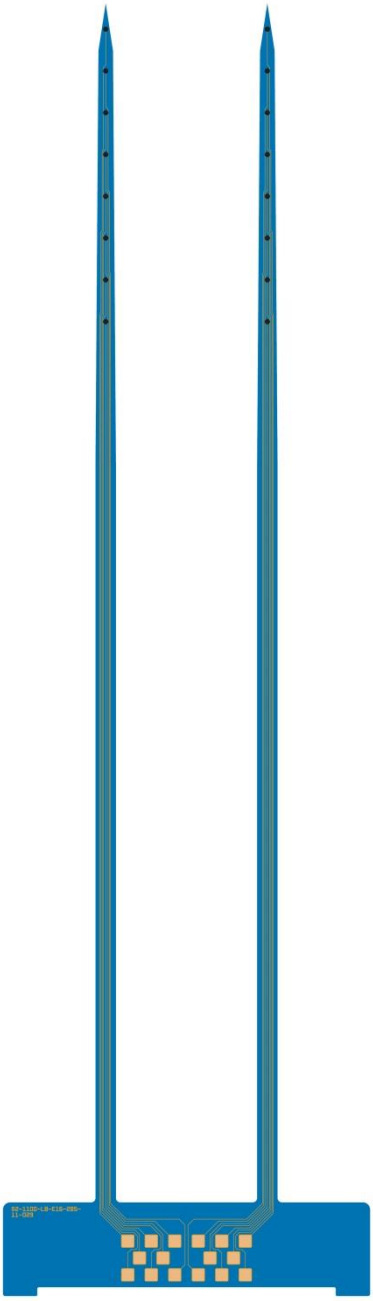
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16-500-S2-L7.5-1000



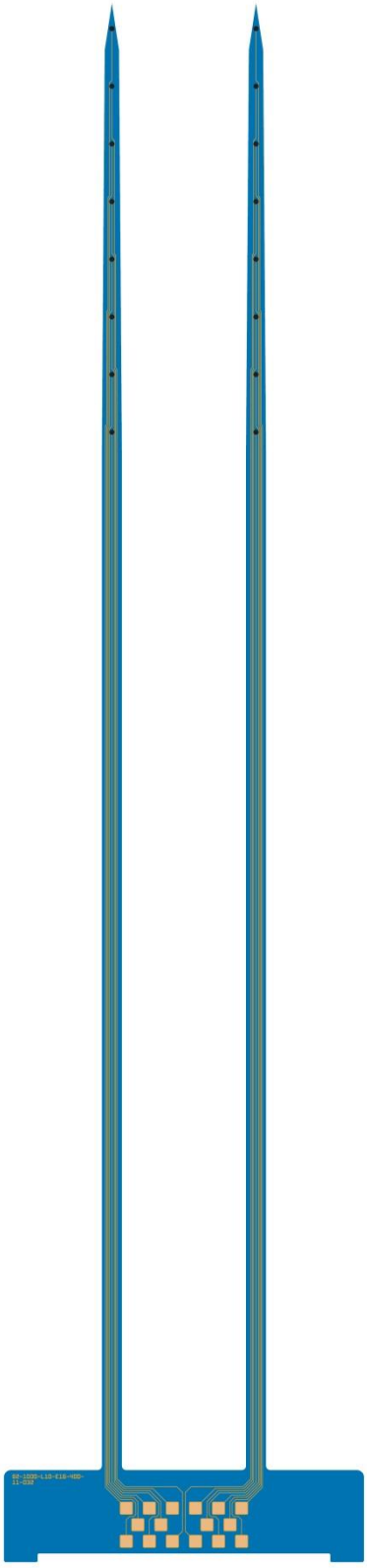
Shaft length (L_{Total})	7.50 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	1000 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	500 µm
Electrode length (L_{EI})	3500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm Ø 35 µm, IrOx, 50 µm

E16-285-S2-L8-1100



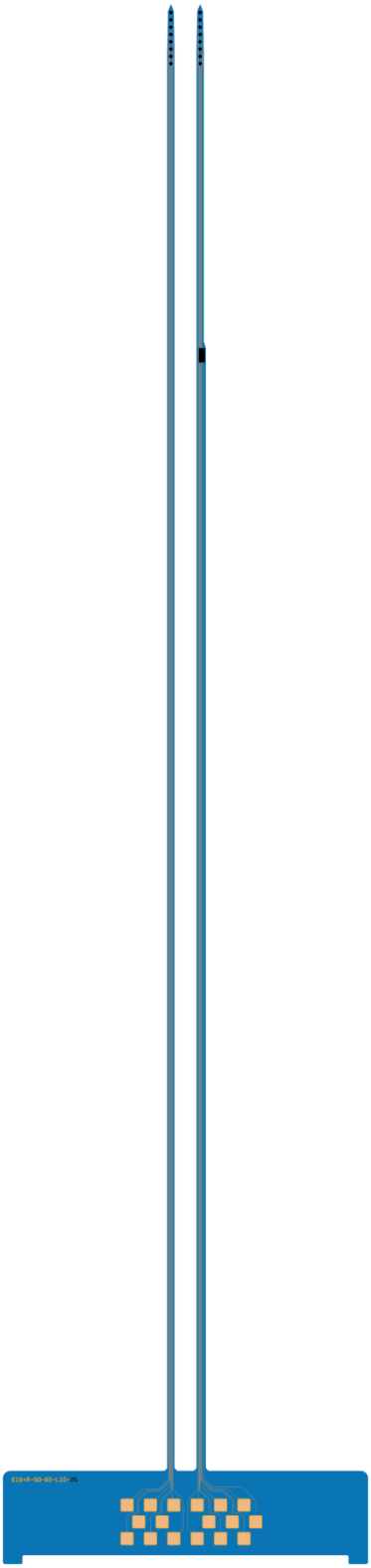
Shaft length (L_{Total})	8.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	1100 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	285 µm
Electrode length (L_{EI})	1995 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm Ø 35 µm, IrOx, 50 µm

E16-400-S2-L10-1000



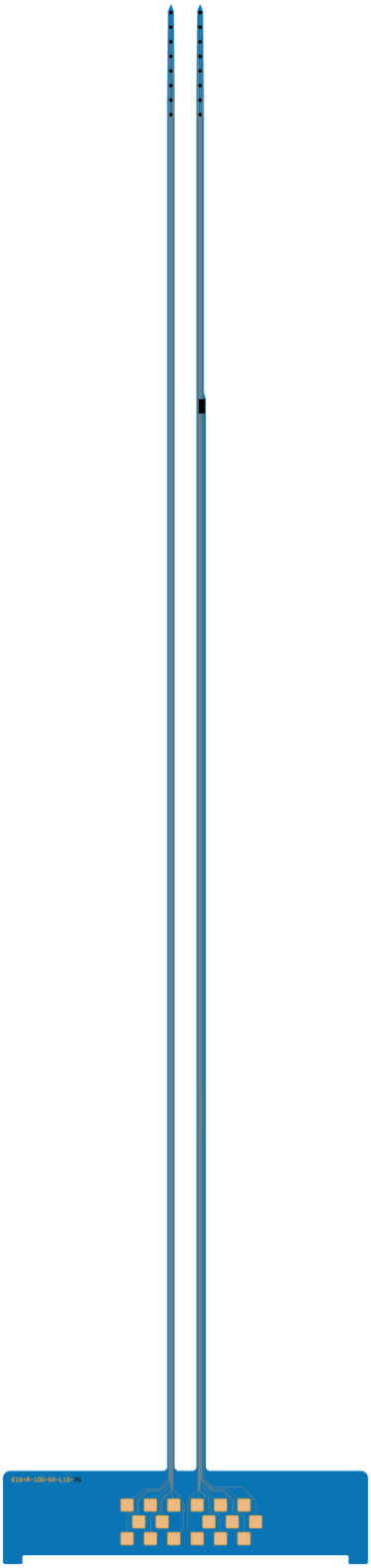
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	1000 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	400 µm
Electrode length (L_{EI})	2800 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm

E16+R-50-S2-L10-200 (new technology)



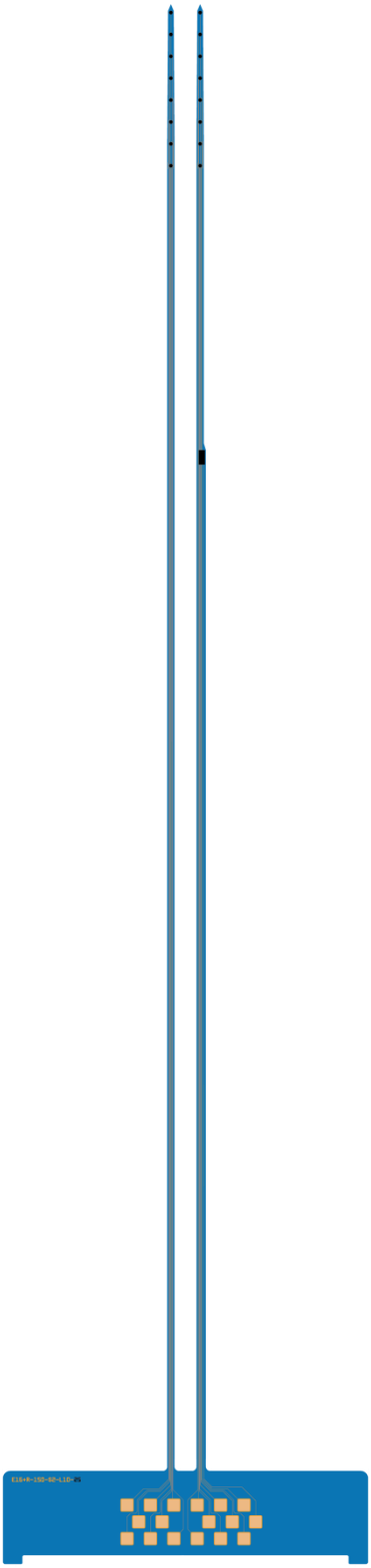
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-100-S2-L10-200 (new technology)



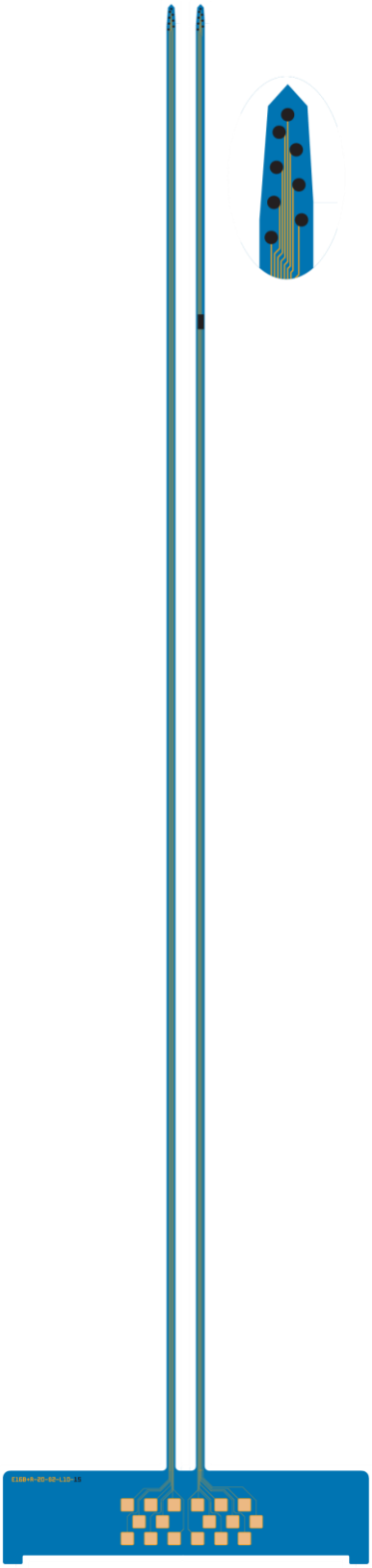
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	700 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-150-S2-L10-200 (new technology)



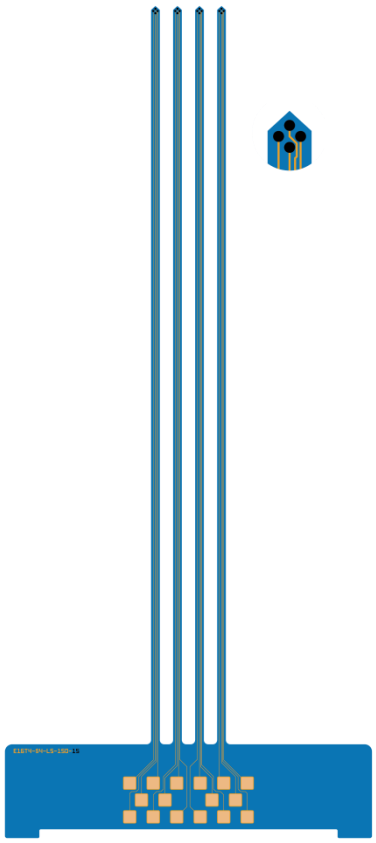
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	16 (2 × 8)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16B+R-20-S2-L10-200 (new technology)



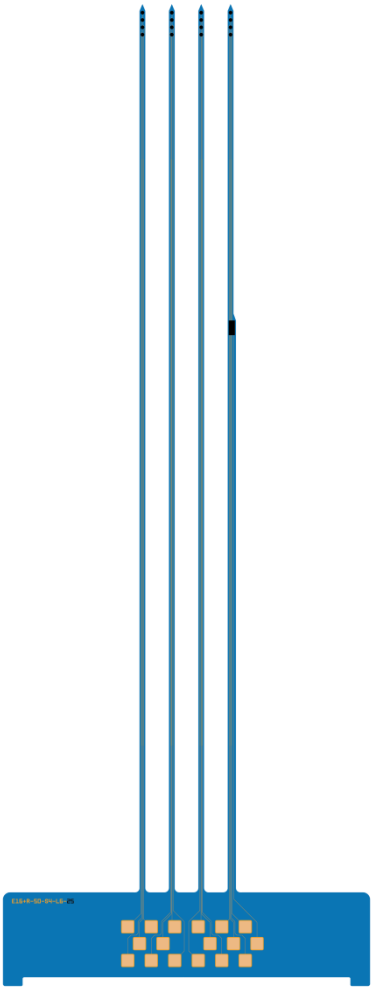
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	61.5 µm
Number of electrodes (N_{El})	16 (2 × 8) B-Style
Electrode pitch (P_{El})	20 µm (x-direction) 10 / 3 µm (y-direction)
Electrode length (L_{El})	140 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16T4-S4-L5-150



