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Welcome!

NeuroNexus is a global leader for innovative neural interface products and technologies to meet current and emerging needs in **neuroscience research, neurosurgery, neurocardiology, and neurostimulation.**

Our diverse line of products is used in species ranging from fruit flies to non-human primates to precisely record, stimulate, and deliver drugs across all areas of the nervous system.

We look forward to collaborating with you in your research work. To see our entire product line, visit **neuronexus.com.**

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Thank you for your interest in NeuroNexus.

We pride ourselves on being at the forefront of neural interface technologies and translating these technologies into innovative products to help power neuroscience research.

At our core, we are a research and development company with deep roots in neuroscience and neurotechnology. We appreciate the challenges and nuances of brain research and are intrinsically interested in working with researchers to develop new research tools and technologies to support their experimental studies. We have many exciting and innovative products – including many types of high-density 2D and 3D neural probes, the high-performance SmartBox Pro recording system, and our powerful new neuro-analytics software platform.

I invite you to browse our catalog and website and to contact us directly to discuss ideas, needs, and opportunities. Enjoy!



Daryl Kipke, PhD
Founder and President

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NeuroNexus products included in this document have not been approved for use in humans.

Any statements regarding NeuroNexus' future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

References in this document to NeuroNexus products and services do not imply that NeuroNexus intents to make such products and services available in all countries in which NeuroNexus does business.

Neither this document nor the description of products and prices contained herein constitutes an offer subject to acceptance by a third party. All sales of products described herein shall be conditioned upon and subject to terms and conditions set forth in definitive agreement documents separate herefrom.

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Editor's Note: *NeuroNexus is constantly growing and adapting our product lines to meet the needs of researchers and scientists. To stay informed of our latest developments, please visit neuronexus.com and download the latest catalogs, brochures, and technical documents.*

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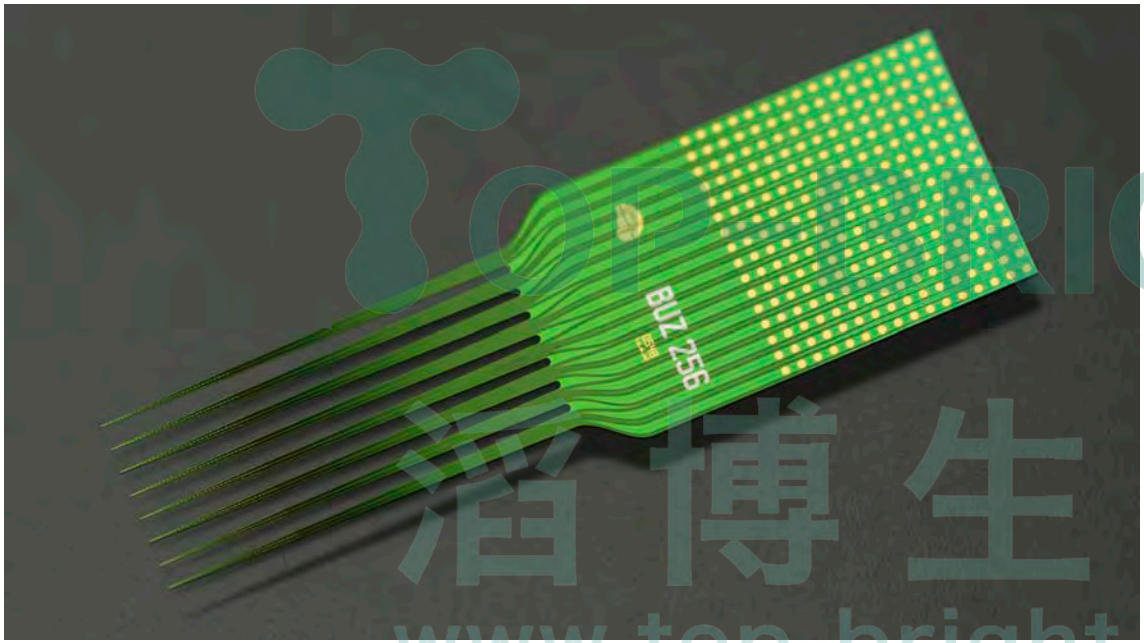
Targets up to 15 mm deep

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The NeuroNexus Probe

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NeuroNexus **Standard Probes** are fabricated using state-of-the-art silicon MEMs technology. Standard Probes are used in labs worldwide for single unit, multiple unit, and local field potential (LFP) recording and stimulation, in acute and chronic applications.

- **Consistent results** – NeuroNexus probes are produced with reliable mechanical, geometric, and electrical characteristics. This means fewer variables for you to manage.
- **A Toolbox of Designs** – We offer a huge variety of electrode array designs for different applications, brain structures, and animal models. Combined with our vast packaging options, you are sure to find a probe to suit your needs – and if not, we can design a probe that will.
- **Acute and Chronic** – Standard Probes can be used successfully in both acute and chronic applications.
- **Connect to any system** – Each microelectrode array is matched with a connector package to connect to a headstage. NeuroNexus collaborates with system manufacturers to ensure our probes connect seamlessly.

SPECIFICATIONS

Usage	Single unit, Multiple unit, LFP. Record and stimulate. Acute and chronic.
Electrode Site Material	Iridium (standard), Platinum (custom), Gold (custom)
Electrode Thickness	15 µm or 50 µm (varies by design)
Electrode Length	2 - 15 mm (varies by design)
Channel Count	16, 32, 64, 128, 256 (varies by design)

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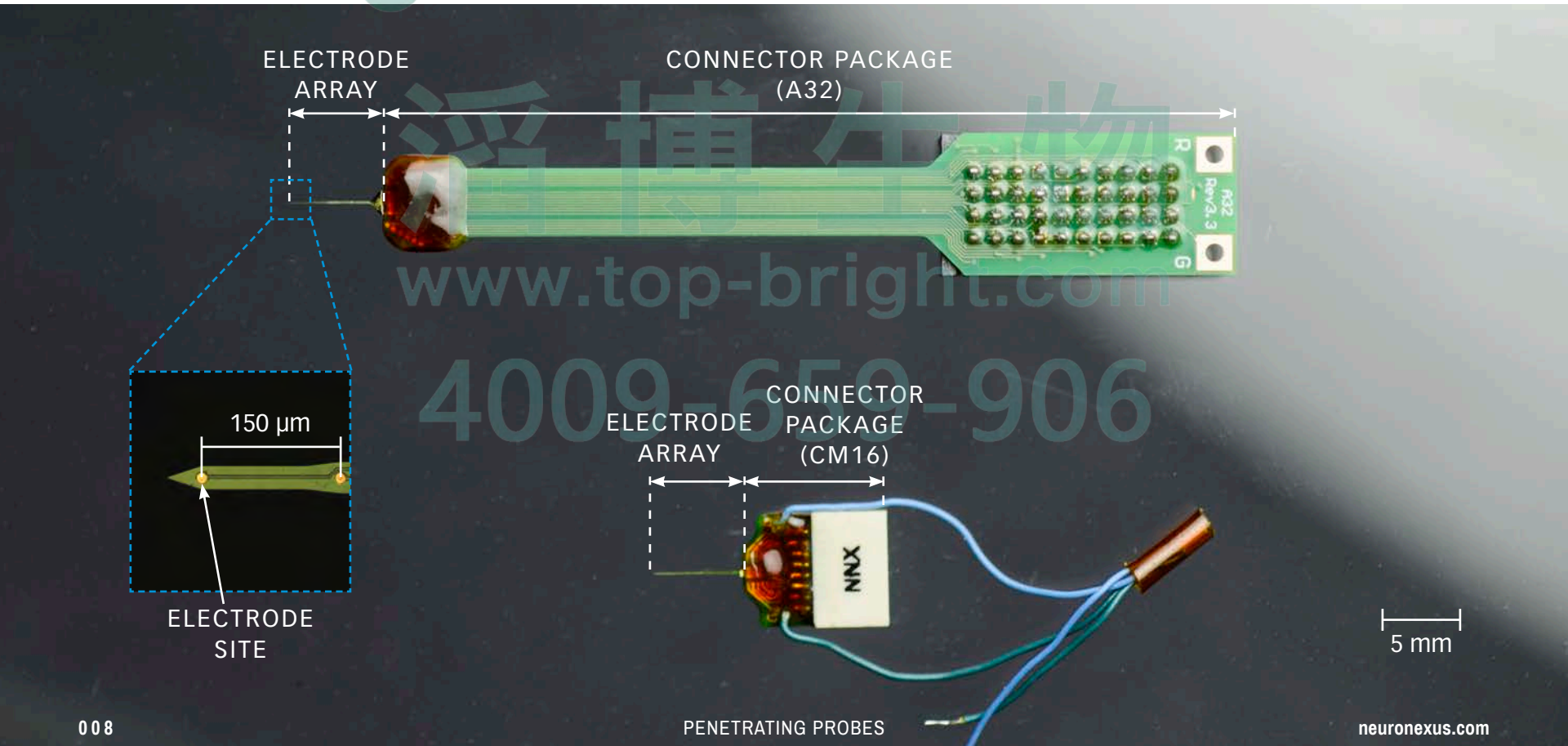
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Neural Probes: In Detail

NeuroNexus products are at the forefront of neural interface technology. Our meticulously crafted neural probes can be broken down into two parts: the **electrode array** and the **connector package.**

The **electrode array** interfaces with neural tissue by recording brain activity or delivering stimuli through precisely placed electrode sites. NeuroNexus probes are suitable for implanting into cortex or deep structures, as well as for interfacing with the brain or nerve surface.

The **connector package** provides the interface between the electrode array and the external instrumentation. Each package includes a specific **connector** type. The same electrode array can be paired with different connector packages, giving you a high degree of flexibility in configuring the best neural probe to suit your experimental requirements.

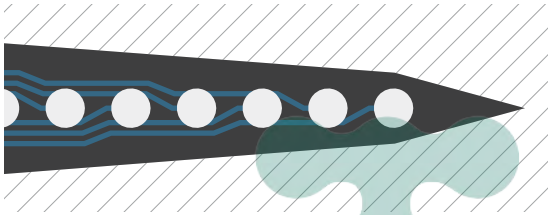


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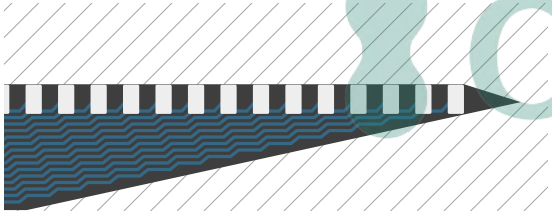
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STANDARD ARRAY SITE LAYOUTS

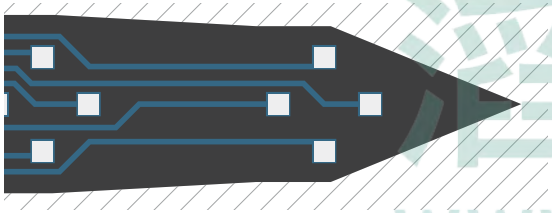
Below are examples of the different types of electrode array tips you can find in our **A-Style Probe Designs section, pgs. 23-77.**.



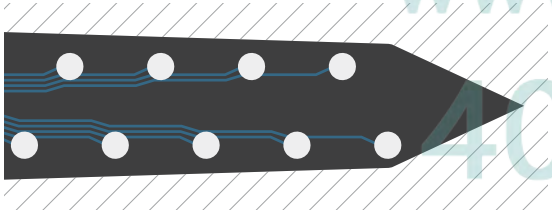
Linear electrode arrays are the foundation for multi-channel recordings. The laminar design allows for a longer area of coverage than a single tip site, and either facilitates or replaces the need for passage-type experiments. Linear electrode arrays fit the widest range of applications.



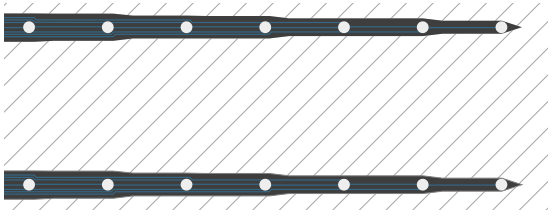
Edge sites are similar to the Linear layout, but electrode sites are strategically positioned at the edge of the substrate.



A **Tetrode** is an arrangement of four electrode sites placed close together, allowing for high-quality cell discrimination in recordings.



Polytrode electrode site layouts come in two variations: Poly2 (two columns of sites, shown left), or Poly3 (three columns of sites). They have a mix of linear and tetrode benefits, with sites close enough together to allow a degree of multiple representation across different sites, while sampling a larger space.



Multi-shank electrode arrays provide a two-dimensional representation of the brain. By controlling shank and site spacing, a more detailed understanding can be obtained of a larger space in the brain. Some multi-shank designs incorporate tetrode and polytrode site arrangements.

"Since NeuroNexus began fabricating probes with high reliability and reasonable costs, we virtually stopped using wire electrodes and monitor electrical activity with silicon probes. It is a one-way process: once one begins to record with silicon probes, he/she never goes back to wires."
- Dr. György Buzsáki, *New York University*

CUSTOM DESIGN

In certain research scenarios, a unique probe design may be required.

To help researchers achieve their goals, NeuroNexus offers a custom probe design service that provides unique access to a virtually unlimited design space. Almost any feature of a probe can be tailored to suit your application - and all it takes to get started is a sketch.

Each custom probe includes:

- Consultation with our engineering team to validate feasibility of your proposed design
- Translation of your design into a CAD layout
- Formal design review with our technical team
- State-of-the-art microfabrication of your design
- Packaging and testing of the fabricated probes

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CONNECTOR PACKAGE AND HEADSTAGE INTERFACE

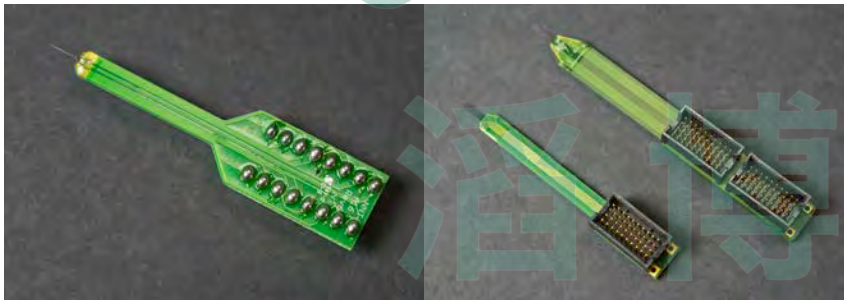
Standard probes can interface with almost any commercially available headstage via the **connector package,** which consists of a specialized circuit board and your choice of connector.

To configure a probe, you must select an appropriate electrode array for your experiment, and combine it with a package that matches your headstage/data acquisition system.

Packages can be classified as acute or chronic, though it is best to consider your existing data acquisition systems and experiment/animal model type. Below is a list of our most commonly requested connector packages - a full list of available packages (with specifications) can be found in the Package Specifications section of this catalog.

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ACUTE



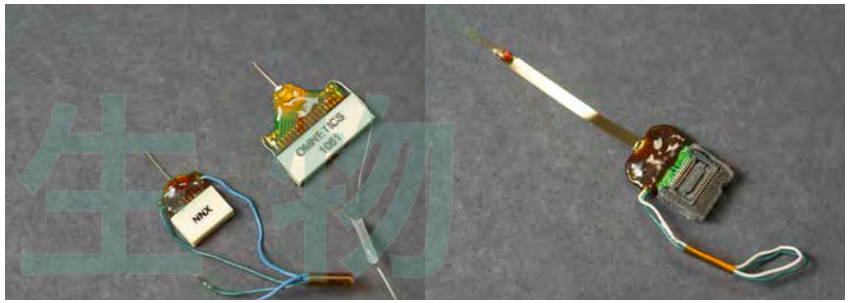
LEFT: A16 Package
RIGHT: A32 (left) and A64 (right) Packages

The A-Series package is suitable for acute experiments. The package is easy to handle and can be used with standard stereotactic frames.

Available acute packages:

- A16 / A32 / A64

CHRONIC



LEFT: CM16LP (left) and CM32 (right) Packages
RIGHT: HZ32 Package

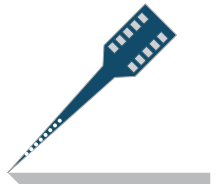
Multiple packages can be specified for chronic experiments. The CM-Series is small and lightweight, permitting chronic implantation in mice. The H-Series packages include a robust, flexible cable, enabling microdrive use or floating implants. The Z-Series utilizes TDT's patented Zif Clip™ technology.

Available chronic packages:

- CM16LP / CM32
- H16 / HC16 / HZ16 / H32 / HC32 / HZ32 / H64 / H64LP / HC64 / HZ64
- Z16 / Z32 / Z64

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How to Configure a Neural Probe



A complete NeuroNexus neural probe assembly consists of two parts: an electrode array, and a package. Both must be configured.

Step 1:

Browse the catalog to find an electrode array that meets your needs. The Electrode arrays are grouped first by **type** (A, E, V, etc.), then by **channel count,** and finally by **length.**

Step 2:

Determine the connector on your headstage, and find a package that will connect to it. The appendix details available packages.

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EXAMPLE 1:

A user specifies an A1x32-6mm-50-177 electrode array. The lab uses a Plexon HST/16V-G20 headstage, which has an 18-pin Omnetics Nano strip connector. The user can specify either a CM16LP or an H16 package, both of which have 18-pin Omnetics Nano strip connectors. The user desires connector standoff from the implant site, so the H16 package is selected. Because the A1x32-6mm-50-177 electrode comes in two thicknesses, that must be specified as well.

This is the resulting part number for this probe:

A1x32-6mm-50-177-H16-50
Electrode Array — Package — Thickness

EXAMPLE 2:

A user wants to combine optical stimulation with neuronal recording using an A4x4-3mm-100-125-703 electrode array. The lab uses a TDT recording system with a 16 channel Zif Clip™ headstage. Because the user wants to specify an optoelectrode, the OZ16 package is selected. Because the electrode array has multiple shanks, the user must co-ordinate fiber placement with the sales co-ordinator. Because the A4x4-3mm-100-125-703 electrode only comes in one thickness, that value can be omitted from the part number.

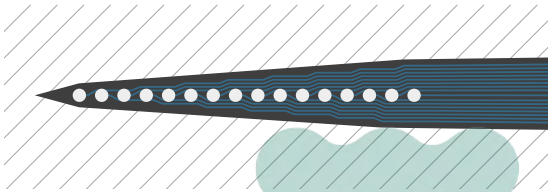
This is the resulting part number for this probe:

A4x4-3mm-125-703-OZ16
Electrode Array — Package

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EXAMPLE CONFIGURATIONS

A1x16-5mm-25-177-A16

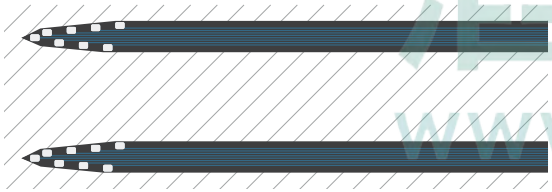


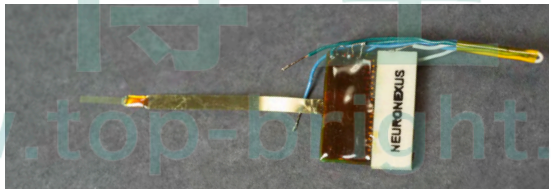


This example shows an A1x16-5mm-25-177 linear electrode array configured with an A16 connector package. The electrode is 5mm long, and electrode site coverage spans 375 µm.

The A16 package utilizes Dual Inline Pin connections. Because of its size, this connector package is best suited for acute applications.

Buzsaki64-H64LP





This example shows a Buzsaki64 electrode array configured with a H64LP connector package. The Buzsaki64 electrode array has a unique "octrode" electrode site layout which spans 140 µm vertically and 1400 µm horizontally.

The H64LP connector package utilizes two 32-channel Omnetics Nano connectors and includes a 30mm flex cable for connector standoff.

NEURONEXUS CAN HELP

If you are not sure what electrode array or package you need for your experiment, please contact us for assistance.

NeuroNexus staff have decades of combined experience in neuroscience and neural engineering. Additionally, we may be able to direct you to other researchers in hundreds of labs all over the world who have found success using NeuroNexus products.

To contact us, please email **support@neuronexus.com**, or call +1.734.913.8858.

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dDrive

CHRONIC MICRODRIVE

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Light, compact, and inexpensive, the **dDrive** chronic microdrive enables precise probe movement in freely behaving animals, and can improve experiment longevity.

- **150 µm/turn** – Carefully target brain layers with the dDrive's high accuracy.
- **Right-sized for different animal models** – The dDrive comes in different sizes for different animal models. Minimize strain on a mouse with the dDrive-Nano, or size up to the dDrive-xL for larger brains and animals.
- **Lightweight** – The dDrive-Nano weighs 0.36 g (with cap), while the largest dDrive-xL weighs 0.75 g (with cap).
- **Secure** – All dDrive models are designed with features that improve adhesion to the skull for additional security and stability.
- **Simplified implant** – NeuroNexus worked closely with labs to develop a low-risk implant procedure. Ask us for a demonstration video!
- **Optogenetics-compatible** – The oDrive combines chronic, freely behaving microdrive implants with optogenetics.

MICRODRIVE OPTIONS

NeuroNexus offers different kinds of microdrives for different applications:

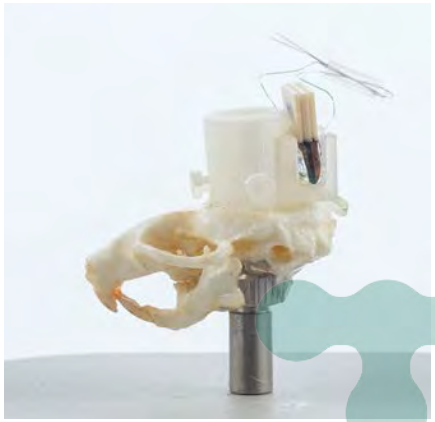
The **dDrive-Nano** is our smallest microdrive, optimized for applications where an exceptionally small and lightweight solution is needed.

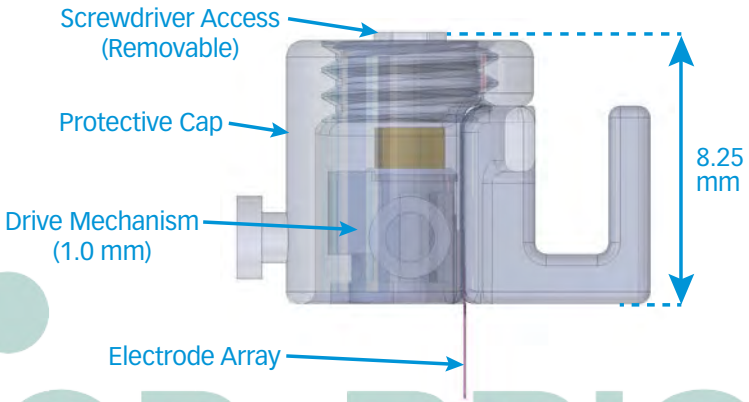
The **dDrive-m** suits the widest variety of applications, and the **dDrive-xL**, with its extended drive range, is best suited to larger animal models.

The **oDrive** combines the dDrive with an optical fiber for chronic optogenetics work.

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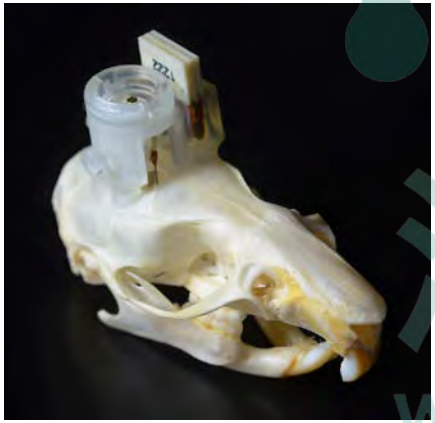
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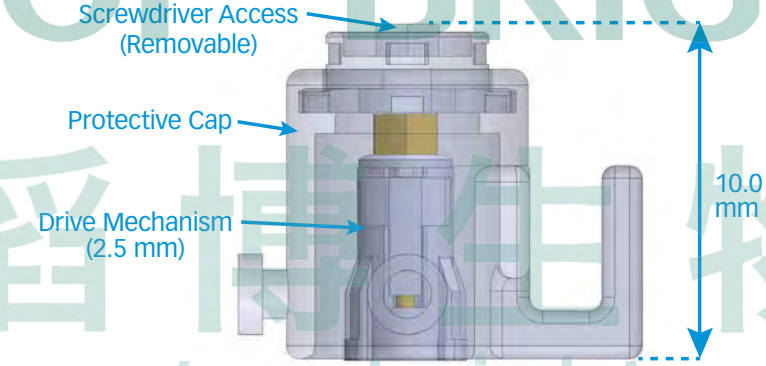




dDRIVE-NANO SPECIFICATIONS

Drive Range	1.0 mm
Height	8.25 mm
Weight	0.36 g

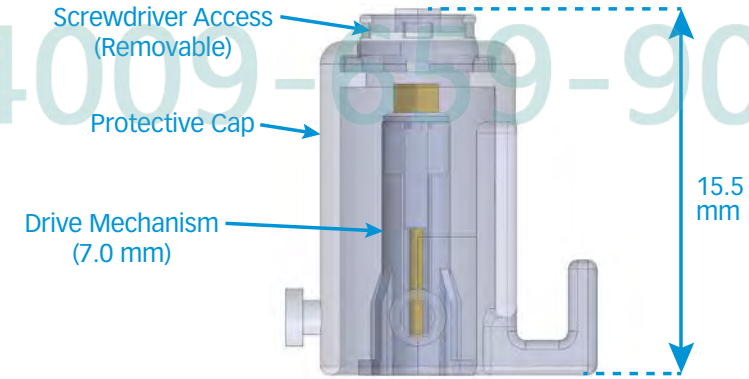




dDRIVE-m SPECIFICATIONS

Drive Range	2.5 mm
Height	10.0 mm
Weight	0.47 g





dDRIVE-xL SPECIFICATIONS

Drive Range	7.0 mm
Height	15.5 mm
Weight	0.75 g

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Optoelectrodes

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Illustration showing flat optical fiber mounted on an electrode array shank.

NeuroNexus **Optoelectrodes** enable concurrent optogenetic stimulation and high-resolution electrophysiology.

- **A powerful tool** – Optical fibers are laminated onto silicon probes to create an optoelectrode. Utilize a single fiber, or configure multiple fibers on a single probe (one fiber per electrode shank) to activate different opsins or target different brain areas.
- **Options, options** – Utilize any electrode array design and select from multiple fiber types (and specify their termination locations on each shank) to create your ideal optoelectrode. Optogenetics packages use the "O" prefix (e.g. OA, OCM).
- **Minimal tissue damage** – New OptogeniX fibers taper to a point for minimal impact on brain tissue.
- **Controlled artifact** – NeuroNexus optoelectrodes are engineered for minimal photoelectric artifacts.

FIBER OPTIONS

NeuroNexus offers multiple types of optical fiber, with different diameters, tip profiles, and numerical aperture values. Please consider the best option for your application.

Flat Profile
Inner diameter/Outer diameter, Numerical Aperture

50 µm/70 µm, 0.22 NA (flexible)
50 µm/62.5 µm, 0.22 NA (etched)
105 µm/125 µm, 0.22 NA (standard)
105 µm/125 µm, 0.66 NA (Plexon patch cords)
200 µm/220 µm, 0.22 NA

Tapered Profile (OptogeniX)
Inner diameter/Outer diameter, Numerical Aperture

105 µm/125 µm, 0.22 NA
200 µm/225 µm, 0.39 NA
200 µm/230 µm, 0.66 NA

More information on following pages.

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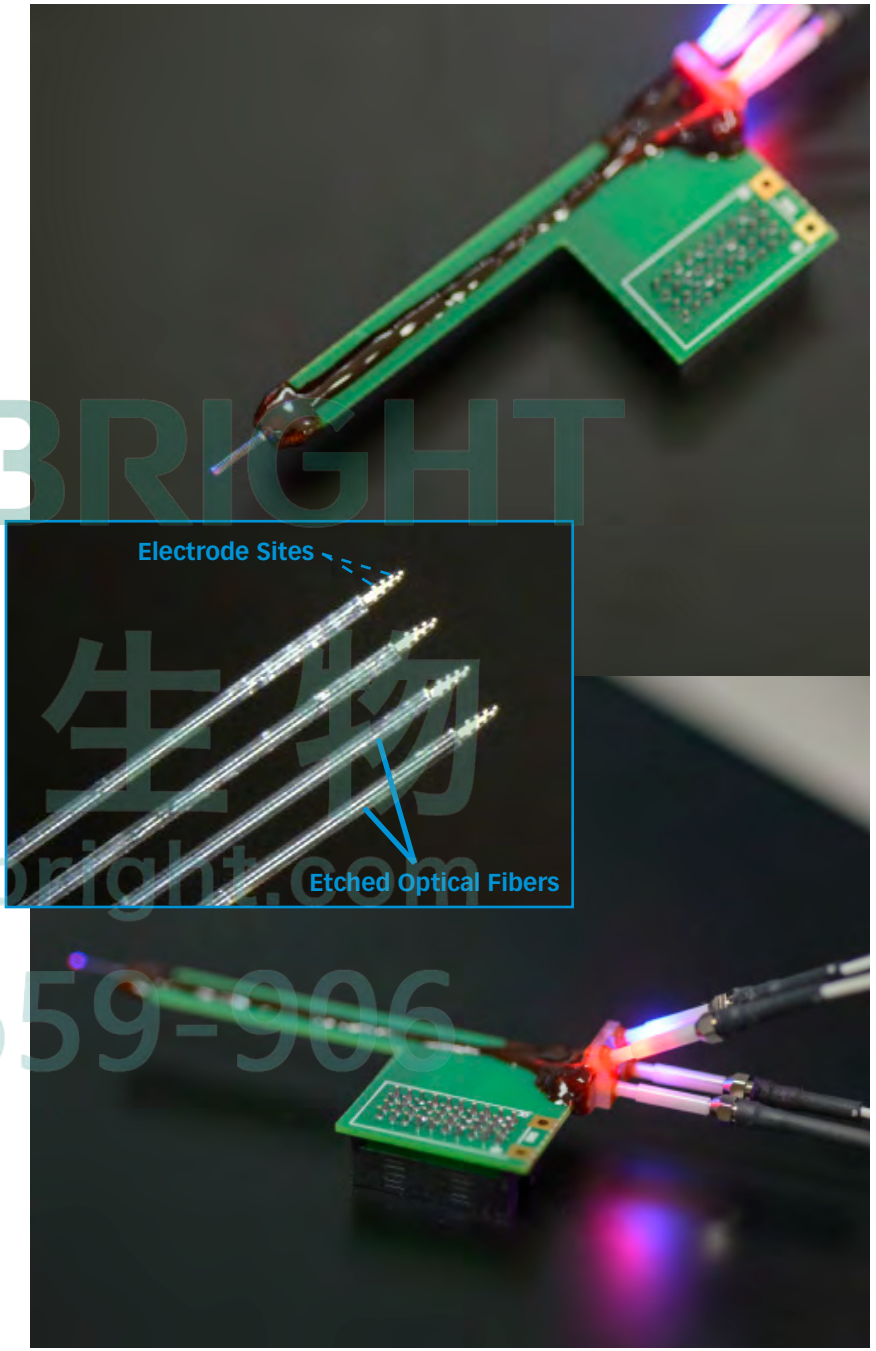
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MULTI-FIBER OPTOELECTRODES

NeuroNexus offers **multi-fiber optoelectrodes** for expanded optogenetics applications in a compact, robust package.

Using acid etched optical fibers (65 µm), up to 8 fibers can be attached to each probe (one fiber per electrode array shank). Because of the physical limitations of optical fibers and NeuroNexus microelectrode arrays, there are some design constraints.

RIGHT, TOP: Quad-optrode package showing lit fibers
RIGHT, BOTTOM: Compact ceramic ferrule attachment
INSET: Close-up image of a Buzsaki32 electrode array showing mounted fibers



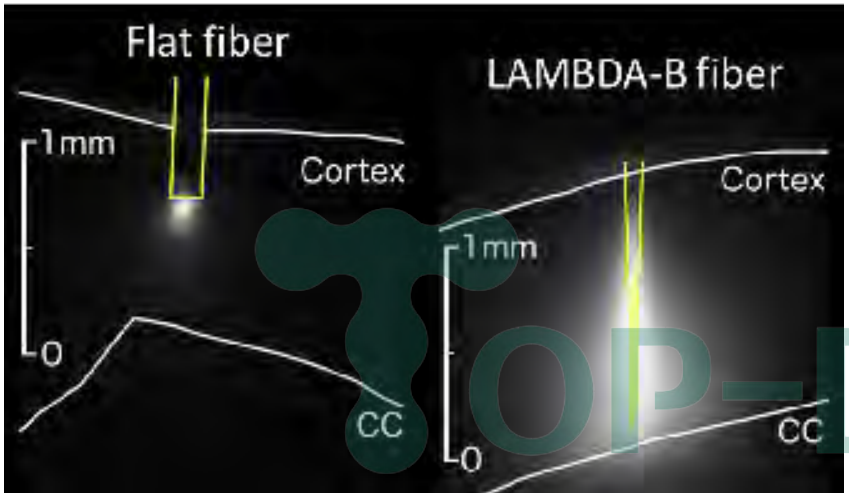
SPECIFICATIONS (FLAT FIBER)

Fibers (ID/OD, NA)	50 µm/70 µm, 0.22 NA (flexible) 50 µm/62.5 µm, 0.22 NA (etched)
Fiber Tip Profile	Flat
Weight (Coupler)	< 0.5 g
Durability	< 5% transmission variability after 40 connections
Rotation Test	< 2% variation over 1 rotation
Connection Strength	> 300 g before latch separation (typical)
Maximum Shear Force	900 g (applied to top of female coupler)
Length	Tolerance ± 500 µm

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TAPERED FIBERS

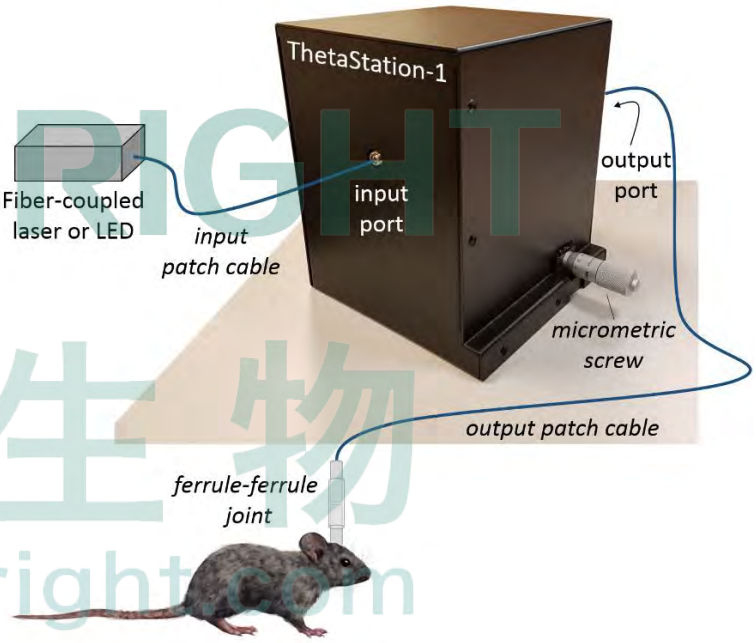


OptogeniX Tapered Fibers can also be specified for a NeuroNexus optoelectrode:

- OptogeniX tapered fibers are designed to illuminate large volumes of tissue in a more homogeneous way than standard optical fibers.
- Gain stimulation efficiency, with less tissue damage.
- Sub-sample your target region – without probe movement – by using an OptogeniX Launching System like the **ThetaStation** (right).

OPTOGENIX THETASTATION

The OptogeniX **ThetaStation-1** is an opto-mechanical tool designed to perform *in vivo* site-selective stimulation with OptogeniX tapered fibers. ThetaStation-1 can be operated with any fiber-coupled source of visible light (either a laser or an LED).



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SPECIFICATIONS (TAPERED FIBER)

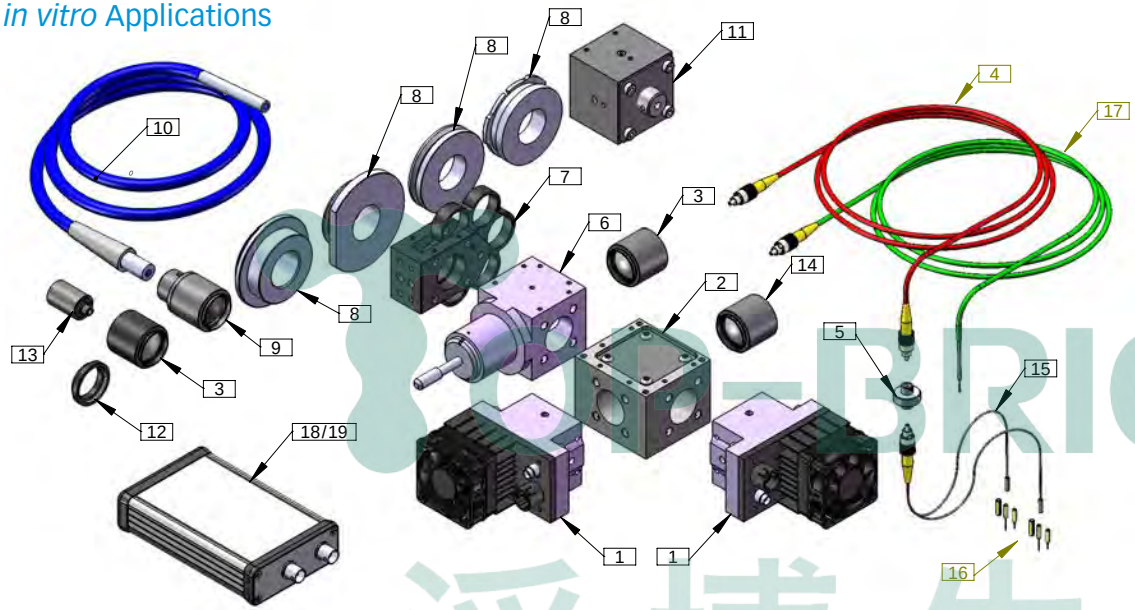
Fibers (ID/OD, NA)	105 µm/125 µm, 0.22 NA 200 µm/225 µm, 0.39 NA 200 µm/230 µm, 0.66 NA
Fiber Tip Profile	Tapered

Emitting Length (5% tolerance)	125 µm OD fiber: 0.7 mm, 0.9 mm, 1.2 mm 225 µm OD fiber: 1.0 mm, 1.5 mm, 2.0 mm, 2.5 mm 230 µm OD fiber: 1.0 mm, 1.5 mm, 2.0 mm, 2.5 mm

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PRIZMATIX HIGH-POWER LED SYSTEMS

in vitro Applications



Prizmatix specializes in ultra high-power LED illumination systems for microscopy and optogenetics.

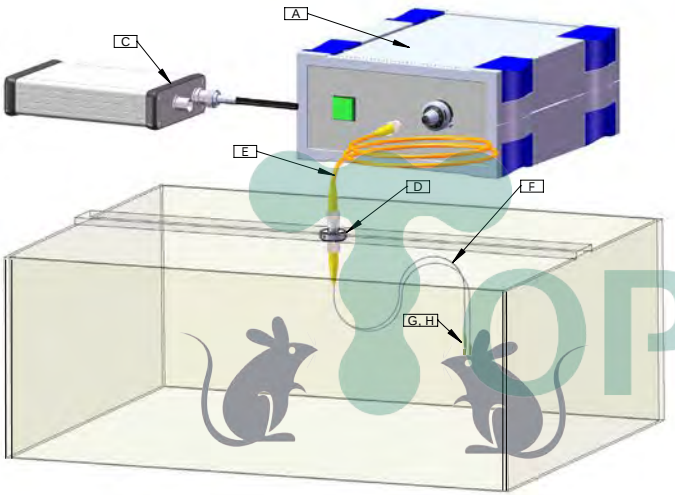
NeuroNexus offers a variety of Prizmatix optogenetics solutions for both *in vitro* experiments and *in vivo* freely moving animals.