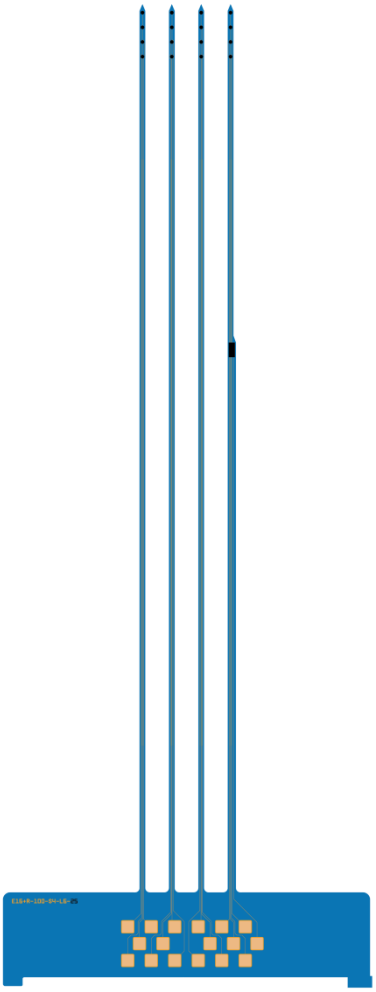
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	150 µm
Shaft width (W_{Shaft})	60 µm
Number of electrodes (N_{EI})	16 (4 × Tetrode)
Electrode pitch (P_{EI})	30 µm (y- and x-direction)
Electrode length (L_{EI})	---
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 100 µm Ø 15 µm, IrOx, 50 µm

E16+R-50-S4-L6-200 (new technology)



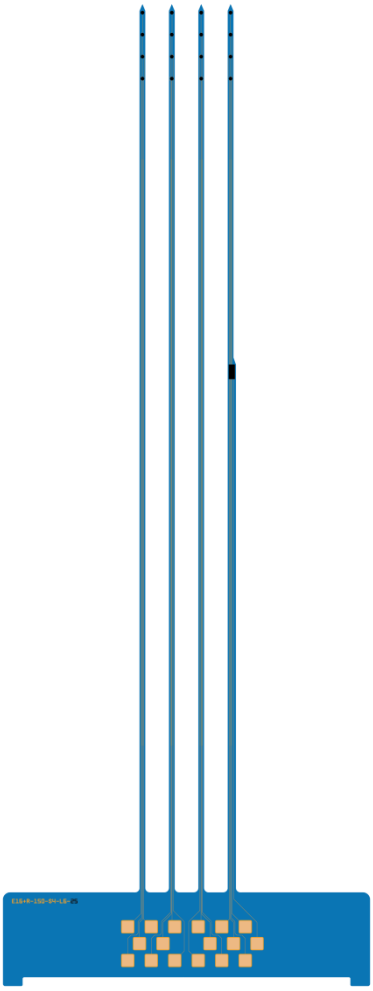
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (4 × 4)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	150 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-100-S4-L6-200 (new technology)



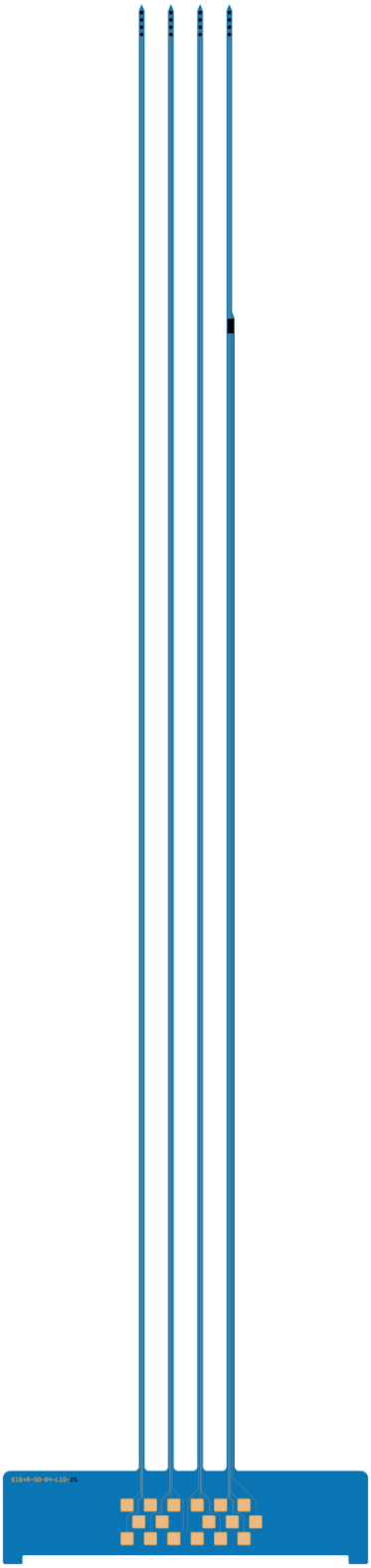
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (4 × 4)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	300 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-150-S4-L6-200 (new technology)



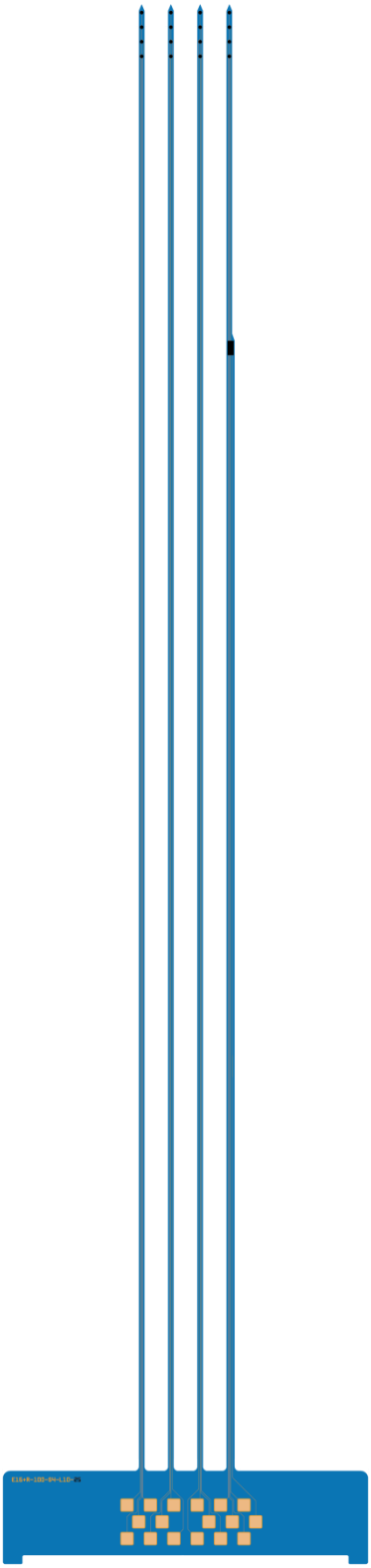
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (4 × 4)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	450 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-50-S4-L10-200 (new technology)



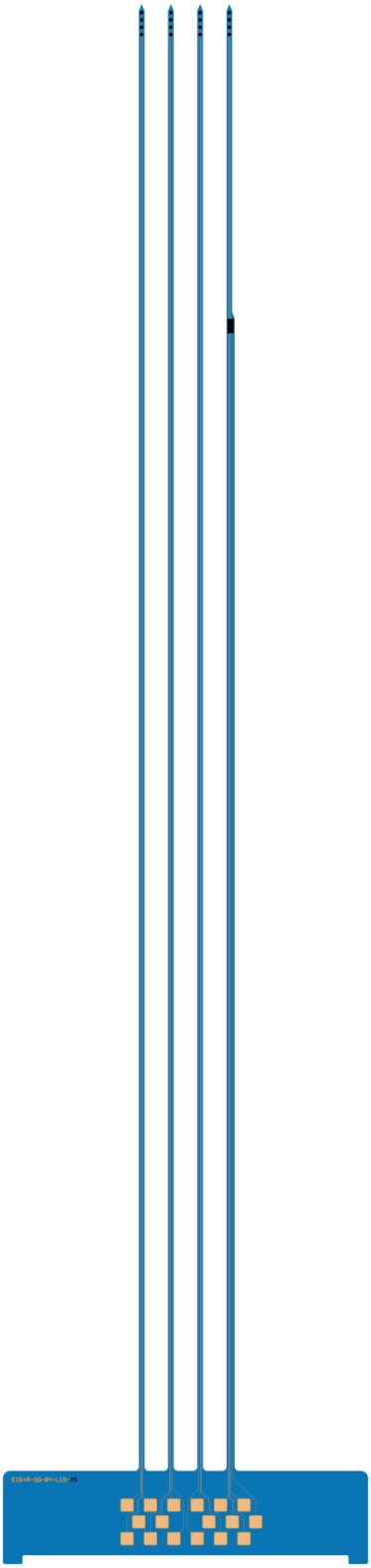
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (4 × 4)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	150 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-100-S4-L10-200 (new technology)



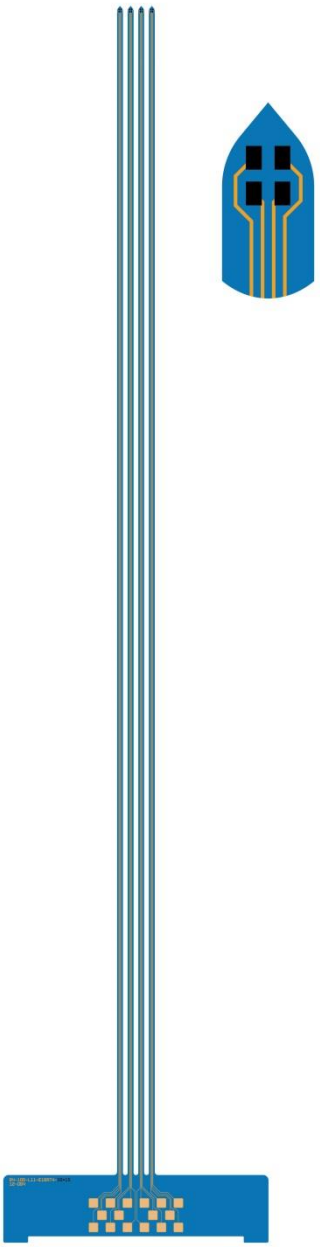
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (4 × 4)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	300 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16+R-150-S4-L10-200 (new technology)



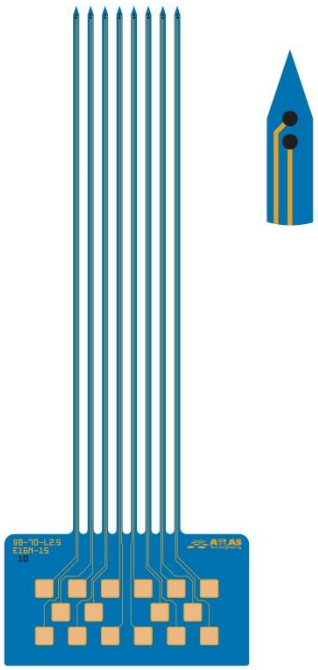
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (4 × 4)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	450 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E16T4-S4-L11-100



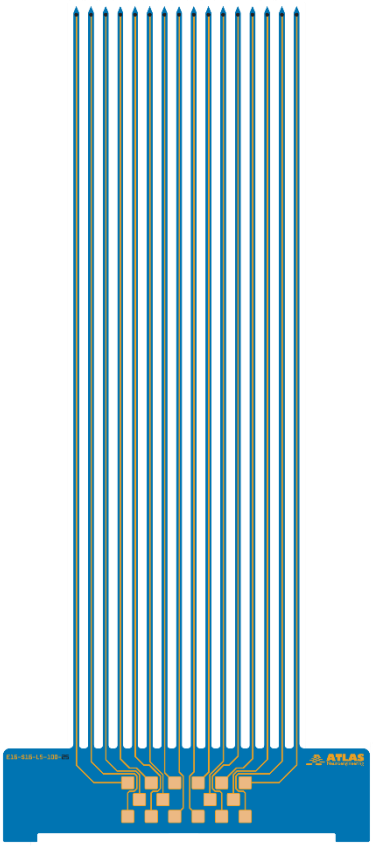
Shaft length (L_{Total})	11.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	100 µm
Shaft width (W_{Shaft})	58 µm
Number of electrodes (N_{EI})	16 (4 × Tetrode)
Electrode pitch (P_{EI})	18 µm (x-direction) 22.5 µm (y-direction)
Electrode length (L_{EI})	---
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	10×15 µm, Pt, 50 µm 10×15 µm, IrOx, 50 µm

E16-15-S8-L2.5-70



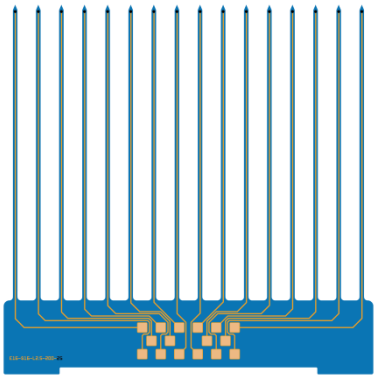
Shaft length (L_{Total})	2.50 mm
Number of shafts (N_{Shaft})	8
Shaft pitch (P_{Shaft})	70 µm
Shaft width (W_{Shaft})	30 µm
Number of electrodes (N_{EI})	16 (8 × 2)
Electrode pitch (P_{EI})	15 µm
Electrode length (L_{EI})	15 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 10 µm, Pt, 50 µm Ø 10 µm, IrOx, 50 µm Ø 10 µm, Au, 50 µm

E16-S16-L5-100



Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	16
Shaft pitch (P_{Shaft})	100 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{El})	16 (16 × 1)
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm

E16-S16-L5-200

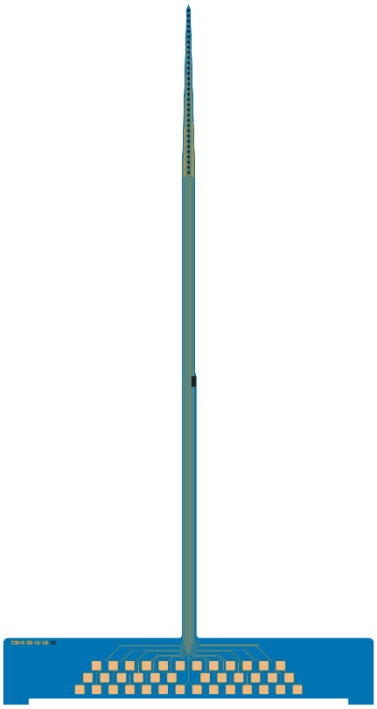


Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	16
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	40 µm
Number of electrodes (N_{EI})	16 (16 × 1)
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm

Passive Probes

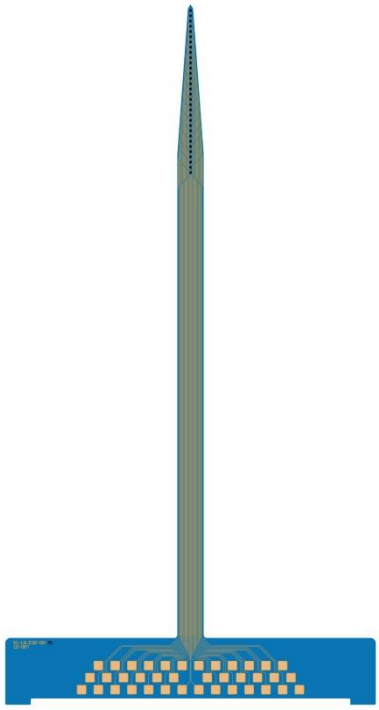
32-channel probes

E32+R-50-S1-L6 (new technology)



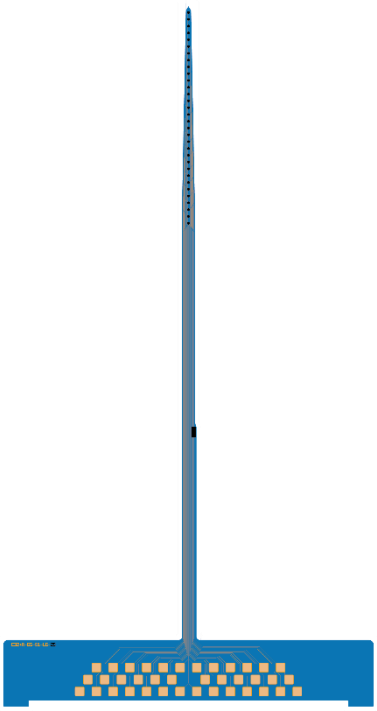
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	1550 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-50-S1-L6



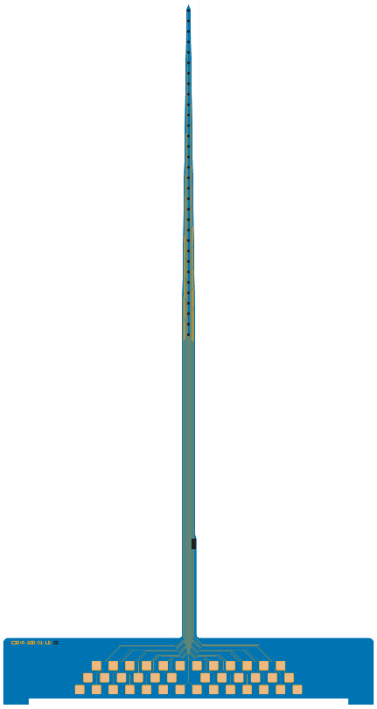
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	253 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	1550 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E32+R-65-S1-L6 (new technology)



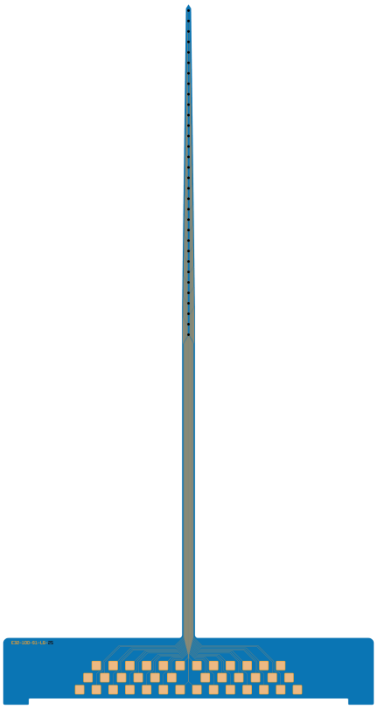
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	65 µm
Electrode length (L_{EI})	2015 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-100-S1-L6 (new technology)



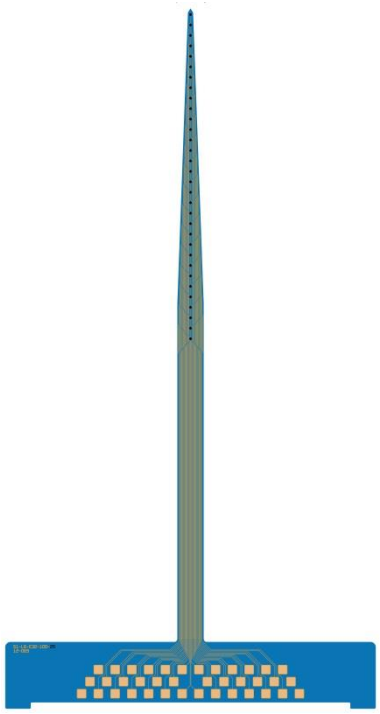
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	3100 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-100-S1-L6 (new technology)



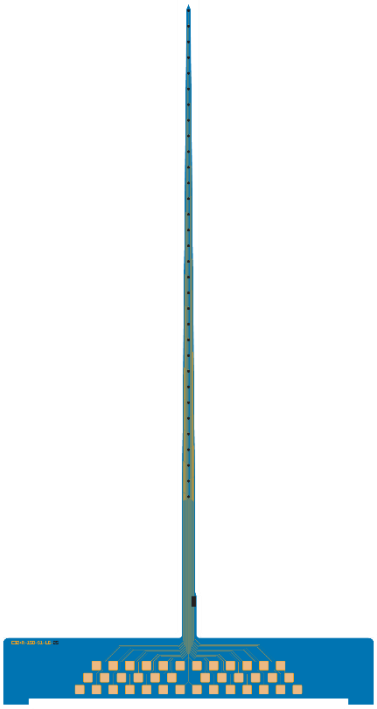
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	3100 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm

E32-100-S1-L6



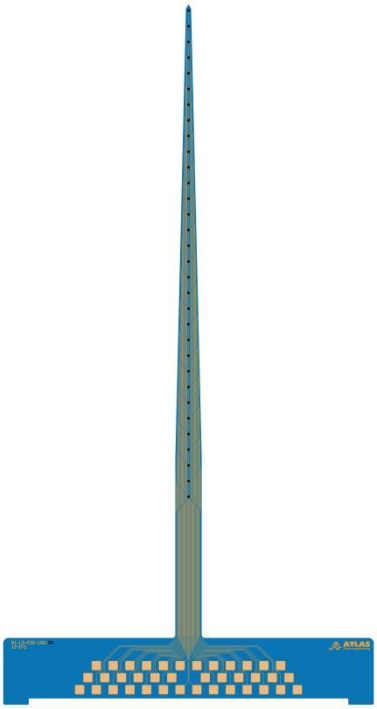
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	253 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	3100 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E32+R-150-S1-L6 (new technology)



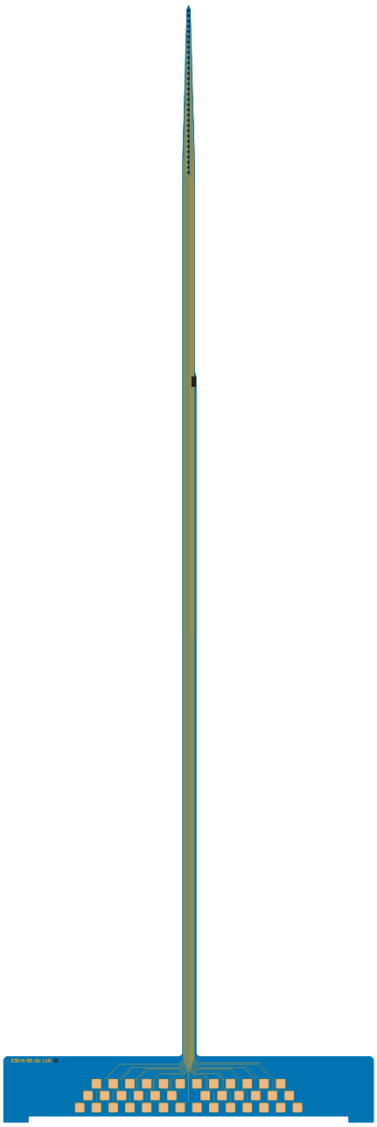
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{El})	32
Electrode pitch (P_{El})	150 µm
Electrode length (L_{El})	4650 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-150-S1-L6



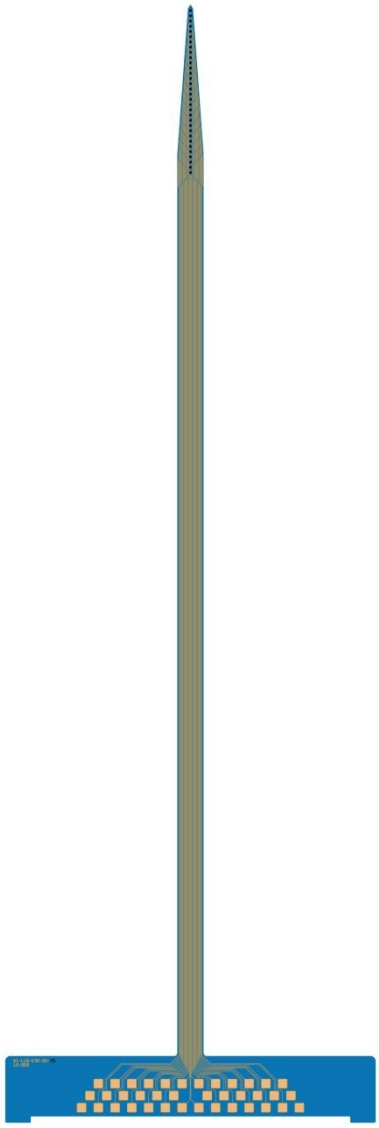
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	253 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	4650 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E32+R-50-S1-L10 (new technology)



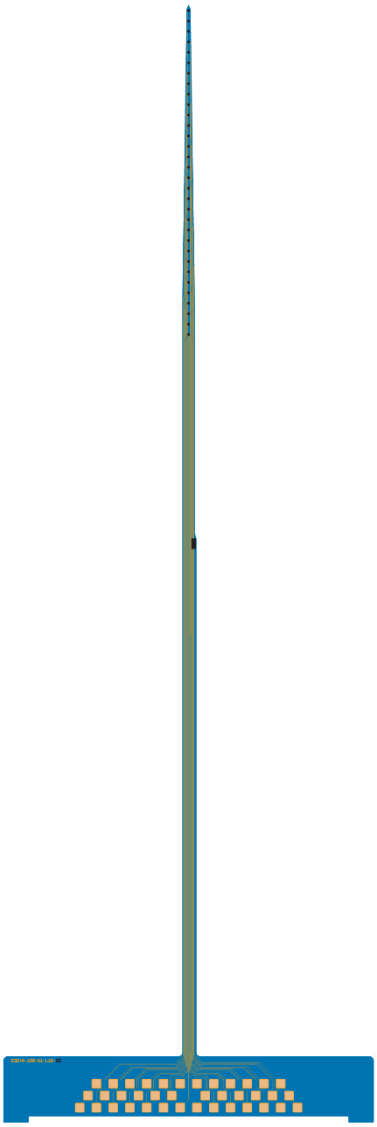
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	1550 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-50-S1-L10



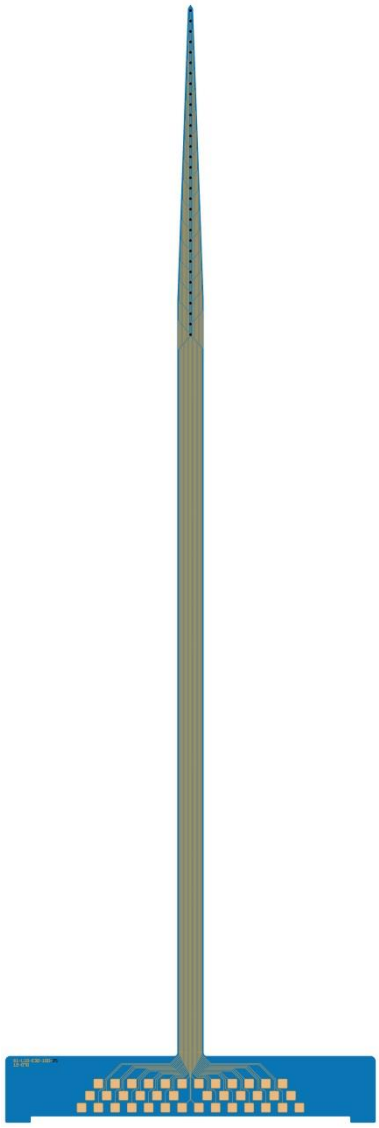
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	253 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	1550 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E32+R-100-S1-L10 (new technology)



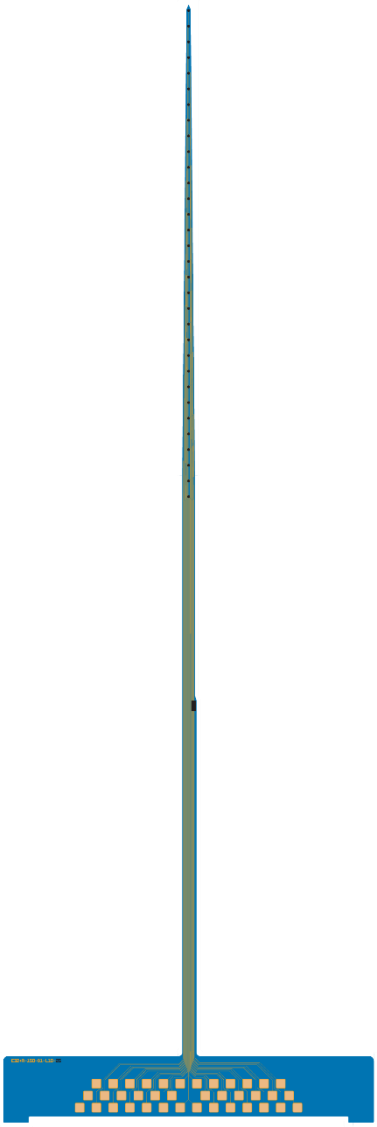
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	3100 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-100-S1-L10



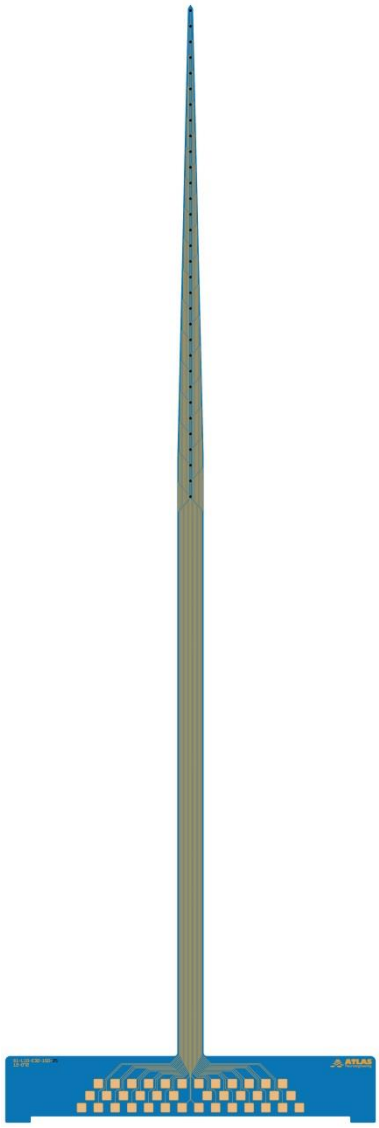
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	253 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	3100 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E32+R-150-S1-L10 (new technology)