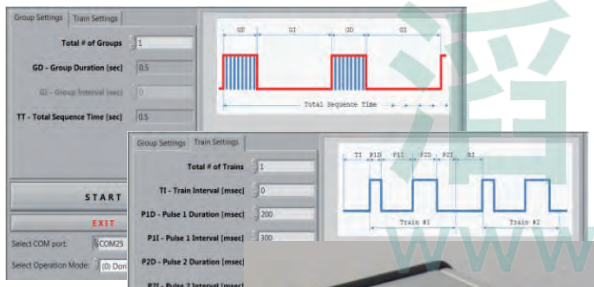
1.	**High-Power LED**	Modular UHP-Mic-LEDs for fiber optic and epi-fluorescence optogenetics
2.	**Beam Combiner**	Combines several LEDs into one output beam using a dichroic mirror
3.	**Fiber Coupler Adaptor**	Couples an optical fiber to LED: SMA or FC connectors
4.	**Patch Cable**	Polymer / silica optical fiber (single or multiple branches), SMA or FC connectors
5.	**Rotary Joint**	Low friction fiber optic Rotary Joint for *in vivo* optogenetics with small animals
6.	**Beam Switcher**	Changes direction of beam output (e.g. microscope to fiber)
7.	**Filter Wheel**	Takes up to six 1" filters
8.	**Microscope Adaptors**	Adaptors for epi-fluorescence ports of Nikon/Olympus/Zeiss/Leica microscopes
9.	**LLG-A (Liquid Light Guide)**	Couples Liquid Light Guide to the LED system
10.	**LLG-3 / LLG-5**	Liquid Light Guide: 3mm or 5mm core
11.	**LLG-XYZ Collimator**	Collimates Light Guide beam to epi- fluorescence port of a microscope
12.	**C-Mount Adaptor**	Used to mount LED on camera port of a microscope
13.	**Patch Cable Collimator**	Specially designed to collimate high NA optical fibers
14.	**Reference Photodiode**	Monitors LED system power output
15.	**Single/Dual Fiber**	For *in vivo* applications, single or bilateral dual fiber
16.	**Implantable Cannulae**	Ferrule diameters: 2.5 mm, and lightweight 1.25mm for smaller animals
17.	**in vitro Patch Cable**	For *in vitro* applications: bare fiber protruding from thin stainless steel tubing
18.	**USB-TTL Interface**	Controls Prizmatix LEDs from imaging software (e.g. microManager) via USB
19.	**Pulser**	TTL pulse train generator featuring simple PC software for pulse programming

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PRIZMATIX HIGH-POWER LED SYSTEMS

in vivo Applications

















A. Optogenetics-LED	Blue (ChR1,ChR2), Green (ArchT), Red (eNpHR3.0, red-shifted ChR) ultra-bright fiber coupled LEDs for *in vivo* optogenetics
B. Dual-Optogenetics-LED	Dual (Blue, Green, Red) ultra-bright fiber coupled LEDs with independent channels
C. Pulser	TTL pulse train generator featuring simple PC software for pulse programming
D. Rotary Joint	Low friction fiber optic Rotary Joint for *in vivo* optogenetics with small animals
E. Optogenetics-Fiber-1000	Polymer optical fiber, High NA, 1000 µm core, SMA to FC connectors
F. Optogenetics-Fiber-500 / Optogenetics-Fiber-2x500	Polymer optical fiber, High NA, 500 µm core, FC to ferrule. Dual (2x500) bundle available for bilateral stimulation
G. Sleeves	Zirconia sleeves for 2.5 mm or 1.25 mm cannulae
H. Implantable Cannulae	Ferrules diameters: 2.5 mm and lightweight 1.25 mm for smaller animals as mice

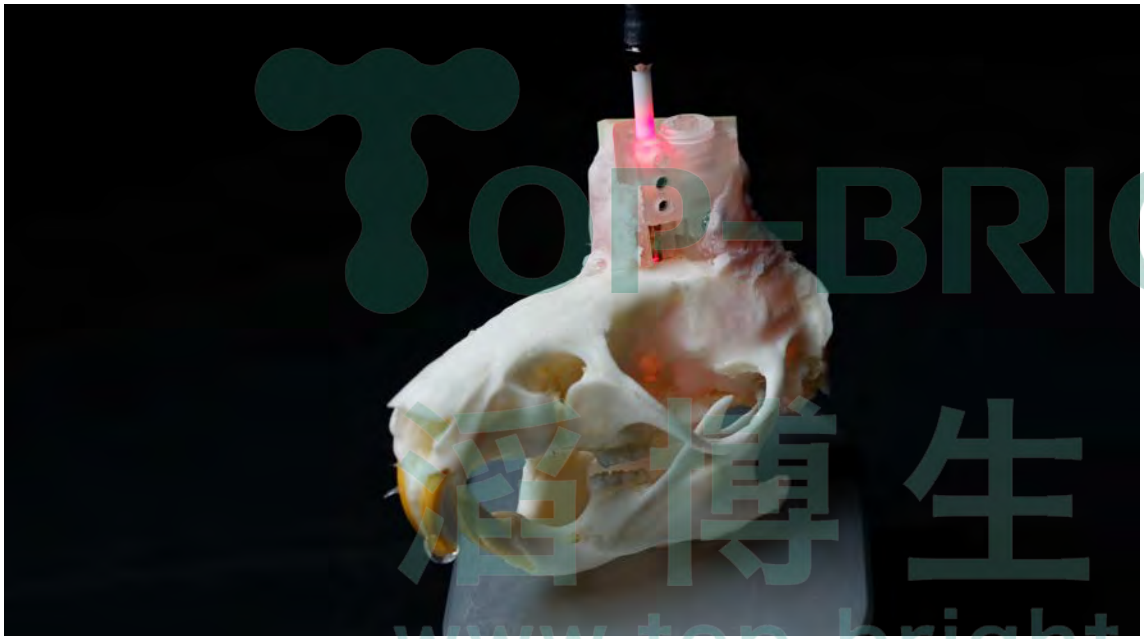
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oDrive

OPTOGENETICS-ENABLED MICRODRIVE

BACK TO INDEX



The **oDrive** is the optogenetics-enabled version of the compact and accurate dDrive chronic microdrive.

- **150 µm/turn** – Carefully target brain layers with the oDrive's high accuracy.
- **Right-sized for different animal models** – The oDrive comes in two sizes for different animal models. Minimize strain on a small animal or rodent with the oDrive-m, or size up to the oDrive-xL for larger brains and animals.
- **Lightweight** – The oDrive-m weighs 0.65 g, while the oDrive-xL weighs 0.9 g.
- **Fiber Options** – Select from different optical fiber options to match your needs. See specifications for more information.
- **Simplified implant** – NeuroNexus worked closely with labs to develop a low-risk implant procedure. Ask us for a demonstration video!

SPECIFICATIONS

oDrive-m:	
Drive Range	2.5 mm
Dimensions (W x L x H)	9.5 x 8 x 12 (mm)
Weight	0.65 g
oDrive-xL:	
Drive Range	7.0 mm
Dimensions (W x L x H)	9.5 x 8 x 18.5 (mm)
Weight	0.90g
Both:	
Drive Resolution	150 µm/turn
Drive Mechanism	Screw base
Optical Termination	1.25 mm ferrule
Fiber Options	50/62.5 µm, 0.22 50/85 µm, 0.22* 105/125 µm, 0.22 105/125 µm, 0.66

**Coupling loss of -3.2 dB/junction, measured with 105 µm patch cable*

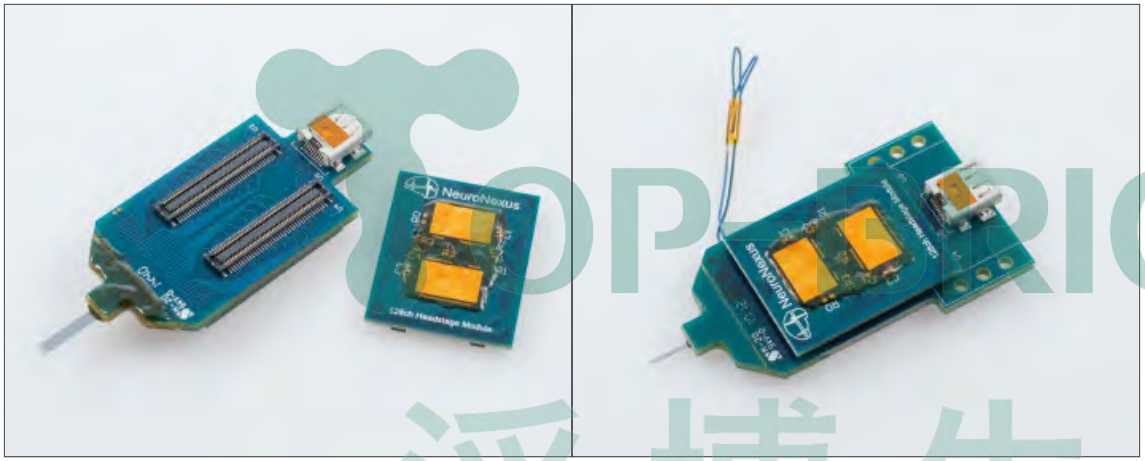
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SmartProbe™

MINIATURIZED HIGH CHANNEL COUNT PROBE
WITH ON-BOARD DIGITIZATION

BACK TO INDEX



SmartProbe™ enables high channel count electrophysiology with on-board electronics.

- **Integrated headstage and accelerometer** – Neural signals are digitized at the implant site, reducing noise from connectors and movement.
- **Modular components** – The SmartProbe™ utilizes modular headstage boards. Remove the headstage components after your experiment for use with the next probe, and save money in the long run.
- **Reduced strain** – A low connection force using the micro HDMI connector means daily connections can take place more reliably.

DATA ACQUISITION AND CONTROL SYSTEMS

The SmartProbe™ requires a control and acquisition system such as the SmartBox™, or any Intan-compatible system.

Alternatively, conventional probes can be connected to the SmartBox™ with SmartLink headstages.

ARRAY DESIGNS

The SmartProbe™ can be configured with any A-type NeuroNexus electrode array.

Turn to the **Electrode Array Designs** section to review available designs, or **contact us** to design your own electrode array.

SPECIFICATIONS

Channel Count	128, 256
A/D Converter	16-bit ADC
Sampling Rate	Up to 30 kSamples/s
Signal Bandwidth	0.1-100 Hz 0.25 - 7.5 kHz
Electrode Array Length	2 - 10 mm (varies by design)
Electrode Array Thickness	15 µm or 50 µm (varies by design)
Electrode Site Material	Iridium (standard), Platinum (custom), Gold (custom)
Available Packages	S128, H128, S256, H256

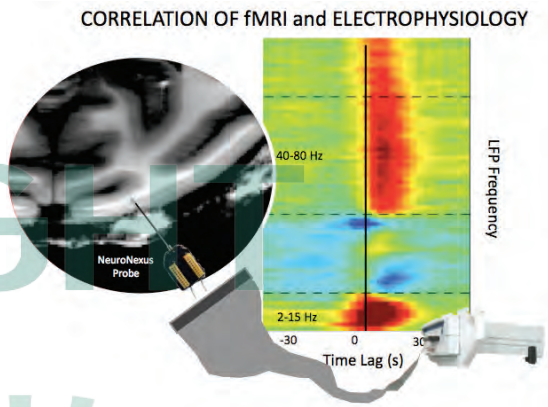
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MR-Compatible

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When configured with the MR-Series Package, NeuroNexus probes include only trace amounts of ferromagnetic material and cause minimal or no distortion during typical MR imaging. Most of our Omnetics connector-based packages can be made MR compatible. Please contact us for details.

Above, Left: *MR-Compatible probes use special Omnetics connectors, marked "NI FR."*
Above, Right: *The Matrix Array can be made MR-Compatible for chronic MRI applications in small and large animals..*

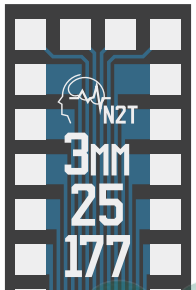
SPECIFICATIONS

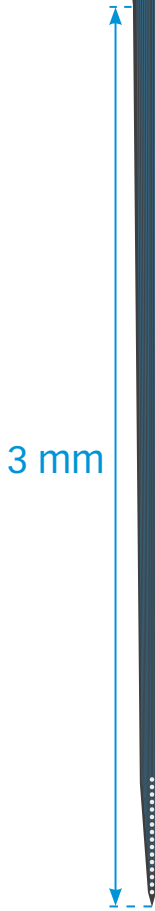
Electrode Site Material	Iridium (standard), Platinum (custom), Gold (custom)
Electrode Thickness	15 µm or 50 µm (varies by design)
Electrode Length	2 - 15 mm (varies by design)
Channel Count	16, 32, 64 (varies by design)
Packages	MR_A16, MR_CM16, MR_CM32, MR_HC16, MR_HC32, MR_HC64, Matrix Array

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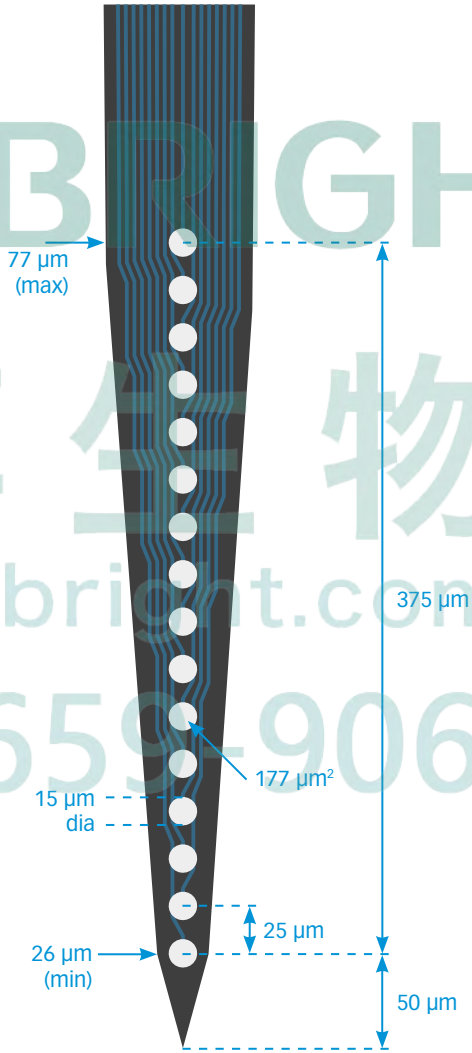
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A1x16-3mm-25-177





TIP DETAIL



available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

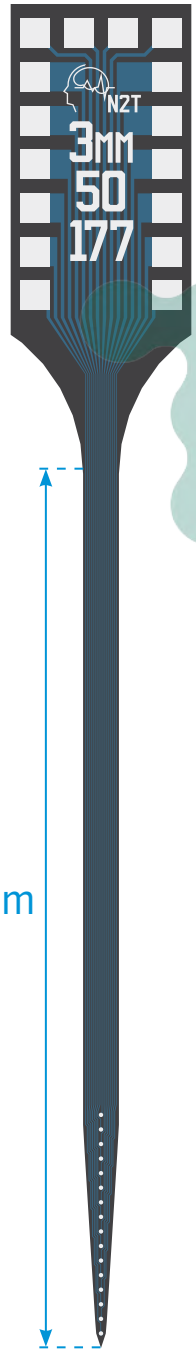
thickness

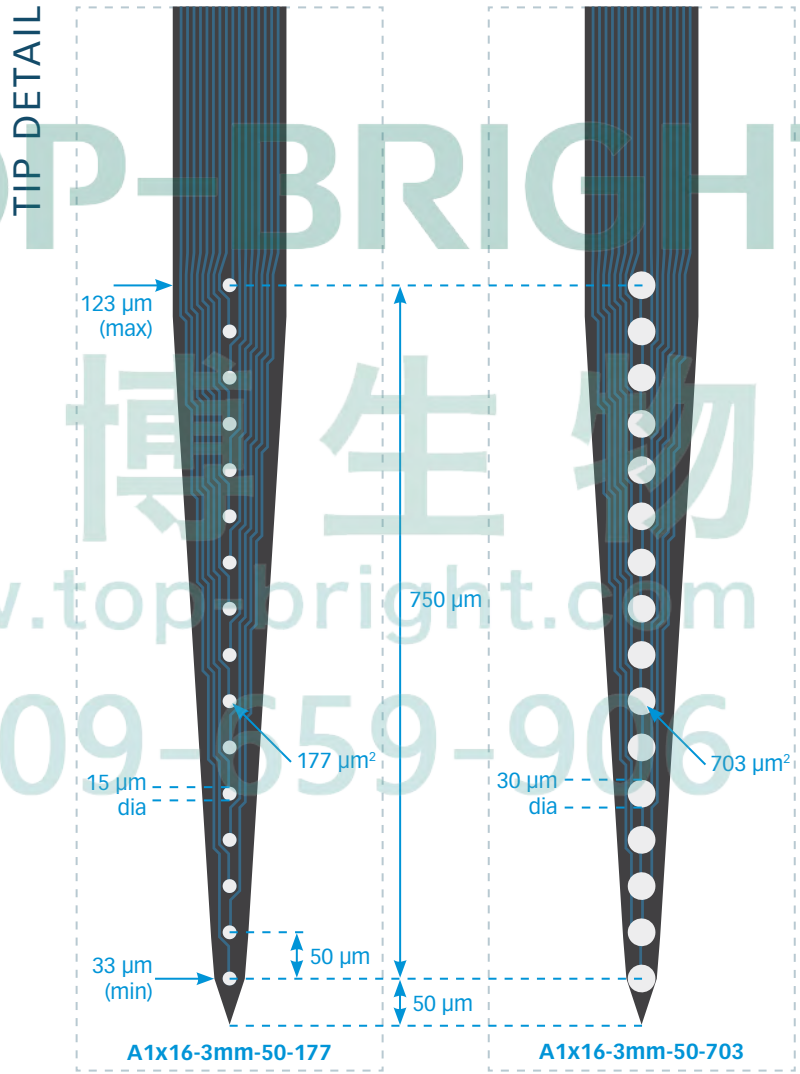
15 µm

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A1x16-3mm-50-177
A1x16-3mm-50-703





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

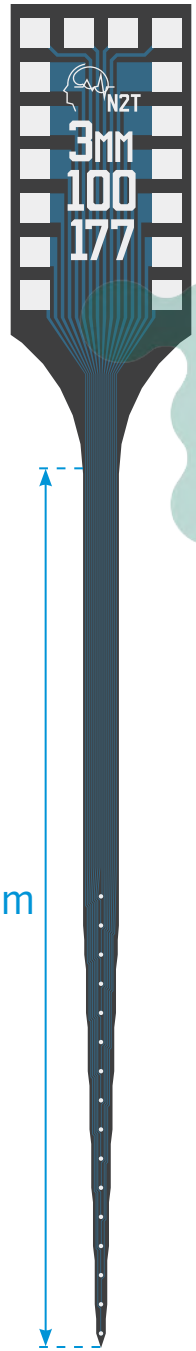
thickness

15 µm

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A1x16-3mm-100-177
A1x16-3mm-100-703





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

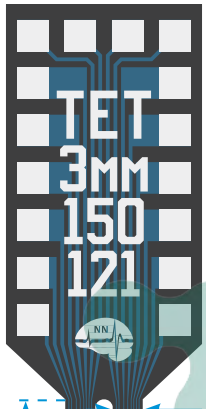
thickness

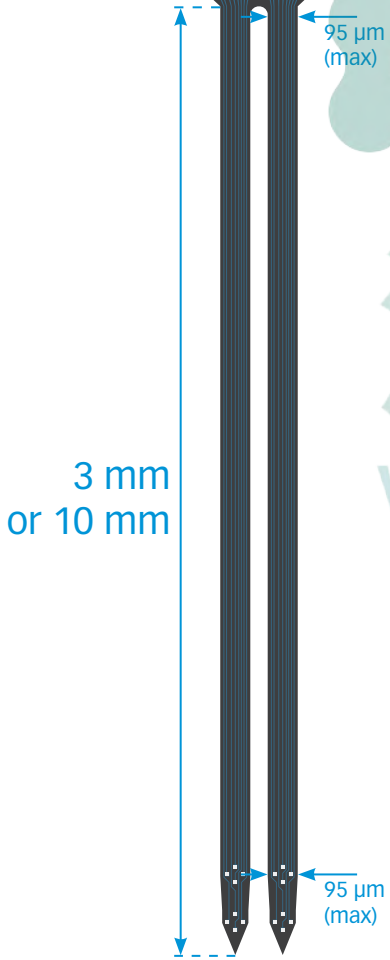
15 µm

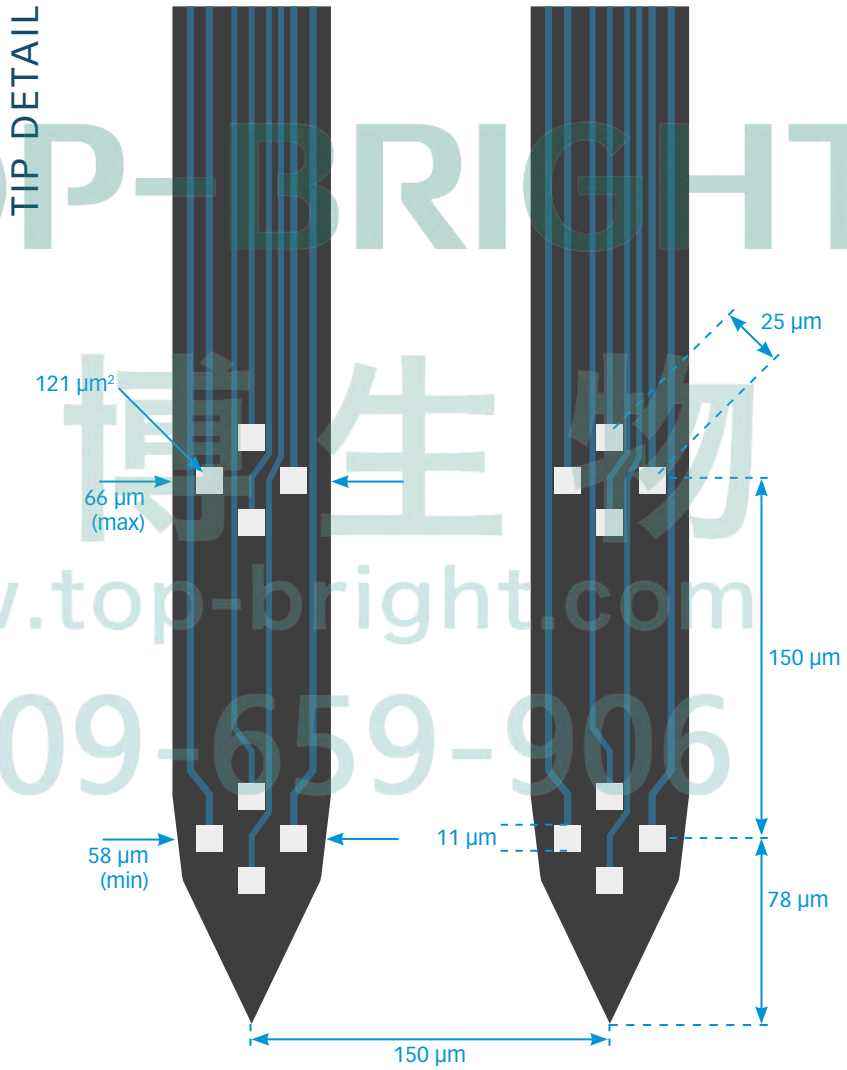
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A2x2-tet-3mm-150-150-121







available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

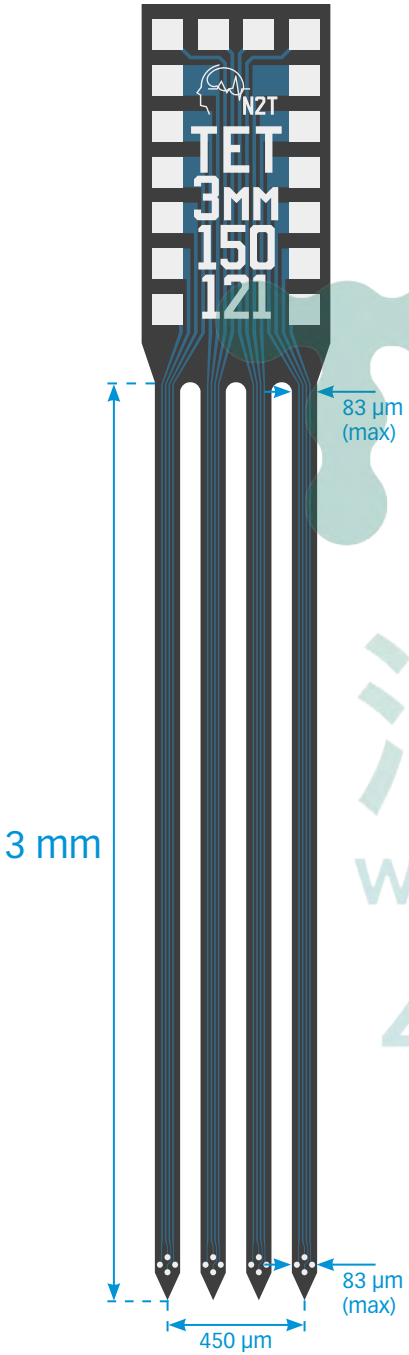
thickness

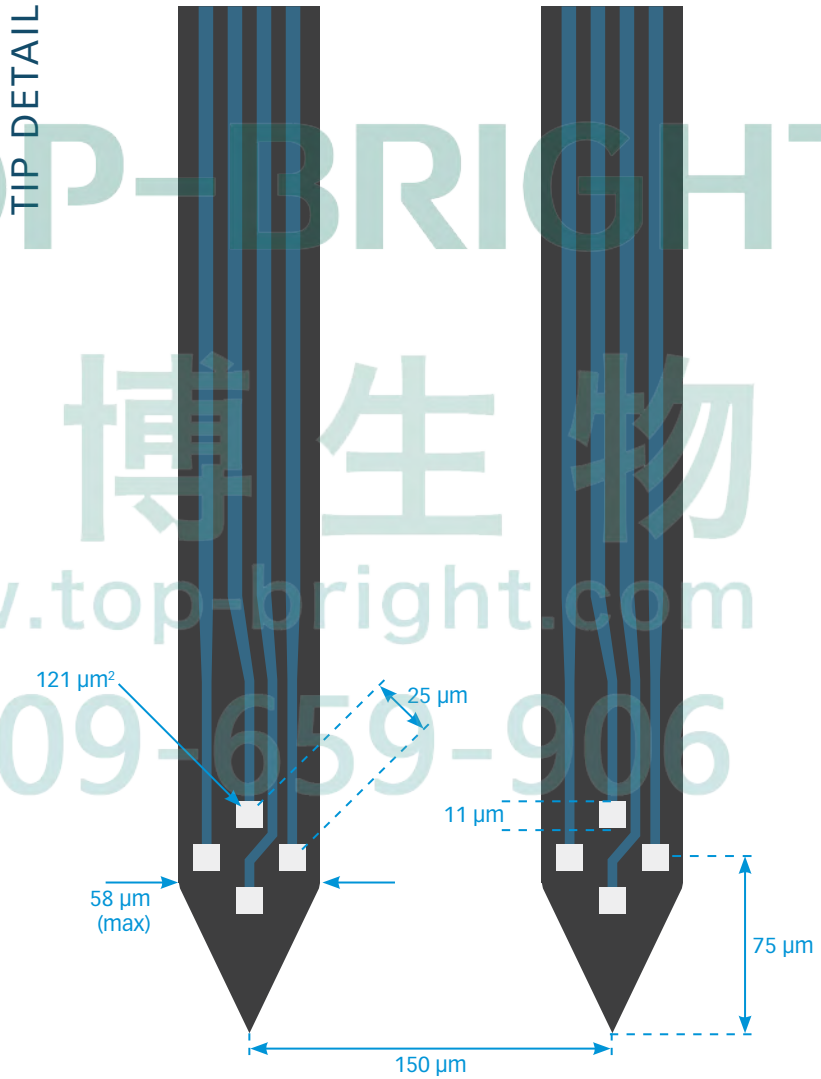
15 µm (3 mm only)
50 µm (10 mm only)

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A4x1-tet-3mm-150-121
A2x2-tet-10mm-150-150-121





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

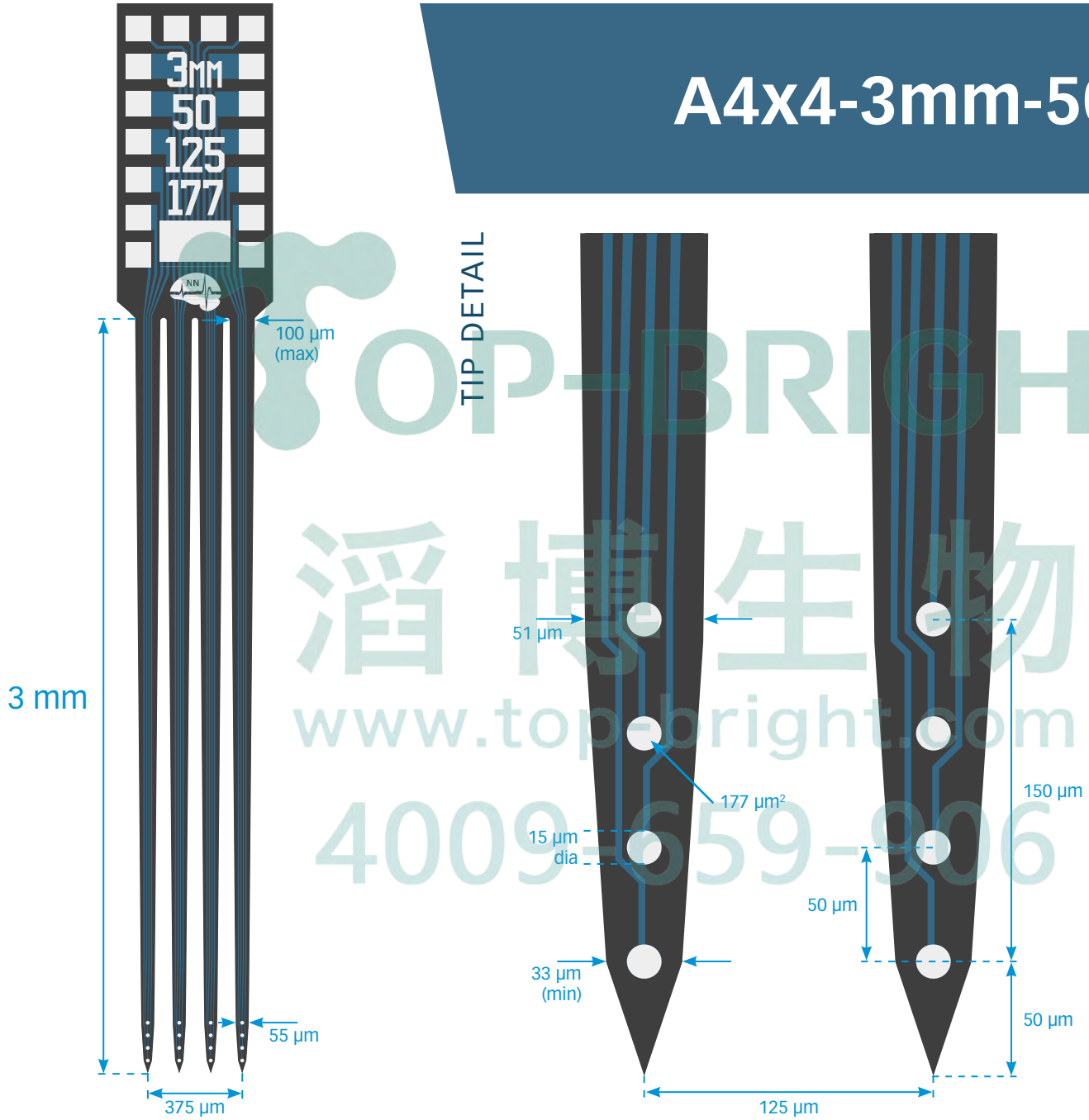
thickness

15 µm

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A4x4-3mm-50-125-177



available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

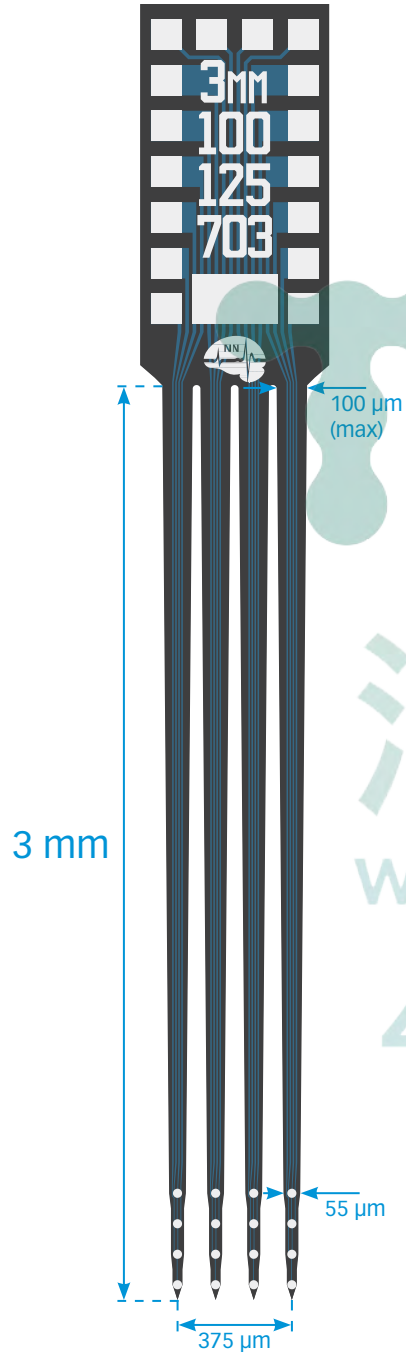
thickness

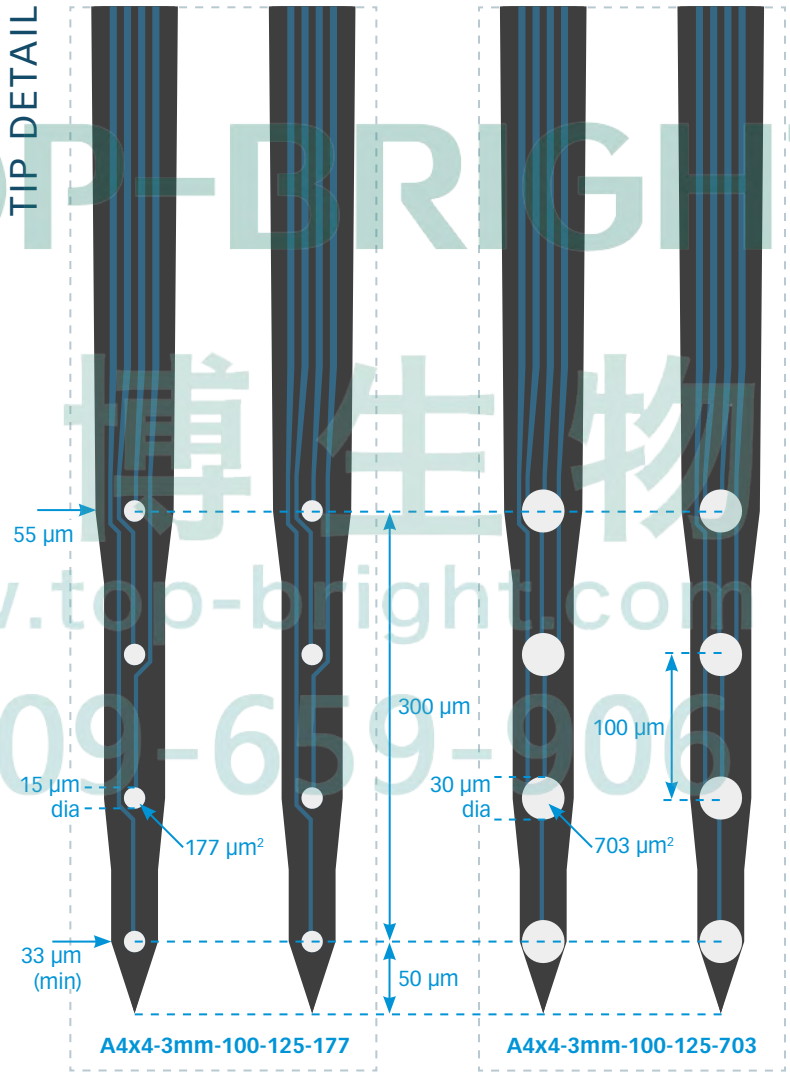
15 µm

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A4x4-3mm-100-125-177
A4x4-3mm-100-125-703





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

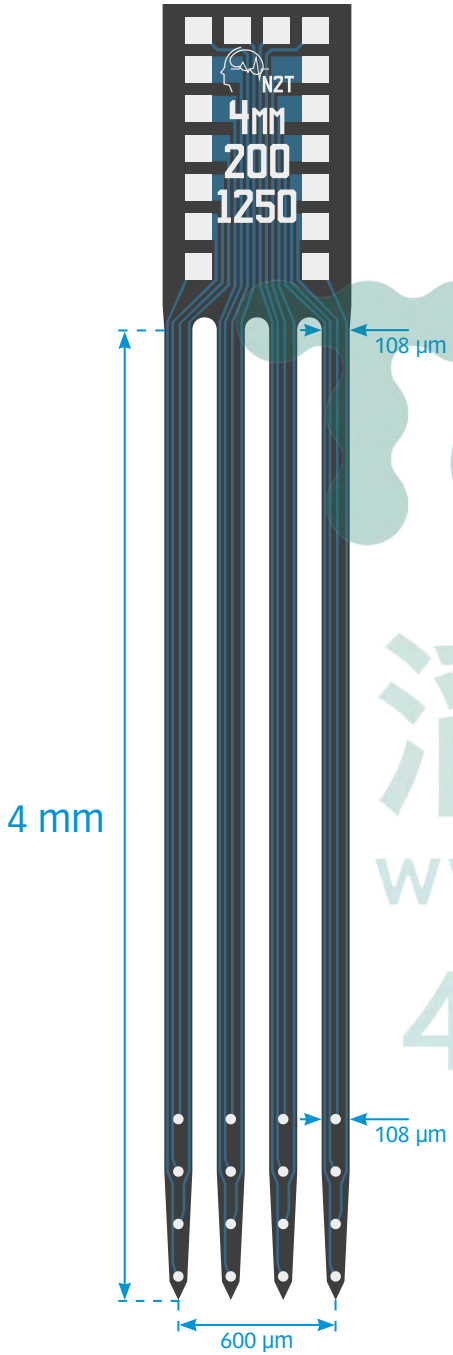
thickness

15 µm

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A4x4-4mm-200-200-1250





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

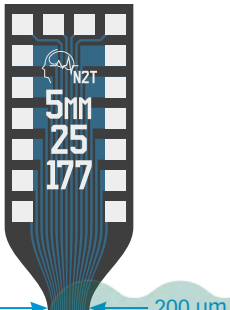
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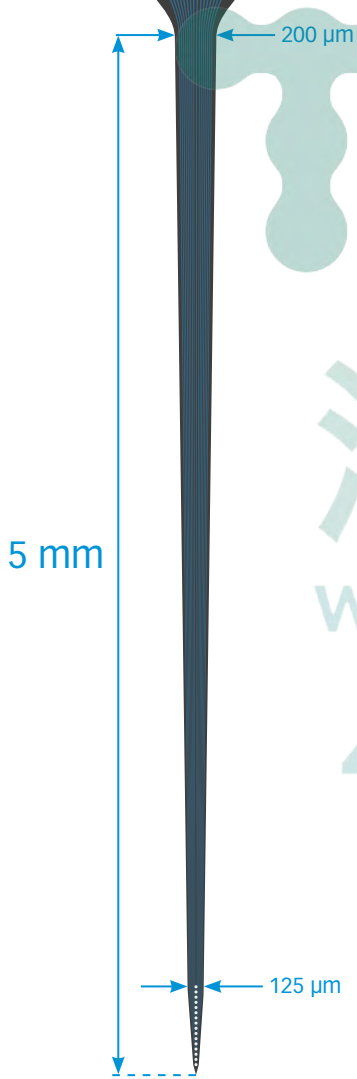
15 µm

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A1x16-5mm-25-177





TIP DETAIL



available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

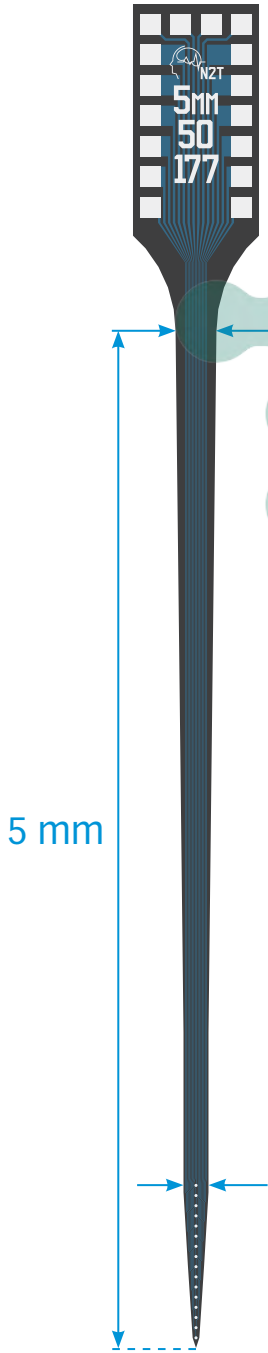
thickness

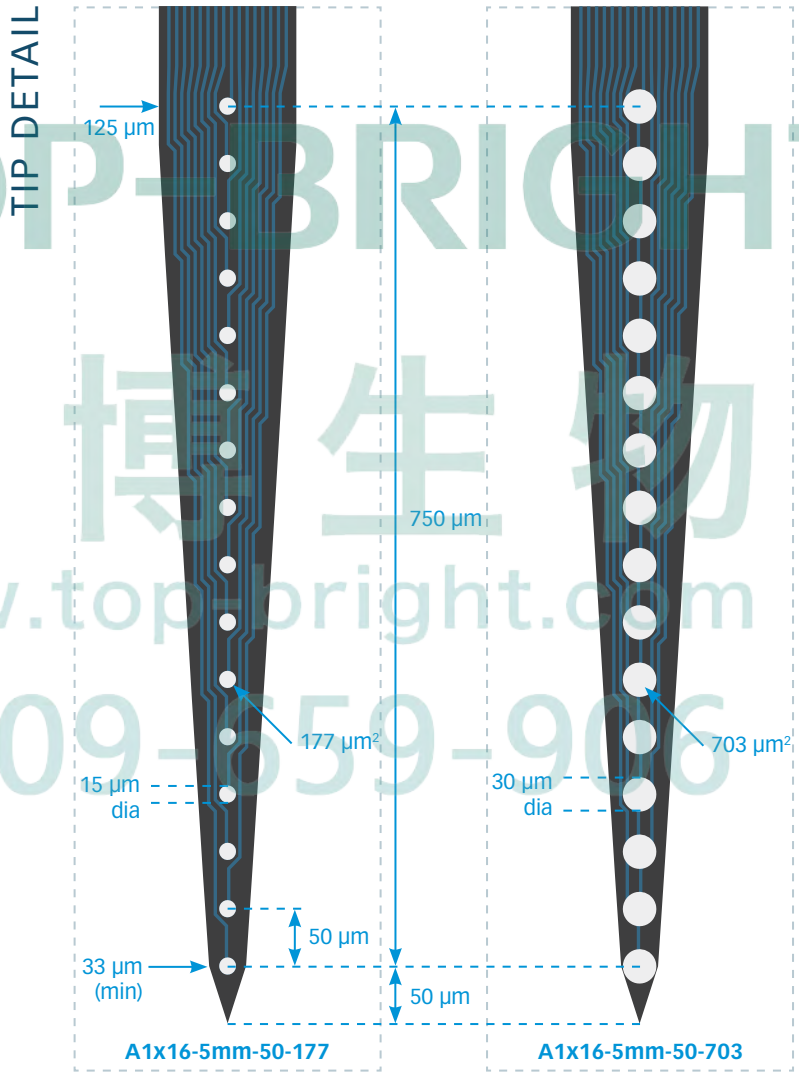
15 µm

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A1x16-5mm-50-177
A1x16-5mm-50-703





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

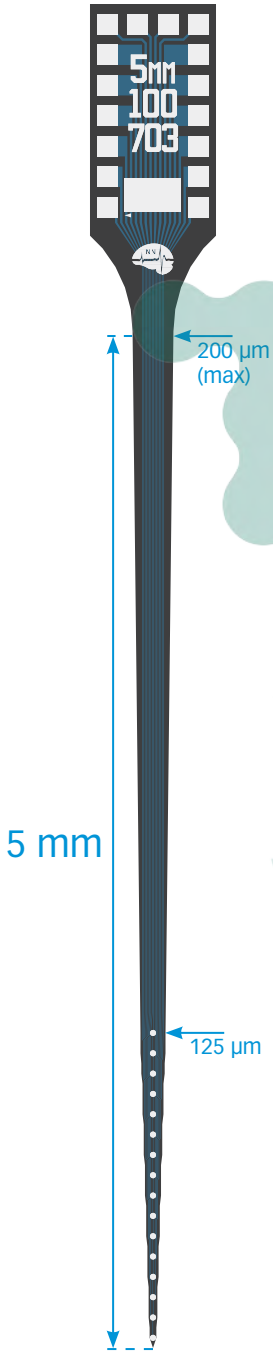
thickness

15 µm
50 µm

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A1x16-5mm-100-177
A1x16-5mm-100-703