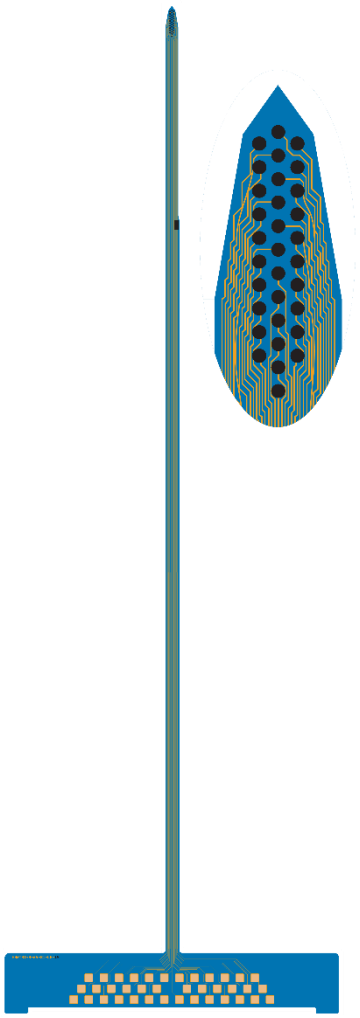
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	123 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	4650 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-150-S1-L10



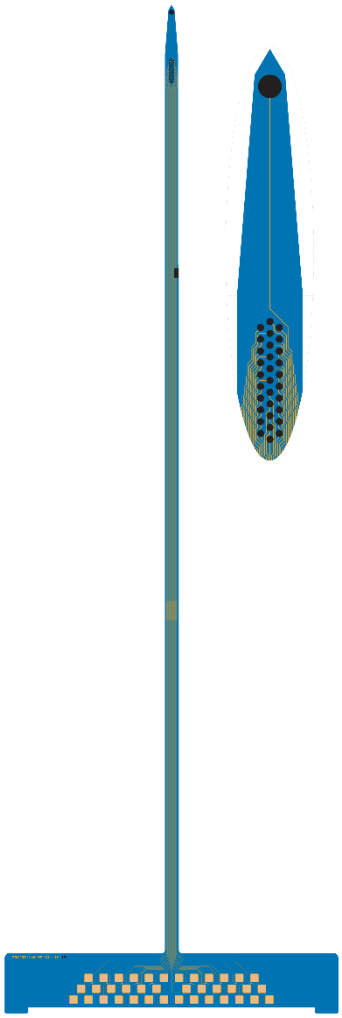
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	253 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	4650 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 50 µm Ø 25 µm, IrOx, 50 µm

E32Tri+R-25-S1-L10 (new technology)



Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	135 µm
Number of electrodes (N_{EI})	32 (triple row)
Electrode pitch (P_{EI})	25 µm (x- and y-direction)
Electrode length (L_{EI})	275 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 100 µm Ø 15 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

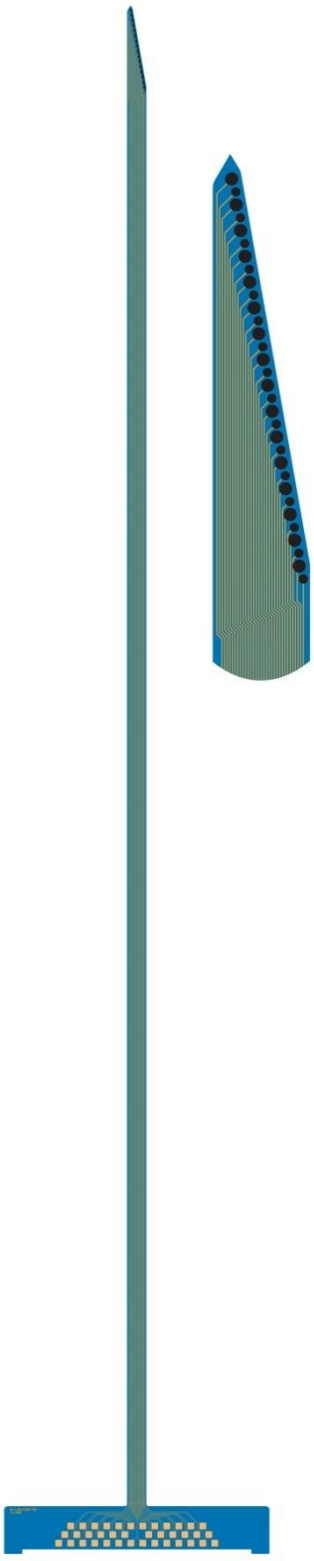
E31Tri+1+R-25-S1-L10 (new technology)



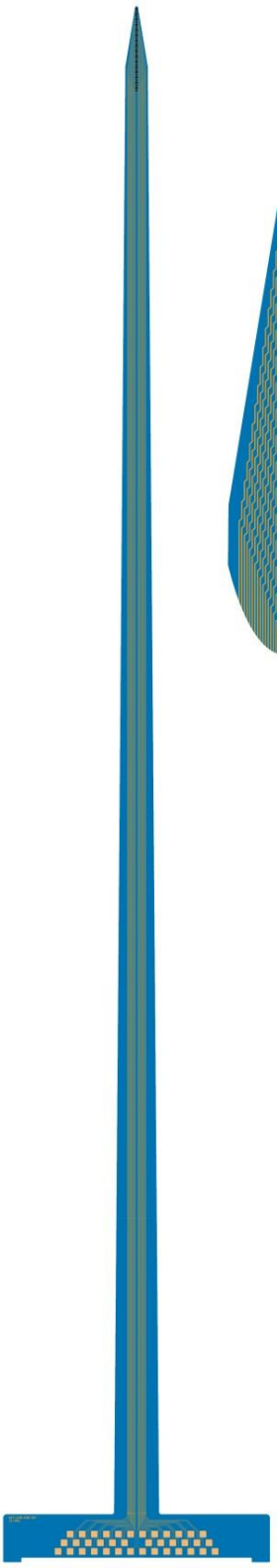
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	135 µm
Number of electrodes (N_{EI})	31 (triple row), additional electrode at tip (Ø 50 µm)
Electrode pitch (P_{EI})	25 µm (x- and y-direction)
Electrode length (L_{EI})	250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 100 µm Ø 15 µm, Pt, 50 µm
Reference electrode size	42 × 100 µm²

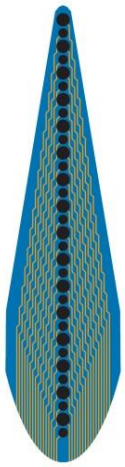
E32-35-S1M-L20

Shaft length (L_{Total})	20.00 mm
Number of shafts (N_{Shaft})	1
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	260 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	35 µm
Electrode length (L_{EI})	1085 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø alternating 35 µm and 25 µm, IrOx, 80 µm Ø alternating 35 µm and 25 µm, IrOx, 50 µm

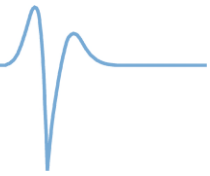


E32-35-S1T-L20

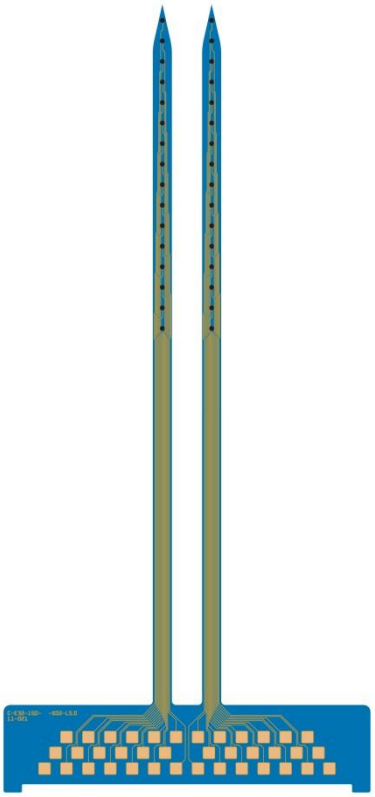




Shaft length (L_{Total})	20.00 mm
Number of shafts (N_{Shaft})	1 (tapered)
Shaft pitch (P_{Shaft})	---
Shaft width (W_{Shaft})	300 - 600 µm
Number of electrodes (N_{EI})	32
Electrode pitch (P_{EI})	35 µm
Electrode length (L_{EI})	1085 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø alternating 35 µm and 25 µm, Pt, 100 µm Ø alternating 35 µm and 25 µm, IrOx, 80 µm Ø alternating 35 µm and 25 µm, IrOx, 50 µm Ø alternating 35 µm and 25 µm, Au, 100 µm

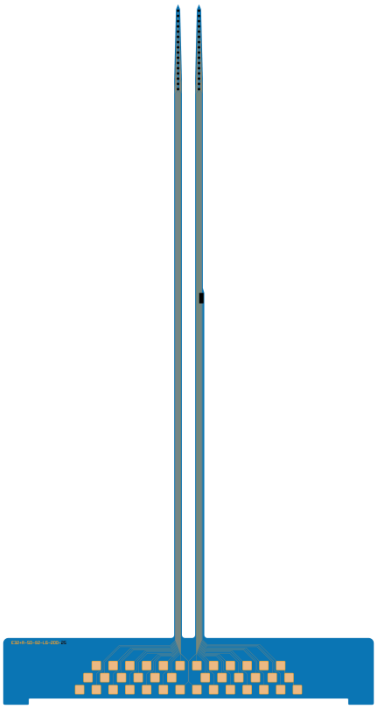


E32-150-S2-L5-360



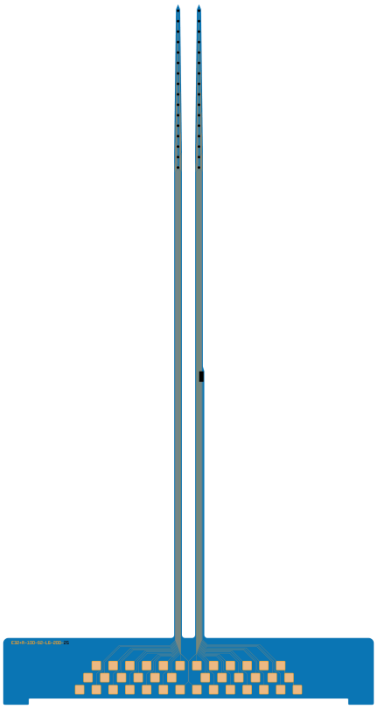
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	360 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm

E32+R-50-S2-L6-200 (new technology)



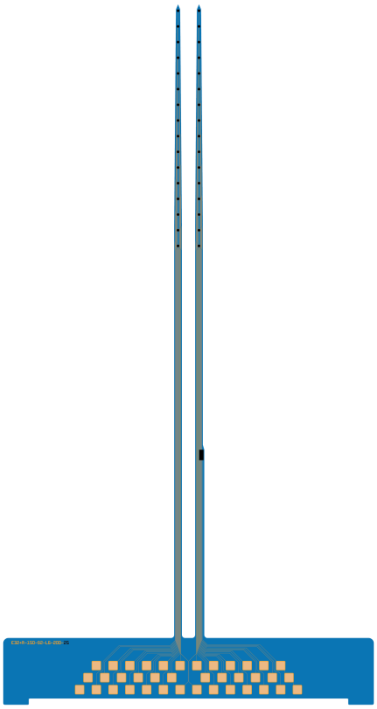
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-100-S2-L6-200 (new technology)



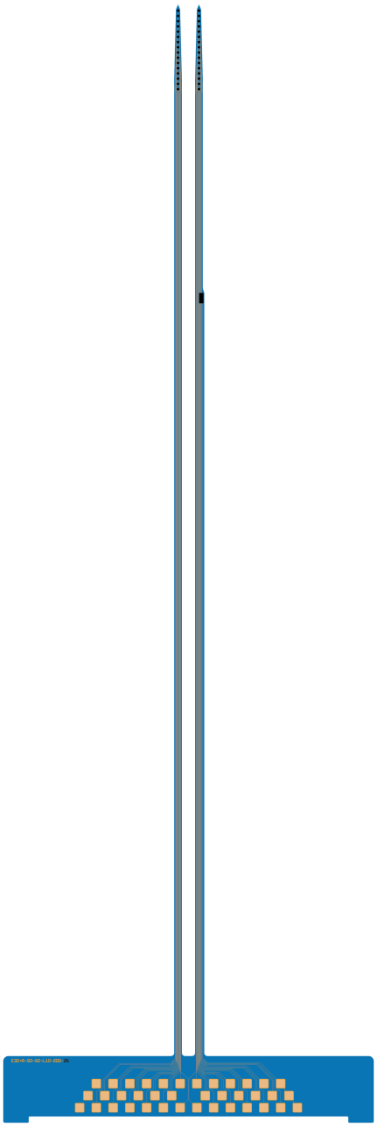
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-150-S2-L6-200 (new technology)



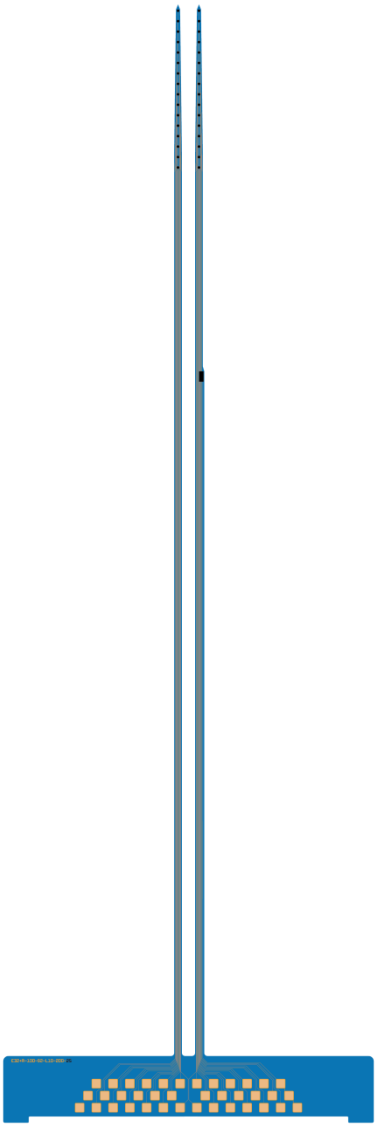
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-50-S2-L10-200 (new technology)



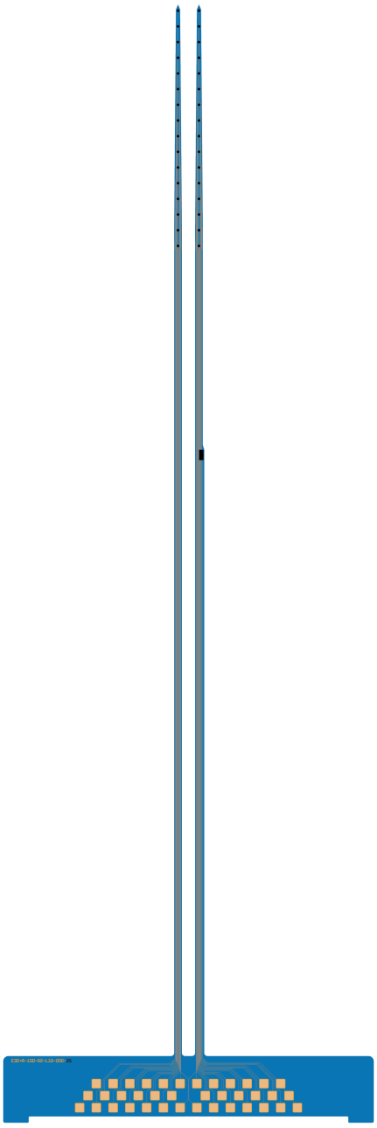
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	750 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-100-S2-L10-200 (new technology)



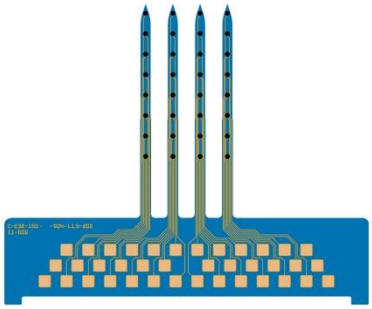
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-150-S2-L10-200 (new technology)



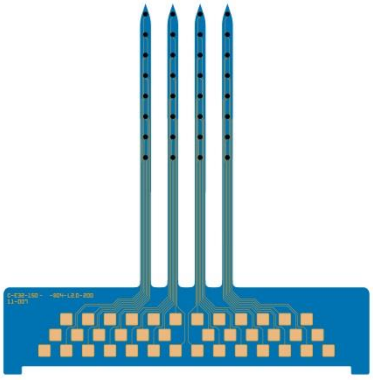
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	2
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	75 µm
Number of electrodes (N_{EI})	32 (2 × 16)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	2250 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-150-S4-L1.5-200



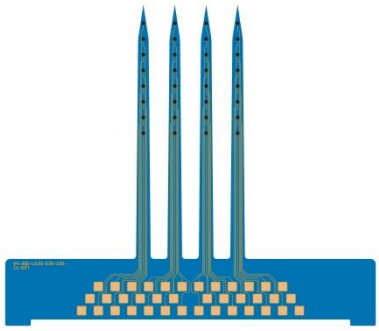
Shaft length (L_{Total})	1.50 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	80 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, IrOx, 100 µm Ø 35 µm, Au, 50 µm

E32-150-S4-L2-200



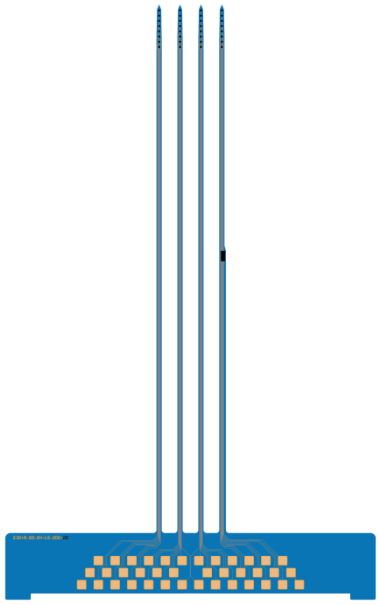
Shaft length (L_{Total})	2.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	80 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, Au, 50 µm

E32-150-S4-L2.25-300



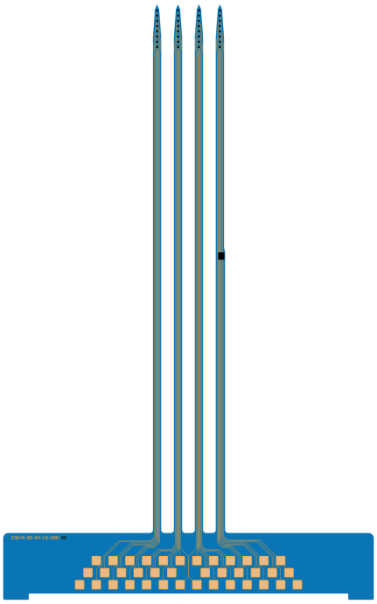
Shaft length (L_{Total})	2.25 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	300 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm Ø 35 µm, IrOx, 50 µm

E32+R-50-S4-L5-200 (new technology)



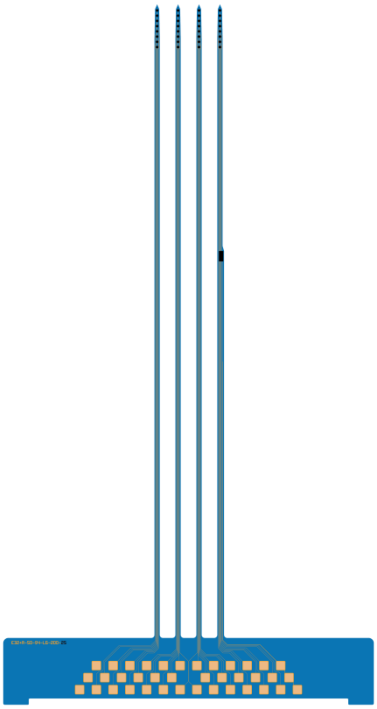
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-50-S4-L5-200



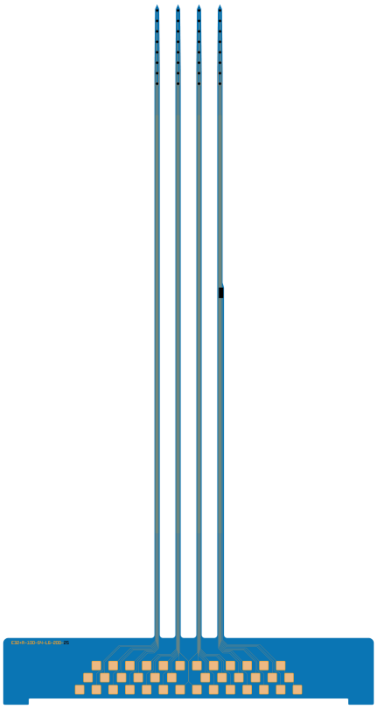
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	80 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-50-S4-L6-200 (new technology)



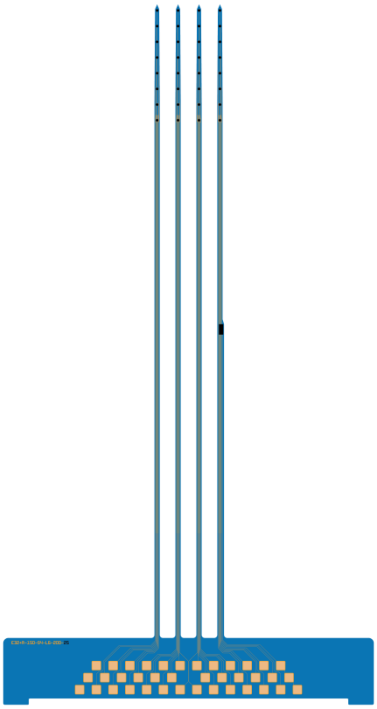
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-100-S4-L6-200 (new technology)



Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	700 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-150-S4-L6-200 (new technology)

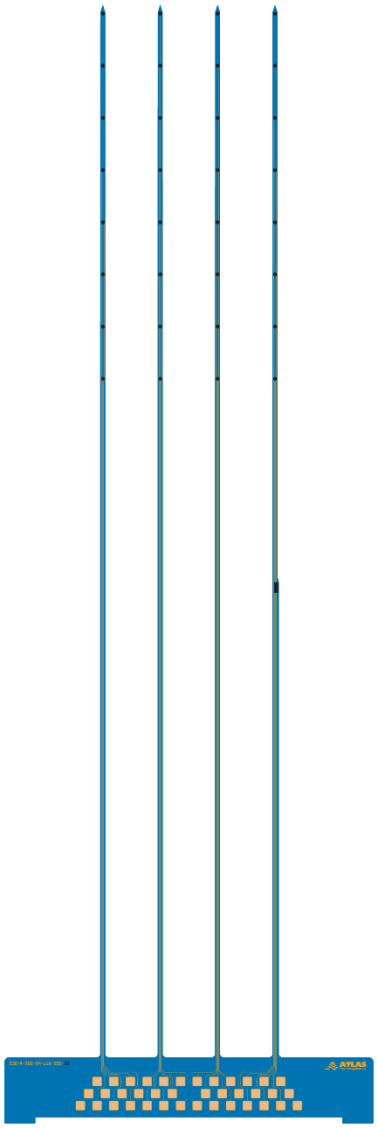


Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-500-S4-L8-550

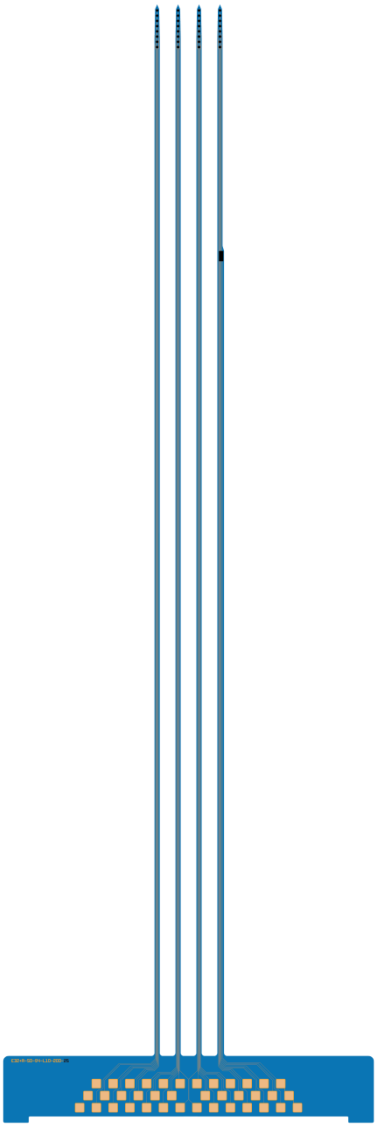
Shaft length (L_{Total})	8.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	550 µm
Shaft width (W_{Shaft})	80 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	500 µm
Electrode length (L_{EI})	3500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, IrOx, 100 µm Ø 35 µm, Au, 50 µm

E32+R-500-S4-L10-550 (new technology)



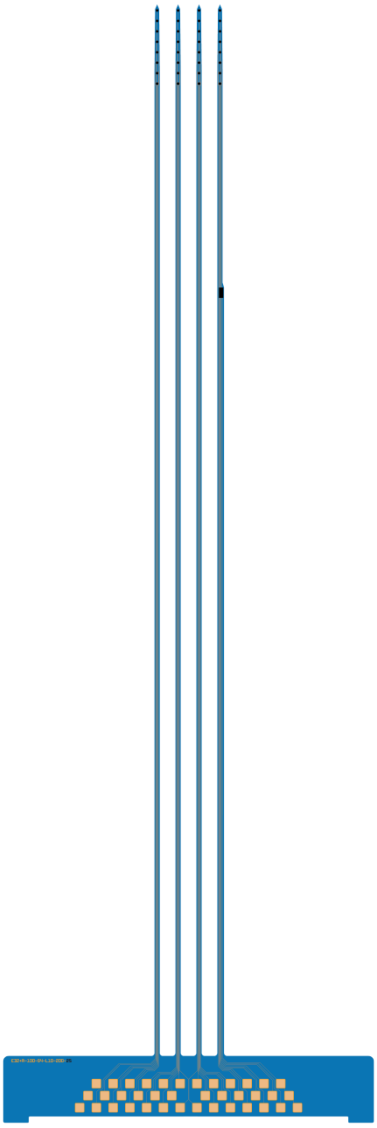
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	550 µm
Shaft width (W_{Shaft})	52 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	500 µm
Electrode length (L_{EI})	3500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-50-S4-L10-200 (new technology)



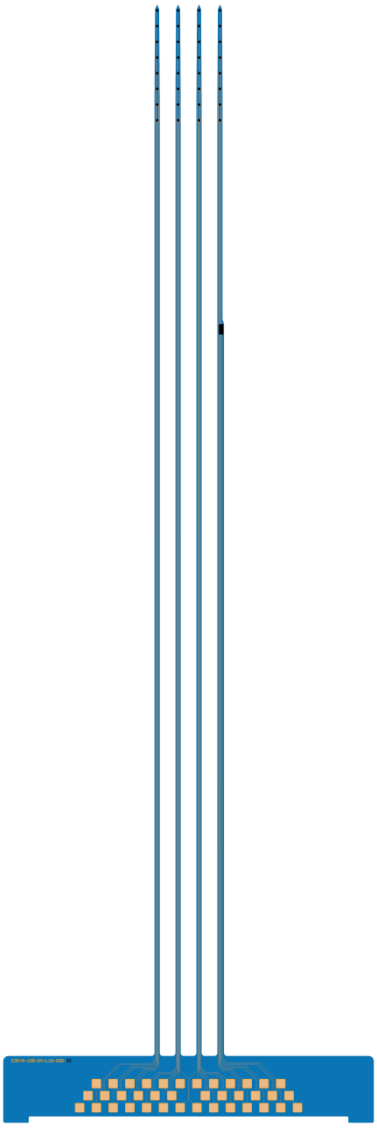
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-100-S4-L10-200 (new technology)



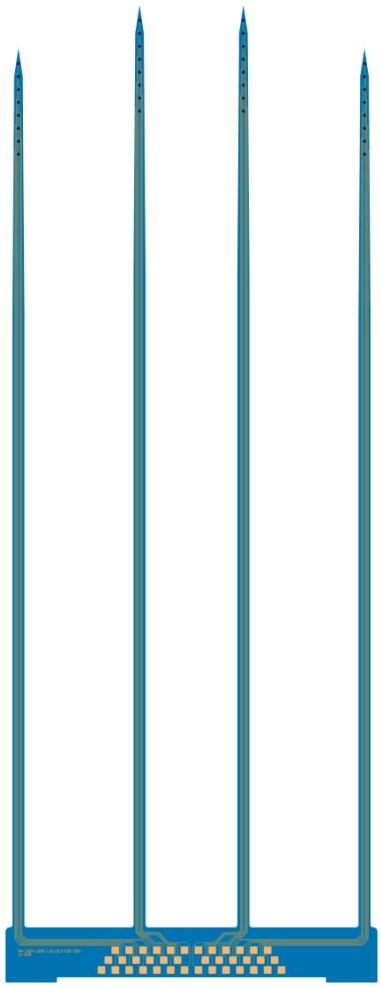
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	700 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32+R-150-S4-L10-200 (new technology)