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

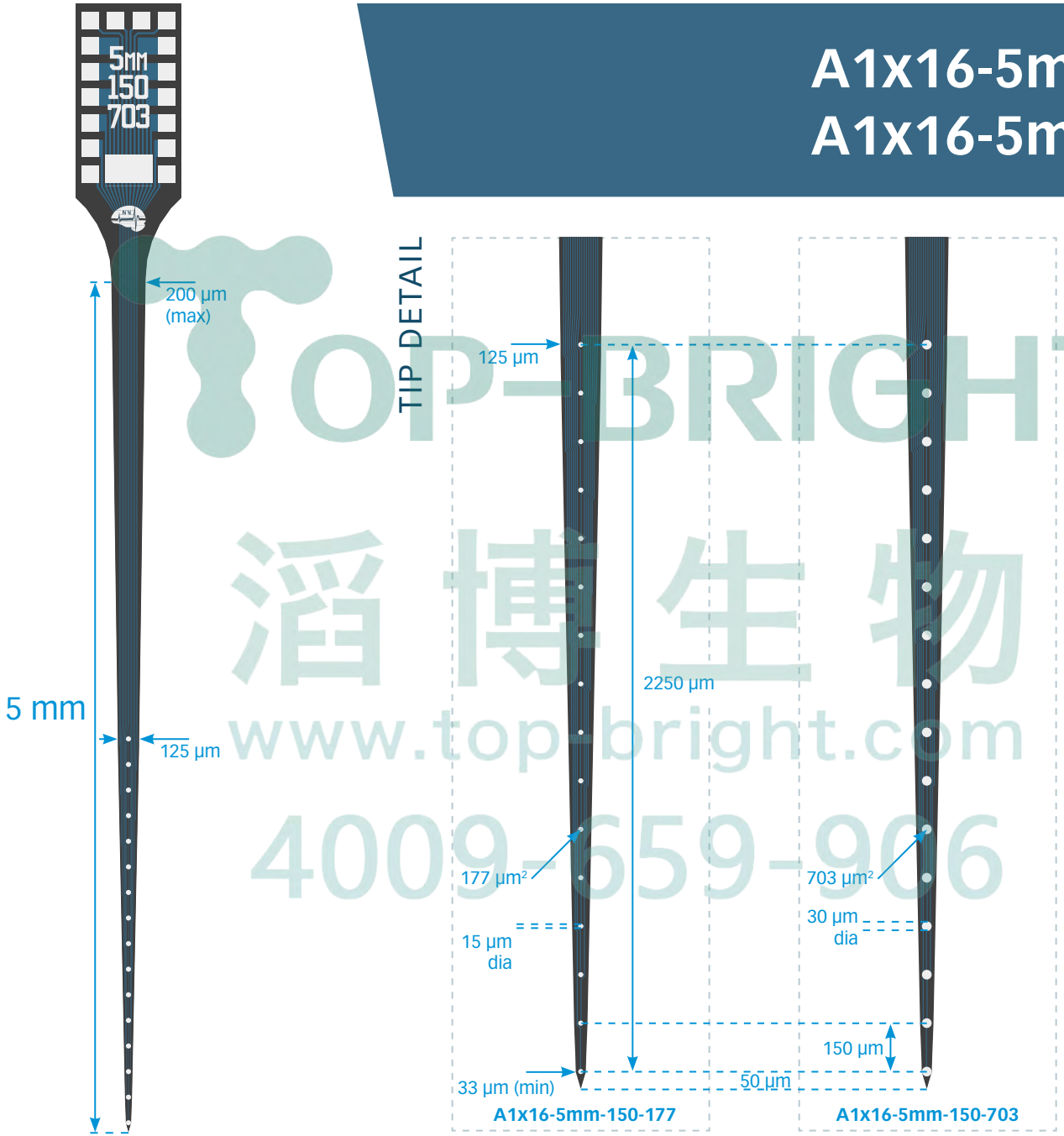
thickness

15 µm
50 µm

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A1x16-5mm-150-177
A1x16-5mm-150-703



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available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

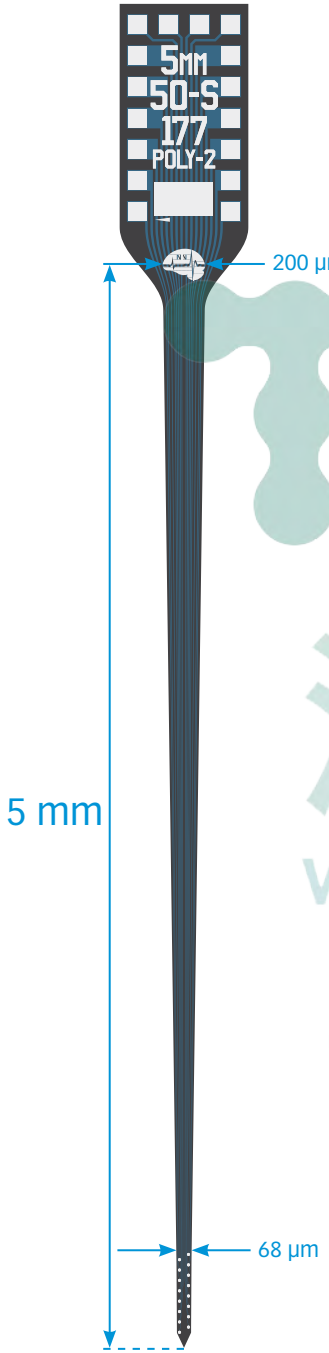
MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

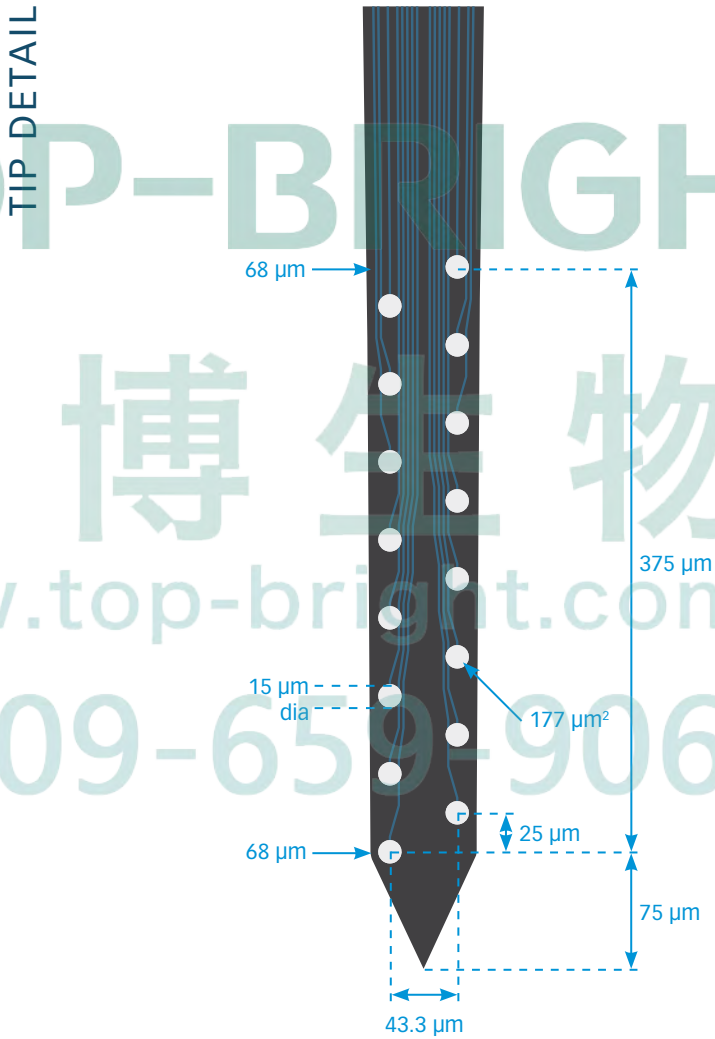
thickness

15 µm

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A1x16-Poly2-5mm-50s-177





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

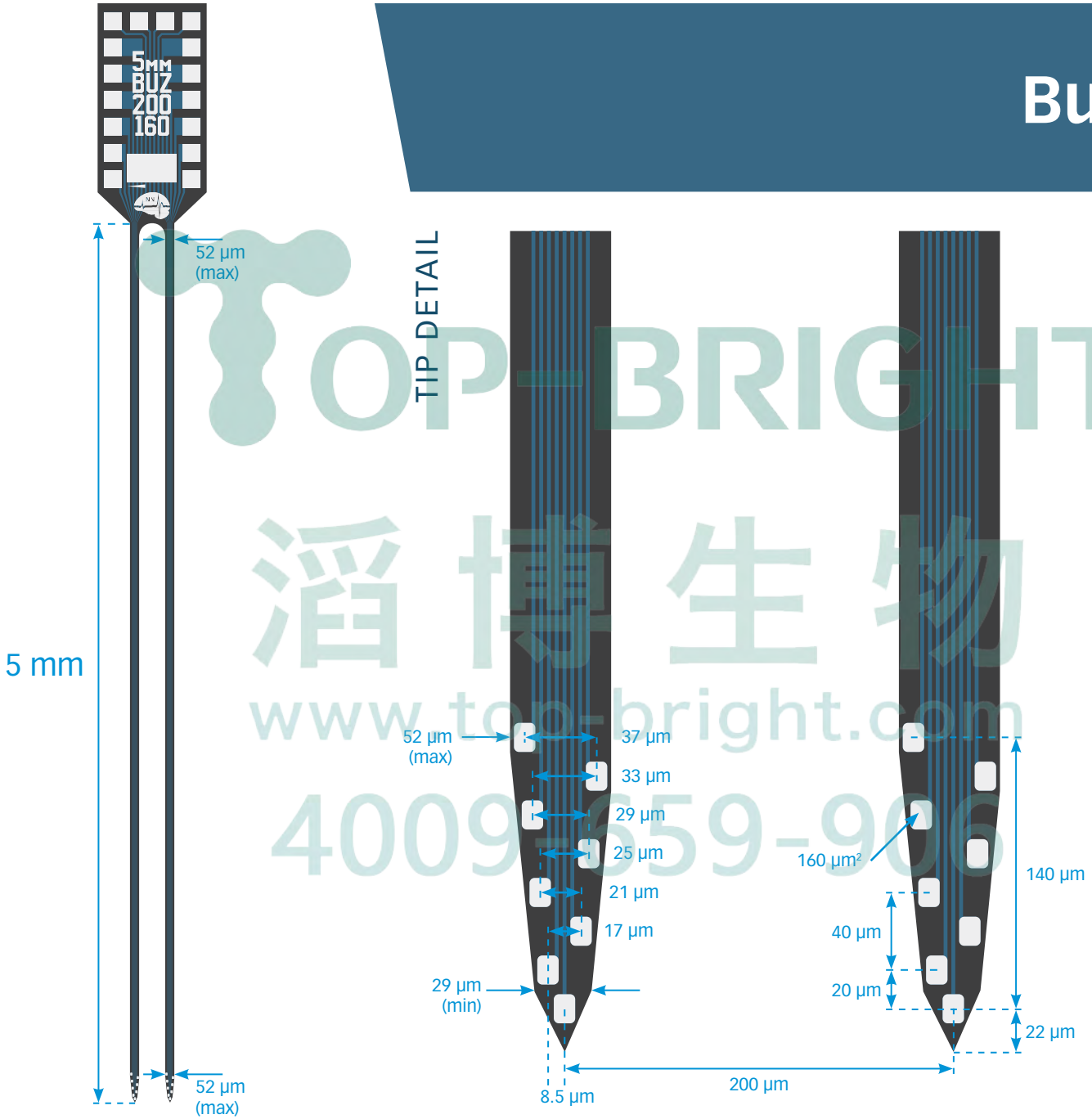
thickness

15 µm

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Buzsaki16



available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

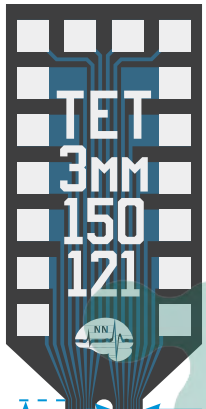
thickness

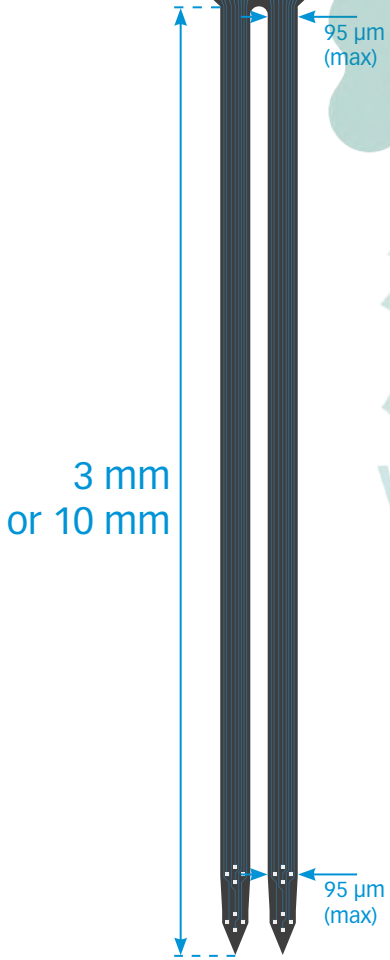
15 µm

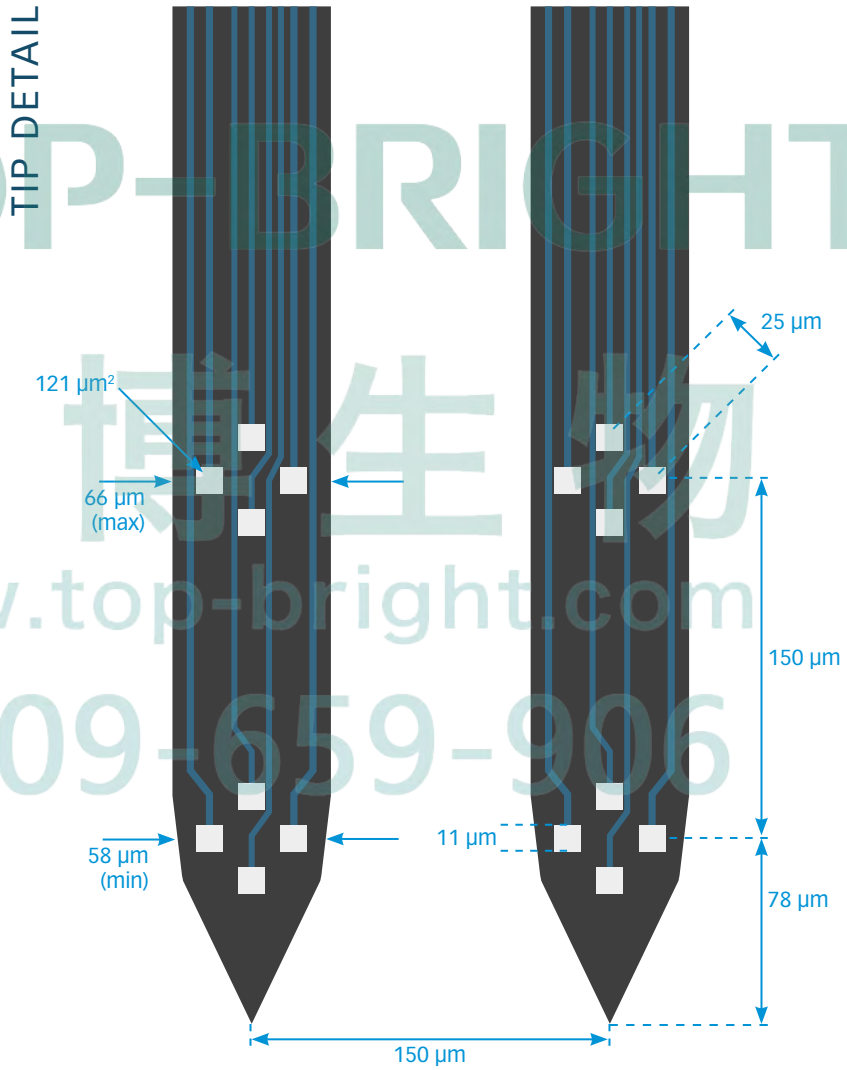
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A2x2-tet-3mm-150-150-121
A2x2-tet-10mm-150-150-121







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available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

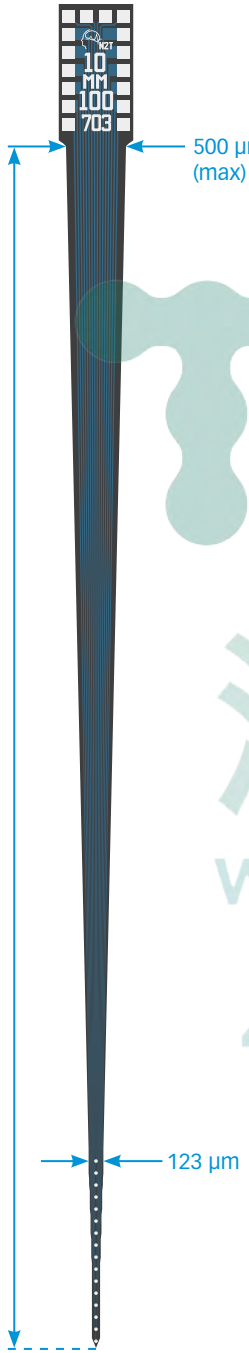
MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

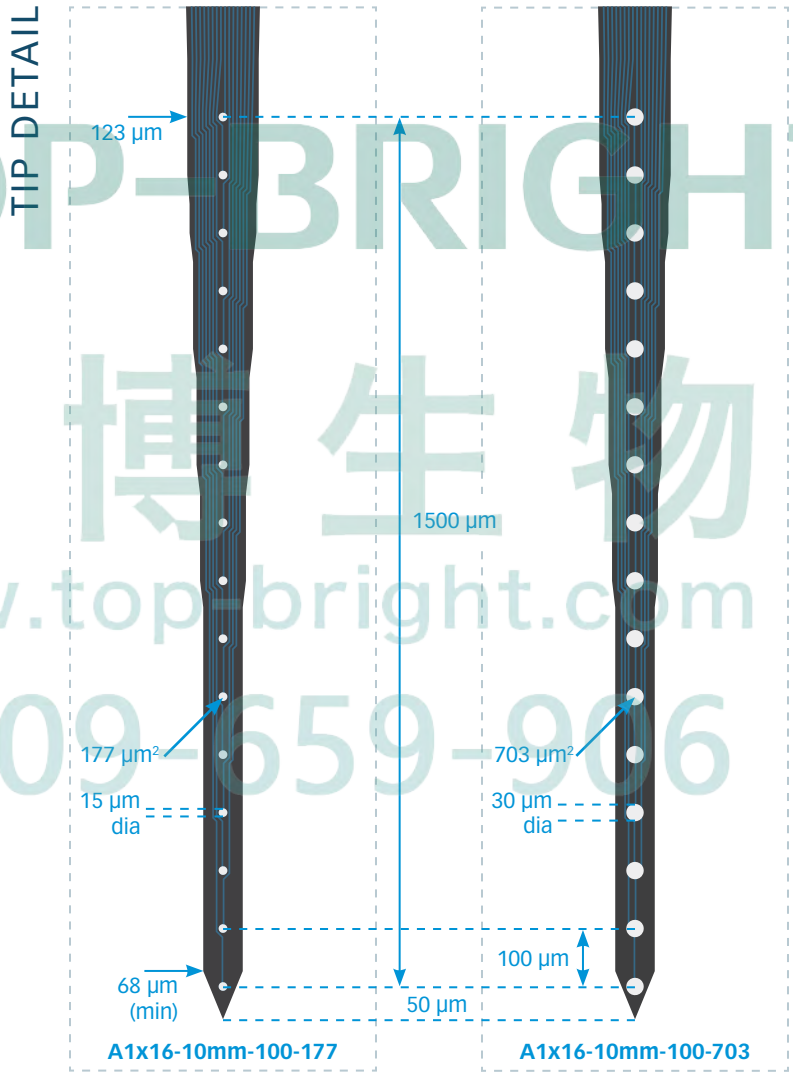
thickness

15 µm (3 mm only)
50 µm (10 mm only)

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A1x16-10mm-100-177
A1x16-10mm-100-703





available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
HC16_21mm
HZ16_21mm
Z16

OPTOGENETICS
OA16LP
OCM16LP
OH16LP (required for oDrive)
OZ16LP

MR-COMPATIBLE
MR_CM16
MR_H16_21mm
MR_HC16_21mm

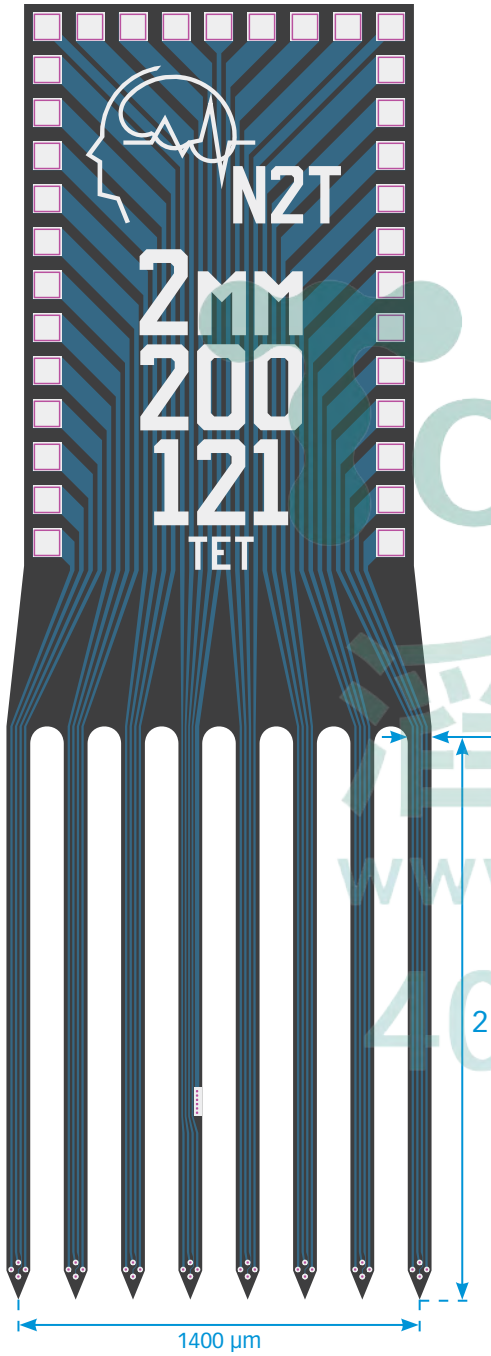
thickness

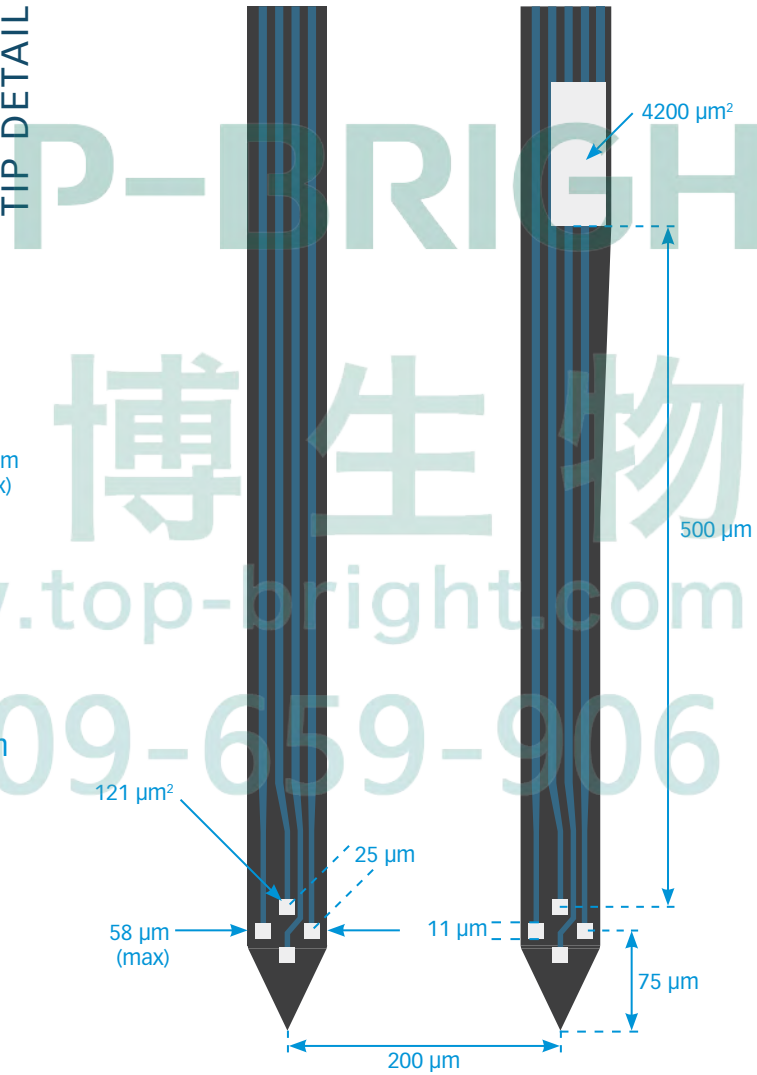
50 µm

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A8x1-tet-2mm-200-121





available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

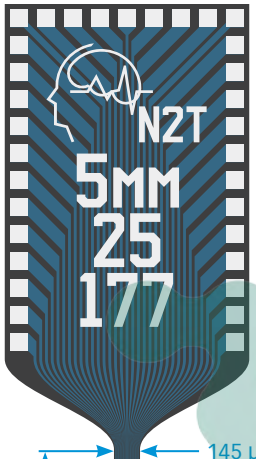
thickness

15 µm

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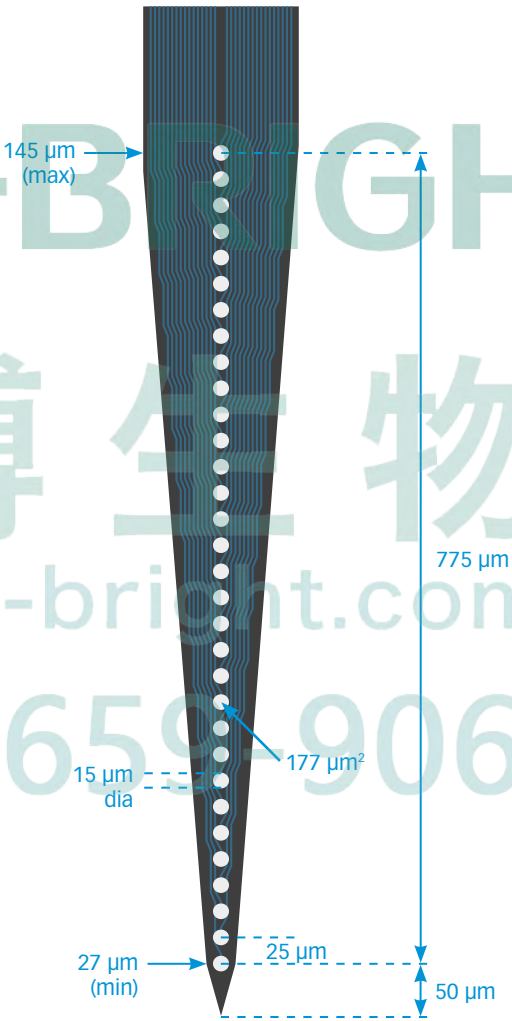
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A1x32-5mm-25-177





TIP DETAIL



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

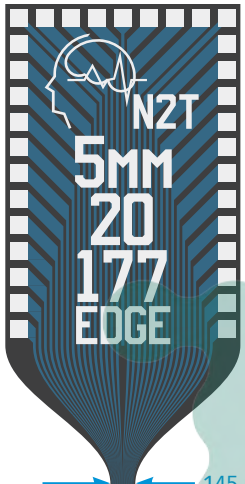
thickness

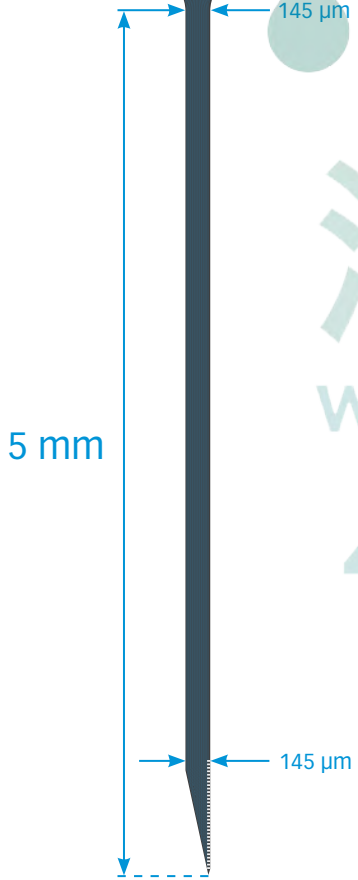
15 µm

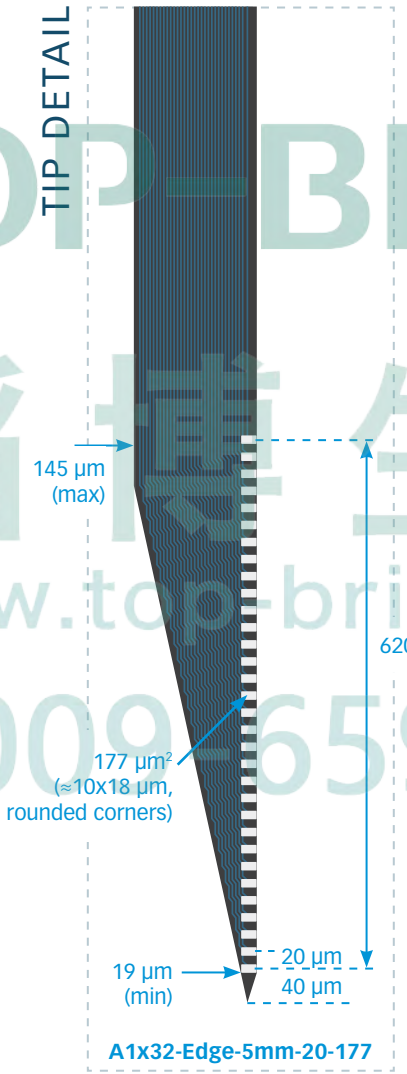
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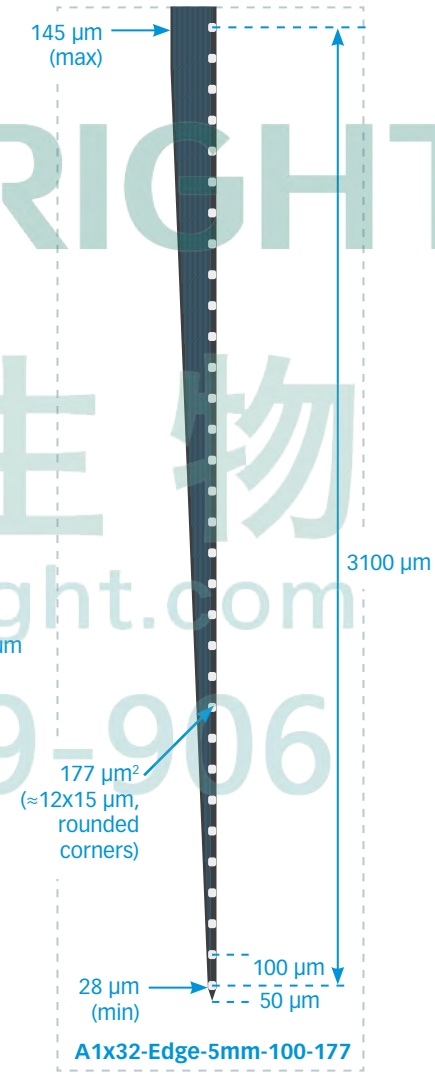
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A1x32-Edge-5mm-20-177
A1x32-Edge-5mm-100-177









available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

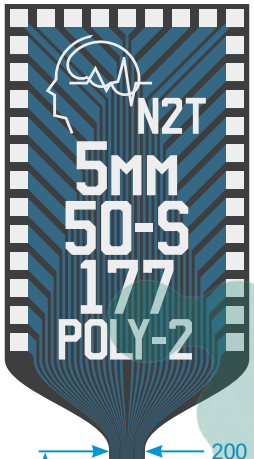
thickness

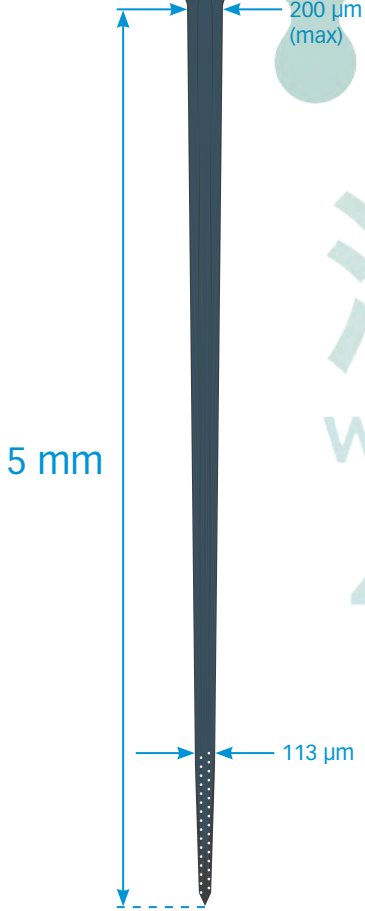
15 µm

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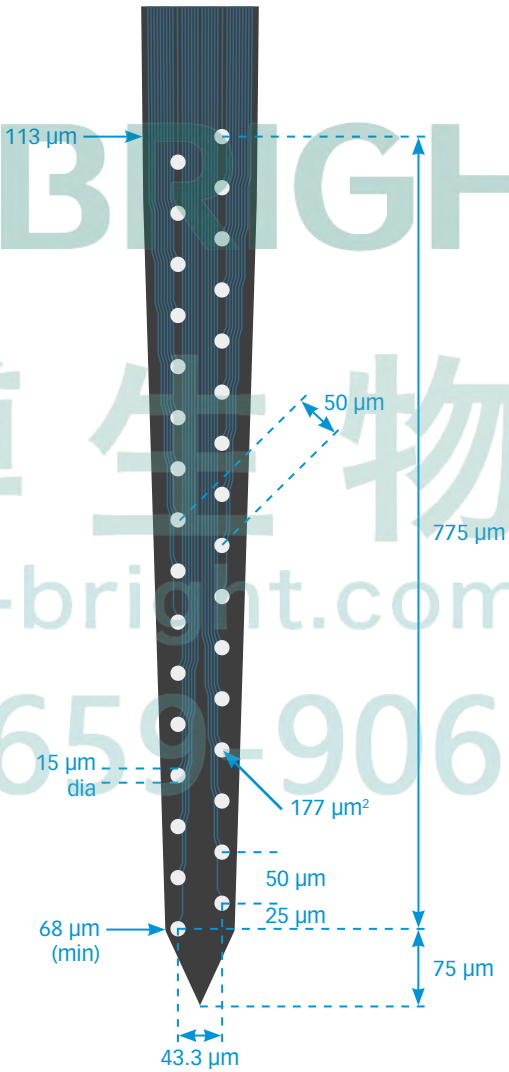
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A1x32-Poly2-5mm-50s-177





TIP DETAIL



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

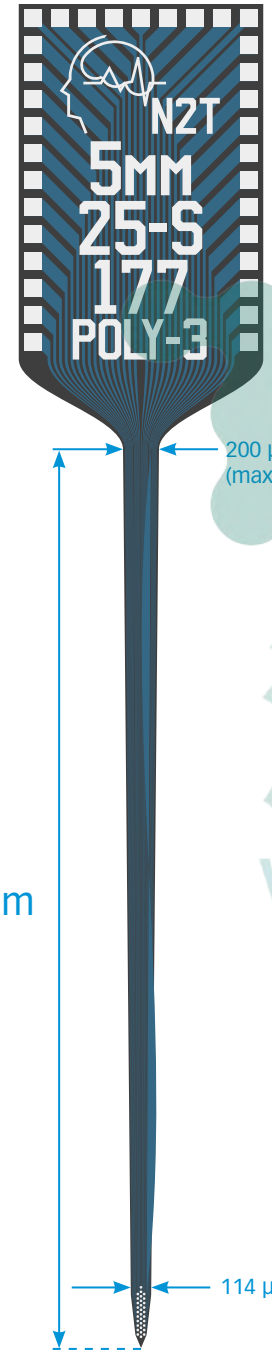
thickness

15 µm

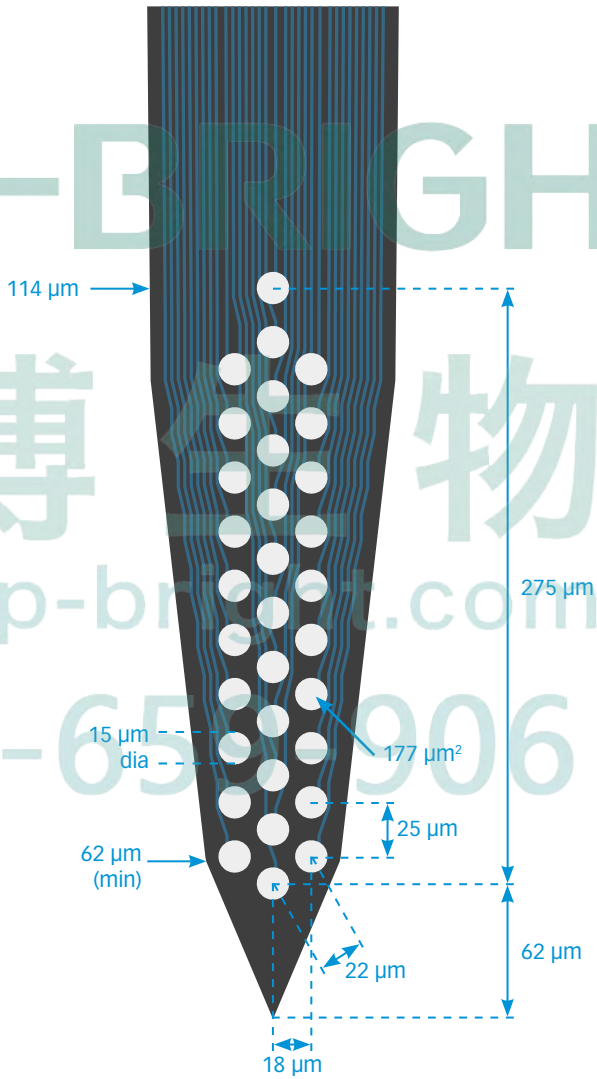
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A1x32-Poly3-5mm-25s-177