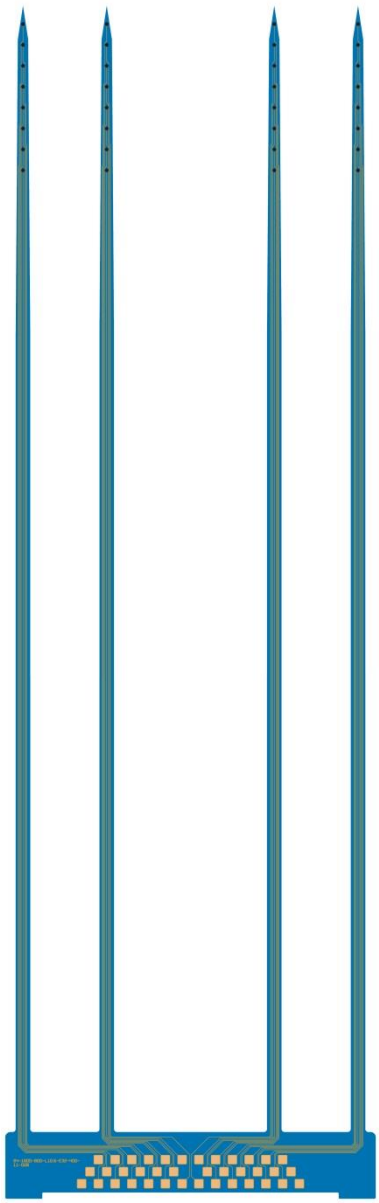
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 25 µm, Pt, 100 µm Ø 25 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-150-S4-L10-10.5-1400-1200



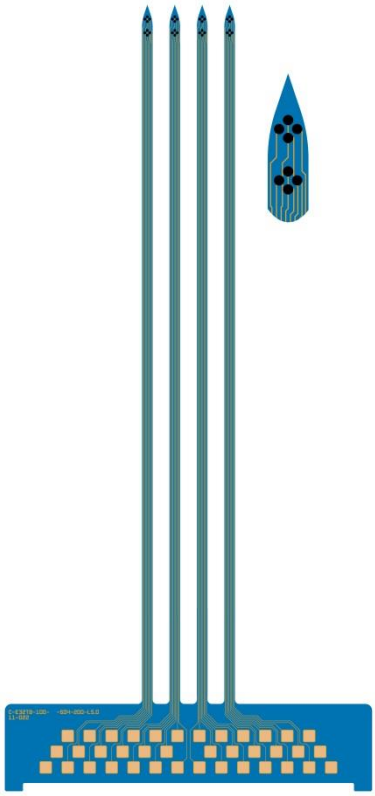
Shaft length (L_{Total})	10.00 mm 10.50 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	1400 µm 1200 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	150 µm
Electrode length (L_{EI})	1050 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm Ø 35 µm, IrOx, 50 µm

E32-400-S4-L10.6-800-1600



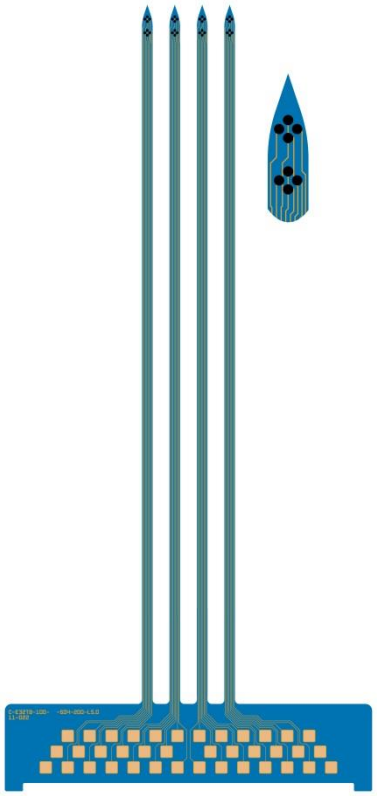
Shaft length (L_{Total})	10.60 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	800 µm 1600 µm
Shaft width (W_{Shaft})	140 µm
Number of electrodes (N_{EI})	32 (4 × 8)
Electrode pitch (P_{EI})	400 µm
Electrode length (L_{EI})	2800 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, IrOx, 80 µm Ø 35 µm, IrOx, 50 µm

E32T8-100-S4-L5-200



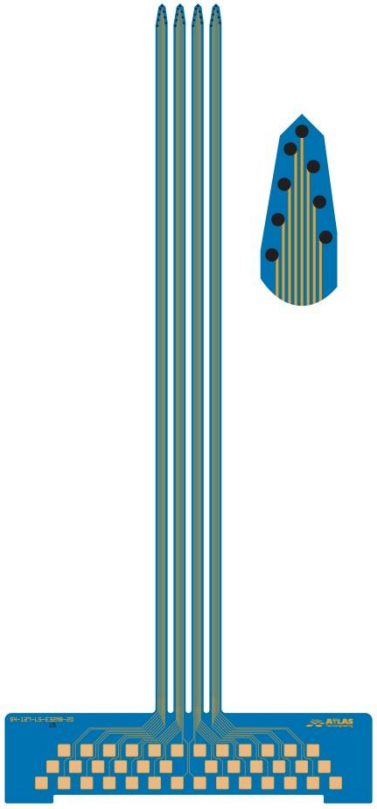
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	80 µm
Number of electrodes (N_{El})	32 (4 × 2 Tetrodes)
Tetrode pitch (P_{El})	100 µm
Tetrode length (L_{El})	100 µm
Electrode pitch	35 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, IrOx, 100 µm Ø 20 µm, Au, 50 µm

E32T8+R-100-S4-L6-200 (new technology)



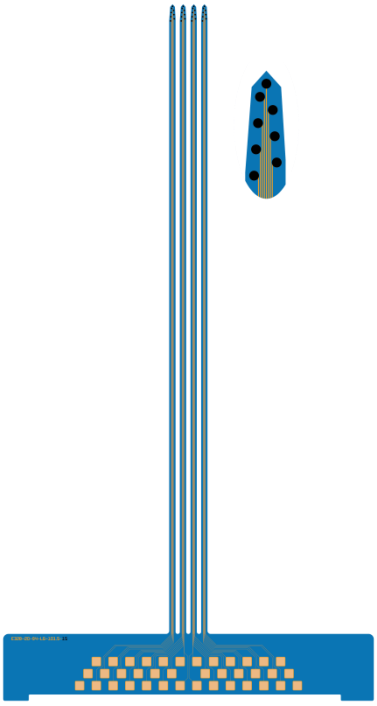
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	70 µm
Number of electrodes (N_{El})	32 (4 × 2 Tetrodes)
Tetrode pitch (P_{El})	100 µm
Tetrode length (L_{El})	100 µm
Electrode pitch	35 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, Pt, 50 µm Ø 20 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32B-20-S4-L5-127



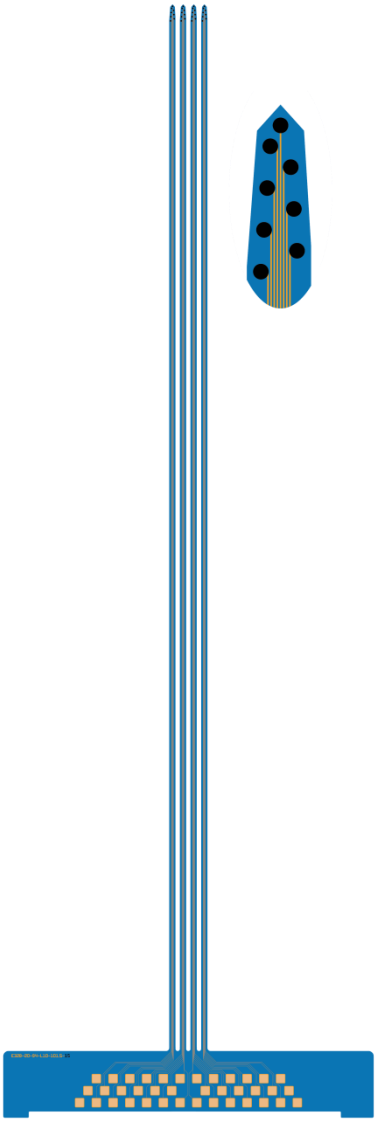
Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	127 µm
Shaft width (W_{Shaft})	87 µm
Number of electrodes (N_{EI})	32 (4 × 8) B-style
Electrode pitch (P_{EI})	20 µm (x-direction) 13 / 7 µm (y-direction)
Electrode length (L_{EI})	140 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 50 µm Ø 15 µm, IrOx, 50 µm Ø 15 µm, Au, 50 µm

E32B-20-S4-L6-101.5 (new technology)



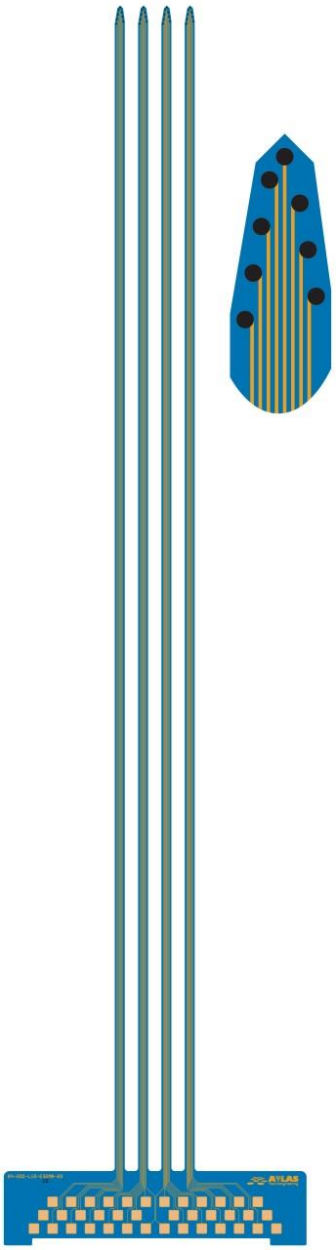
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	101.5 µm
Shaft width (W_{Shaft})	61.5 µm
Number of electrodes (N_{EI})	32 (4 × 8) B-style
Electrode pitch (P_{EI})	20 µm (x-direction) 10 / 3 µm (y-direction)
Electrode length (L_{EI})	140 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 100 µm Ø 15 µm, IrOx, 50 µm

E32B-20-S4-L10-101.5 (new technology)



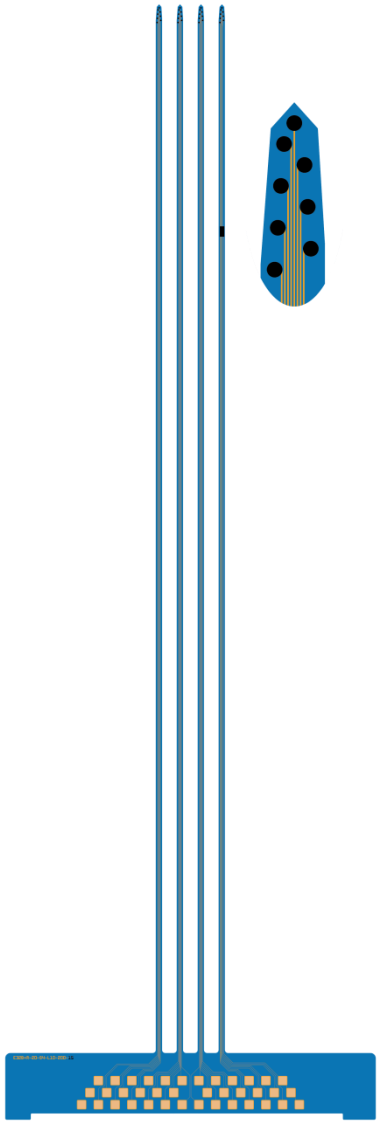
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	101.5 µm
Shaft width (W_{Shaft})	61.5 µm
Number of electrodes (N_{El})	32 (4 × 8) B-style
Electrode pitch (P_{El})	20 µm (x-direction) 10 / 3 µm (y-direction)
Electrode length (L_{El})	140 µm
Electrode size (D_{El}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 100 µm Ø 15 µm, IrOx, 50 µm

E32B-20-S4-L10-200



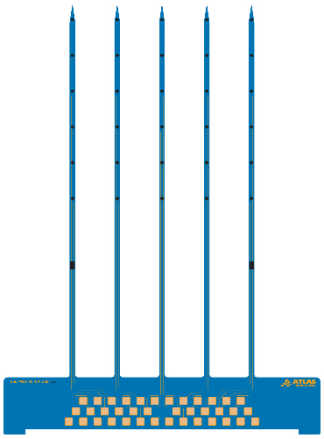
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	87 µm
Number of electrodes (N_{EI})	32 (4 × 8) B-style
Electrode pitch (P_{EI})	20 µm (x-direction) 13 / 7 µm (y-direction)
Electrode length (L_{EI})	140 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 50 µm Ø 15 µm, Au, 50 µm

E32B+R-20-S4-L10-200 (new technology)



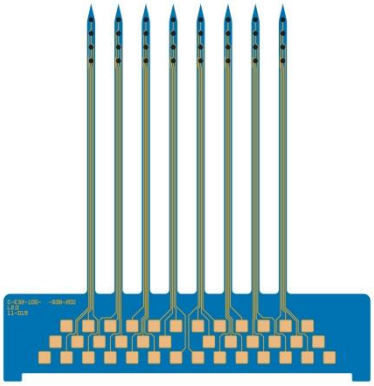
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	61.5 µm
Number of electrodes (N_{EI})	32 (4 × 8) B-style
Electrode pitch (P_{EI})	20 µm (x-direction) 10 / 3 µm (y-direction)
Electrode length (L_{EI})	140 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 15 µm, Pt, 100 µm Ø 15 µm, IrOx, 50 µm
Reference electrode size	42 × 100 µm²

E32-400-S5-L4-500



Shaft length (L_{Total})	4.00 mm
Number of shafts (N_{Shaft})	5
Shaft pitch (P_{Shaft})	500 µm
Shaft width (W_{Shaft})	65 µm
Number of electrodes (N_{EI})	32 (5 × 6) + 2 reference electrodes
Electrode pitch (P_{EI})	400 µm
Electrode length (L_{EI})	2000 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, IrOx, 50 µm
Reference electrode size	50 × 90 µm²

E32-100-S8-L2-200

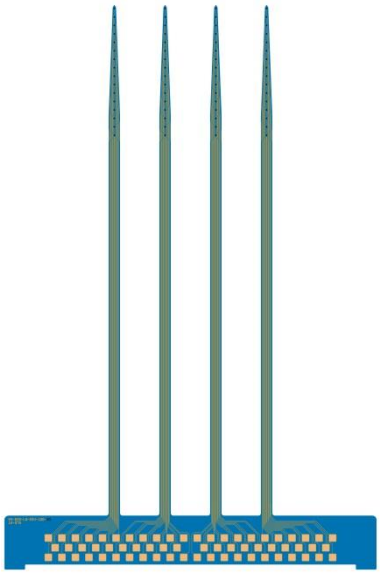


Shaft length (L_{Total})	2.00 mm
Number of shafts (N_{Shaft})	8
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	60 µm
Number of electrodes (N_{EI})	32 (8 × 4)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	300 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 35 µm, Pt, 100 µm Ø 35 µm, Pt, 50 µm Ø 25 µm, Pt, 100 µm Ø 35 µm, IrOx, 100 µm Ø 35 µm, Au, 50 µm

Passive Probes

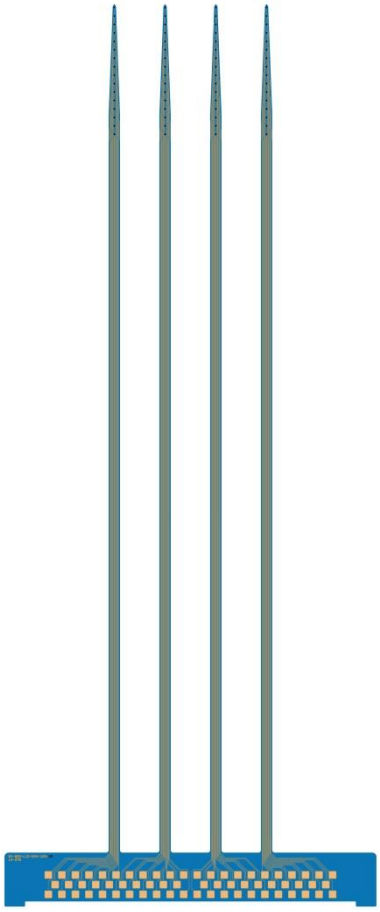
64-channel probes

E64-100-S4-L6-600



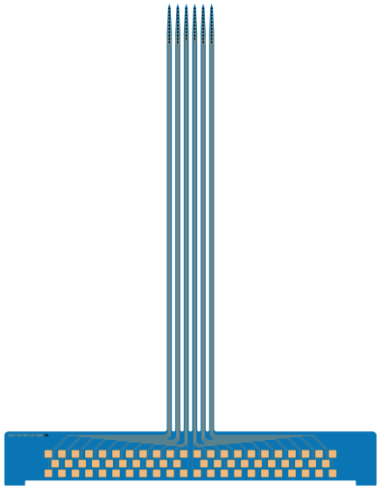
Shaft length (L_{Total})	6.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	600 µm
Shaft width (W_{Shaft})	136 µm
Number of electrodes (N_{EI})	64 (4 × 16)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 50 µm Ø 20 µm, IrOx, 50 µm

E64-100-S4-L10-600



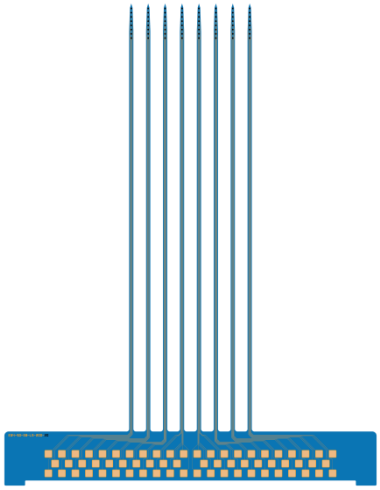
Shaft length (L_{Total})	10.00 mm
Number of shafts (N_{Shaft})	4
Shaft pitch (P_{Shaft})	600 µm
Shaft width (W_{Shaft})	136 µm
Number of electrodes (N_{EI})	64 (4 × 16)
Electrode pitch (P_{EI})	100 µm
Electrode length (L_{EI})	1500 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 50 µm Ø 20 µm, IrOx, 50 µm

E64-40-S6-L5-100 (new technology)



Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	6
Shaft pitch (P_{Shaft})	100 µm
Shaft width (W_{Shaft})	60 µm
Number of electrodes (N_{EI})	64 (4 × 11 + 2 × 10)
Electrode pitch (P_{EI})	40 µm
Electrode length (L_{EI})	400 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, IrOx, 50 µm

E64-50-S8-L5-200 (new technology)



Shaft length (L_{Total})	5.00 mm
Number of shafts (N_{Shaft})	8
Shaft pitch (P_{Shaft})	200 µm
Shaft width (W_{Shaft})	51 µm
Number of electrodes (N_{EI})	64 (8 × 8)
Electrode pitch (P_{EI})	50 µm
Electrode length (L_{EI})	350 µm
Electrode size (D_{EI}), material (E_M), Probe thickness (T)	Ø 20 µm, Pt, 100 µm Ø 20 µm, IrOx, 50 µm

Custom-design

Probes and cables

Design rules

Probes

Through our custom-design-service we can provide probes that perfectly match your experimental setup. Almost every geometrical design is possible. Figure 16 shows the design parameters for a custom-made probe. The geometrical information, the number of shafts (N_{Shaft}) and the number of electrodes (N_{El}) are necessary for the design.

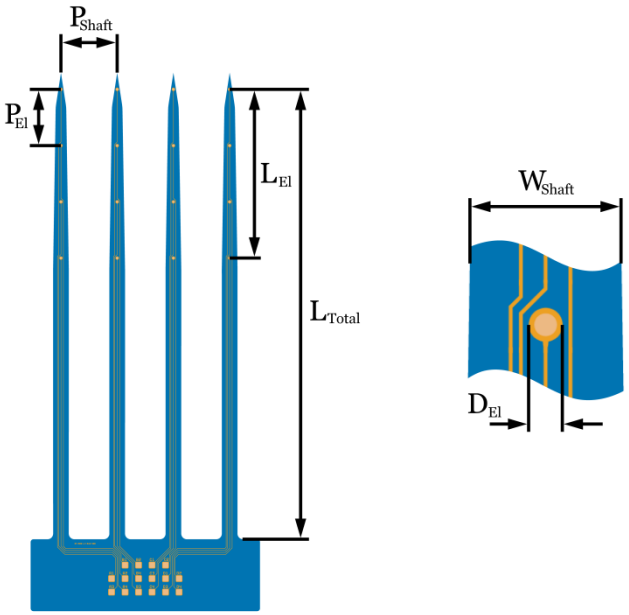


Figure 16: Geometrically specifications necessary for a custom probe layout.

The electrode pitch P_{El} is the distance from the center of one electrode to the center of the next electrode and must be at least 5 µm longer than the electrode diameter D_{El}. The electrode diameter D_{El} has to be at least 10 µm. The shaft pitch P_{Shaft} is the distance from the center of one shaft to the center of the next shaft. The shaft pitch P_{Shaft} has to be at least 40 µm longer than the shaft width W_{Shaft}. The electrode length L_{El} is the distance from the center of the first electrode on a shaft (at the tip) and the center of the last electrode (towards the base of the probe) on the shaft. The shaft length L_{Total} is the distance from the center of the first electrode on the shaft (at the tip) to the beginning of the base of the probe.

Table 2: Design rules for custom-design probes.

Shaft length L_{Total}	≤ 40 mm
Shaft pitch P_{Shaft}	≥ W_{Shaft} + 40 µm
Number of electrodes N_{El} per probe	≤ 64
Electrode pitch P_{El}	≥ D_{El} + 5 µm
Electrode diameter D_{El}	≥ 10 µm
Shaft width W_{Shaft}	≥ ((N_{El} / N_{Shaft}) – 1) * 3 µm + 33 µm

PI Cable

The PI cables can also be modified to your specific needs. The cables can vary in length as well as width. They can also be modified to fit to another specific connector.

Apart from the above mentioned modifications, a lot of other probe and cable designs are possible. Please contact us for further information:

info@atlasneuro.com

Order guide

The easiest way to order your probe is described in the following. First of all, choose the type of probe you want to use. Then you have to choose for the electrode material. Usually our standard probes are available with Pt, IrOx and Au electrodes. While Pt and Au have a similar impedance (~ 0.8 MΩ @ 1 kHz, for an electrode with an diameter of 35 µm), IrOx has a drastically lower impedance (~ 0.19 MΩ @ 1 kHz, for an electrode with an diameter of 35 µm). Then also the thickness of the probe has to be defined, since our standard probes are usually available with a thickness of 50, 80 and 100 µm. Now the probe itself is completely defined.

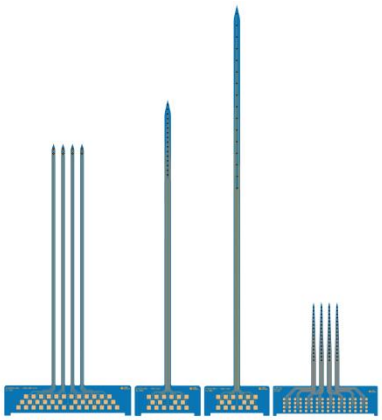
Once the probe is defined, we also need to know which assembly variant you want to use. All the different assembly variants that we offer are described in pp. 5 - 6. For acute applications, the probes are mounted on a PCB (see p. 5), while for chronic application, the probes are connected to a highly flexible ribbon cable (see p. 6).

Examples:

- You chose for probe E16RT4-S04-L11.0-100 (see p. 56) with IrOx electrodes, a thickness of 50 µm, mounted on a PCB with a DIL-header, the correct order information to us would be: **E16RT4-S04-L11.0-100, IrOx, thickness 50 µm, PCB (DIL) assembly**.
- You chose for probe E32B-S04-L10.0-200 (see p. 116) with Pt electrodes, a thickness of 50 µm, connected to a PI cable and a ZIF-plug, the correct order information for us would be: **E32B-S04-L10.0-200, Pt, thickness 50 µm, Cable-ZIF-plug assembly**.

On the next page, there is a summary on all the assembly variants.

Standard probe order guide



1. Probe:

- Choose probe type
- Select electrode material:
  - ☐ Pt
  - ☐ IrOx
  - ☐ Au
- Define probe thickness:
  - ☐ 50 µm
  - ☐ 80 µm
  - ☐ 100 µm

2. Assembly variant:

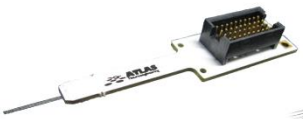
- Acute application:
  - ☐ 8-channel:

PCB assembly

  - ☐ 16-channel:

PCB assembly (DIL)

  - ☐ 32-channel:



PCB assembly

  - ☐ 64-channel:

PCB assembly

PCB assembly (Omnetics)

- Chronic application:
  - ☐ 16-channel:

Cable-ZIF-plug assembly

  - ☐ 32-channel:

Cable-ZIF-plug assembly

Cable-Omnetics assembly

Cable-Omnetics assembly

Cable-strip connector assembly

Semi-chronic assembly

Semi-chronic assembly

Assembly dimensions

PCB assembly

8-channel probe:

A 8-channel probe with PCB assembly is shown in Figure 17. The length of the PCB $L_{PCB,1}$ (distance from the end of the probe shaft to the beginning of the wider part of the PCB) is ~27.2 mm. The width of this part of the PCB $W_{PCB,1}$ is ~3.3 mm. The length of the back part of the PCB $L_{PCB,2}$ is ~26.4 mm. Here, the PCB has a width $W_{PCB,2}$ of ~7.5 mm. The dimensions of the PCB assemblies are summarized in Table 3.

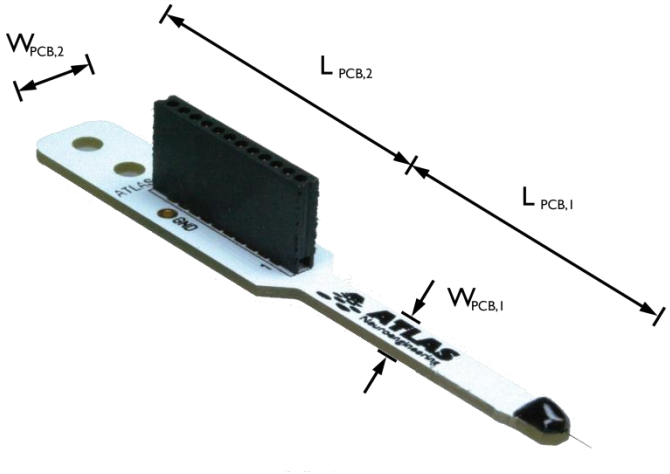


Figure 17: 8-channel probe with PCB assembly.

16-channel probe, DIL-header:

In Figure 18, a 16-channel probe with PCB (DIL) assembly is shown. The length of the PCB $L_{PCB,1}$ (distance from the end of the probe shaft to the beginning of the wider part of the PCB) is ~25.2 mm. The width of this part of the PCB $W_{PCB,1}$ is ~5.3 mm. The length of the back part of the PCB $L_{PCB,2}$ is ~22.0 mm. Here, the PCB has a width $W_{PCB,2}$ of ~12.4 mm. The dimensions of the PCB assemblies are summarized in Table 3.

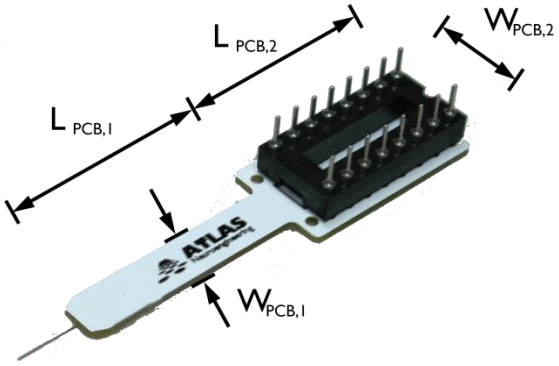


Figure 18: 16-channel probe with PCB (DIL) assembly.

16-channel probe, Omnetics:

Figure 19 shows a 16-channel probe with PCB (Omnetics) assembly. The length of the PCB $L_{PCB,1}$ (distance from the end of the probe shaft to the beginning of the wider part of the PCB) is ~24.6 mm. The width of this part of the PCB $W_{PCB,1}$ is ~5.0 mm. The length of the back part of the PCB $L_{PCB,2}$ is ~27.6 mm. Here, the PCB has a width $W_{PCB,2}$ of ~9.3 mm. The dimensions of the PCB assemblies are summarized in Table 3.

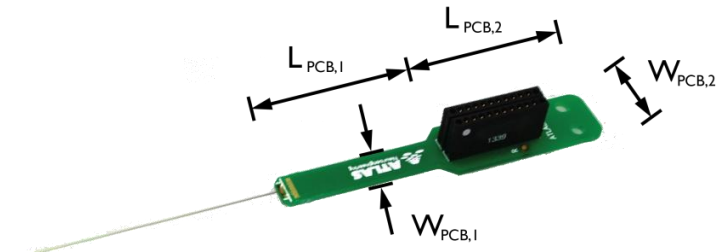


Figure 19: 16-channel probe with PCB (Omnetics) assembly.

32-channel probe:

A 32-channel probe with PCB assembly is shown in Figure 20. The length of the PCB $L_{PCB,1}$ (distance from the end of the probe shaft to the beginning of the wider part of the PCB) is ~25.2 mm. The width of this part of the PCB $W_{PCB,1}$ is ~4.7 mm. The length of the back part of the PCB $L_{PCB,2}$ is ~26.4 mm. Here, the PCB has a width $W_{PCB,2}$ of ~11.2 mm. The dimensions of the PCB assemblies are summarized in Table 3.

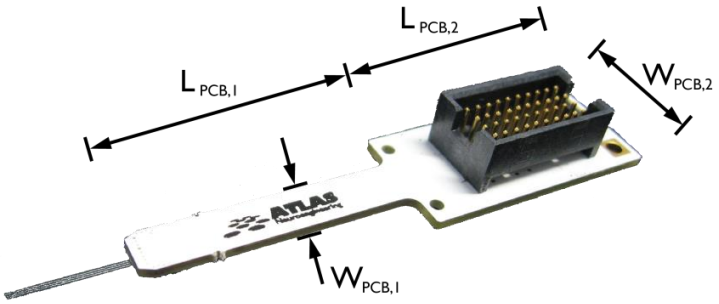


Figure 20: 32-channel probe with PCB assembly.