TIP DETAIL



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

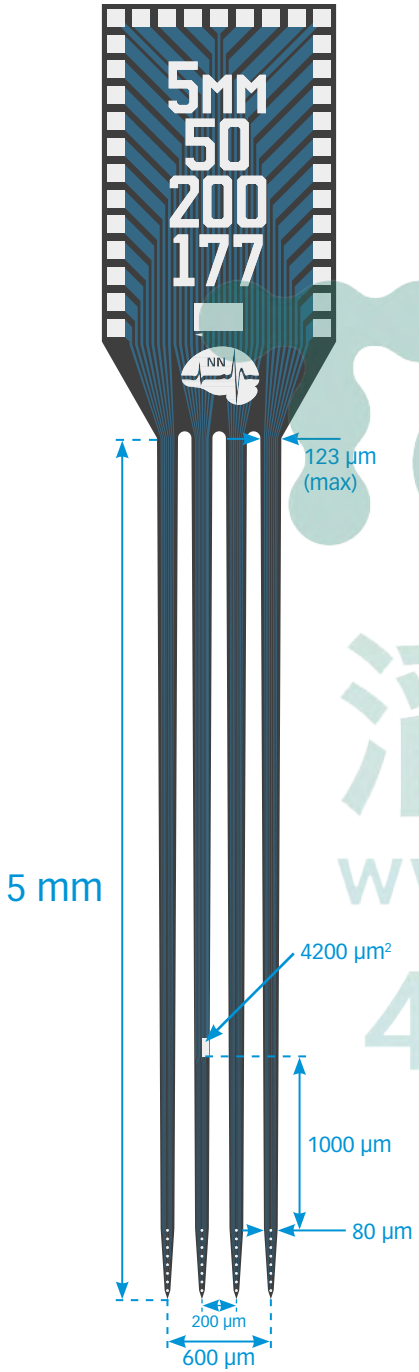
thickness

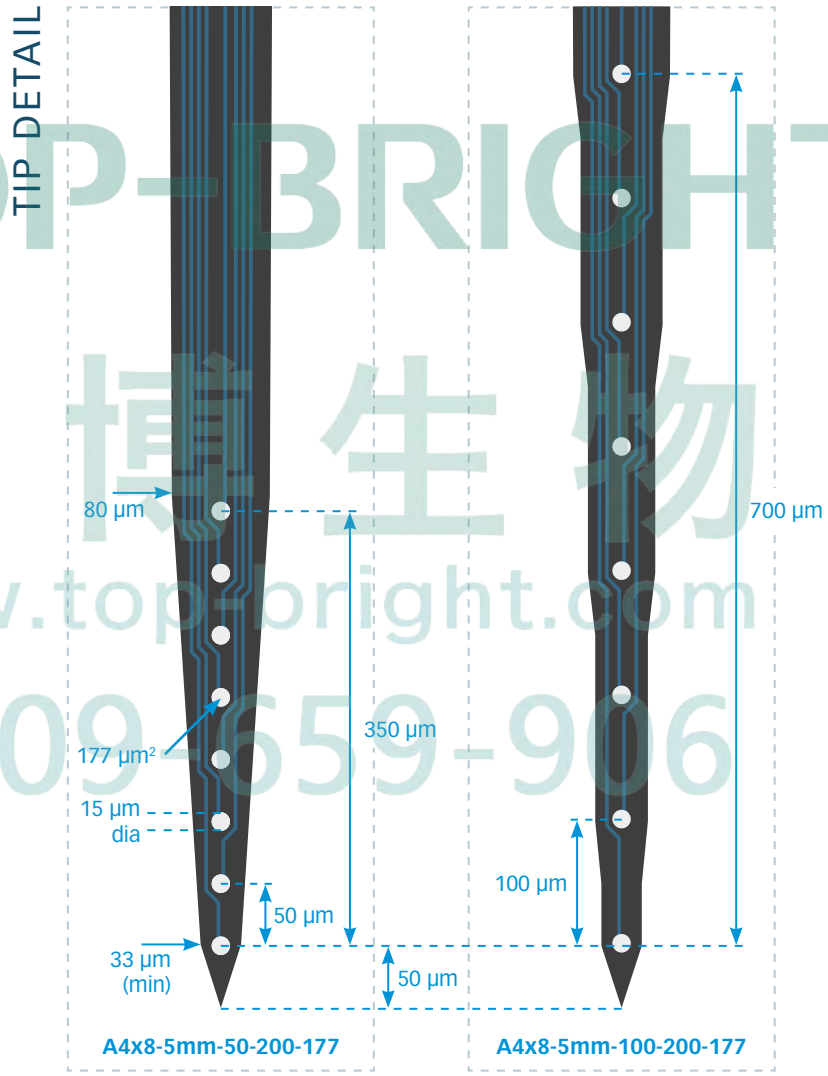
15 µm

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A4x8-5mm-50-200-177
A4x8-5mm-100-200-177





available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

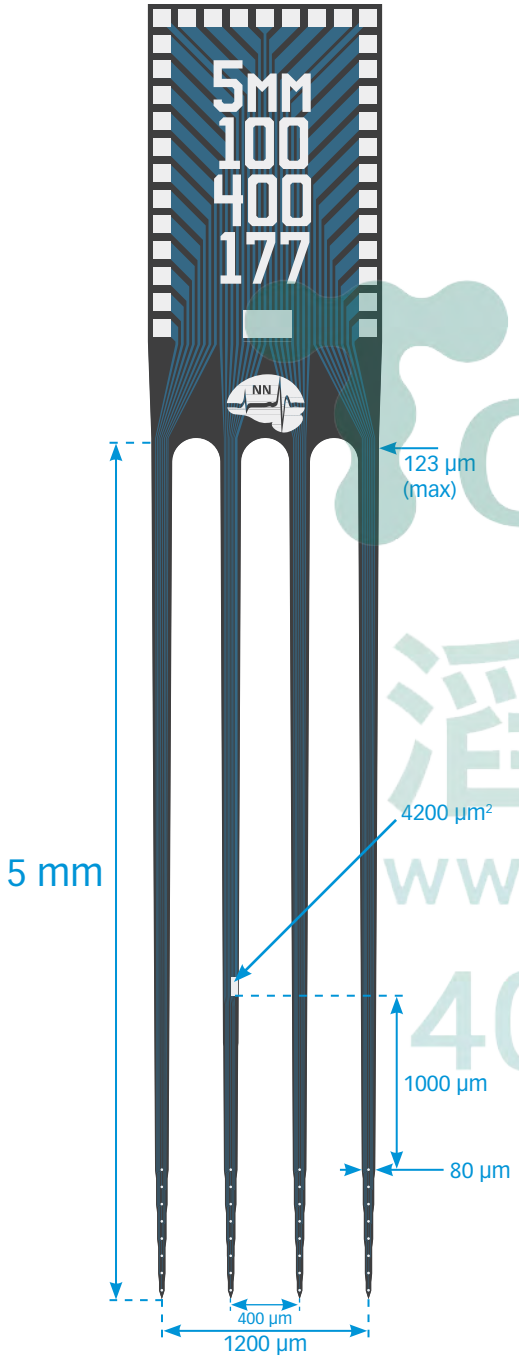
thickness

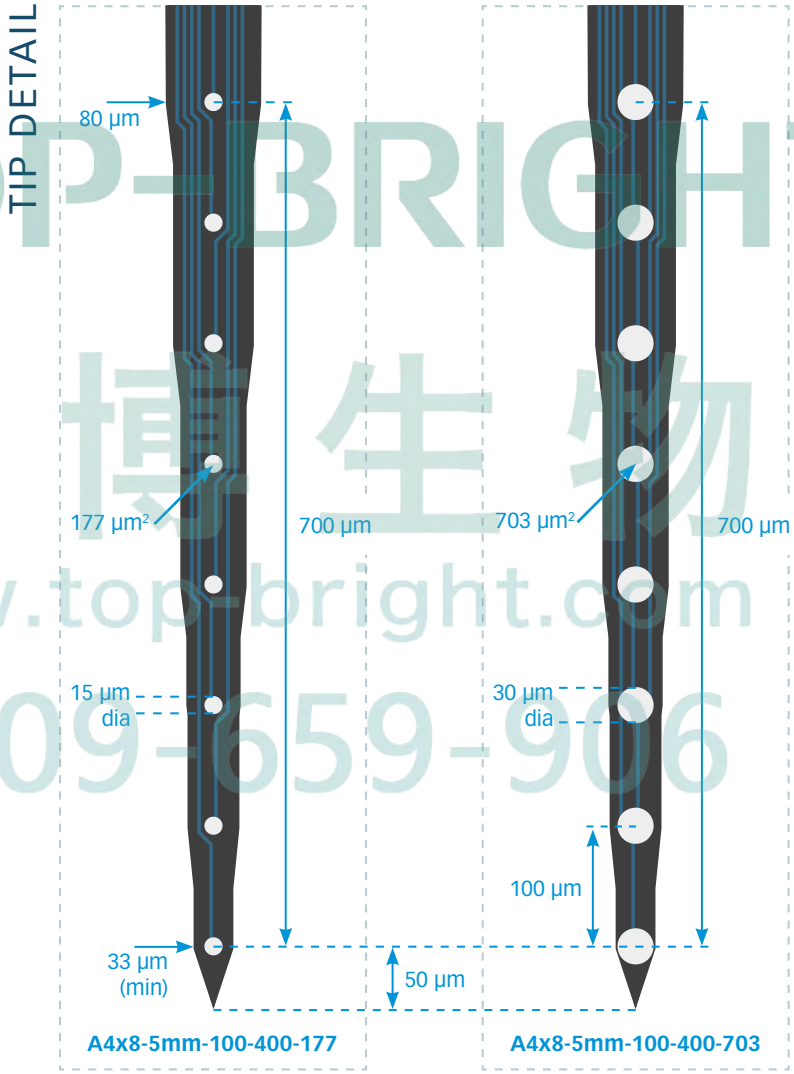
15 µm

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A4x8-5mm-100-400-177
A4x8-5mm-100-400-703





available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

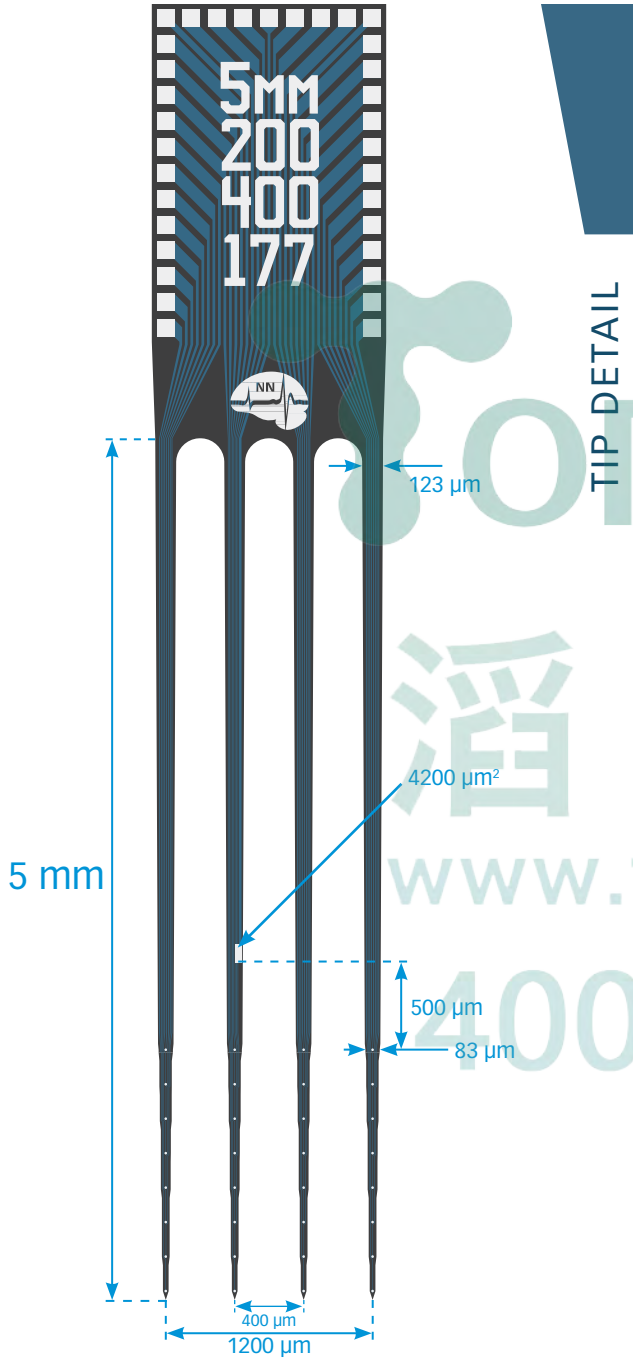
thickness

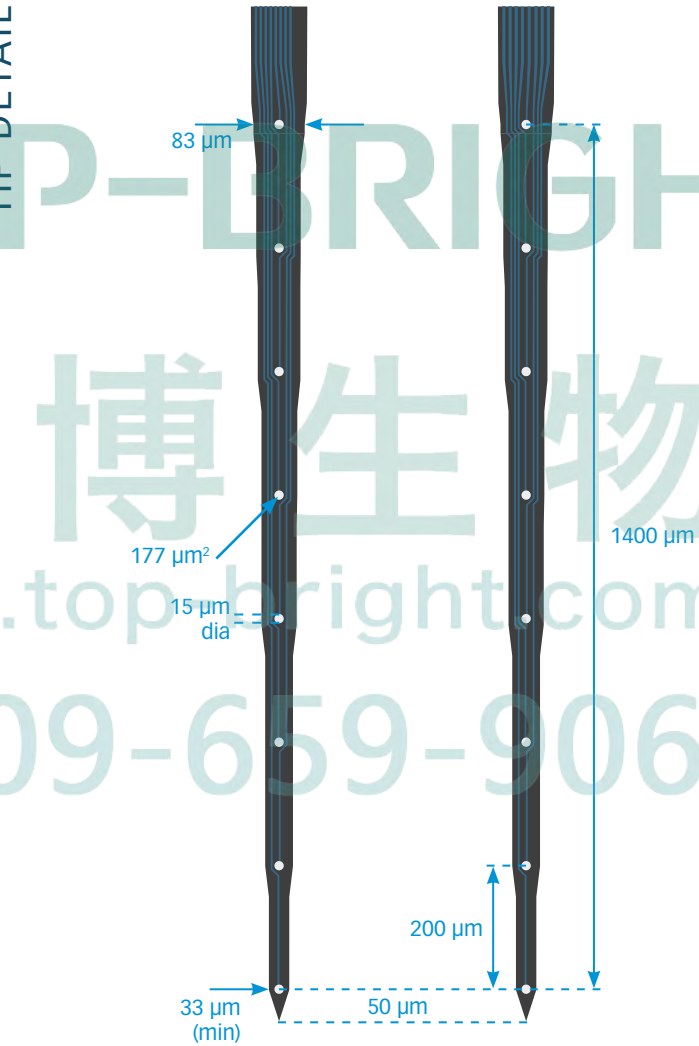
15 µm

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A4x8-5mm-200-400-177
A4x8-5mm-200-400-703





available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

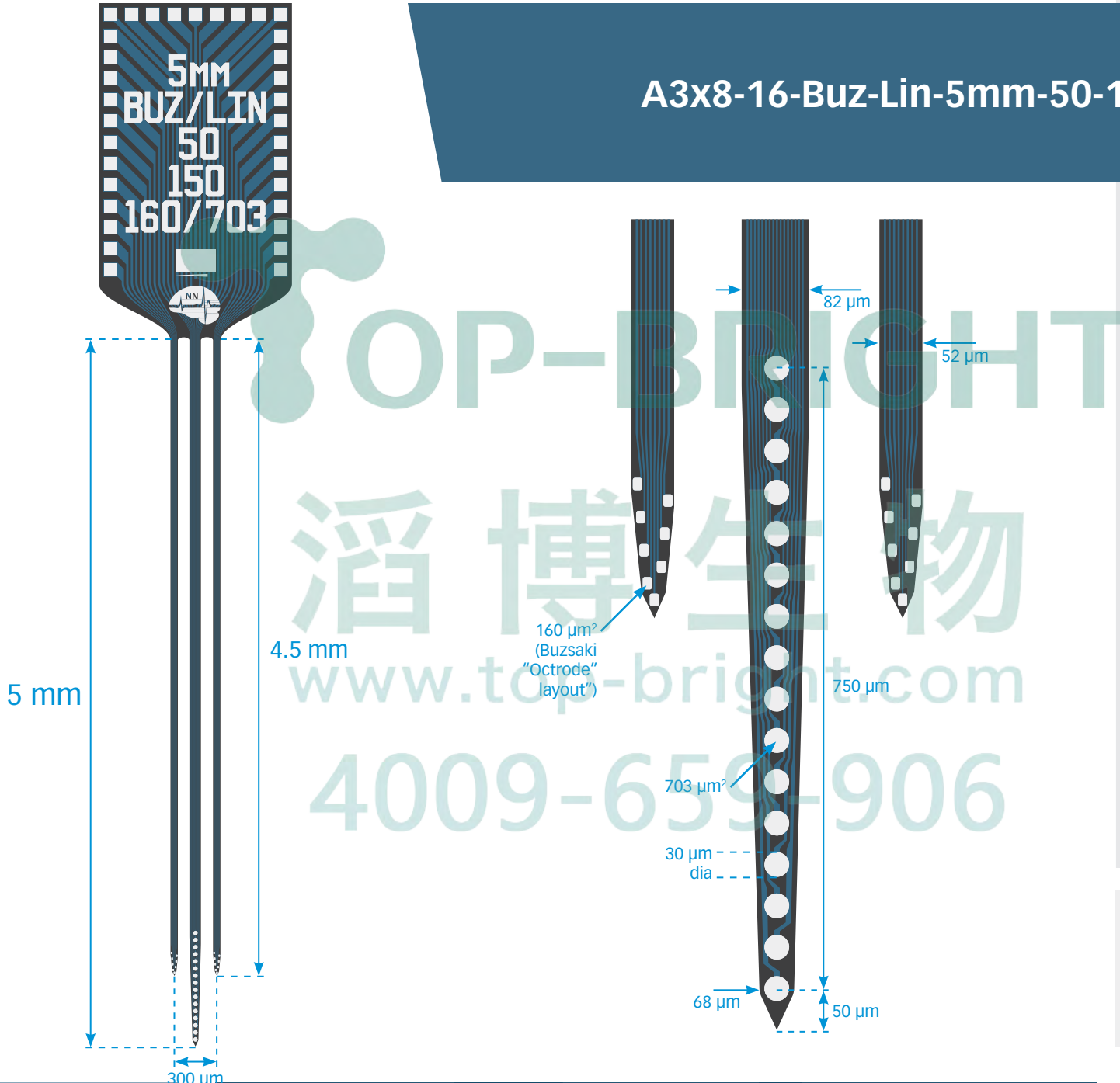
thickness

15 µm

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A3x8-16-Buz-Lin-5mm-50-150-160-703



TOP-BRIGHT
滔博生物
www.top-bright.com
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available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

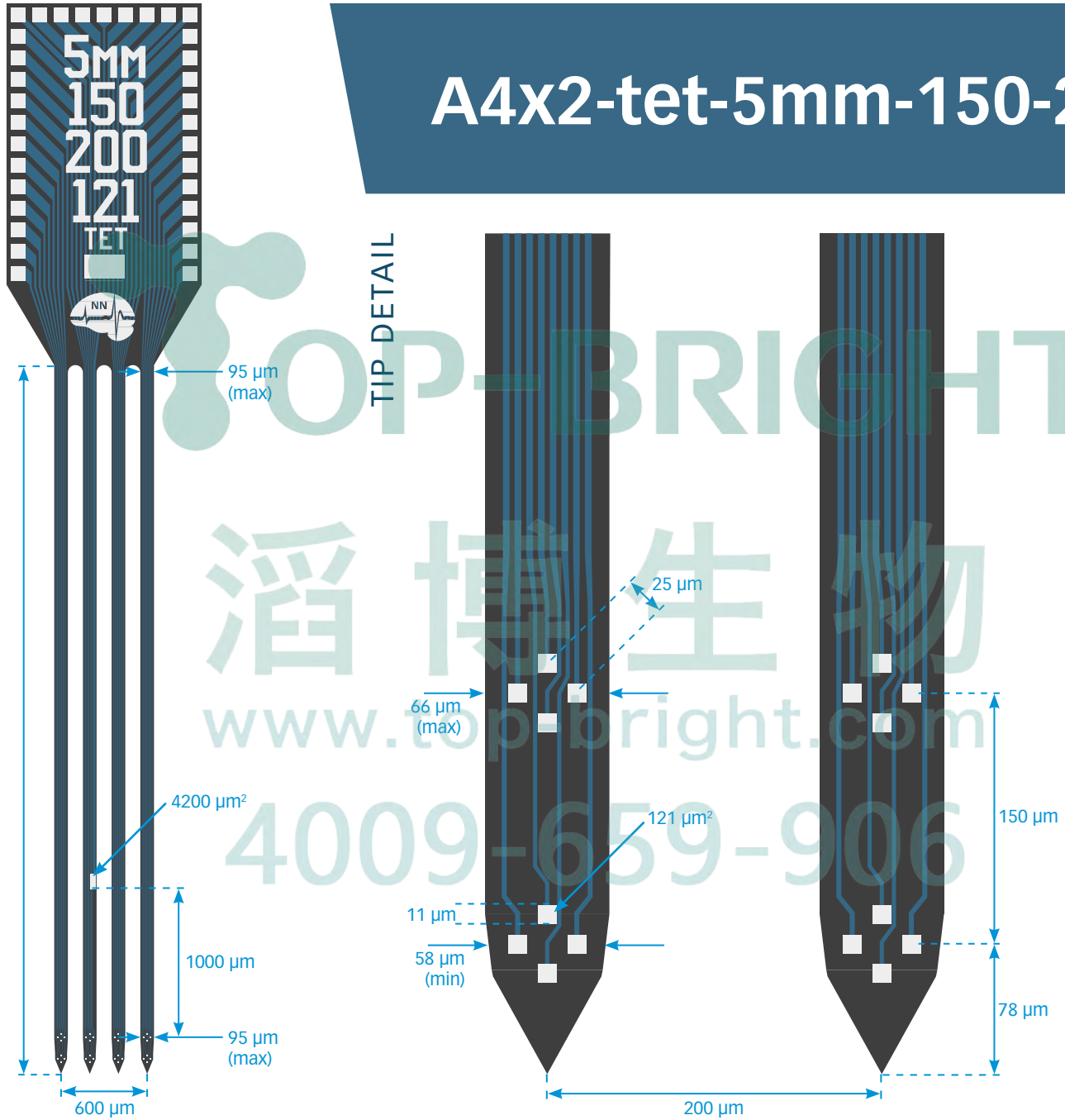
MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

thickness

15 µm

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A4x2-tet-5mm-150-200-121



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

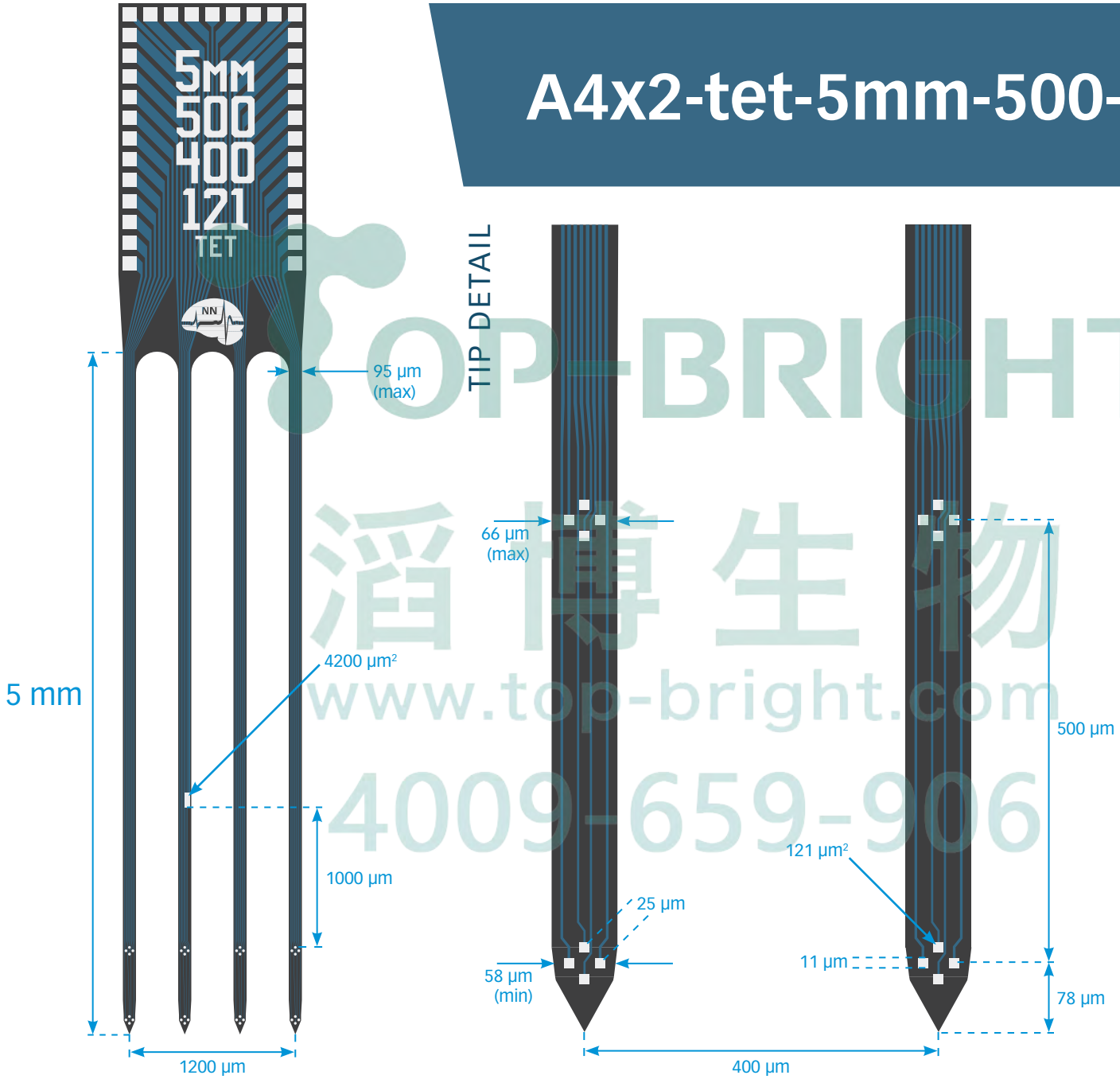
thickness

15 µm

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A4x2-tet-5mm-500-400-121



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

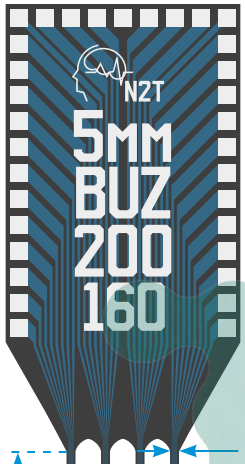
thickness

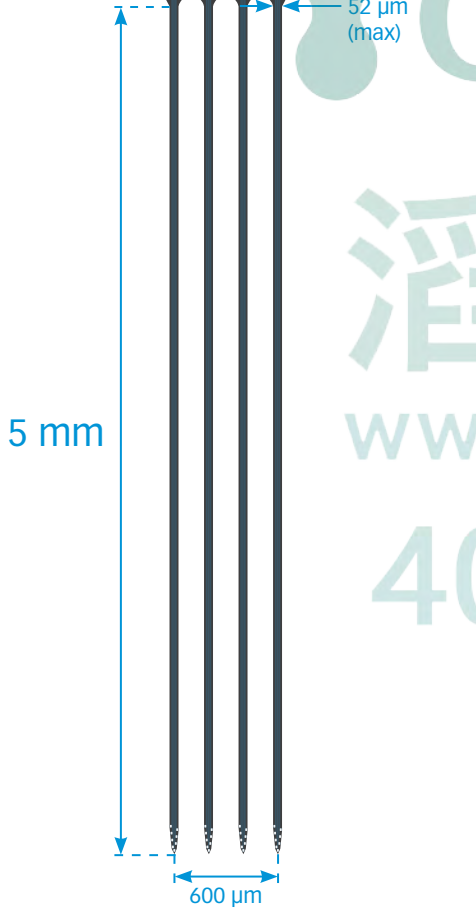
15 µm

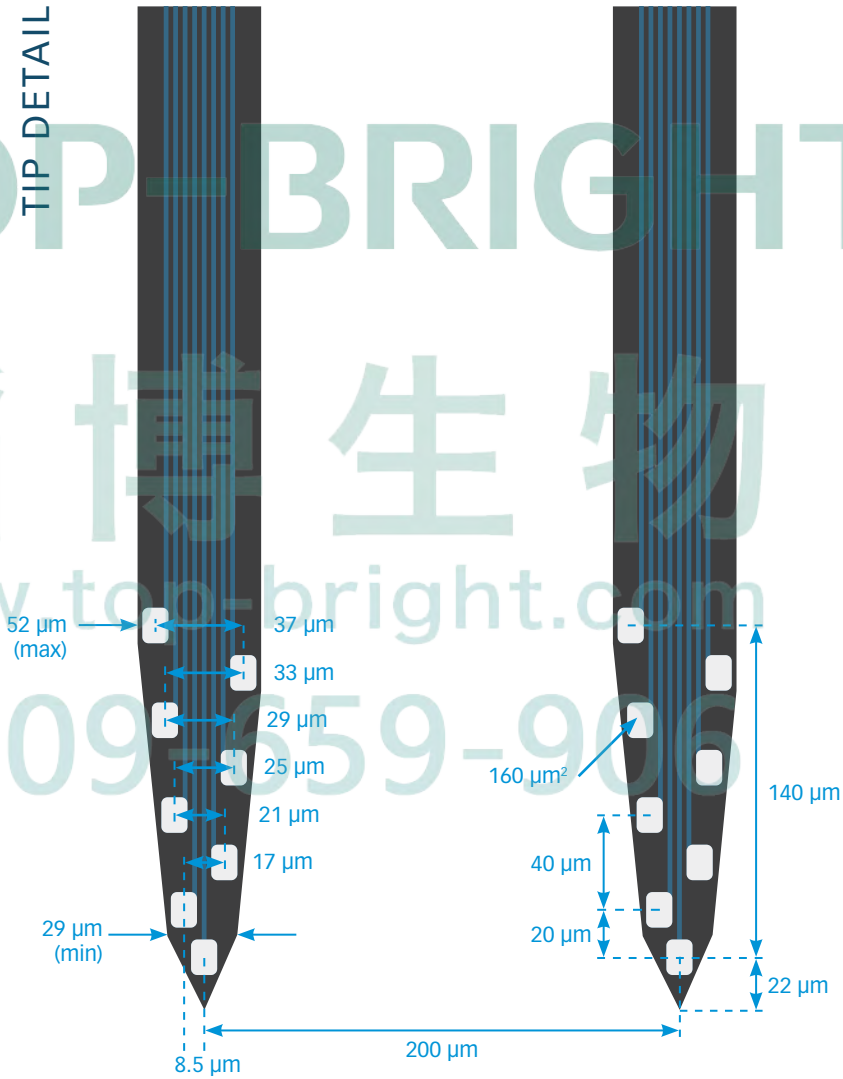
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Buzsaki32







available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

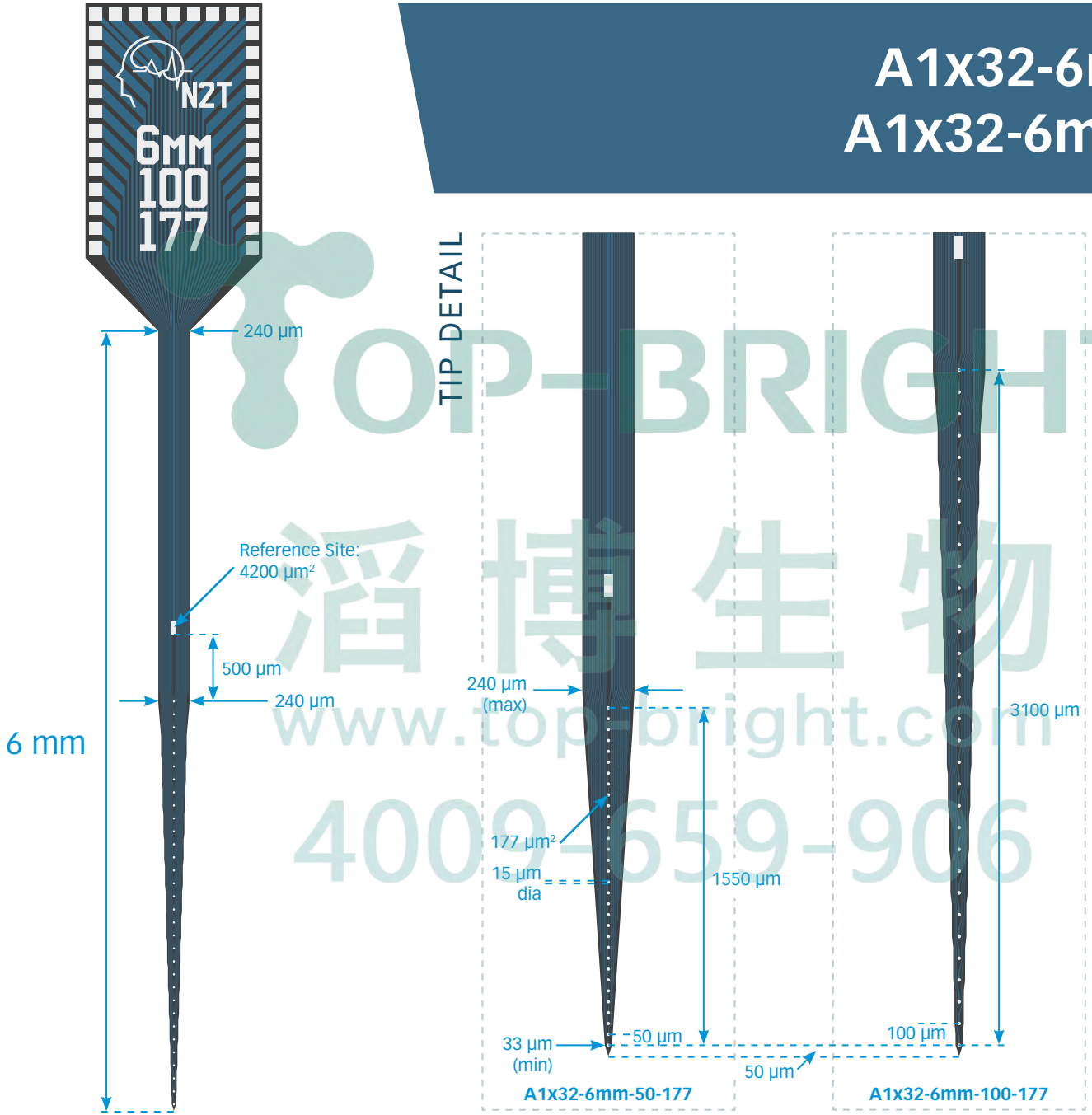
thickness

15 µm

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A1x32-6mm-50-177
A1x32-6mm-100-177



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available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

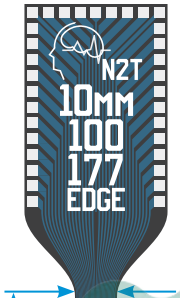
MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

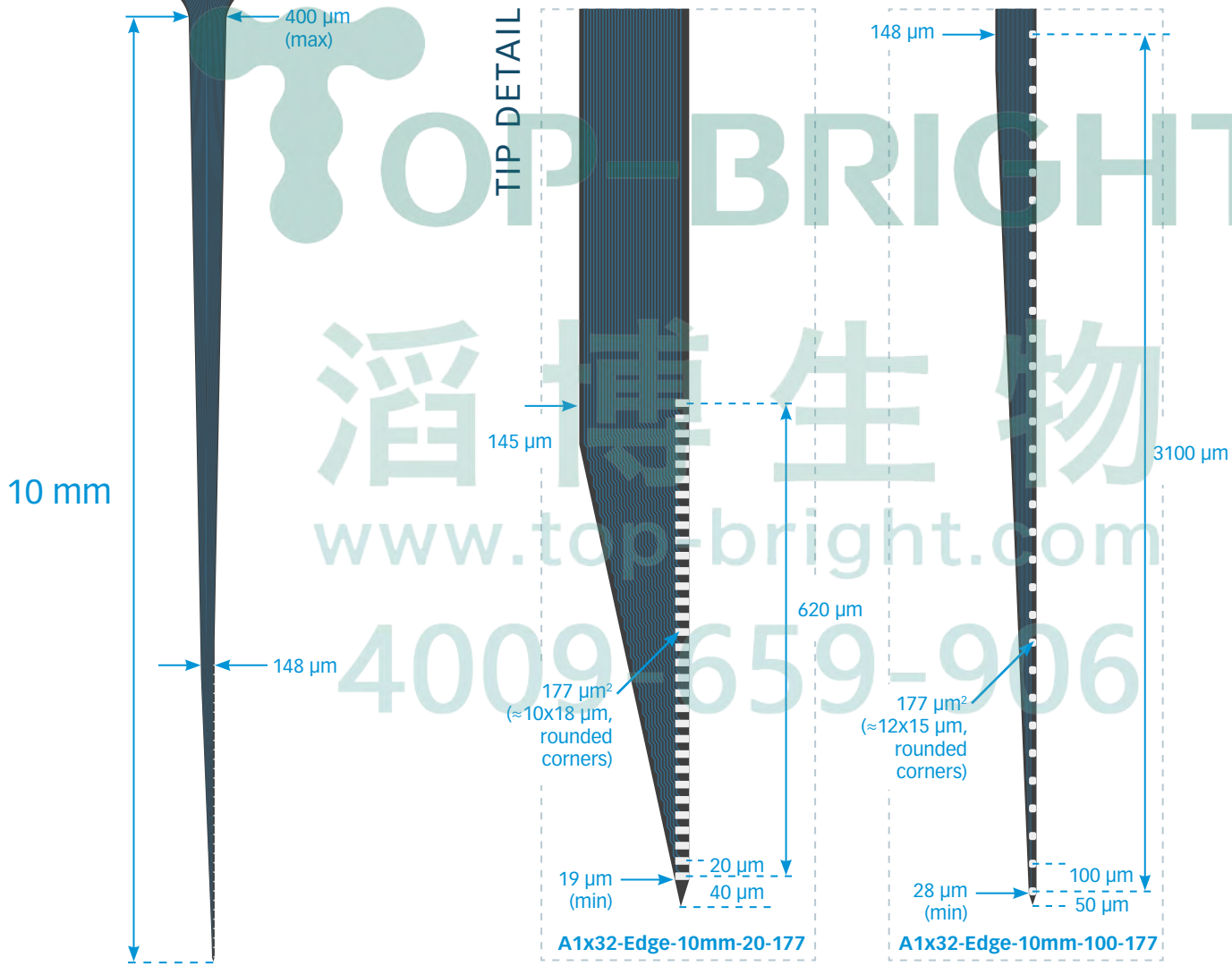
thickness

15 µm
50 µm

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A1x32-Edge-10mm-20-177
A1x32-Edge-10mm-100-177





available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

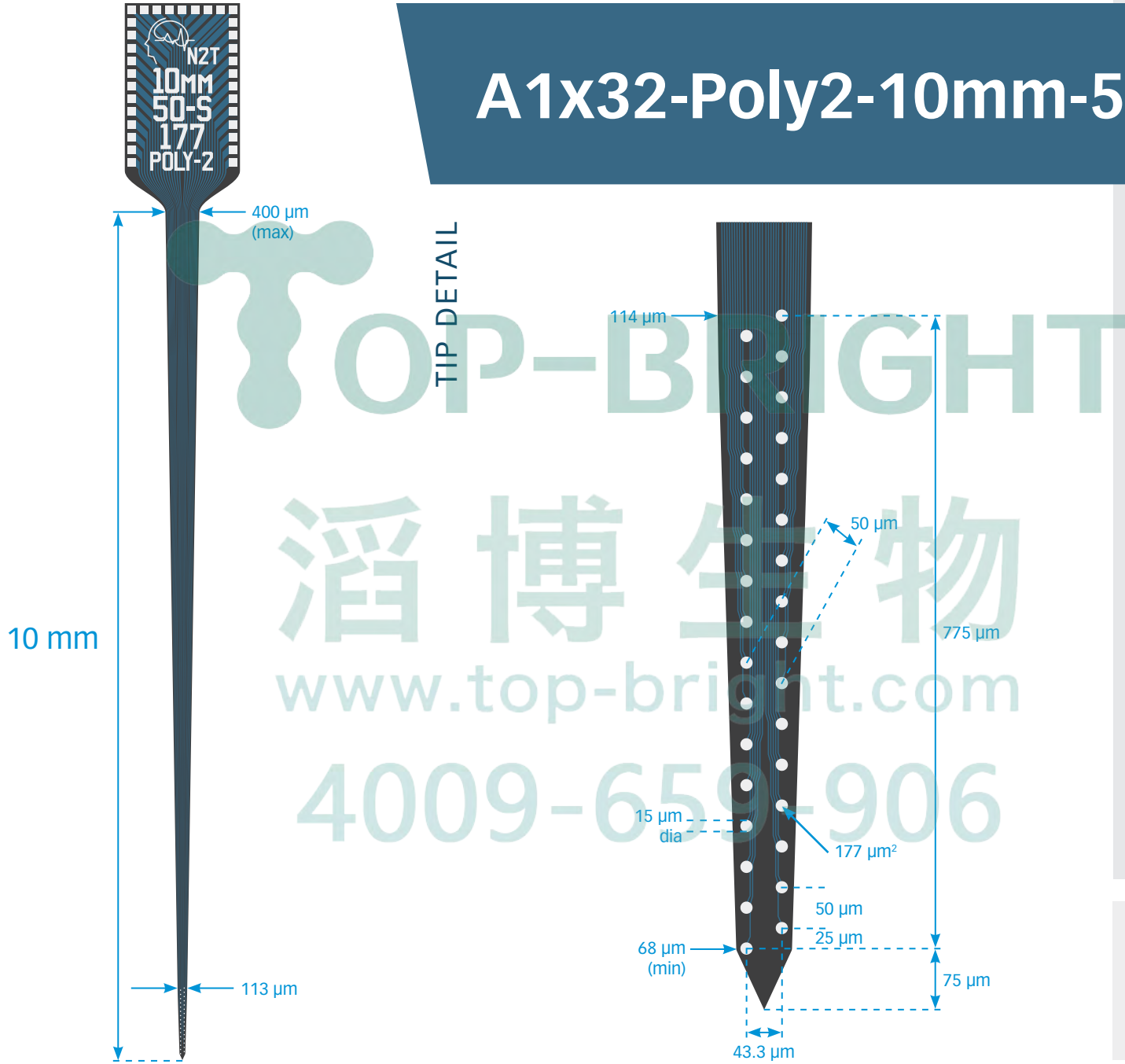
thickness

50 µm

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A1x32-Poly2-10mm-50s-177



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

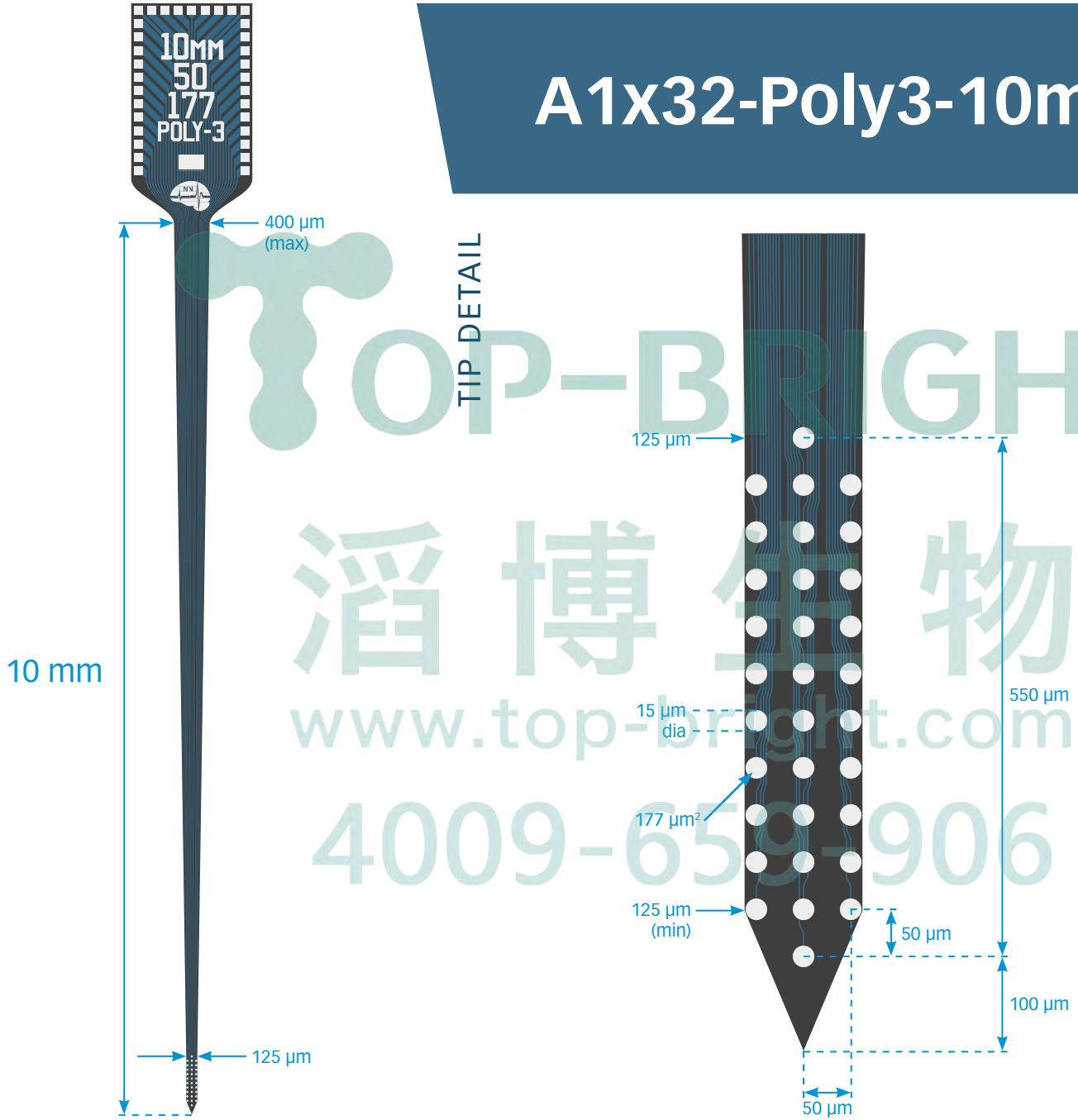
thickness

50 µm

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A1x32-Poly3-10mm-50-177



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

thickness

50 µm

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A2x16-10mm-50-500-177
A2x16-10mm-100-500-177