64-channel probe:

Figure 21 shows a 64-channel probe with PCB assembly. The length of the PCB $L_{PCB,1}$ (distance from the end of the probe shaft to the beginning of the wider part of the PCB) is ~25.4 mm. The width of this part of the PCB $W_{PCB,1}$ is ~9.3 mm. The length of the back part of the PCB $L_{PCB,2}$ is ~45.3 mm. Here, the PCB has a width $W_{PCB,2}$ of ~14.0 mm. The dimensions of the PCB assemblies are summarized in Table 3.

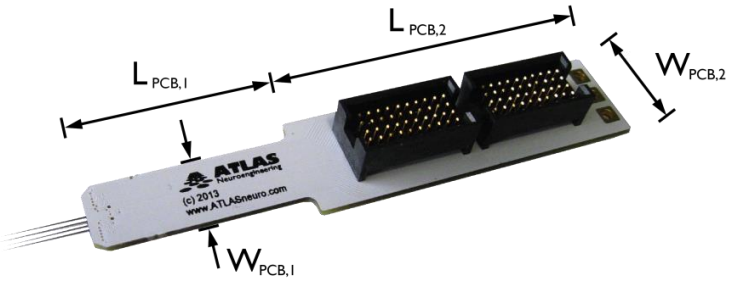


Figure 21: 64-channel probe with PCB assembly.

Table 3: Dimensions of 8, 16, 32 and 64-channel probes with PCB assembly.

	8-channel	16-channel (DIL)	16-channel (Omnetics)	32-channel	64-channel
	dimensions in mm				
PCB length $L_{PCB,1}$	27.2	25.2	24.6	25.2	25.4
PCB width $W_{PCB,1}$	3.3	5.3	5.0	4.7	9.3
PCB length $L_{PCB,2}$	26.4	22.0	27.6	26.4	45.3
PCB width $W_{PCB,2}$	7.5	12.4	9.3	11.2	14.0
Mating connector	Omneticss PSI-10	Common DIL-header	Omnetics PS1-10	Samtec FOLC-110-01-S-Q	Samtec FOLC-110-01-S-Q

Semi-chronic assembly

16-channel probe:

In Figure 22, a 16-channel probe with semi-chronic assembly is shown. The length of the PCBs L_{PCB} is ~5.8 mm. The width of the PCB W_{PCB} is ~7.1 mm. The length of the connector L_{cnctr} is ~4.4 mm. The width of the connector W_{cnctr} is ~6.7 mm. The weight of these devices is ~0.26 g. The dimensions of the semi-chronic assemblies are summarized in Table 4.

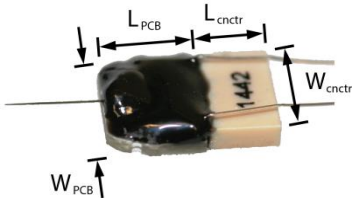


Figure 22: 16-channel probe with semi-chronic assembly.

32-channel probe:

32-channel probes with semi-chronic assembly are shown in Figure 23. The length of the PCBs L_{PCB} is ~8.0 mm (for Omnetics A8828-001 as well as for Omnetics A9435-001). The width of the PCB W_{PCB} is ~13.0 mm for A8828-001 and ~15.0 mm for A9435-001. The length of the connector L_{cnctr} is

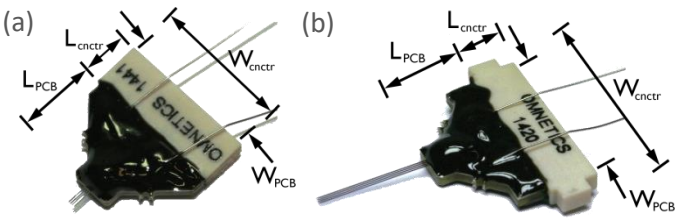


Figure 23: 32-channel probe with semi-chronic assembly with (a) Omnetics A8828-001 and (b) Omnetics A9435-001.

~4.4 mm. The width of the connector W_{cnctr} is ~12.1 mm for A8828-001 and ~18.2 mm for A9435-001. The weight of these devices is ~0.45 g and ~0.50 g, respectively. The dimensions of the semi-chronic assemblies are summarized in Table 4.

Table 4: Dimensions of 32- and 16-channel probes with semi-chronic assembly.

	16-channel	32-channel A8828-001 dimensions in mm	32-channel A9435-001
PCB length L_{PCB}	5.8	8.0	8.0
PCB width W_{PCB}	7.1	13.0	15.0
Connector length L_{cnctr}	4.4	4.4	4.4
Connector width W_{cnctr}	6.7	13.1	18.2
Weight [g]	0.26	0.45	0.50
Mating connector	Omnetics NSD-18	Omnetics NSD-36	Omnetics NSD-44

Cable-ZIF-plug assembly

16-channel:

A 16-channel probe with cable-ZIF-plug assembly is shown in Figure 24. The length of the cable L_{Cable} (distance from the end of the probe to the beginning of the ZIF-plug) is ~30.0 mm. The cable width W_{cable} is ~1.9 mm. The ZIF-plug has a length L_{flex} of ~7.2 mm. The part of the ZIF-plug which is inserted into the ZIF-connector has a length L_{insert} of ~2.0 mm. The width of the wider part of the ZIF-plug W_{flex} is ~6.9 mm. The width of the end of the ZIF-plug which is inserted into the ZIF-connector W_{insert} is ~4.5 mm. The weight of this device is ~0.02 g. The dimensions of the 16-channel probe with cable-flex assembly are summarized in Table 5.

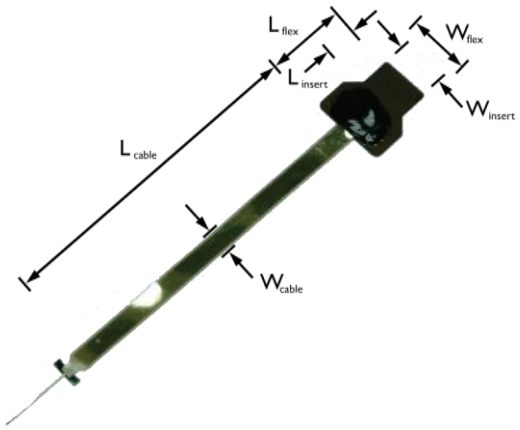


Figure 24: 16-channel probe with Cable-ZIF-plug assembly.

32-channel:

In Figure 25, a 32-channel probe with cable-ZIF-plug assembly is shown. The length of the cable L_{Cable} (distance from the end of the probe to the beginning of the ZIF-plug) is ~30.0 mm. The cable width W_{cable} is ~2.4 mm. The length of the ZIF-plug L_{flex} is ~12.2 mm. The part of the ZIF-plug which is inserted into the ZIF-connector has a length L_{insert} of ~2.0 mm. The width of the wider part of the ZIF-plug W_{flex} is ~12.6 mm. The width of the end of the ZIF-plug which is inserted into the ZIF-connector W_{insert} is ~10.0 mm. The weight of this device is ~0.06 g. The dimensions of the 32 channel probe with cable-ZIF-plug assembly are summarized in Table 5.

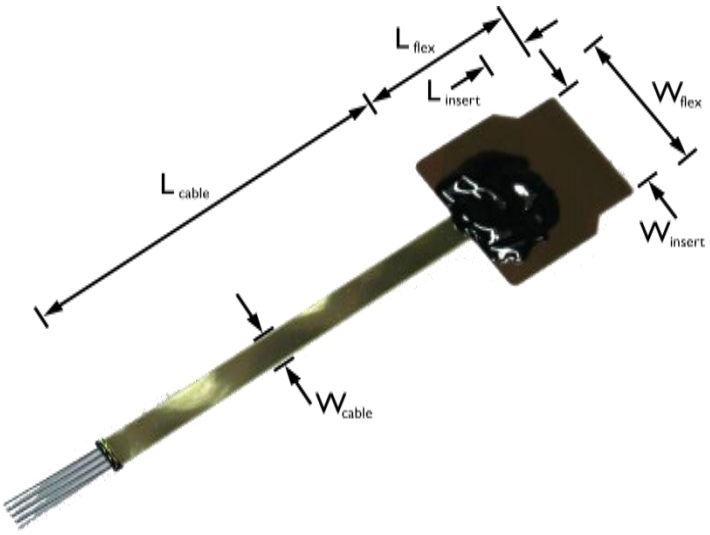


Figure 25: 32-channel probe with Cable-ZIF-plug assembly.

Table 5: Dimensions of 16- and 32-channel probes with ZIF-plug assembly.

	16-channel	32-channel
	dimensions in mm	
Cable length L_{cable}	30.0	30.0
Cable width W_{cable}	1.9	2.4
ZIF-plug length L_{flex}	7.2	12.2
ZIF-plug width W_{flex}	6.9	12.6
Insert length L_{insert}	2.0	2.0
Insert width W_{insert}	4.5	10.0
Weight [g]	0.02	0.06
Mating connector	Molex 502078-1710	Molex 502078-3910

Cable-Omnetics assembly

16-channel:

Figure 26 shows a 16-channel probe with cable-Omnetics assembly. The length of the cable L_{Cable} (distance from the end of the probe to the beginning of the PCB) is ~30.0 mm. The cable width W_{cable} is ~1.9 mm. The length of the PCB L_{PCB} is ~4.9 mm. The width of PCB W_{PCB} is ~7.9 mm. This PCB is equipped with an Omnetics connector (A79038-001). The length of the connector L_{cnctr} is ~4.4 mm. The width of the connector W_{cnctr} is ~6.8 mm. The weight of this device is ~0.21 g. The dimensions of the 16-channel probe with Omnetics assembly are summarized in Table 6.

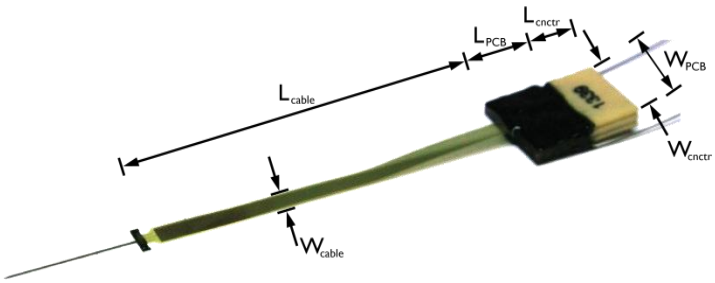


Figure 26: 16-channel probe with Cable-Omnetics assembly.

32-channel:

32-channel probes with cable-Omnetics assembly are shown in Figure 27. The length of the cable L_{Cable} (distance from the end of the probe to the beginning of the PCB) is ~30.0 mm. The cable width W_{cable} is ~2.4 mm. The length of the PCB L_{PCB} is ~8.3 mm. The width of the PCB W_{PCB} is ~11.7 mm for Omnetics A8828-001 and ~14.5 mm for Omnetics A9435-001. The length of these connectors L_{cnctr} is ~4.4 mm. The width of the connector W_{cnctr} is ~13.1 mm for A8828-001 and ~18.2 mm for A9435-001. The weight of these devices is ~0.46 g for A8828-001 and ~0.58 g for A9435-001. The dimensions of the 32 channel probes with Omnetics assembly are summarized in Table 6.

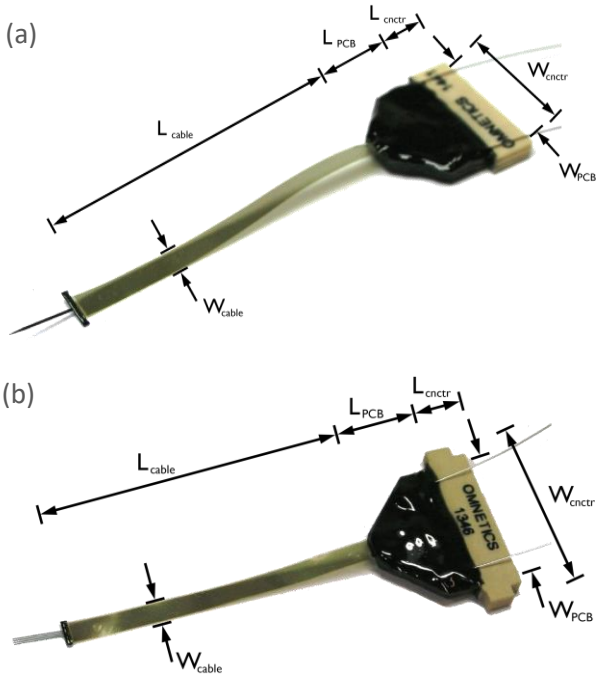


Figure 27: 32-channel probes with Cable-Omnetics assembly with (a) Omnetics A8828-001 and (b) Omnetics A9435-001.

Table 6: Dimensions of 16- and 32-channel probes with Cable-Omnetics assembly.

	16-channel	32-channel A8828-001	32-channel A9435-001
	dimensions in mm		
Cable length L_{cable}	30.0	30.0	30.0
Cable width W_{cable}	1.9	2.4	2.4
PCB length L_{PCB}	4.9	8.3	8.5
PCB width W_{PCB}	7.9	11.7	14.5
Connector length L_{cnctr}	4.4	4.4	4.4
Connector width W_{cnctr}	6.8	13.1	18.2
Weight [g]	0.21	0.46	0.58
Mating connector	Omnetics NSD-18	Omnetics NSD-36	Omnetics NSD-44

Cable-Strip-connector assembly

Figure 28 shows a 16-channel probe with cable-strip-connector assembly. This assembly variant contains a cable with a length L_{cable} of ~18.0 mm, which is measured from the end of the probe to the beginning of the connector. The cable width W_{cable} is ~2.3 mm. The length of the connector L_{cnctr} is ~13.0 mm. The connector width W_{cnctr} is ~4.5 mm. The weight of this device is ~0.70 g. The dimensions of the cable-strip-connector assembly are summarized in Table 7.

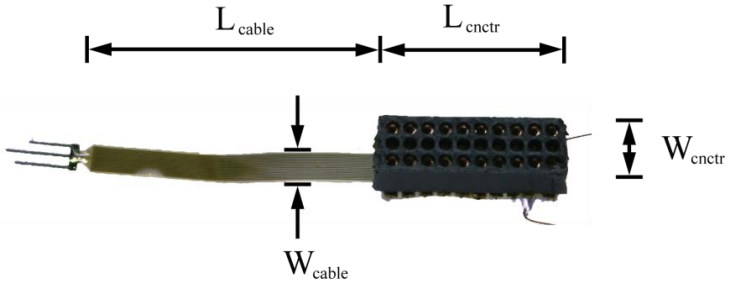


Figure 28: 16-channel probe with cable-strip-connector assembly.

Table 7: Dimensions of a 16-channel probe with cable-strip-connector assembly (in mm).

Cable length L_{cable}	18.0
Cable width W_{cable}	2.3
Connector length L_{cnctr}	13.0
Connector width W_{cnctr}	4.5
Weight [g]	0.70
Mating connector	Preci-dip 852 series