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

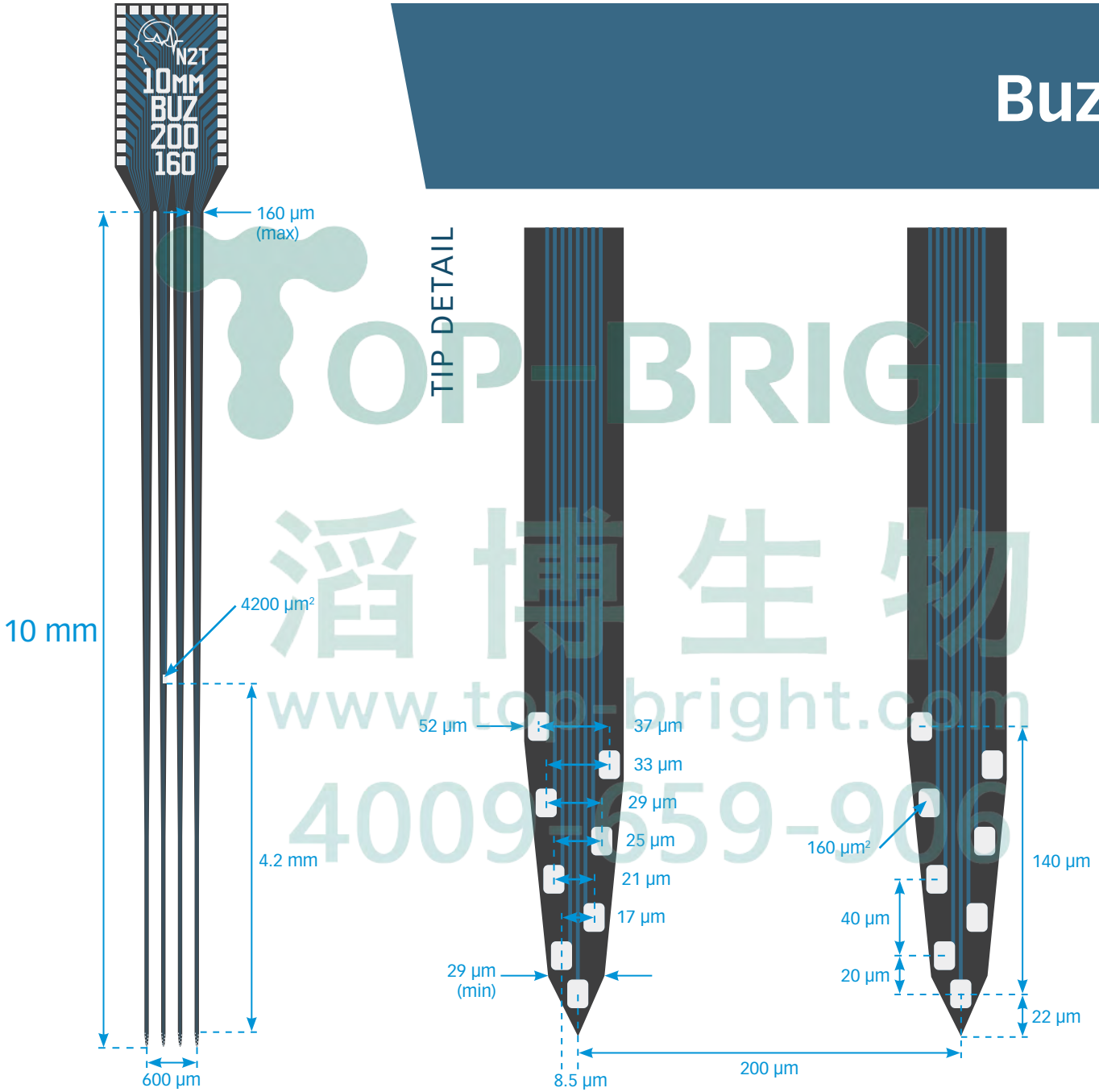
thickness

50 µm

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Buzsaki32L



available packages

ACUTE
A32

CHRONIC
CM32
H32_21mm
HC32_21mm
HZ32_21mm
Z32

OPTOGENETICS
OA32LP
OA32LP_v2
OCM32LP
OH32LP (oDrive)
OXA32LP (Optogenix)
OZ32LP

MR-COMPATIBLE
MR_CM32
MR_H32_21mm
MR_HC32_21mm

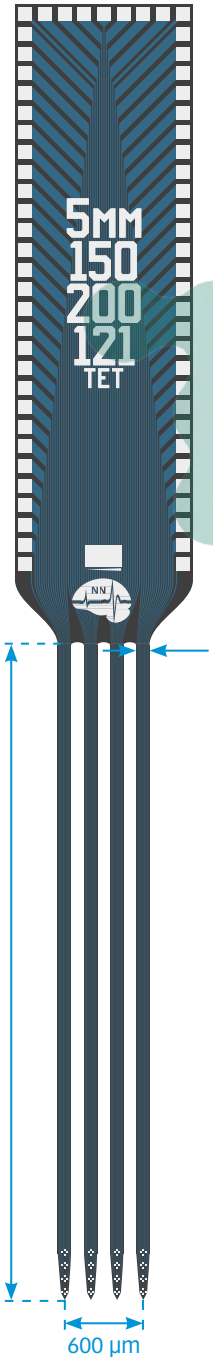
thickness

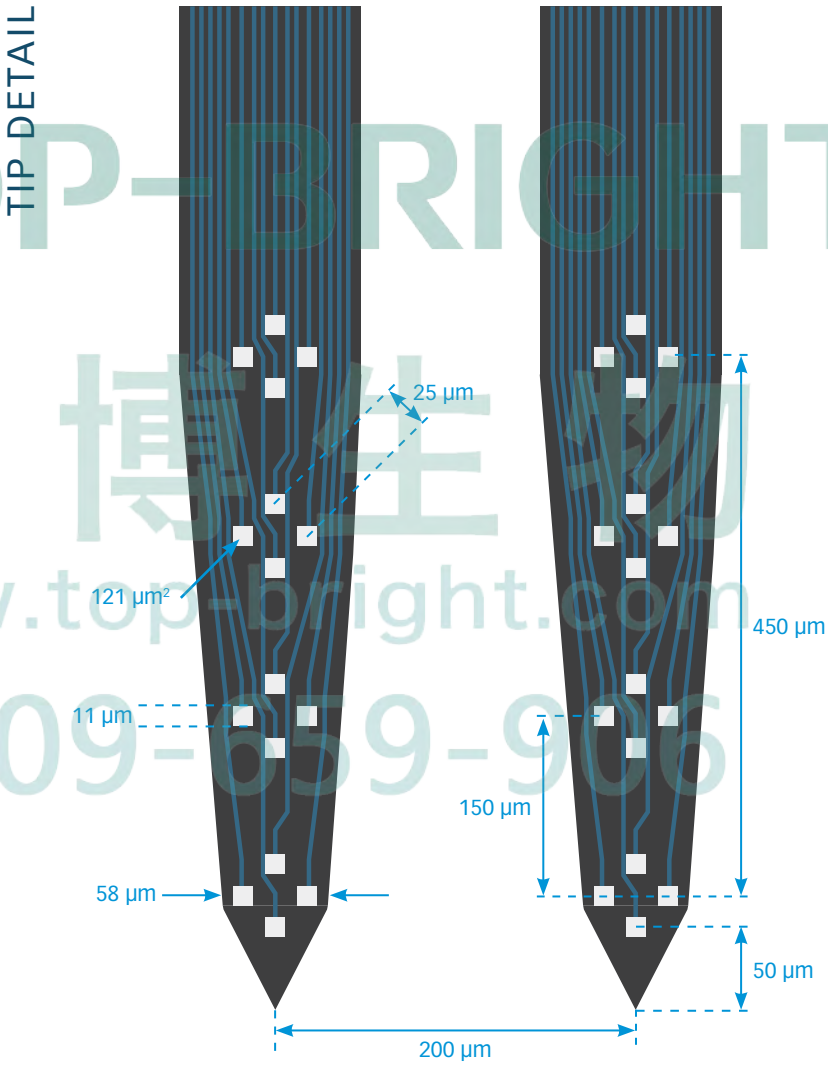
50 µm

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A4x4-tet-5mm-150-200-121





available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

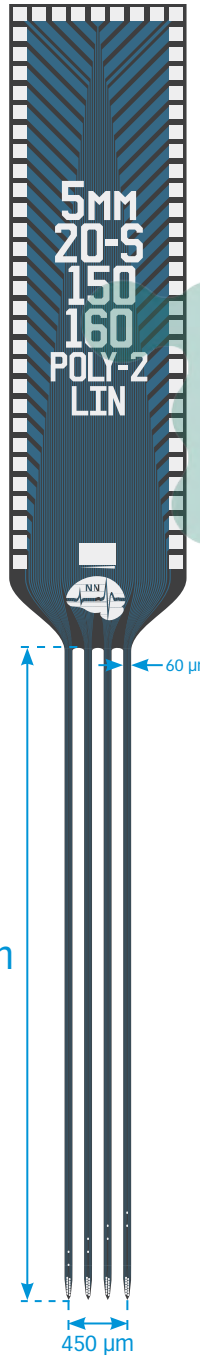
thickness

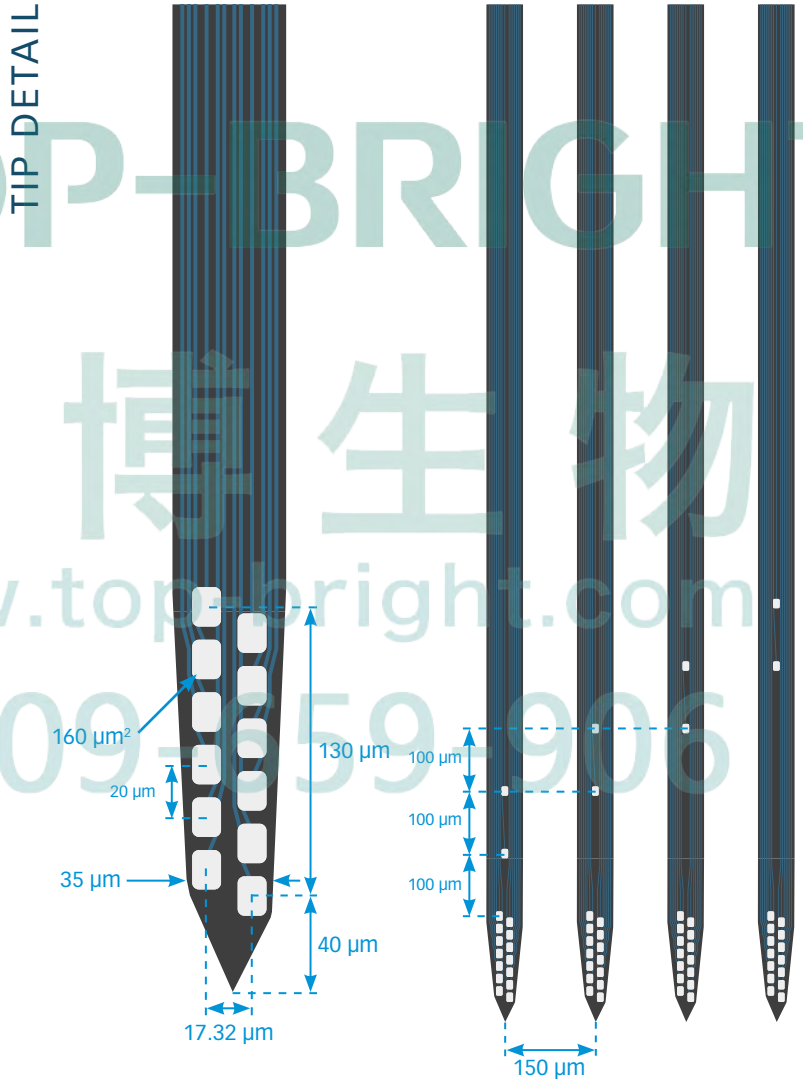
15 µm

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A4x16-Poly2-5mm-20s-150-160





available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

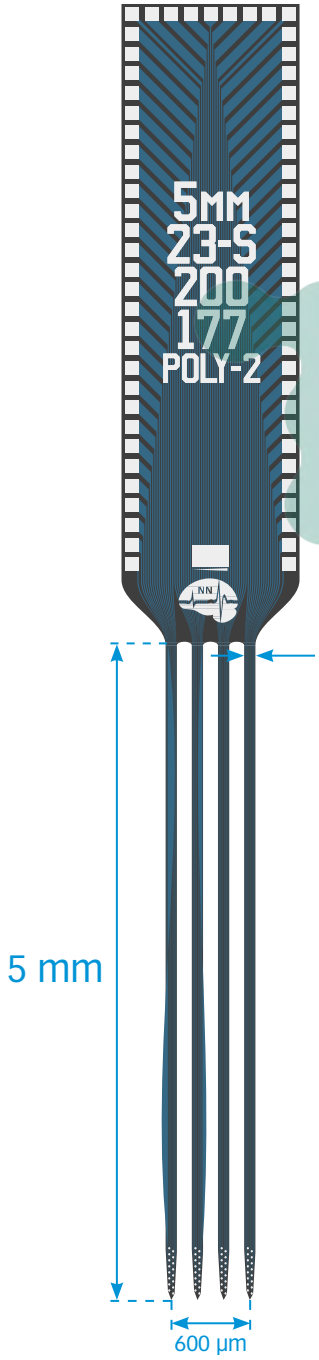
thickness

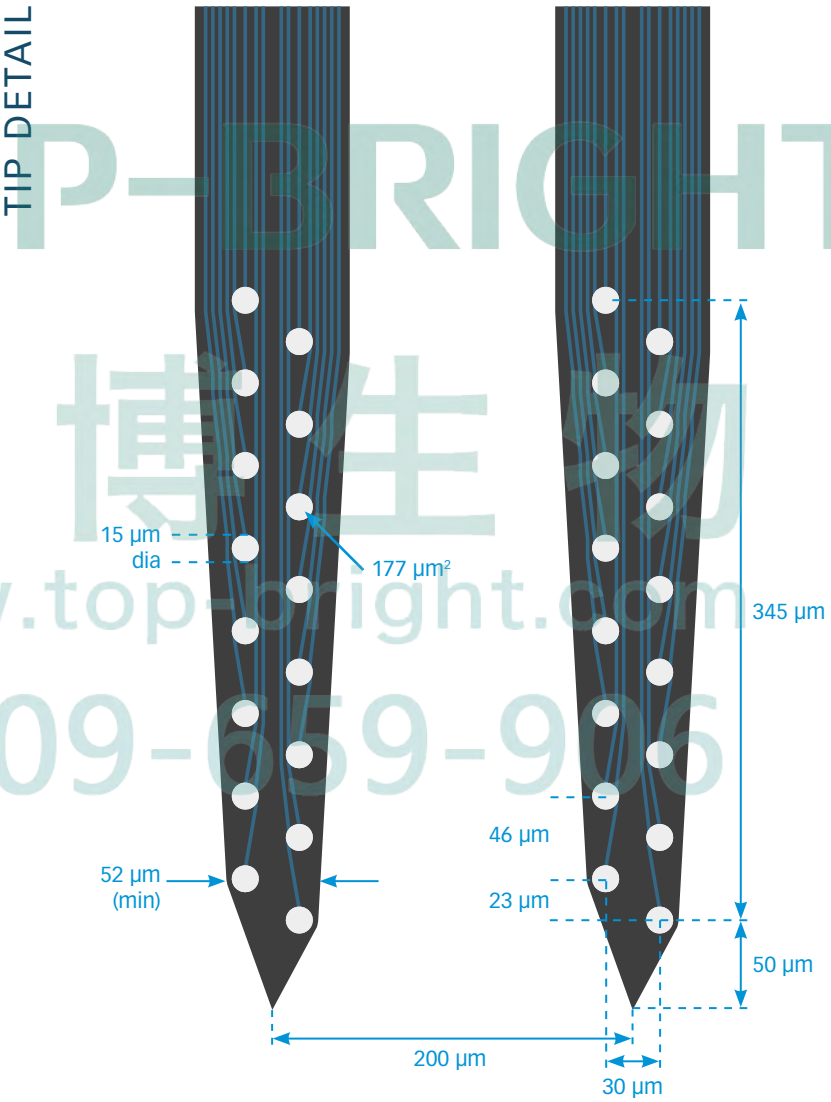
15 µm

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A4x16-Poly2-5mm-23s-200-177





available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

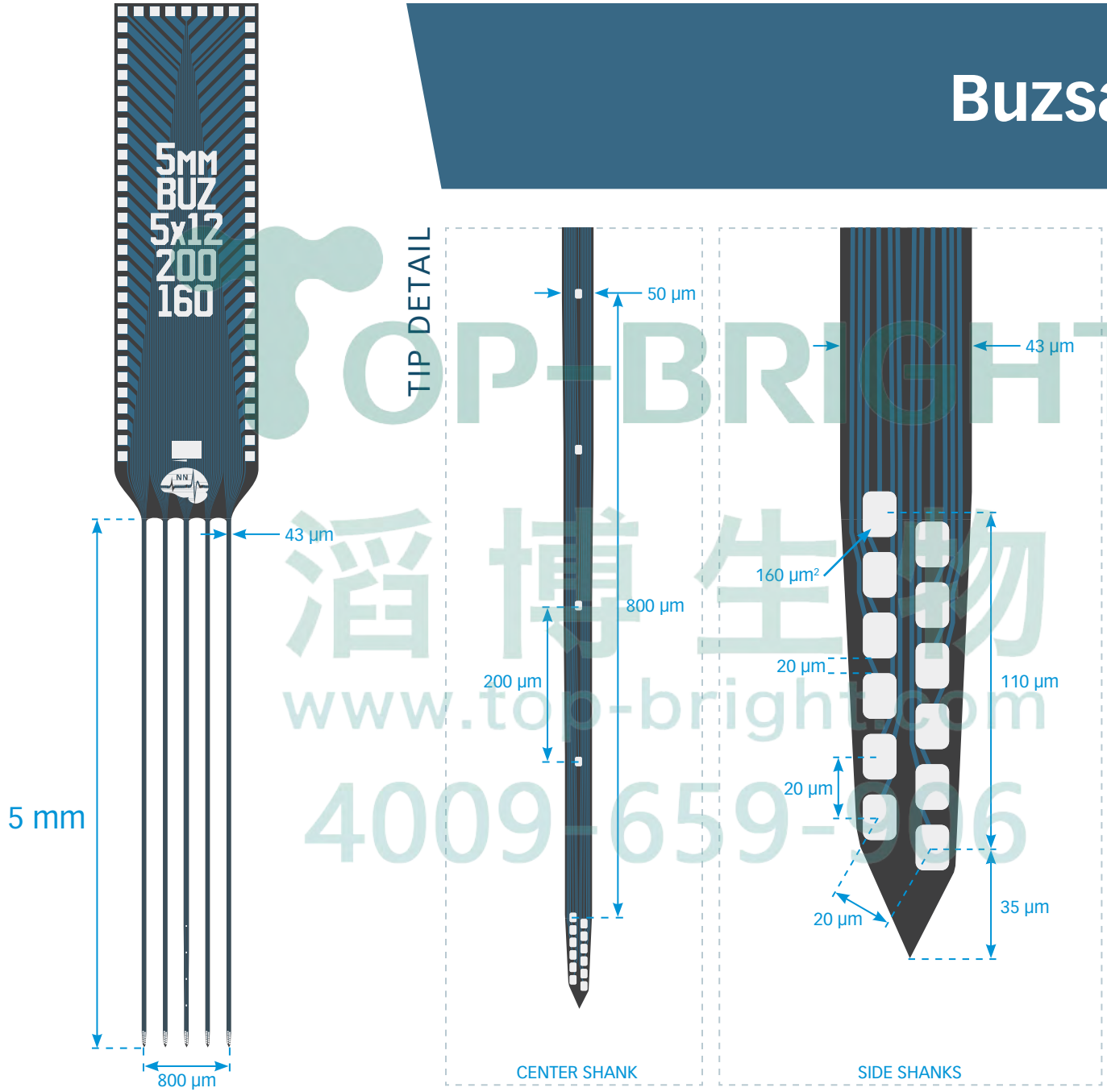
thickness

15 µm

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Buzsaki 5x12



available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

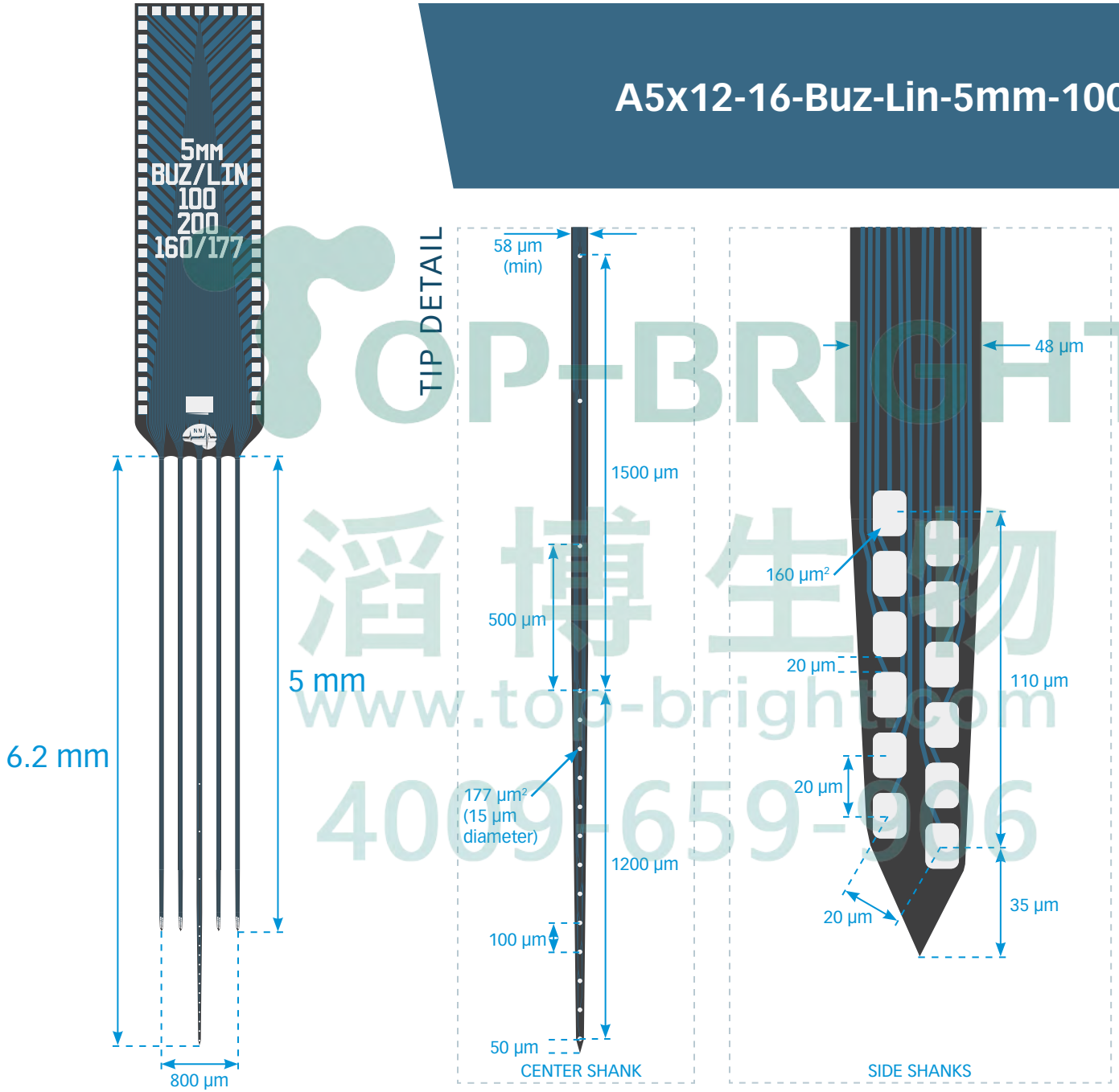
thickness

15 µm

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A5x12-16-Buz-Lin-5mm-100-200-160-177



available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

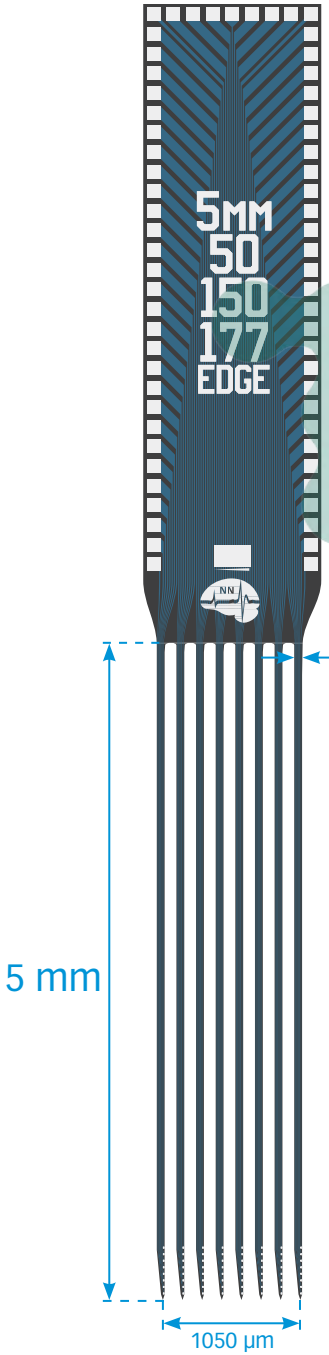
thickness

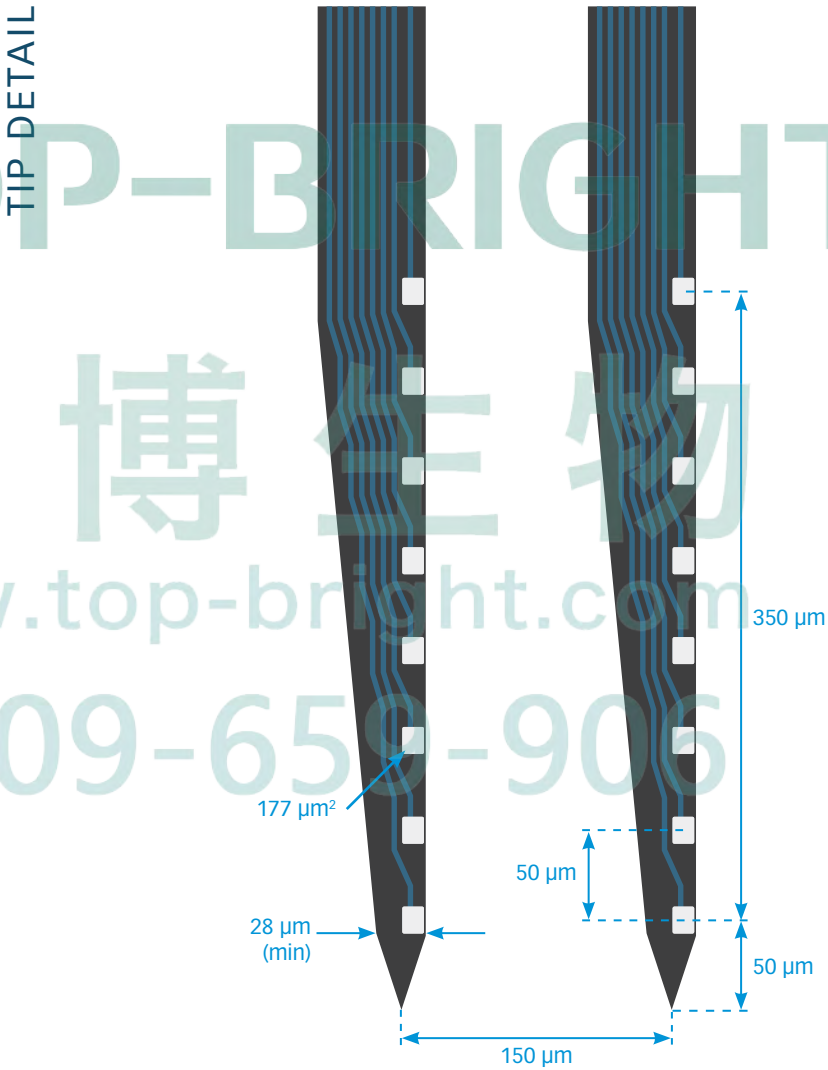
15 µm

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A8x8-Edge-5mm-50-150-177





available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

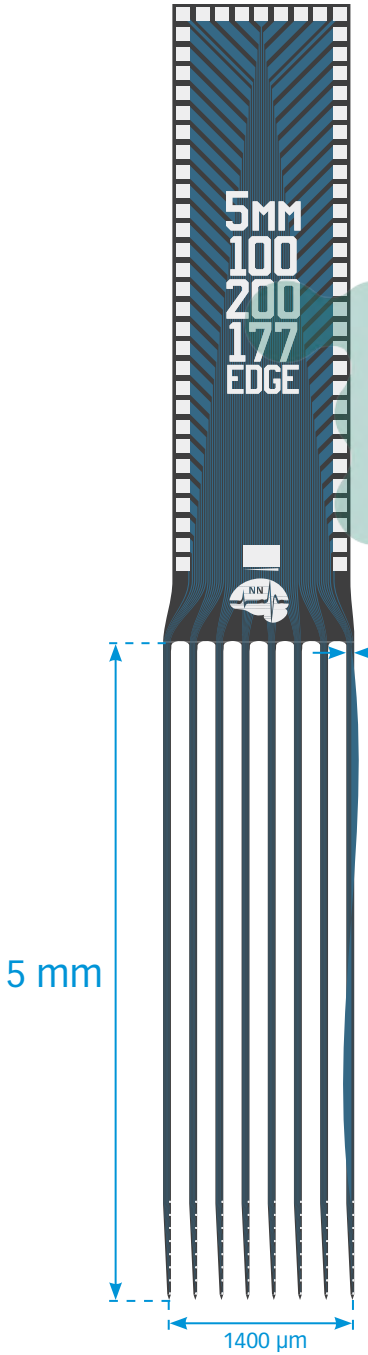
thickness

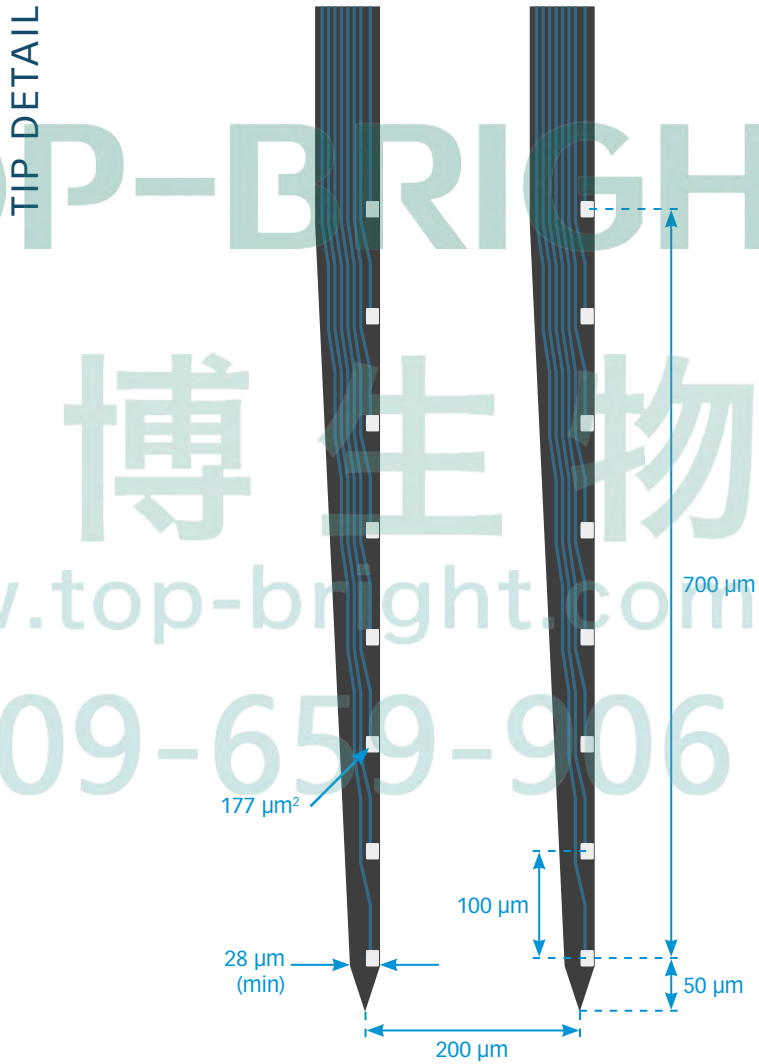
15 µm

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A8x8-Edge-5mm-100-200-177





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available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

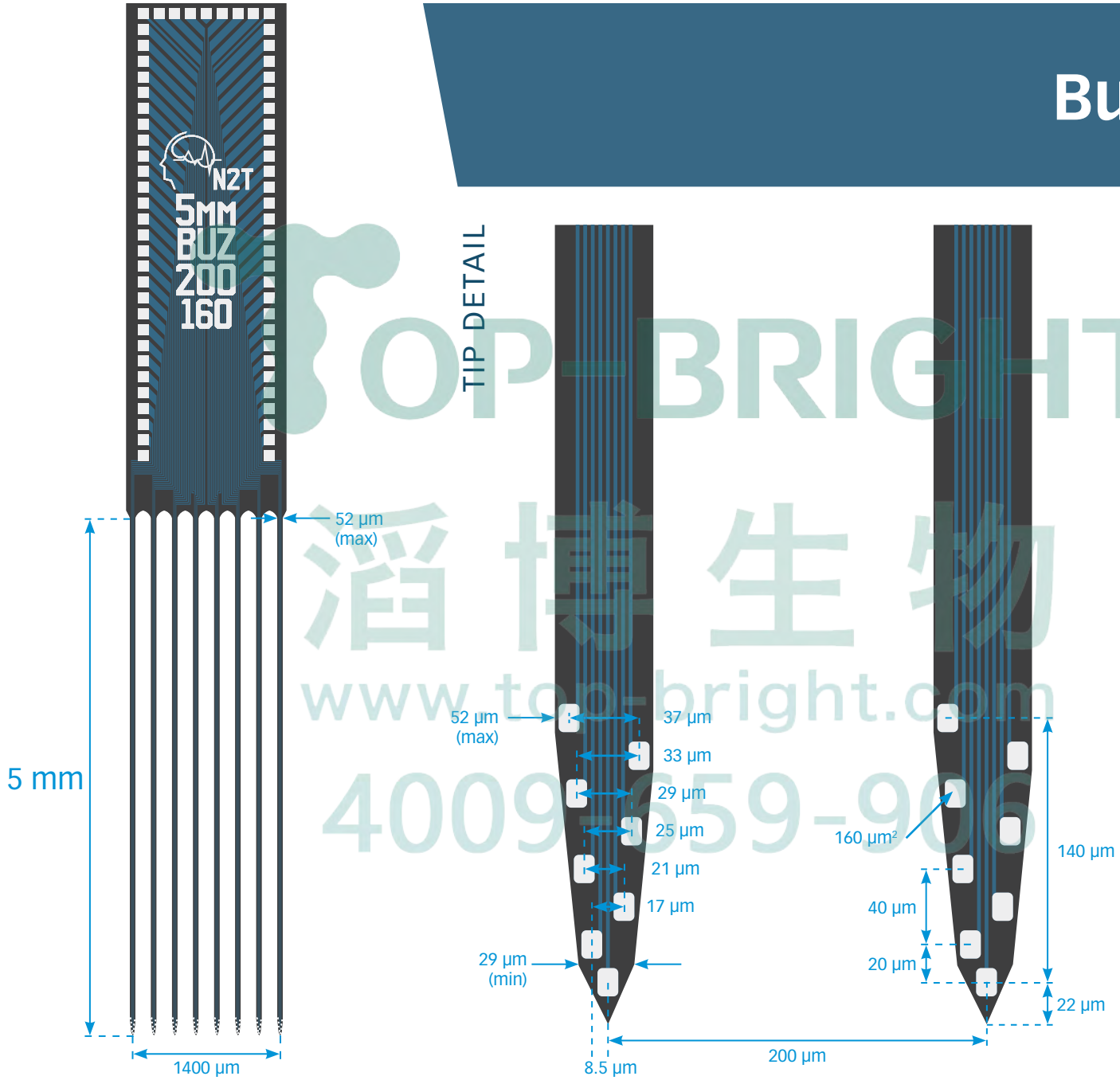
Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

thickness

15 µm

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Buzsaki64



available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

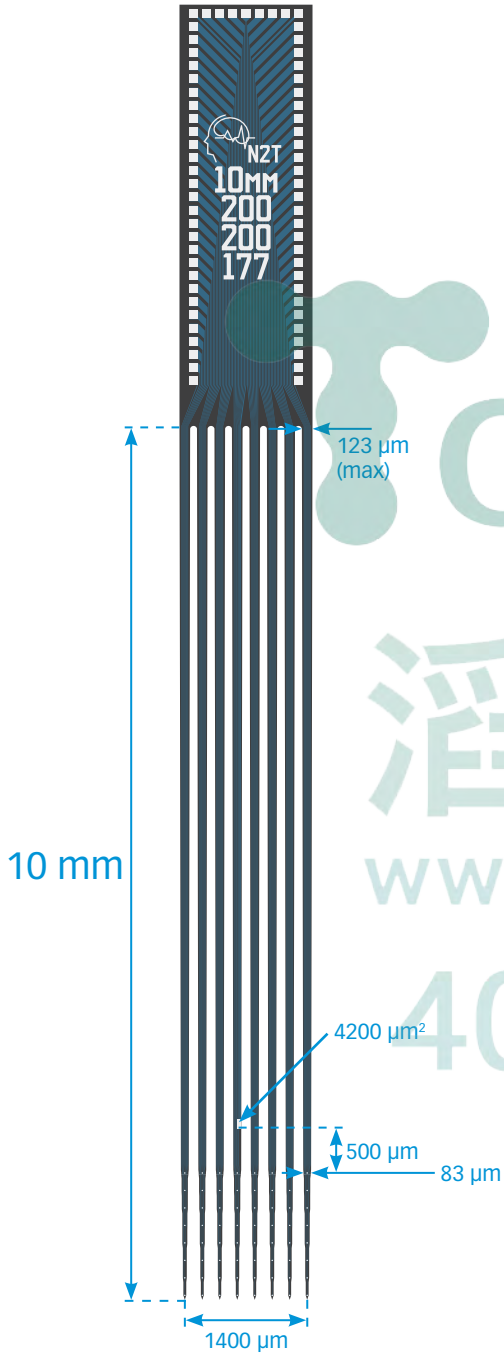
thickness

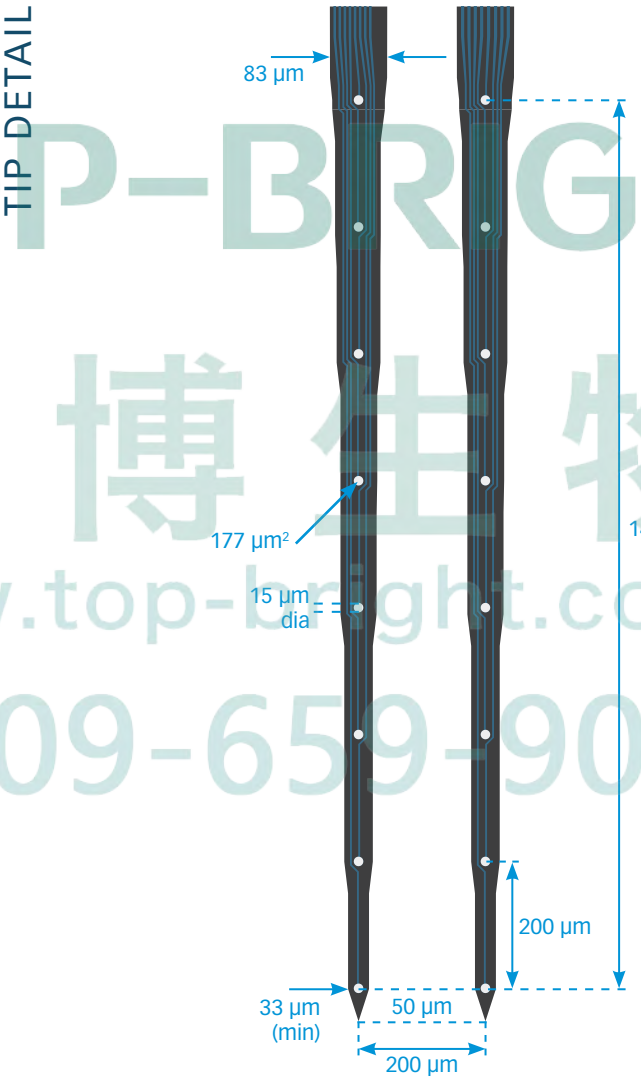
15 µm

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A8x8-10mm-200-200-177





available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

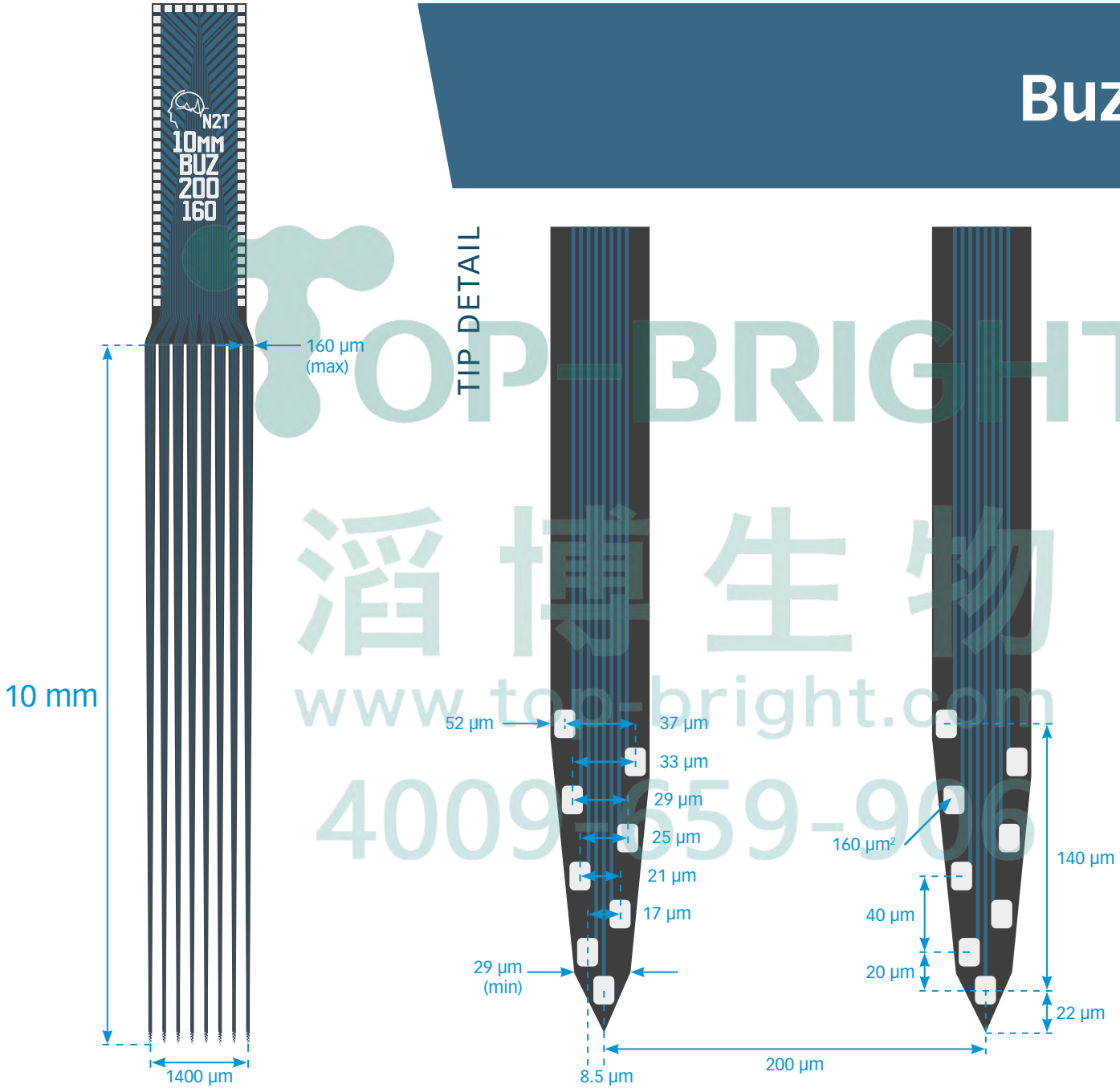
thickness

50 µm

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Buzsaki64L



available packages

ACUTE
A64

CHRONIC
H64_30mm
H64LP_30mm
HC64_30mm
HZ64_30mm
Z64

SMART
S64

OPTOGENETICS
OA64LP
OA64LP_v2
OH64LP (oDrive)
OXA64LP (Optogenix)

MR-COMPATIBLE
MR_H64_30mm
MR_HC64_30mm

Note for H-package 64 channel designs: Unless otherwise requested you will receive a probe with up to 2 irregular sites. If you require a perfect probe, please specify when ordering.

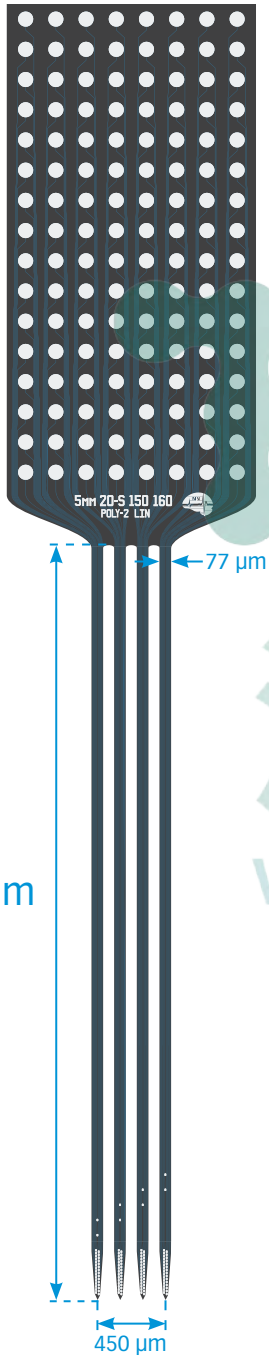
thickness

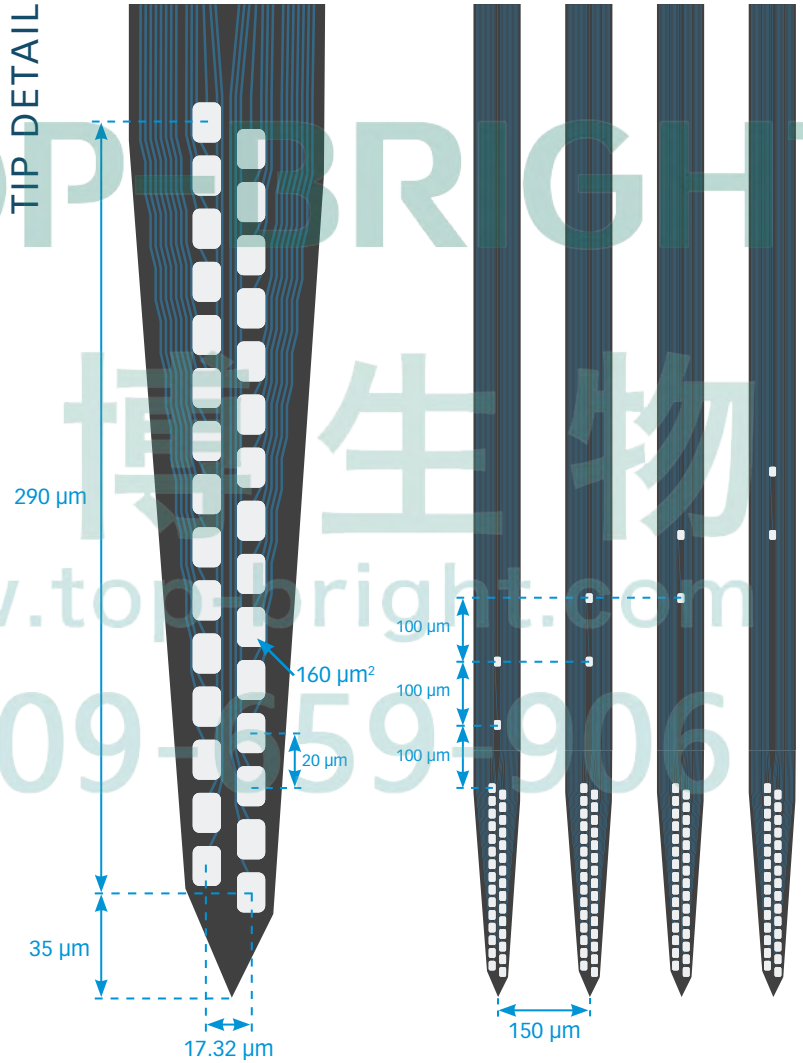
50 µm

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A4x32-Poly2-5mm-20s-150-160





available packages

SMART
H128
S128

INTAN
I128
IH128

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

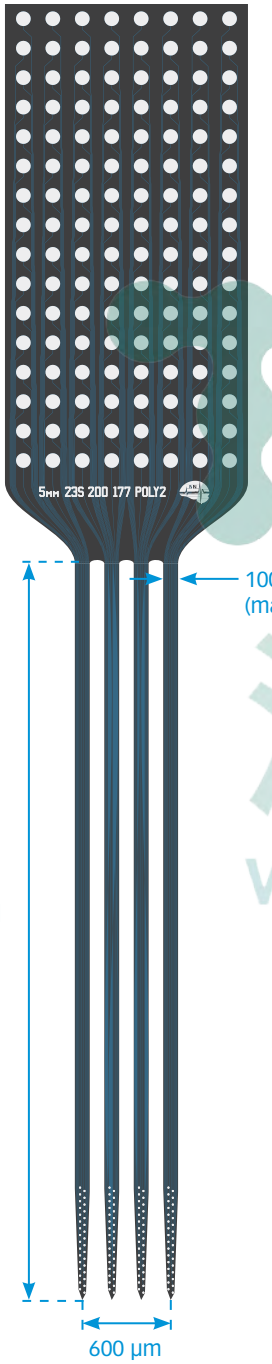
thickness

15 µm

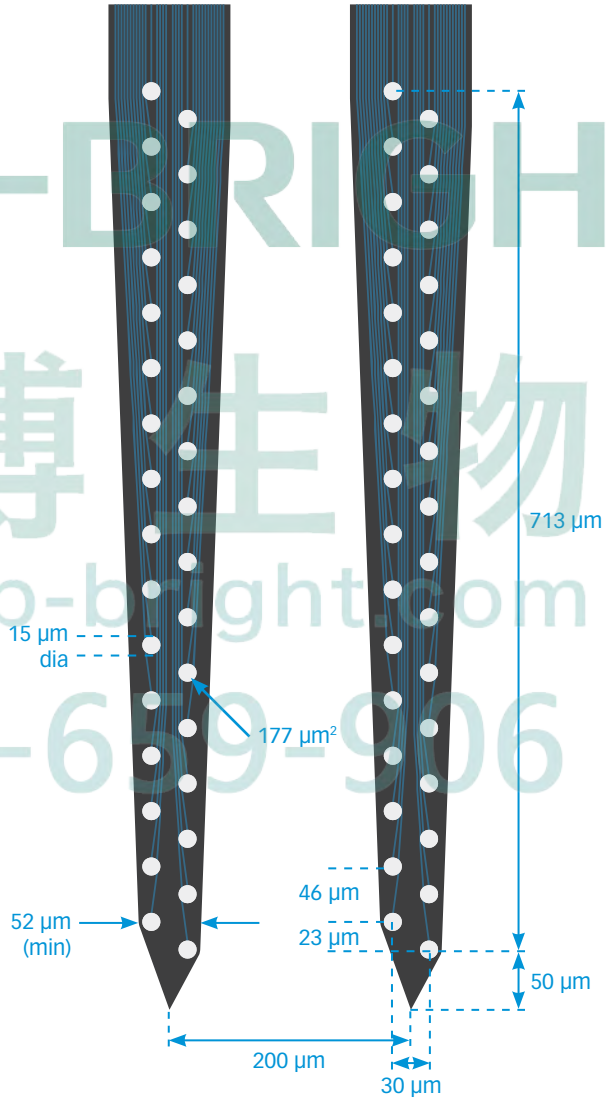
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A4x32-Poly2-5mm-23s-200-177



TIP DETAIL



available packages

SMART
H128
S128

INTAN
I128
IH128

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

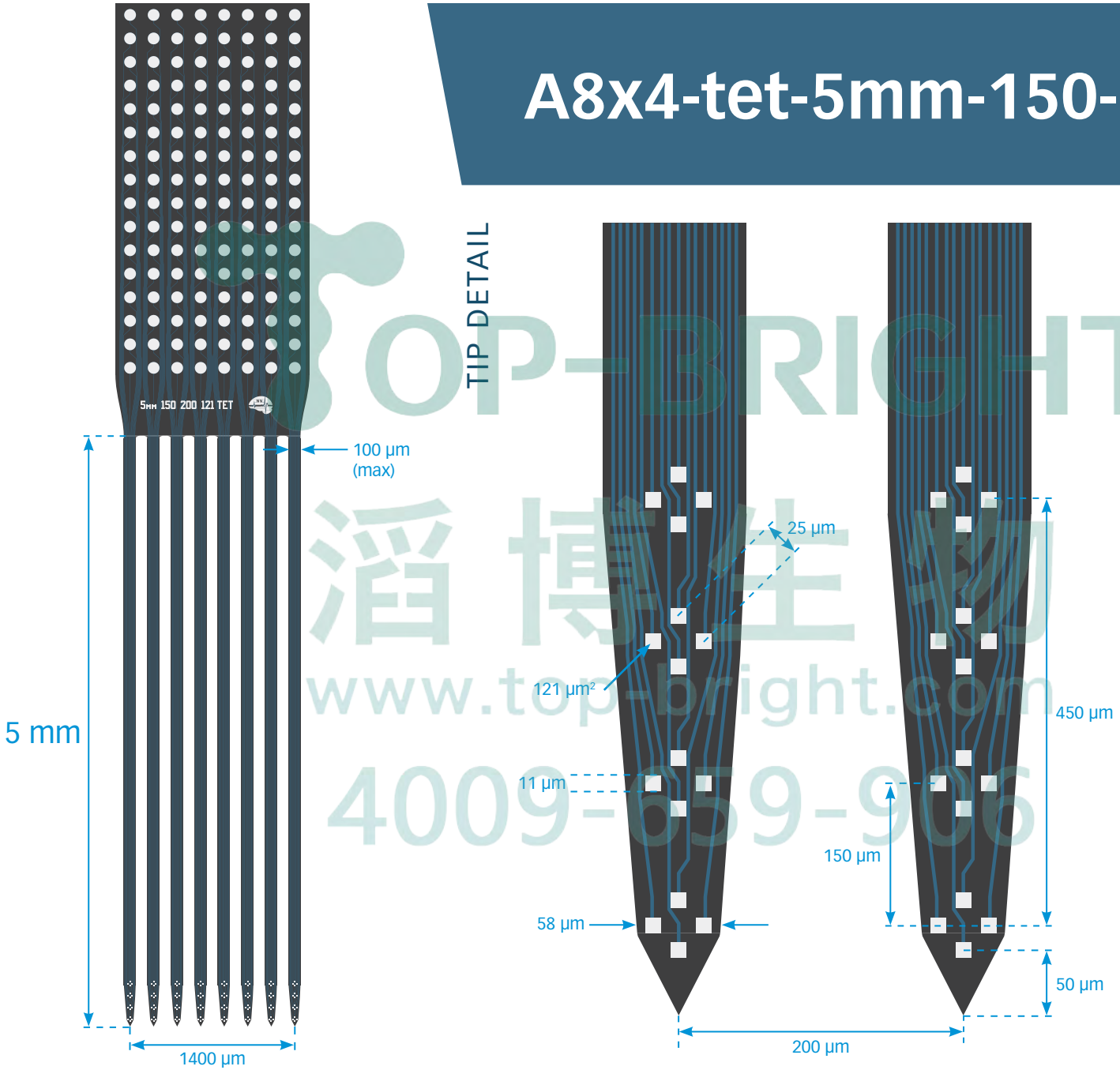
thickness

15 µm

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A8x4-tet-5mm-150-200-121



available packages

SMART
H128
S128

INTAN
I128
IH128

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

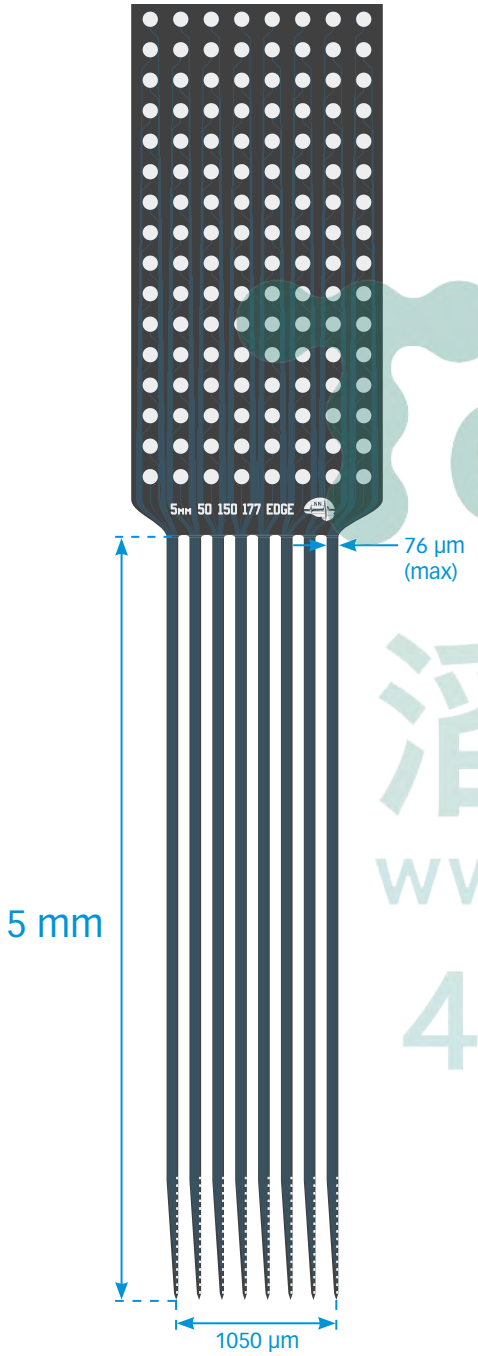
thickness

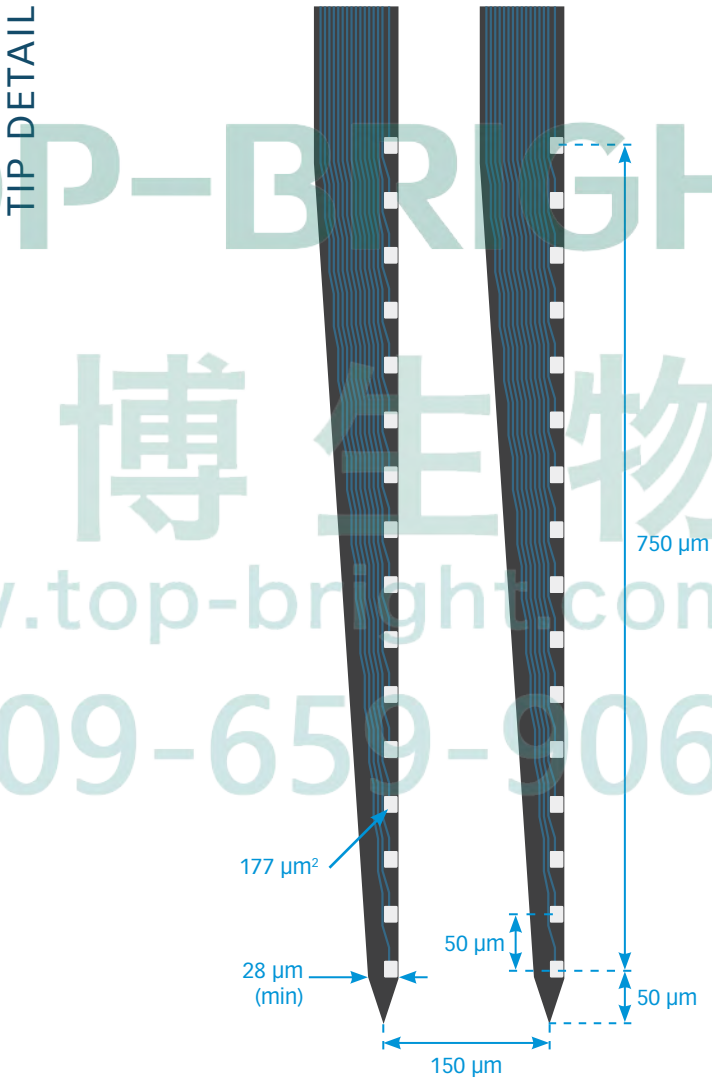
15 µm

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A8x16-Edge-5mm-50-150-177





available packages

SMART
H128
S128

INTAN
I128
IH128

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

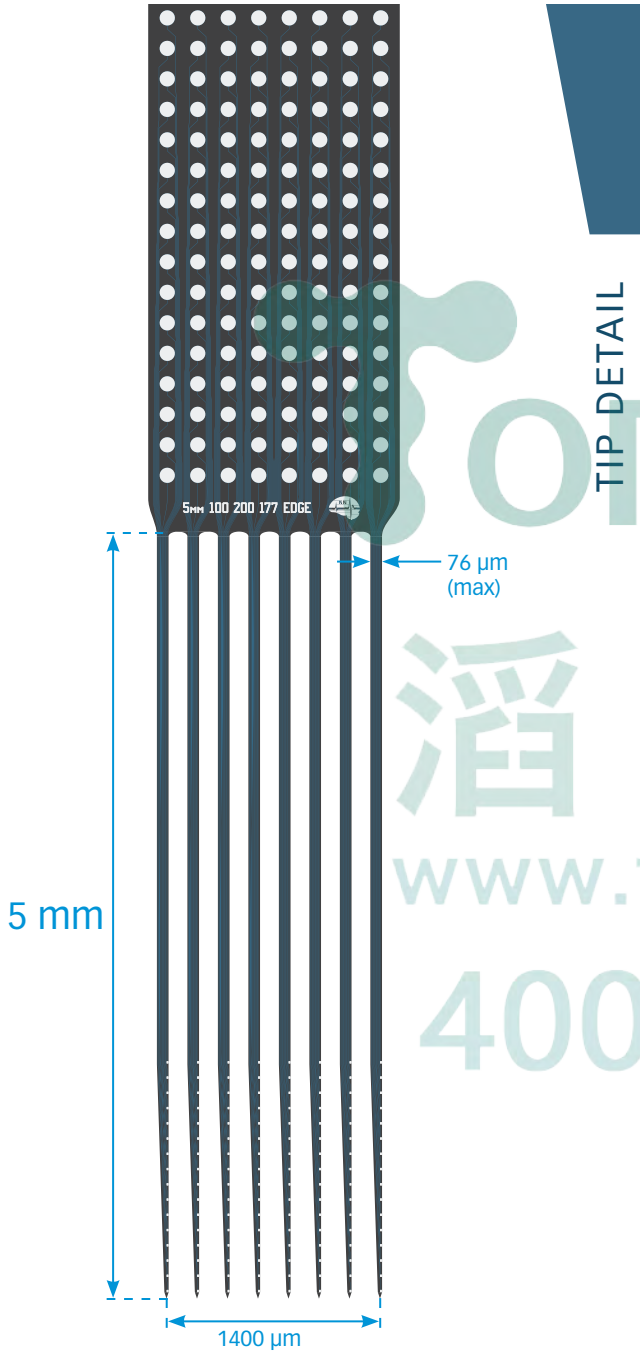
thickness

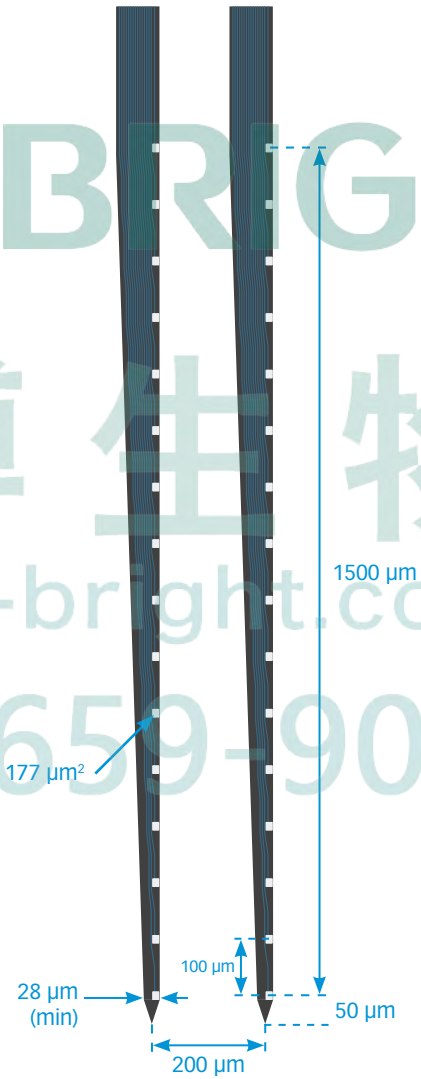
15 µm

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A8x16-Edge-5mm-100-200-177





available packages

SMART
H128
S128

INTAN
I128
IH128

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

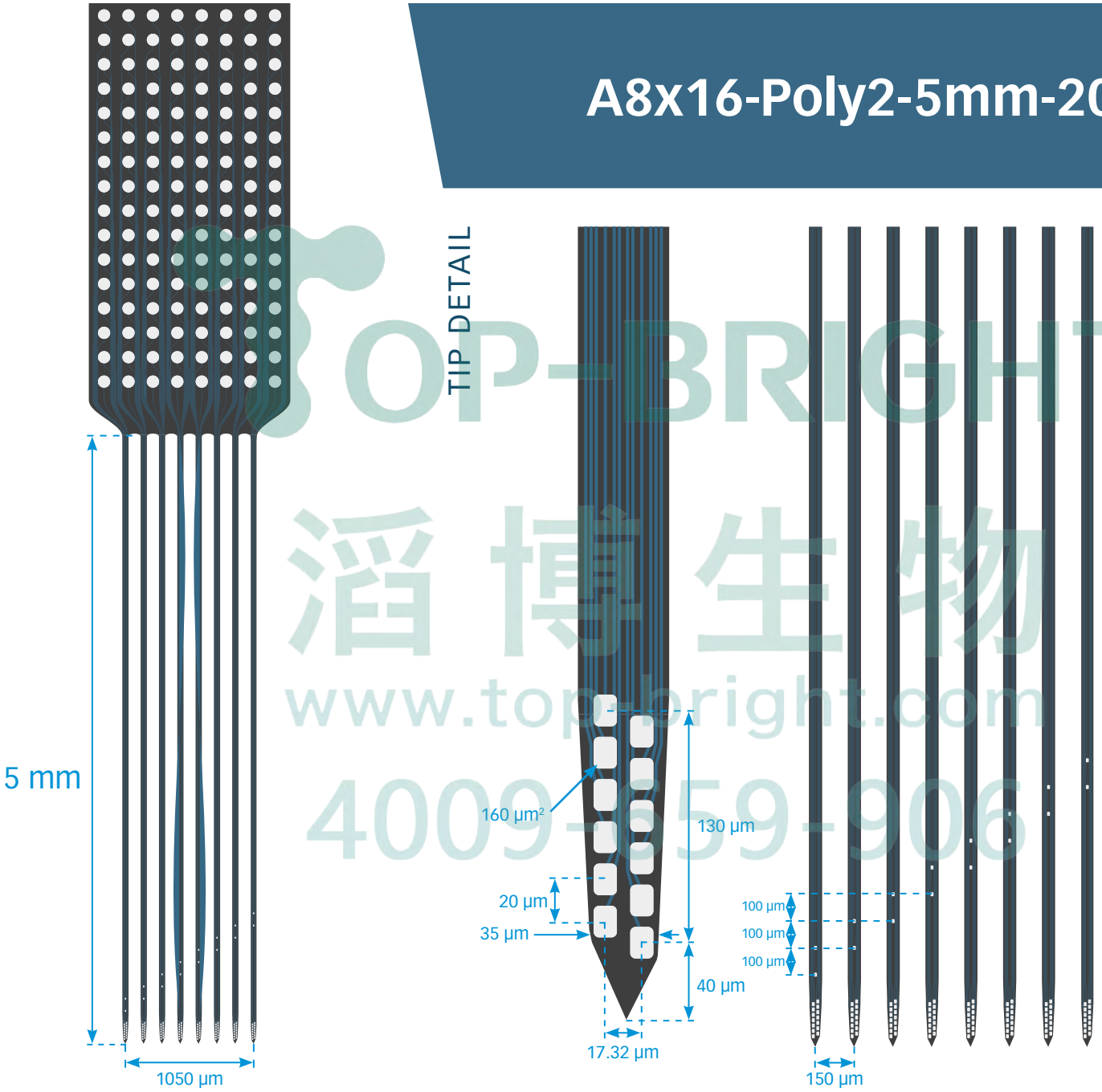
thickness

15 µm

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A8x16-Poly2-5mm-20s-150-160



available packages

SMART
H128
S128

INTAN
I128
IH128

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

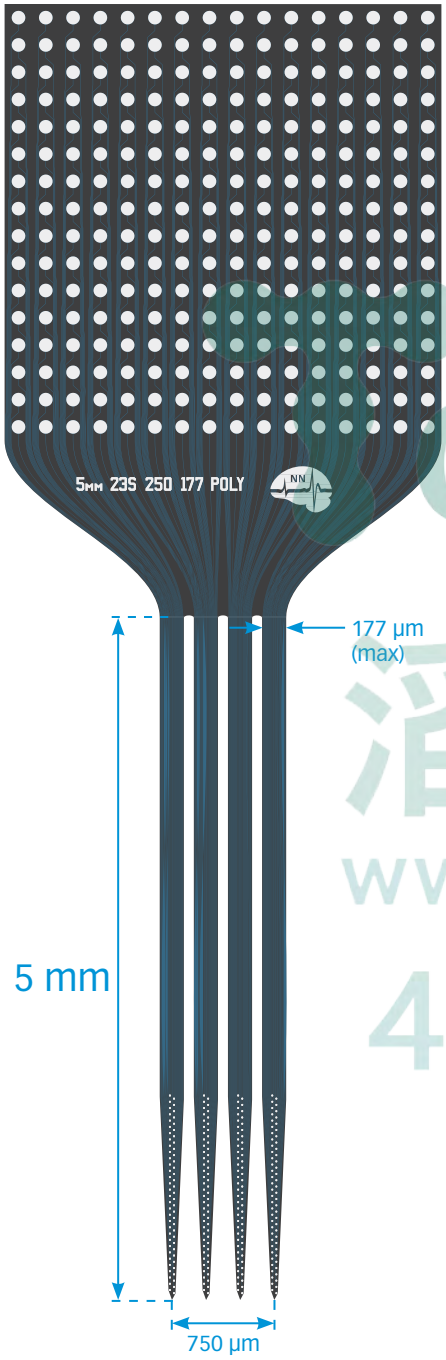
thickness

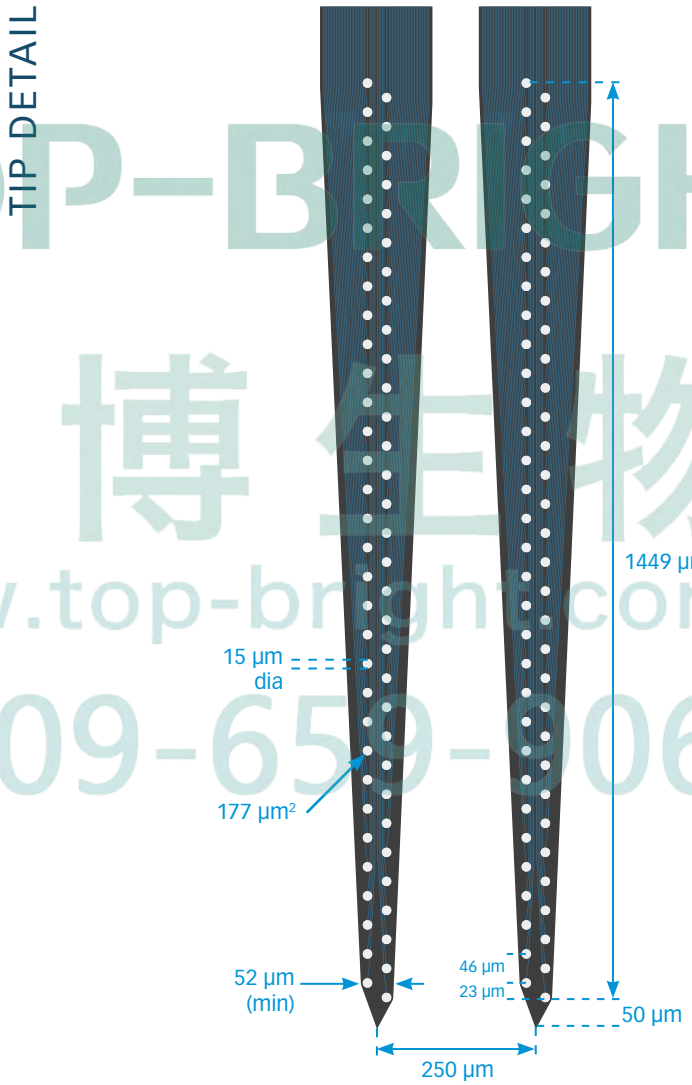
15 µm

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A4x64-Poly2-5mm-23s-250-177





available packages

SMART
H256
S256

INTAN
I256
IH256

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

thickness

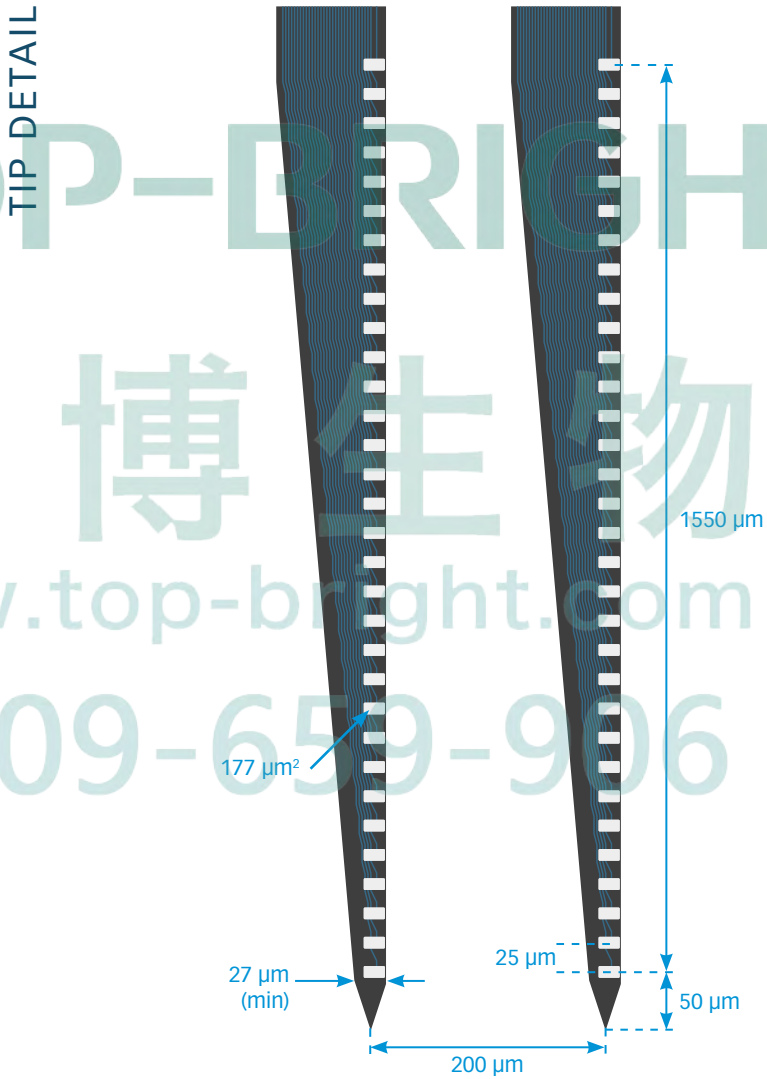
15 µm

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A8x32-Edge-5mm-25-200-177





available packages

SMART
H256
S256

INTAN
I256
IH256

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

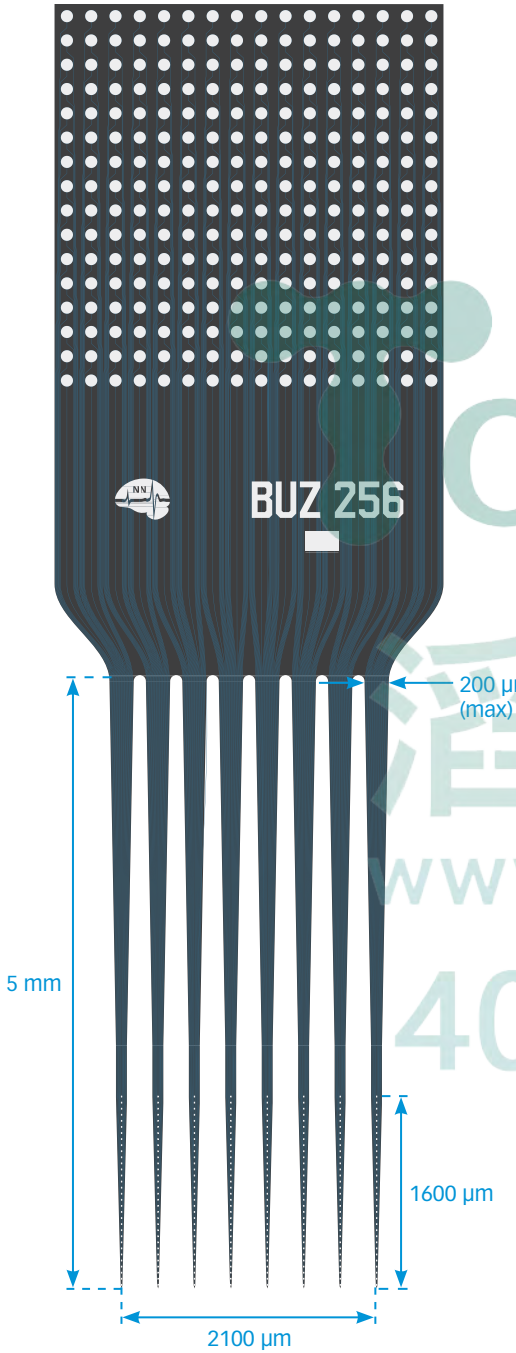
thickness

15 µm

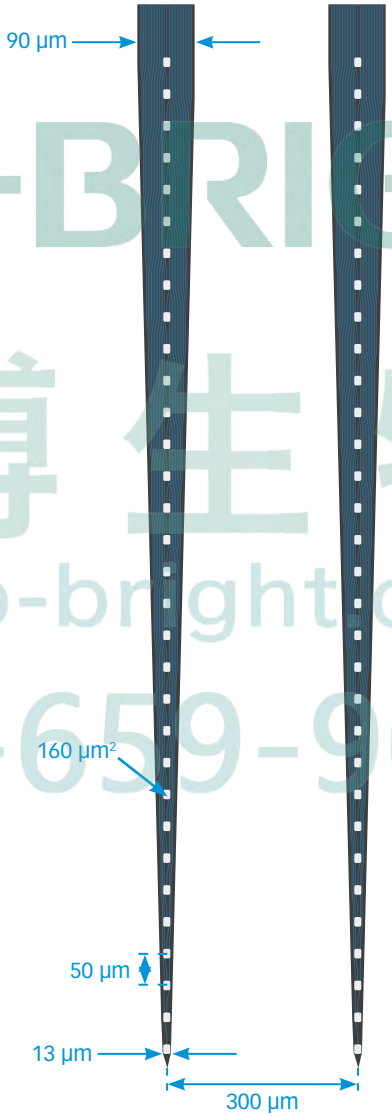
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Buzsaki256



TIP DETAIL



available packages

SMART
H256
S256

INTAN
I256
IH256

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

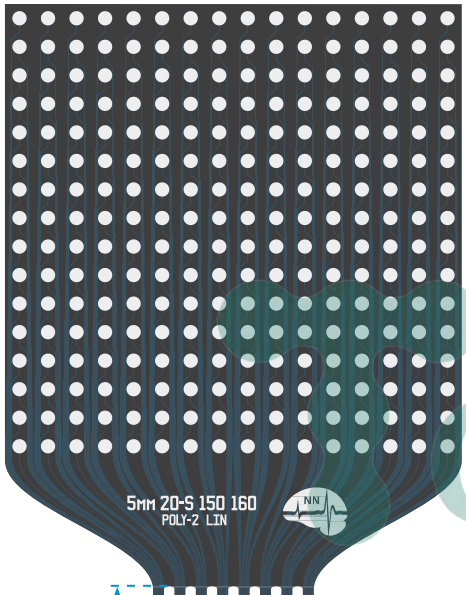
thickness

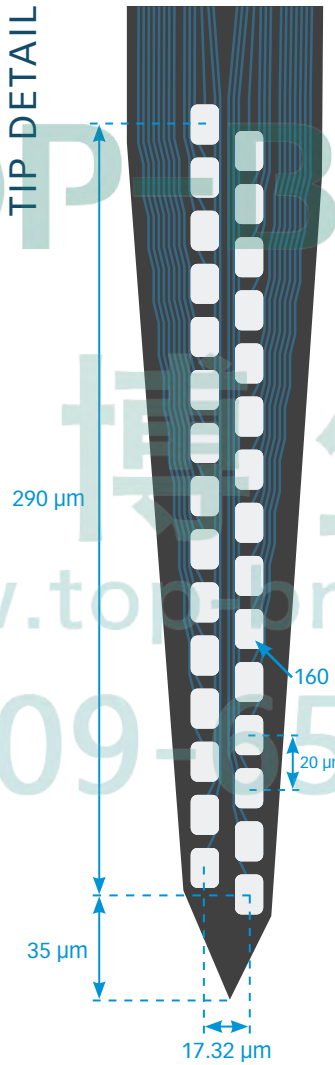
15 µm

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A8x32-Poly2-5mm-20s-150-160







available packages

SMART
H256
S256

INTAN
I256
IH256

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

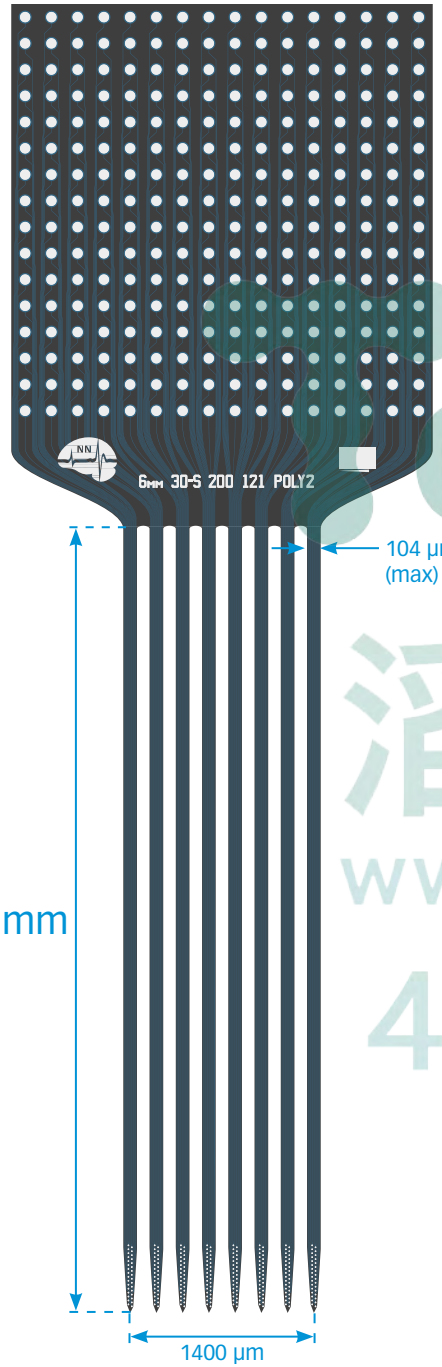
thickness

15 µm

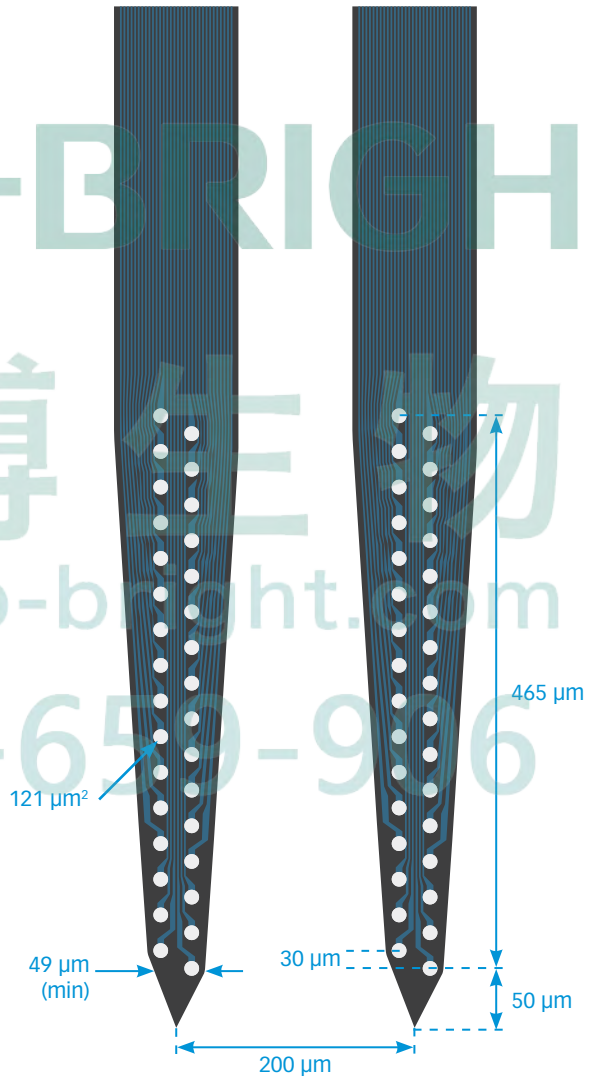
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A8x32-Poly2-6mm-30s-200-121



TIP DETAIL



available packages

SMART
H256
S256

INTAN
I256
IH256

Note: Given the high channel count of this design, there may be up to 15% irregular sites on the assembled device

thickness

15 µm

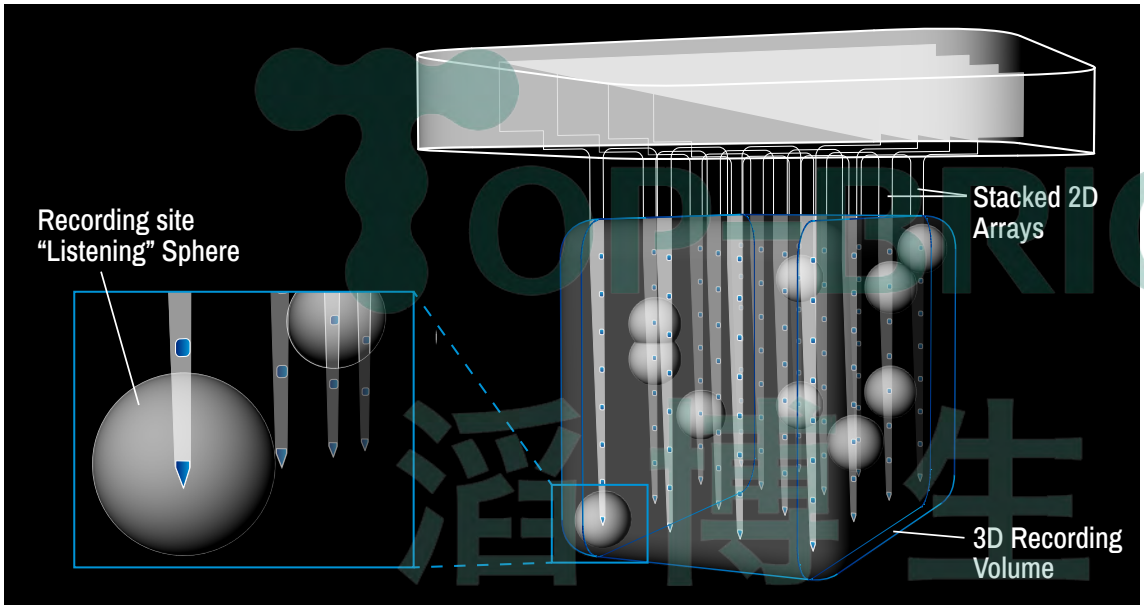
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Matrix Array™

TRUE 3D NEURAL INTERFACE FOR LARGE AND SMALL ANIMALS

BACK TO INDEX



The **Matrix Array™** is a versatile neural interface. It can be used in acute or chronic experiments for both small and large animals, interfacing with large populations of neurons in 3D space, up to 10 mm deep. *See our Matrix Array™ Catalog for full configuration details.*

- **3D Neural Interface** – The Matrix Array™ concurrently spans cortical columns and layers, interfacing with a volume of tissue and large populations of neurons.
- **Robust** – Lab-tested and refined to the smallest detail, the Matrix Array™ can withstand demanding chronic applications.
- **Versatile** – The modular assembly of the Matrix Array allows for varied configurations: record from cortical and/or subcortical areas, as well as from the brain surface, all with the same probe. Electrode length, site area, and shank/site spacing can all be customized for your application.
- **High Channel Density** – Record and stimulate from 64 to 256 channels.
- **Refined surgical procedure** – NeuroNexus worked closely with labs to develop a low-speed, low-risk, automated implantation procedure, reducing recovery time and preserving tissue health.
- **Optogenetics-compatible** – Configure a Matrix Array with an integrated optical fiber for novel optogenetics applications.

MATRIX ARRAY™ OPTIONS

The Matrix Array unlocks 3D neural interfacing in a wide variety of applications:

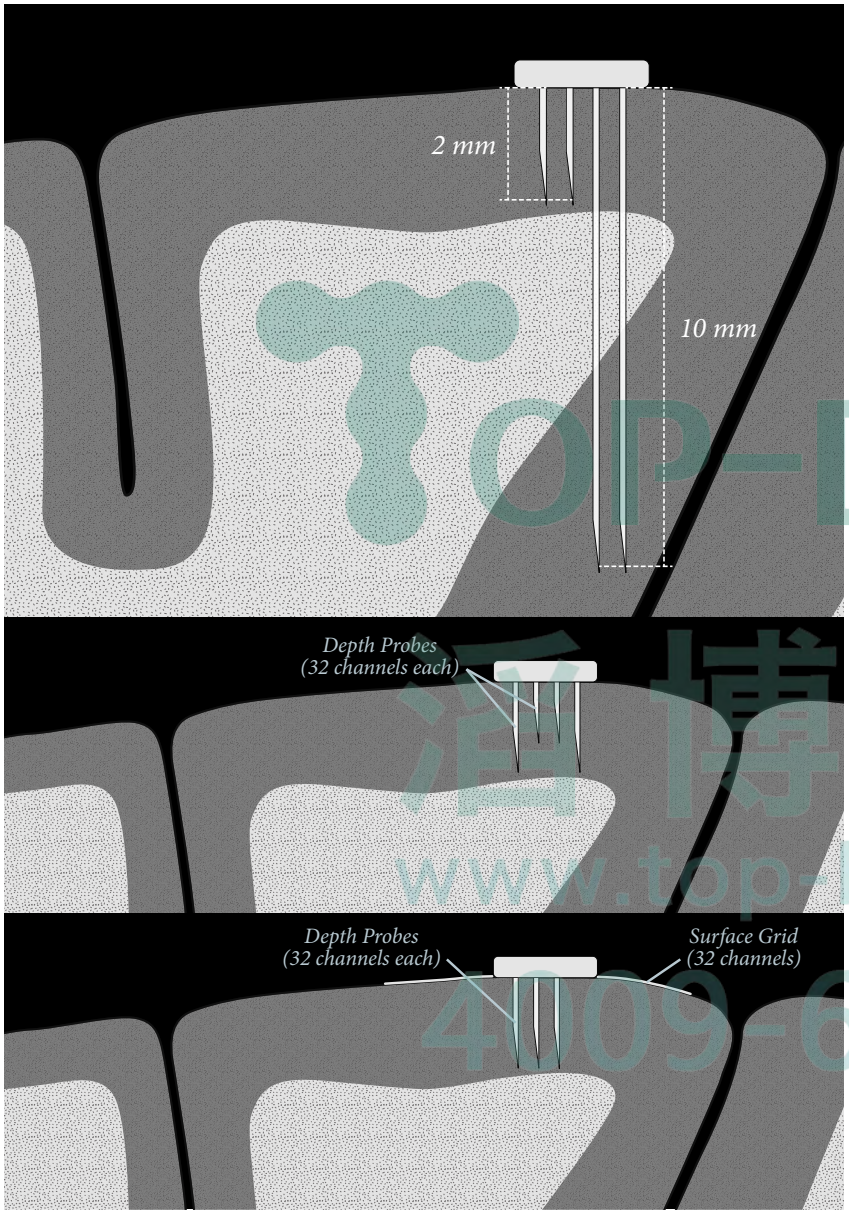
Acute
Matrix Arrays can be configured for acute work with any animal model.

Chronic Small Animal
Compact 64- or 128-channel Matrix Arrays can be configured for chronic small animal applications.

Chronic Large Animal/Primate
Robust large animal packages have been extensively tested and proven over months in labs performing primate research.

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Above: *Illustrations of potential Matrix Array™ configurations. Top: Combine short and long array designs to target both the sulcus and gyrus. Middle: Combine array designs of different lengths to target adjacent cortical layers. Bottom: Combine depth probes with surface grids.*

Matrix Arrays™ offer unique potential to understand neuronal networks in novel ways.

The support structure of the Matrix Array™ is a silicon platform where our industry-standard 2D silicon electrodes are installed. Both the slot spacing and the 2D electrode array combination can be customized, giving you unsurpassed flexibility in customizing a true 3D probe capable of spanning any anatomical structure. An ultra-flexible cable assembly connects the Matrix Array™ to conventional percutaneous connectors.

- Configure electrode length, site area, spacing; combine different 2D array designs for a tailored neural interface.
- Silicon platform comes with 2D arrays spacing ranging from 200-2000 um.
- Penetrating arrays can be combined with surface ECoG grids

SPECIFICATIONS

Channel Count	64, 128, 256 (see following pages)
X-Axis (2D Array) Dimension	1800 µm max width
Y-Axis (2D Array) Spacing Options	200 µm, 300 µm, 400 µm, 600 µm, 800 µm, 1000 µm, 2000 µm (specify when ordering)
Z-Span (Depth)	Up to 10 mm (varies by array design/ selection)
Cable Length (distance from implant to connector)	30 mm, customizable up to 50 mm
Electrode Site Material	Iridium (standard), PtIr (standard), Platinum (custom), Gold (custom)
Electrode Array Thickness	50 µm

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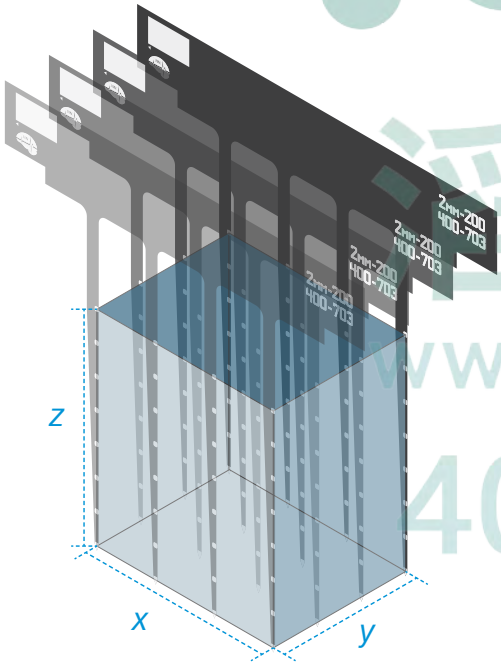
How to Configure a Matrix Array™

Step 1: Select an appropriate package for your experiment type and animal model. (See **Matrix Selection Guide,** next page.)

Step 2: Select 2D Arrays. Each 2D array has 32 electrode sites - for a 64-channel Matrix Array™, select two 2D arrays. For a 128-channel Matrix Array™, select four. You may combine different 2D Arrays in your selection, or include ECoG arrays for combined depth and surface recording.

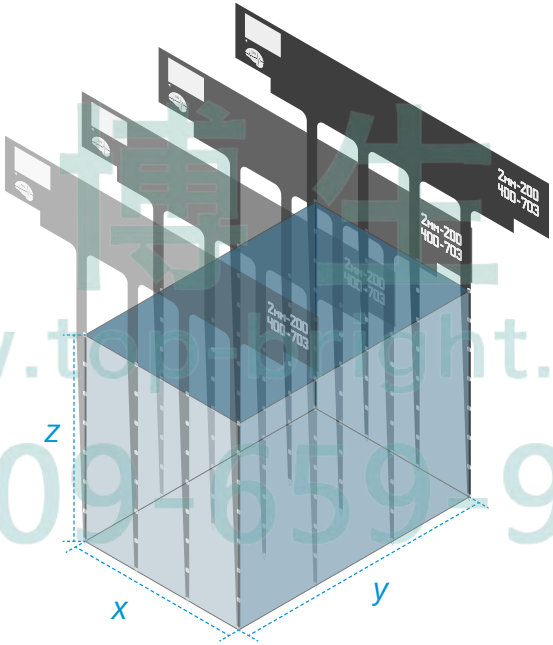
Step 3: Select a platform spacing. The illustration below shows tissue coverage with 3 of the 7 different platform spacings available. In this example, the M4x8-2mm-200-400-177 is used; to calculate tissue coverage for your design, use the dimensions available on the following pages.

300 µm spacing



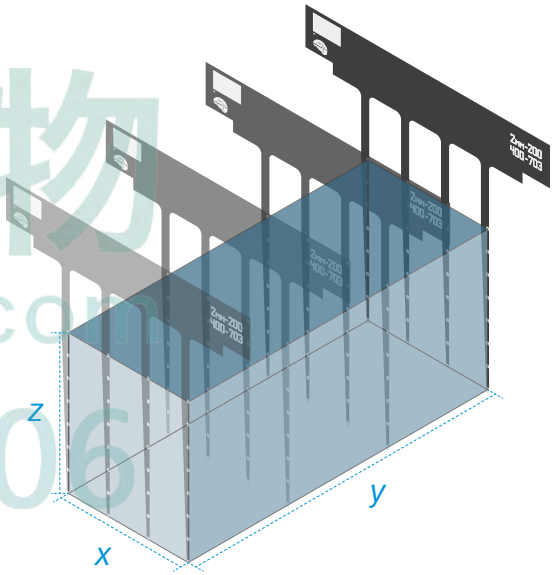
x: 1200 µm
y: 900 µm
z: 1400 µm
volume: ≈ 1.512 mm³

600 µm spacing



x: 1200 µm
y: 1800 µm
z: 1400 µm
volume: ≈ 3.024 mm³

1000 µm spacing



x: 1200 µm
y: 3000 µm
z: 1400 µm
volume: ≈ 5.04 mm³

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MATRIX SELECTION GUIDE

PACKAGE	ANIMAL MODEL	PACKAGE FEATURES	CHANNEL COUNT	APPLICATION	CABLE	32-CHANNEL 2D PROBE SPACING (PLATFORM)	CONNECTORS
MCM Matrix CM-Series	Small	Polymer	64 or 128	Acute / Chronic	N/A	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	Omnetics NSD36 (4 guideposts)
MH Matrix H-Series	Small	Polymer	64 or 128	Chronic	22 mm 25 mm 30 mm	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	Omnetics NSD36 (4 guideposts)
MHS Matrix H-Series, Strengthened	Medium	Polymer and metal supported	64 or 128	Chronic	22 mm 25 mm 30 mm	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	Omnetics NSD36 (4 guideposts)
MHD Matrix Pedestal	Large	Titanium with stand off	128 / 256	Chronic	35 - 40 mm	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	NN-HD
MHD_Dual Matrix Pedestal, Dual Platform	Large	Titanium with stand off	128 / 256	Chronic	Dual 35 - 40 mm	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	NN-HD
MHDLP Matrix Low Profile	Large	Titanium	128 / 256	Chronic	35 - 40 mm	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	NN-HD
MA Matrix Acute	Small/Medium	SS Y-Bracket	64 or 128	Acute	N/A	200 µm 600 µm 300 µm 800 µm 400 µm 1000 µm	Omnetics NSD36 (4 guideposts)

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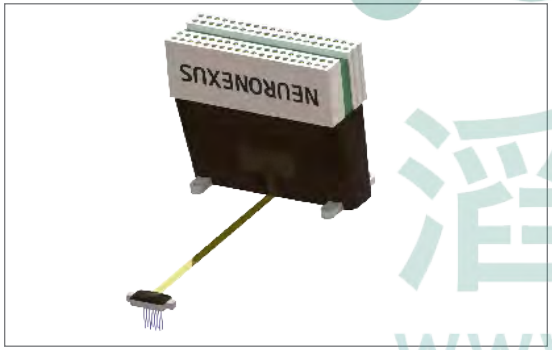
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MATRIX PACKAGES

Small



MCM64 on Rat Skull



MH64

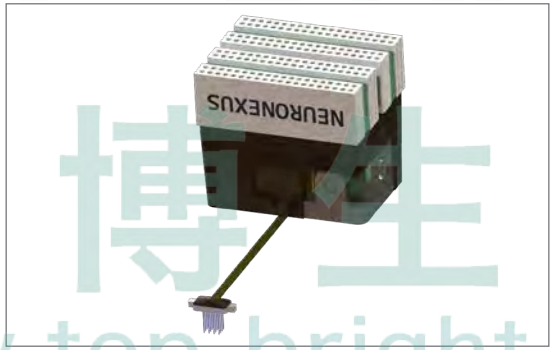
Small Matrix Array Packages

MCM64
MCM128
MH64
MH128
MA64
MA128

Medium



MA128 (Acute Matrix Array)



MHS128

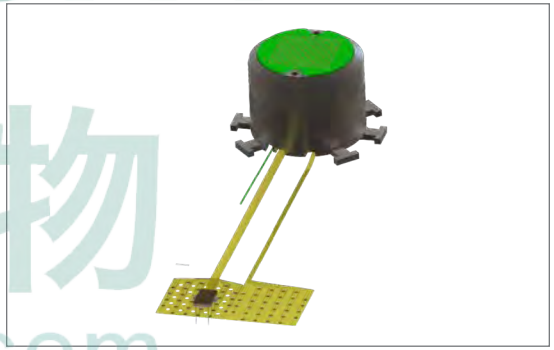
Medium Matrix Array Packages

MHS64
MHS128
MA64
MA128

Large



MHD_Dual256



MHDLP256 (Shown with surface arrays)

Large Matrix Array Packages

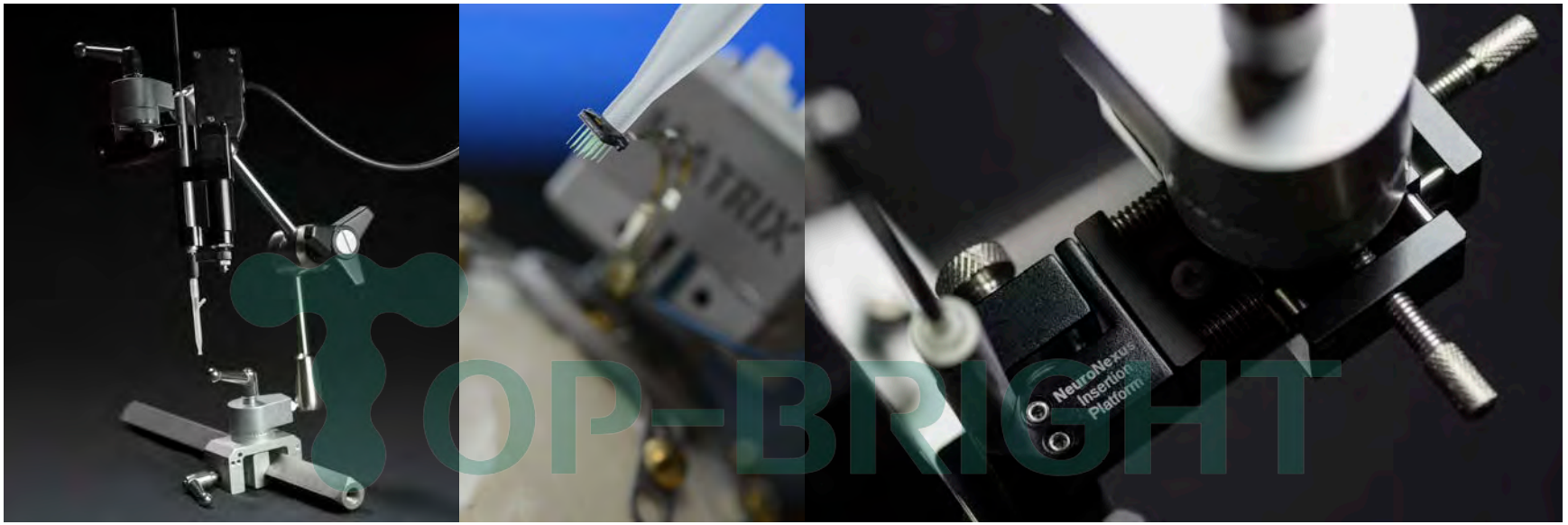
MHD64
MHD128
MHD256
MHD_Dual128
MHD_Dual256
MHDLP64
MHDLP128
MHDLP256
MA64
MA128

Matrix Package Naming Key:

CM = Cableless
H = Cable
S = Strengthened
HD = Primate / Pedestal
LP = Low Profile / No feet
Dual = Dual Platform

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The **Matrix Insertion Tool** (above, left, mounted on **All-Angle Arm** and attached to a Kopf® rail) is a computer-controlled, precision linear actuator to support surgical implantation of NeuroNexus arrays. Through an intuitive software application, arrays can be implanted to precise locations, at speeds most suitable for each application.

The Insertion Tool can be mounted to standard stereotaxic manipulators. All NeuroNexus probe packages are compatible.

The Matrix Insertion Tool is ideal for insertion of our Matrix Arrays™. The carefully calibrated insertion minimizes damage from excessive insertion force. The IST-Matrix utilizes vacuum suction to hold the Matrix Array™ during insertion, allowing for an easy, vibration-free release after implant.

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SPECIFICATIONS (INSERTION TOOL)

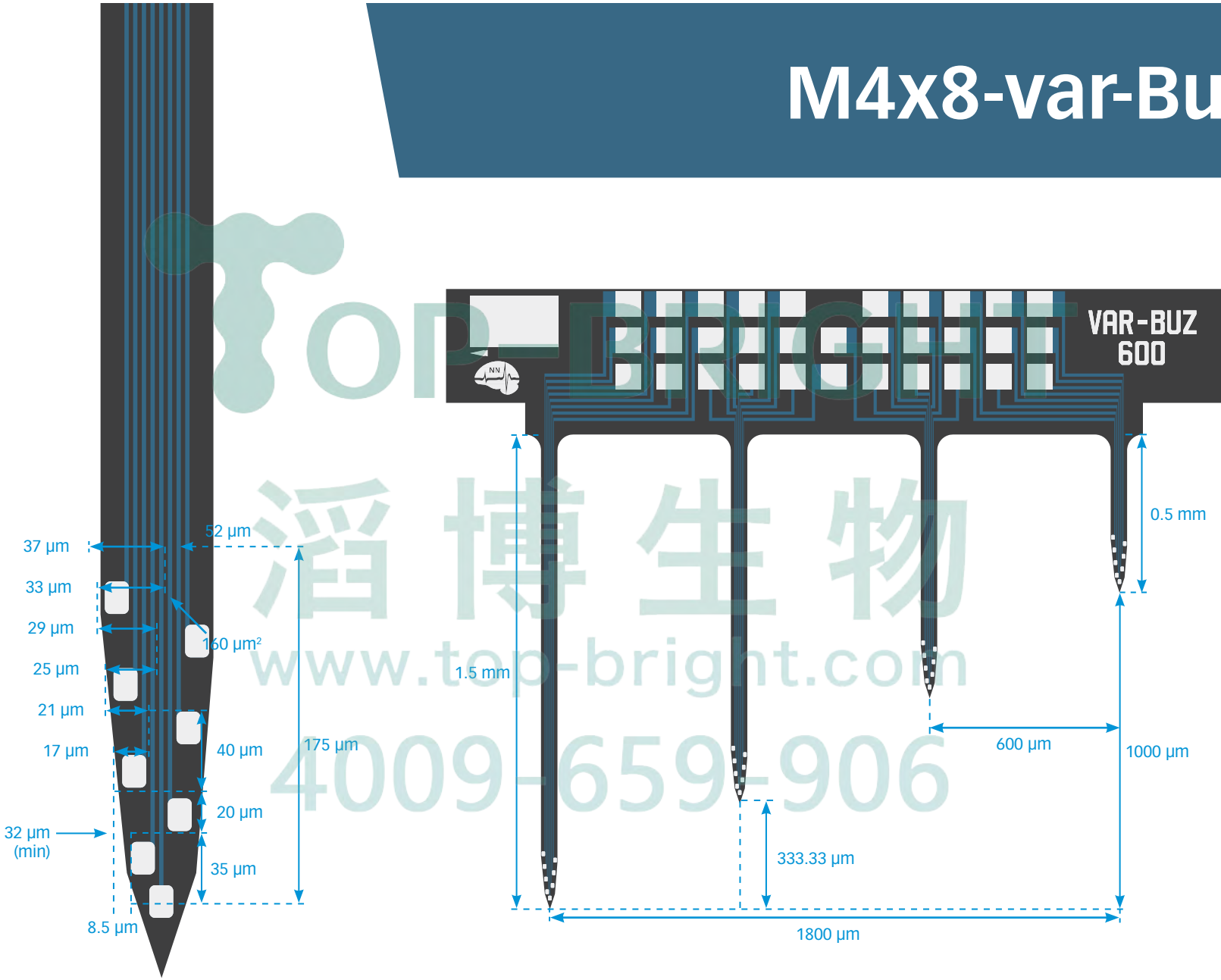
Speed	0.22 µm/s - 8 mm/s (0.5 - 2 mm/s recommended)
Travel Range	0 - 50 mm
Accuracy	30 µm
Step Size	0.05 µm
Dimensions	150 mm (L) x 30 mm (W) x 20 mm (H)

SPECIFICATIONS (ALL-ANGLE ARM)

Total Length	245 mm
Range of movement	Fully articulated positioning arm: 90° pivotable and 360° rotatable ends, 360° rotatable elbow
Insertion Platform	± 5 mm in 2 axes

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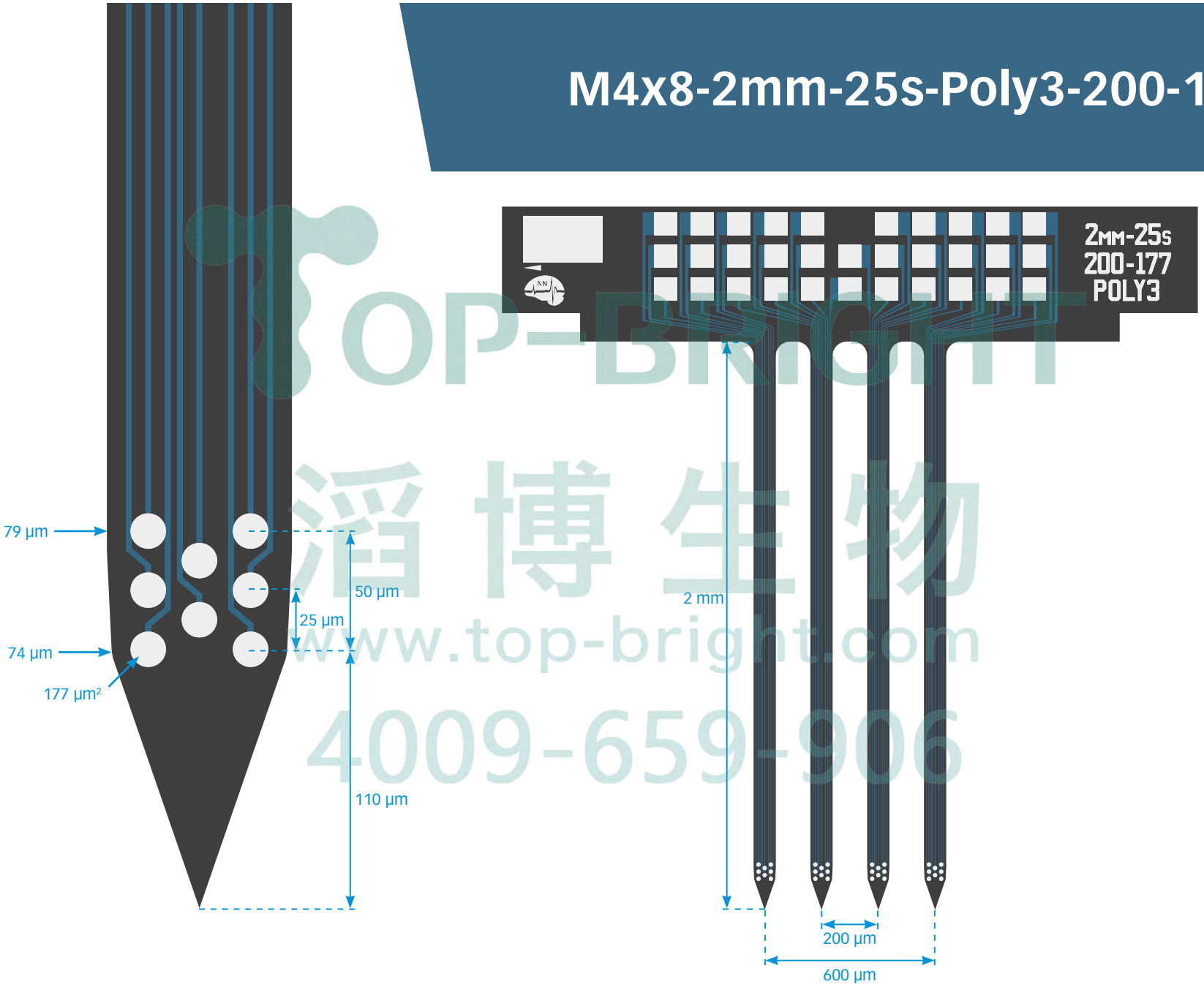
M4x8-var-Buz



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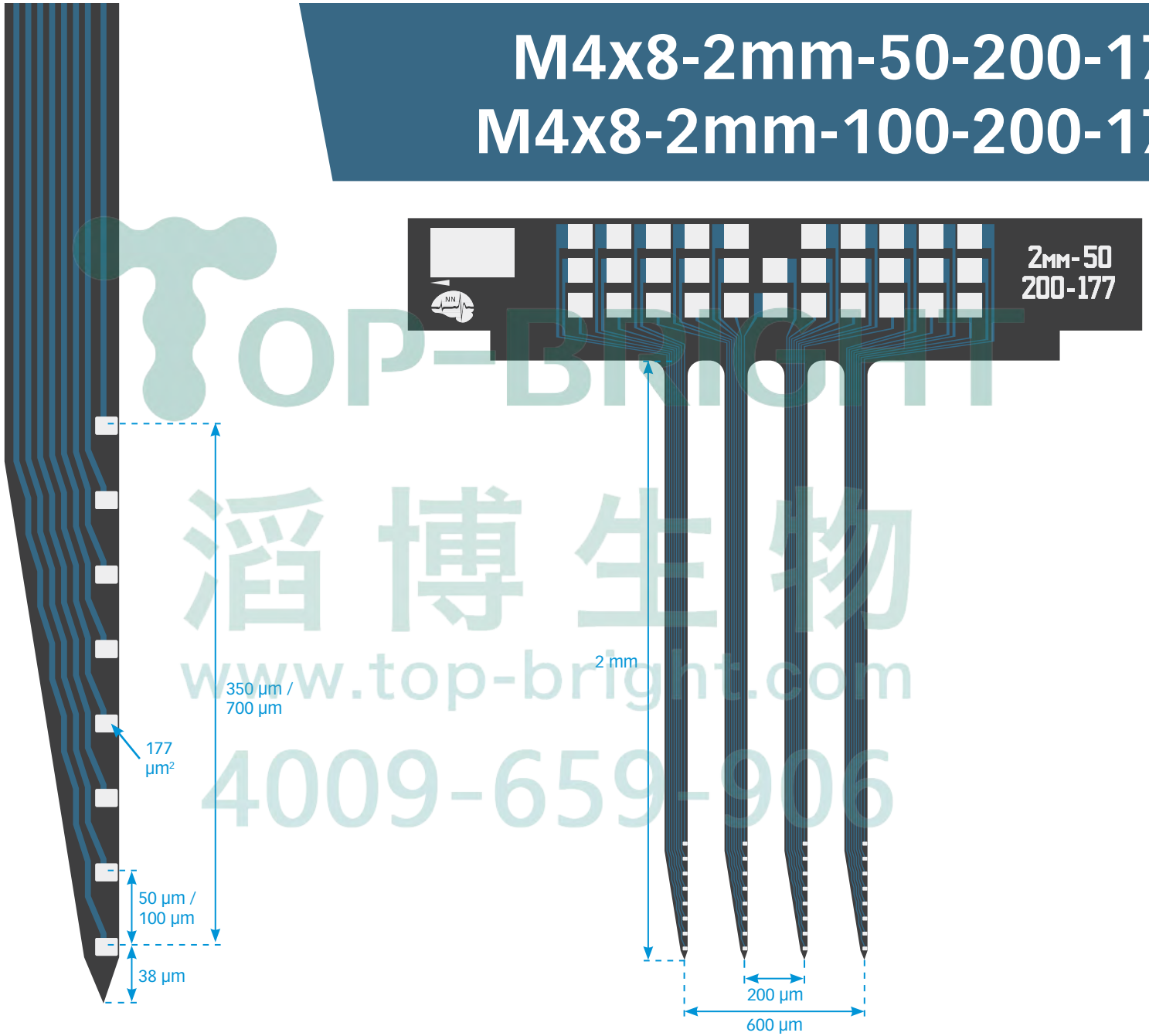
M4x8-2mm-25s-Poly3-200-177



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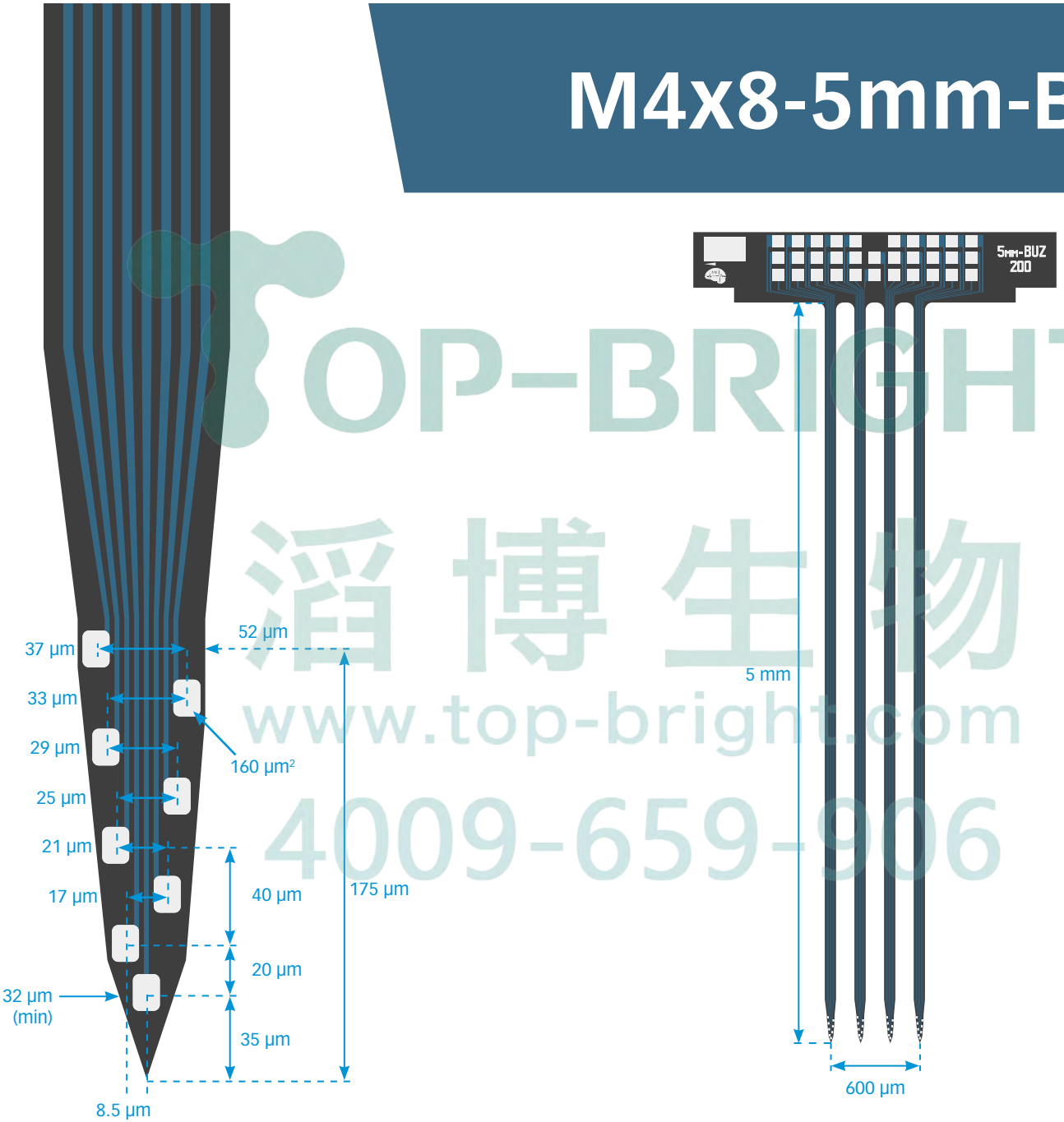
M4x8-2mm-50-200-177
M4x8-2mm-100-200-177



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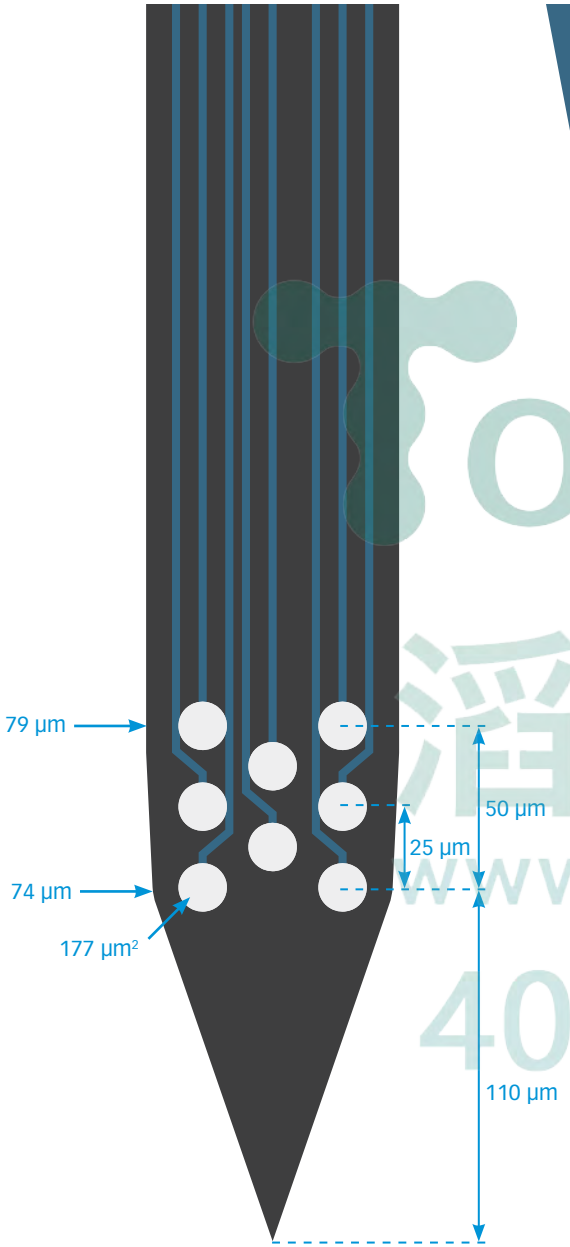
M4x8-5mm-Buz-200

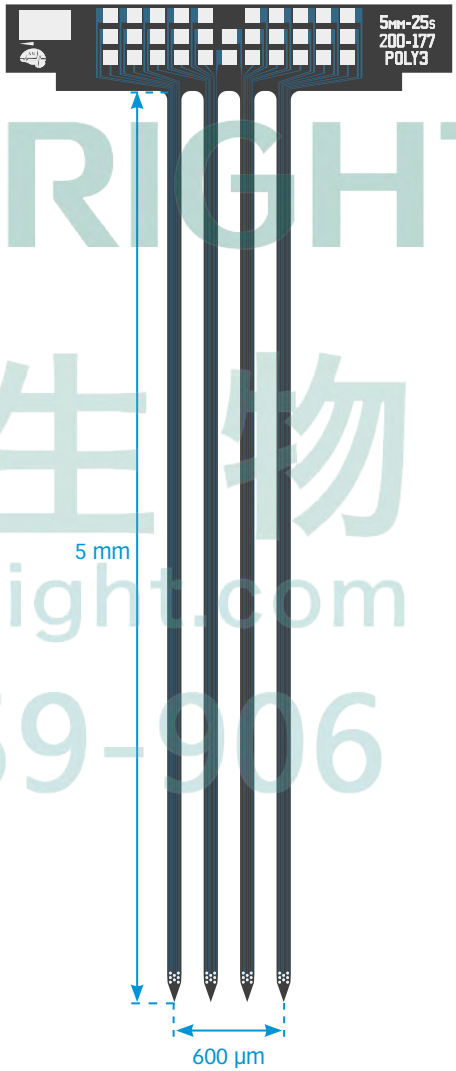


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M4x8-5mm-25s-Poly3-200-177

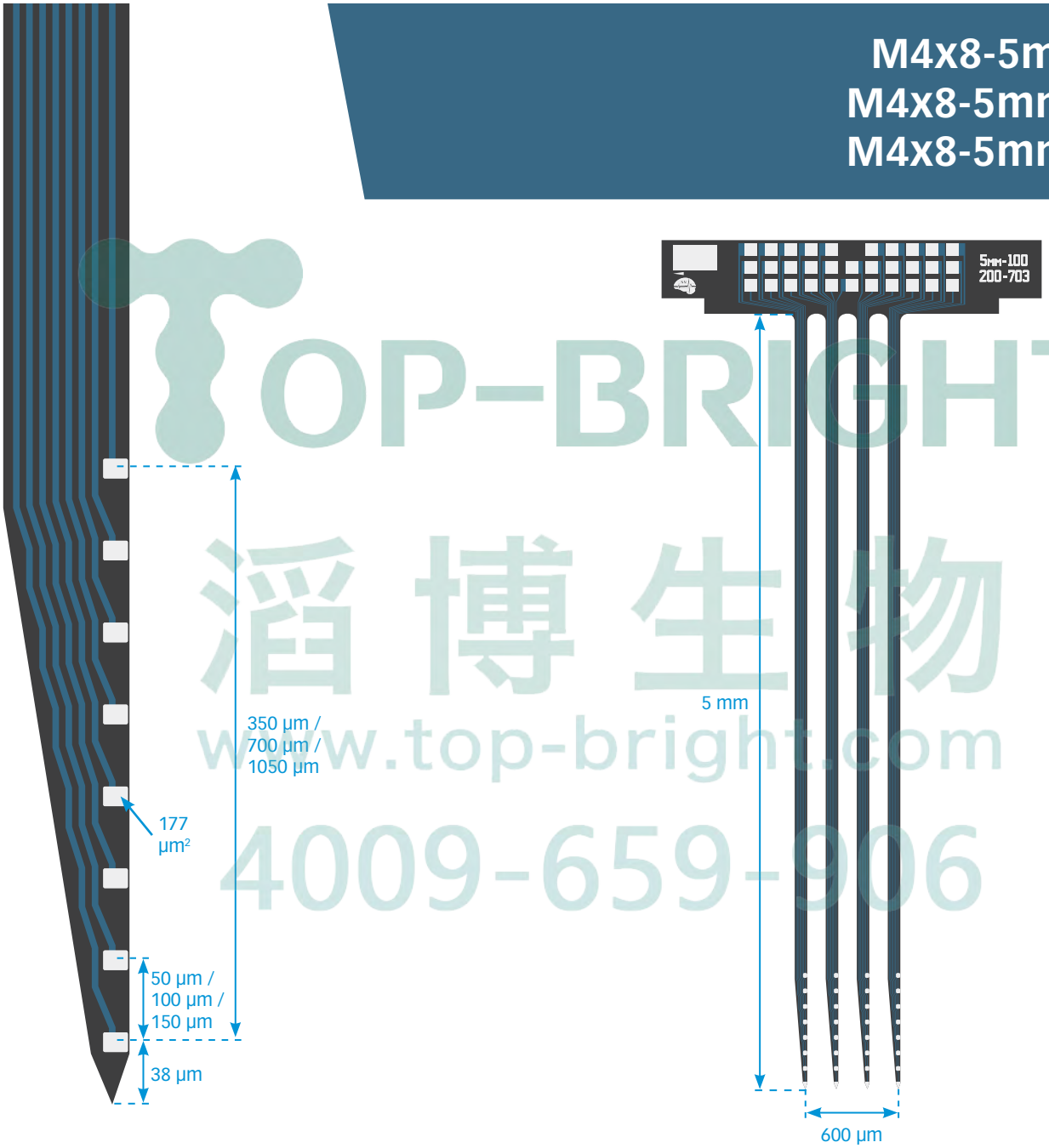




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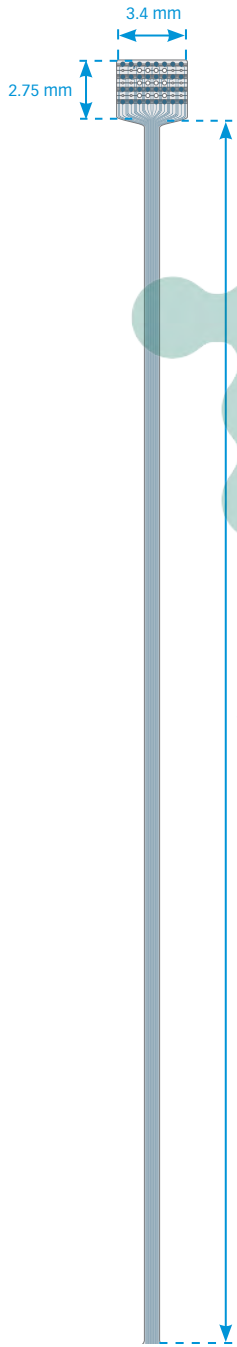
M4x8-5mm-50-200-177
M4x8-5mm-100-200-177
M4x8-5mm-150-200-177

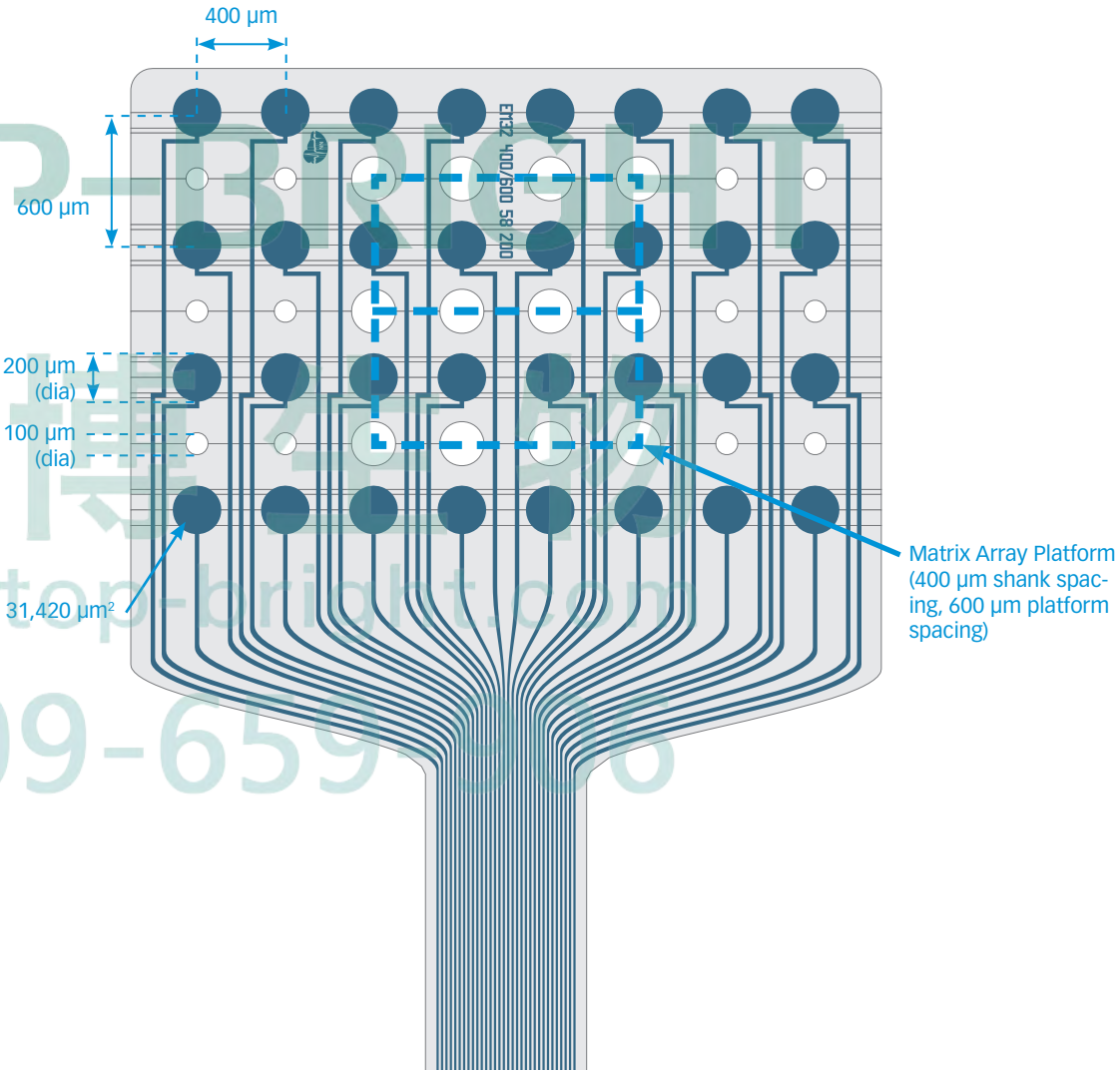


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EM32-400-600-58-200

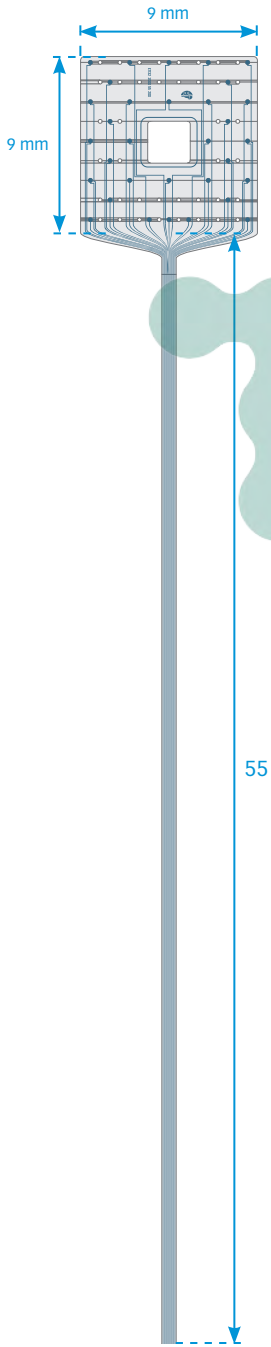


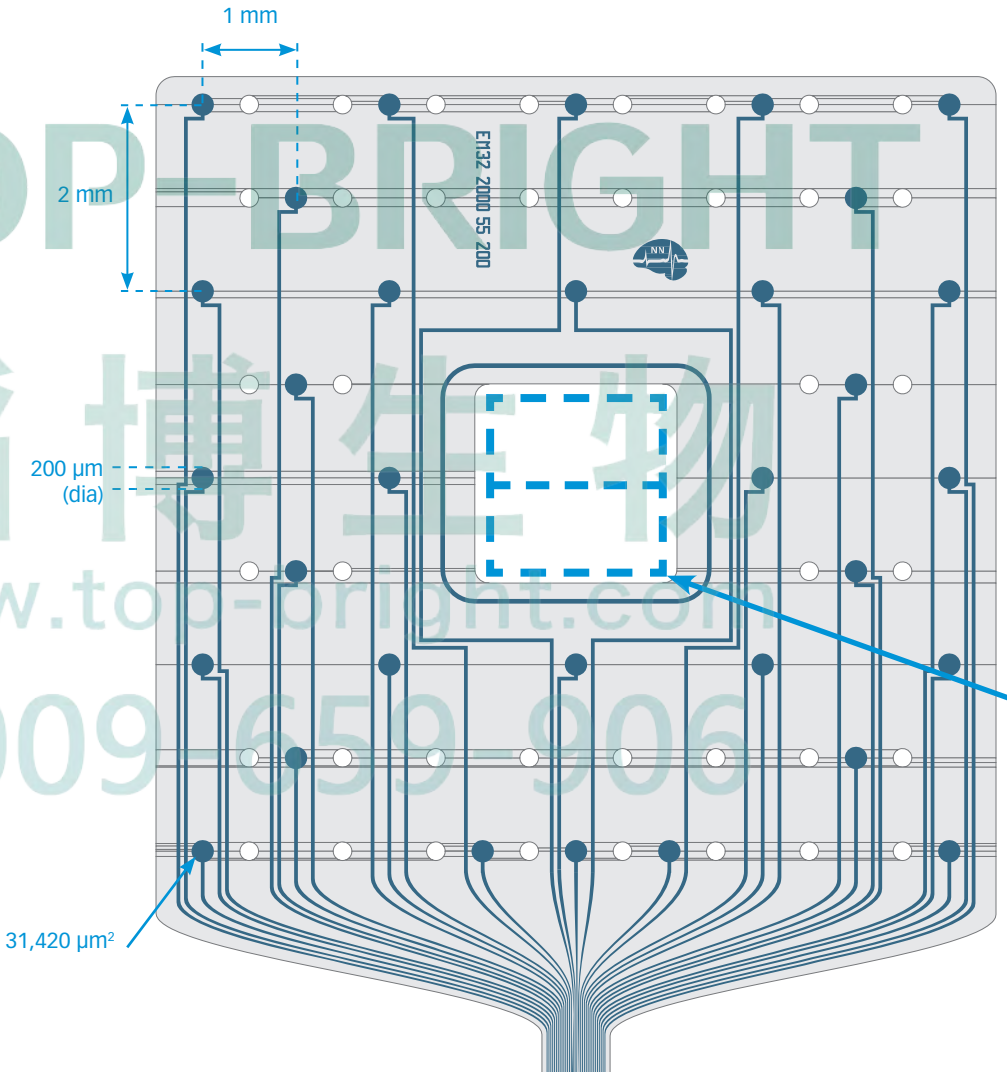


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EM32-2000-55-200



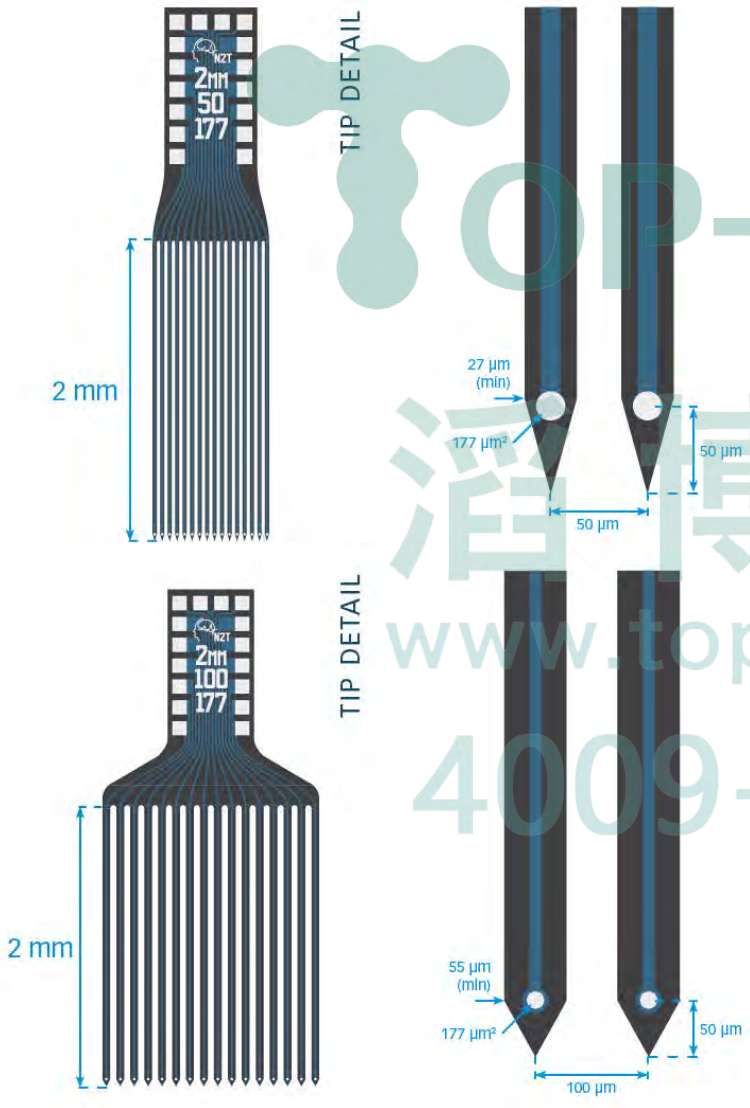


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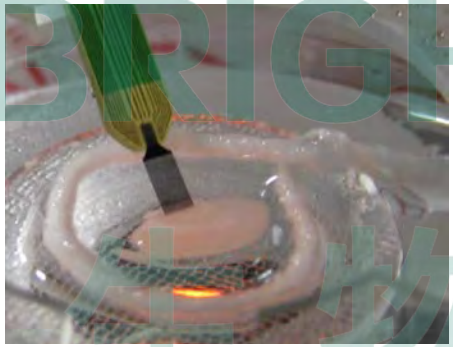
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in vitro

BACK TO INDEX



Designed by Dr. Liset Menendez de la Prida at Instituto Cajal – CSIC, the A16x1 microelectrode array is designed specifically for *in vitro* slice applications. Its 16 tip sites, along with its slender comb design, enable high-resolution in vitro research.



"Both single-cell activity and field potential population events can be easily recorded. The linear array allows for propagation studies both in vitro and in vivo and it can be used for current source density analysis in slices."
- Dr. Liset Menendez de la Prida, *Instituto Cajal - CSIC*

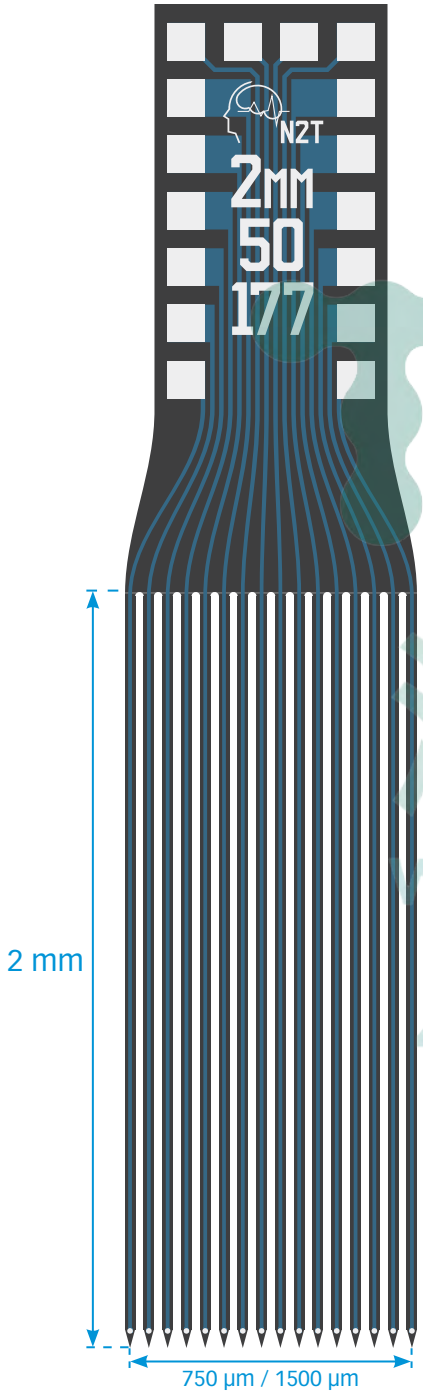
SPECIFICATIONS

Electrode Site Material	Iridium (standard),
Implantable Length	2 mm
Total Horizontal Coverage	750 µm or 1500 µm
Channel Count	16

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A16x1-2mm-50-177
A16x1-2mm-100-177



TIP DETAIL



available packages

ACUTE
A16

CHRONIC
CM16LP
H16_21mm
Z16

thickness

15 µm

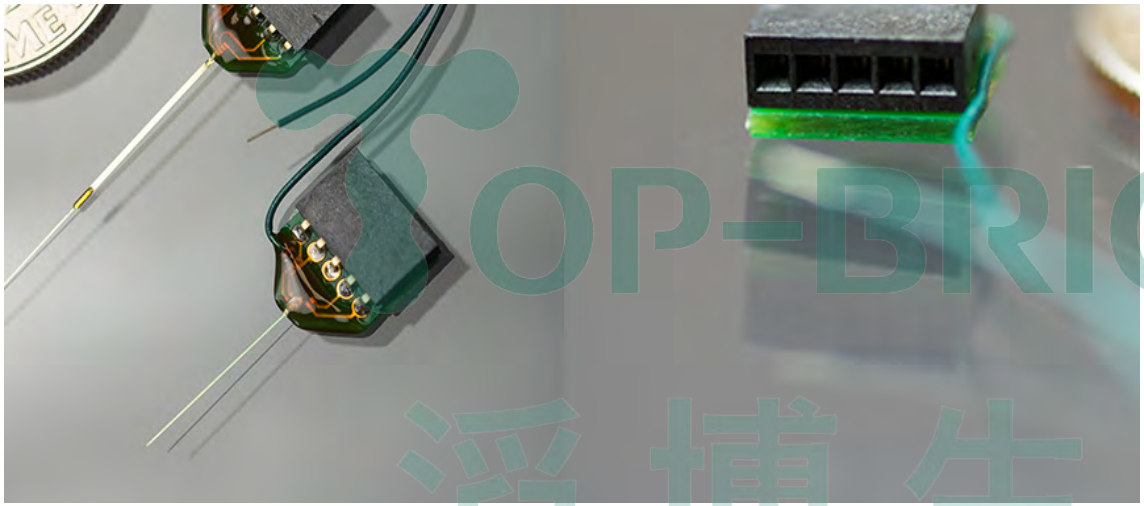
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Qtrode

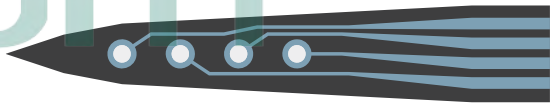
4-CHANNEL PROBE / WIRE TETRODE UPGRADE

BACK TO INDEX



- **Fast Delivery** – Qtrodes are stocked for quick shipment and delivery. Please note there is a minimum order of 5 Qtrodes. (This applies to all models.)

LINEAR



TETRODE



Above: Qtrodes come in linear and tetrode site layouts

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NeuroNexus **Qtrodes** are low-cost 4-channel probes designed to replace tetrodes and/or wires in your lab. Qtrodes are also ideal for acute or chronic experiments requiring lower channel counts.

- **Predictable geometry** – Obtain consistent recording results with precise, reproducible geometry and electrical characteristics from our silicon probes.
- **Optogenetics-compatible** – Combine an acute or chronic Qtrode with an optical fiber to combine electrophysiology with optogenetic stimulation. Opto-Qtrodes use the "O" prefix designation, e.g. "OCQ4."
- **Improved Chronic experiments** – Combine a Qtrode with a microdrive for potentially better chronic experiment longevity and data yield.

SPECIFICATIONS

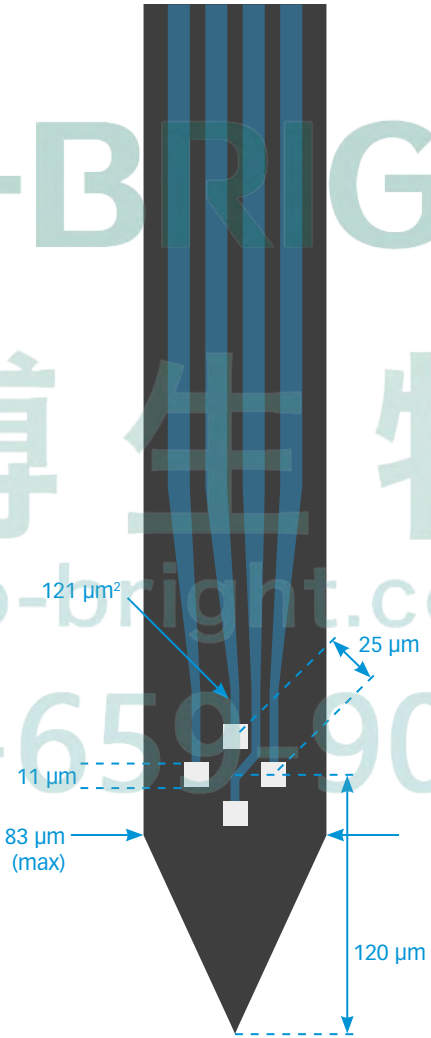
Electrode Site Material	Iridium (standard),
Electrode Thickness	15 µm or 50 µm (varies by design)
Electrode Length	3, 5, 10 mm (varies by design)
Site Layout	Linear or Tetrode
Channel Count	4

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Q1x1-tet-3mm-121
Q1x1-tet-5mm-121
Q1x1-tet-10mm-121



TIP DETAIL



available packages

ACUTE
Q4

CHRONIC
CQ4
HQ4_21mm

OPTOGENETICS
OAQ4LP
OCQ4LP
OHQ4LP

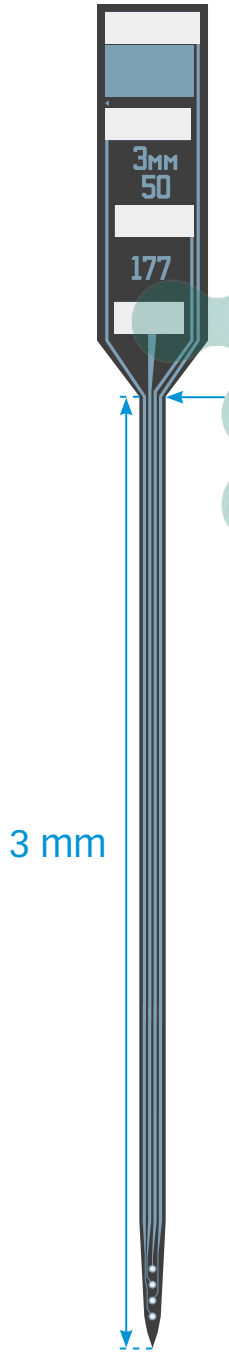
thickness

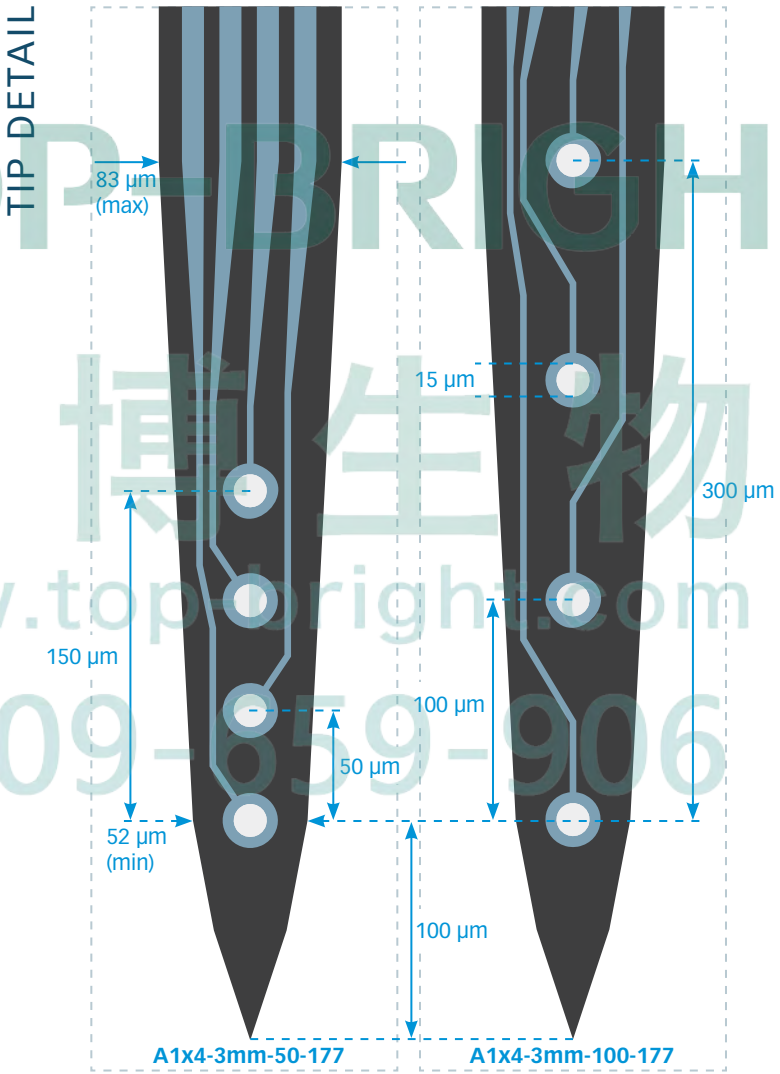
15 µm (3 mm, 5 mm)
50 µm (3 mm, 5 mm, 10 mm)

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Q1x4-3mm-50-177
Q1x4-3mm-100-177





available packages

ACUTE
Q4

CHRONIC
CQ4
HQ4_21mm

OPTOGENETICS
OAQ4LP
OCQ4LP
OHQ4LP

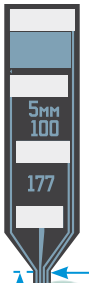
thickness

15 µm
50 µm

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Q1x4-5mm-50-177
Q1x4-5mm-100-177
Q1x4-5mm-200-177





available packages

ACUTE
Q4

CHRONIC
CQ4
HQ4_21mm

OPTOGENETICS
OAQ4LP
OCQ4LP
OHQ4LP

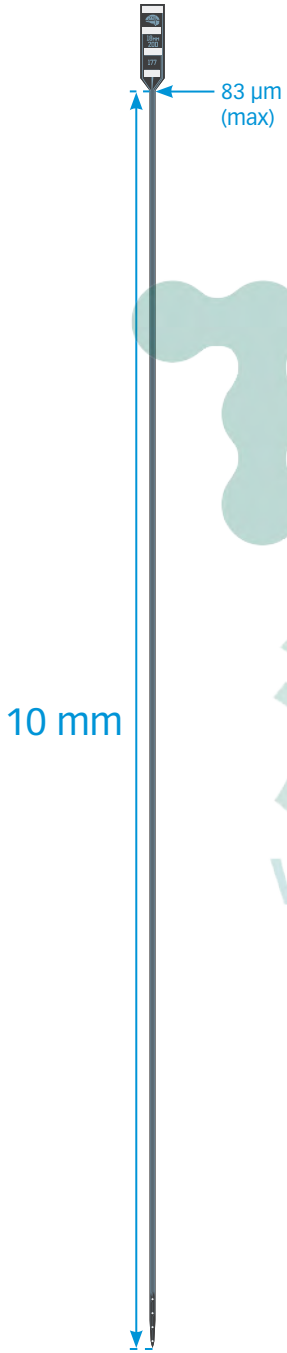
thickness

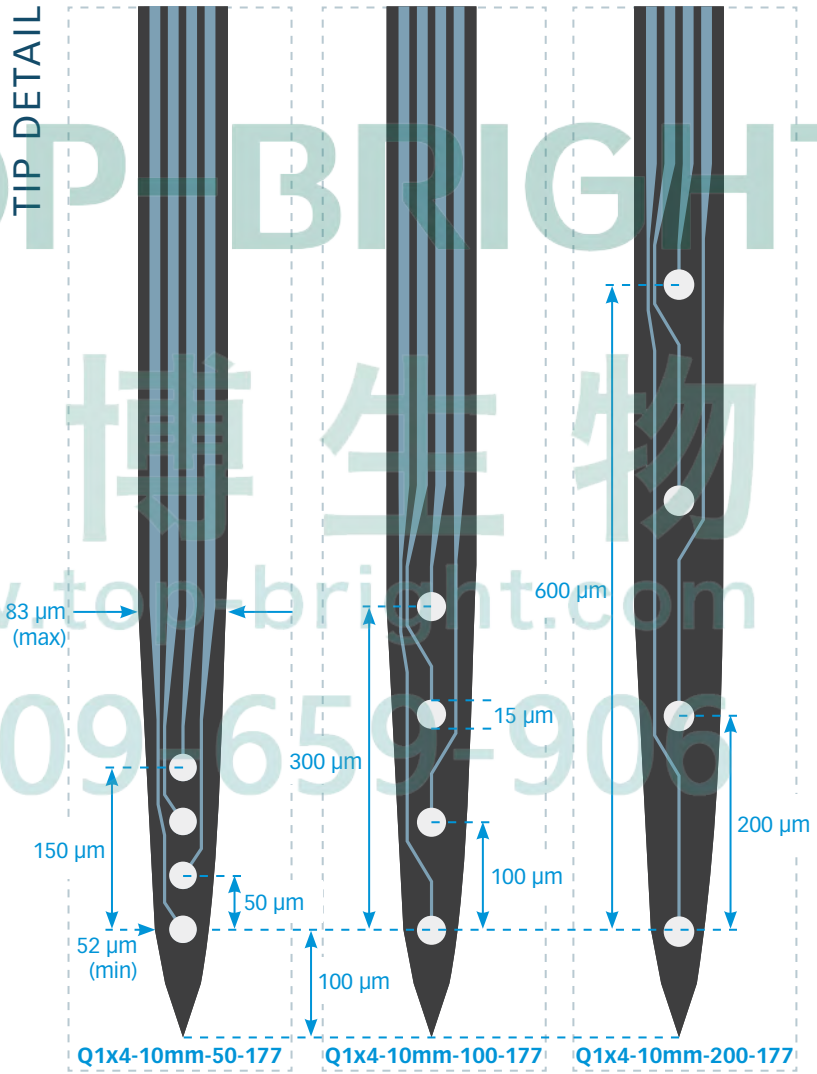
15 µm
50 µm

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Q1x4-10mm-50-177
Q1x4-10mm-100-177
Q1x4-10mm-200-177





available packages

ACUTE
Q4

CHRONIC
CQ4
HQ4_21mm

OPTOGENETICS
OAQ4LP
OCQ4LP
OHQ4LP

thickness

50 µm

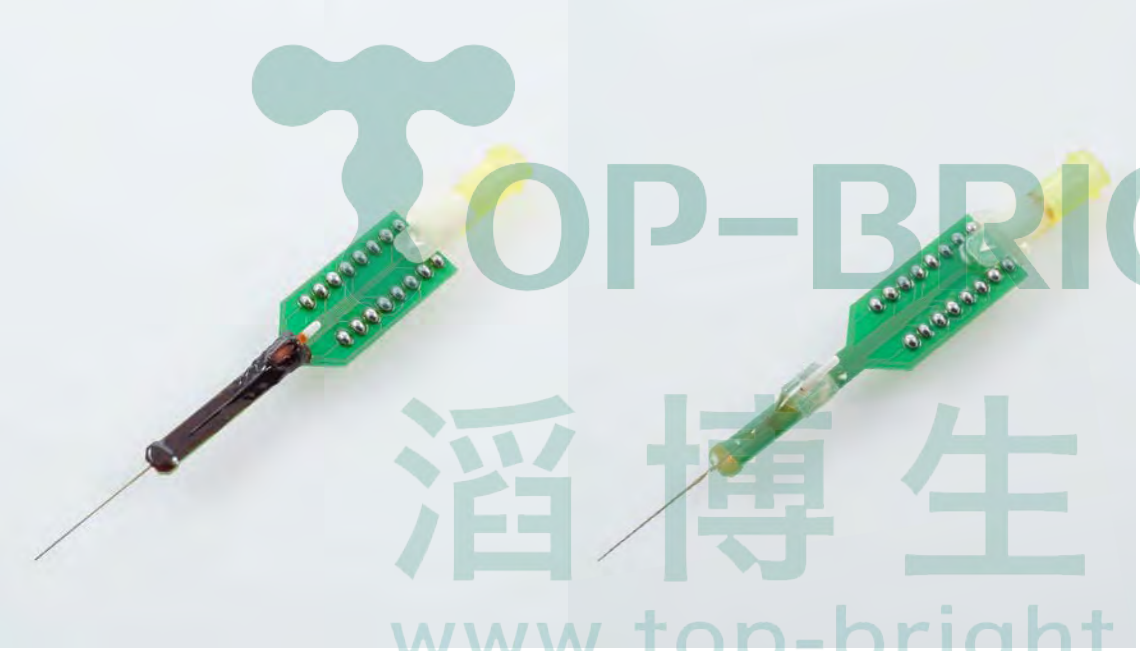
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Drug Delivery

COMBINED DRUG DELIVERY AND ELECTROPHYSIOLOGY

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SPECIFICATIONS

Electrode Site Material	Platinum
Total Probe Thickness	≈185 µm
Coupling Conduit	Luer taper (polypropylene)
Fluidic Tube	32 gauge / 0.241 mm Stainless steel
Fluidic Port Tip Angle	90° (standard), 45°
Implantable Length	15 - 18 mm
Electrode Coverage	1.5 mm
Channel Count	16
Available Packages	D16, DM16, OD16LP

The E16-20mm-100-177 electrode array can be mounted on a fluidic tube to combine drug delivery and electrophysiological recording.

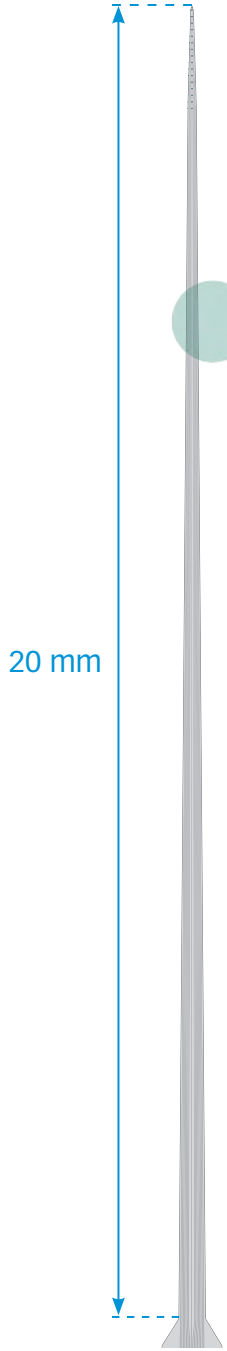
The fluidic tube is mounted on the lower side of the microelectrode array, and the delivery port is at the distal end of the fluidic tube. The fluidic interface is compatible with standard **Luer taper** fittings for interfacing with external injection pumps. Typically, a pressure-based delivery mechanism is used.

The acute drug delivery array can be configured with an optical fiber. As with many of our products, the fluidic probe can be customized. Contact us for your customization needs.

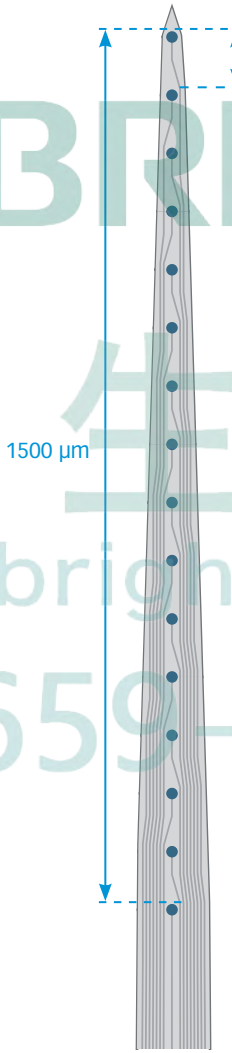
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E16-20mm-100-177 (Drug Delivery Array)



TIP DETAIL



available packages

ACUTE
D16

CHRONIC
DM16

OPTOGENETICS
OD16

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Targets 10 mm or deeper

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Vector Array™

DEEP BRAIN PROBE / ACUTE, CHRONIC, AND OPTOGENETICS

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The **Vector Array™** is optimized for deep brain applications, utilizing NeuroNexus microelectrode technology to record and stimulate in high resolution in hard-to-reach structures. Vector Arrays™ are compatible with NaN and Narishige drives.

- **Reach deep brain structures** – The Vector Array™ comes in 70 mm and 110 mm implantable lengths to reach deep structures in large animal models.
- **High Resolution** – Record and/or stimulate with 16, 32, or 64 channels. The Vector Array™ features the same precise electrode geometry and contact density as other NeuroNexus microelectrode arrays.
- **Versatile** – Configure the Vector Array™ for acute or chronic applications.
- **Optogenetics-Compatible** – An optical fiber can be mounted on the Vector Array™ for optogenetics applications. (See Specifications for fiber options. Opto-Vector packages use "OV" designation.)
- **Options, options** – Specify a laminar array design, or utilize multiple representation techniques with a Poly2 contact layout. Alternatively, design your own custom Vector Array.
- **Robust Hybrid assembly** – The Vector Array™ combines a high-resolution silicon MEA with a rigid stainless steel support body. This arrangement provides strength where needed, while minimizing tissue damage at the recording sites.
- **Inexpensive** – With a low cost per use, the Vector Array™ increases your data yield while saving you money.

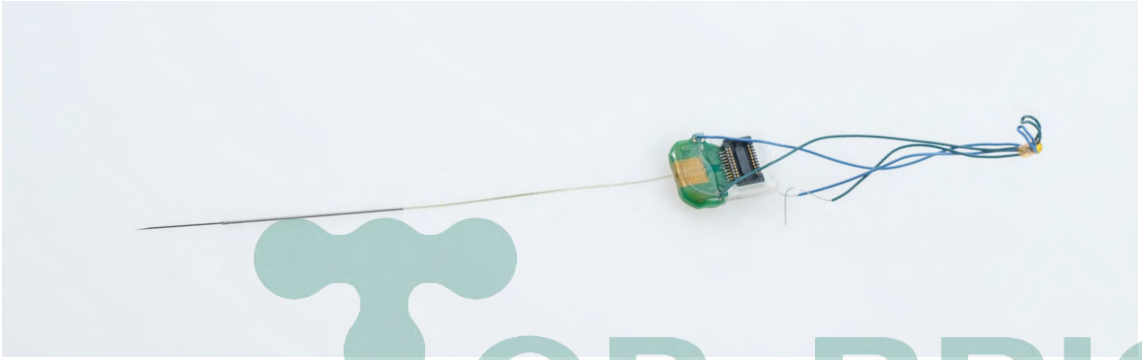
Left: *16- and 32- channel Vector Arrays*
Below: *64-channel Vector Array on a US penny*



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CHRONIC VECTOR ARRAY™



The Chronic Vector Array™ is a new design enabling access to deep brain structures (> 10 mm deep) during chronic applications.

Chronic Vector Arrays™ can be configured with implantable lengths from 30 - 55 mm. Please factor in implantation hardware (clamps, etc.) when configuring your probe.

OPTO VECTOR ARRAY™



FLAT FIBER OPTIONS (ID / OD / NA)
50 µm/70 µm, 0.22 NA (flexible)
50 µm/62.5 µm, 0.22 NA (etched)
105 µm/125 µm, 0.22 NA (standard)
105 µm/125 µm, 0.66 NA (Plexon patch cords)
200 µm/220 µm, 0.22 NA

SPECIFICATIONS

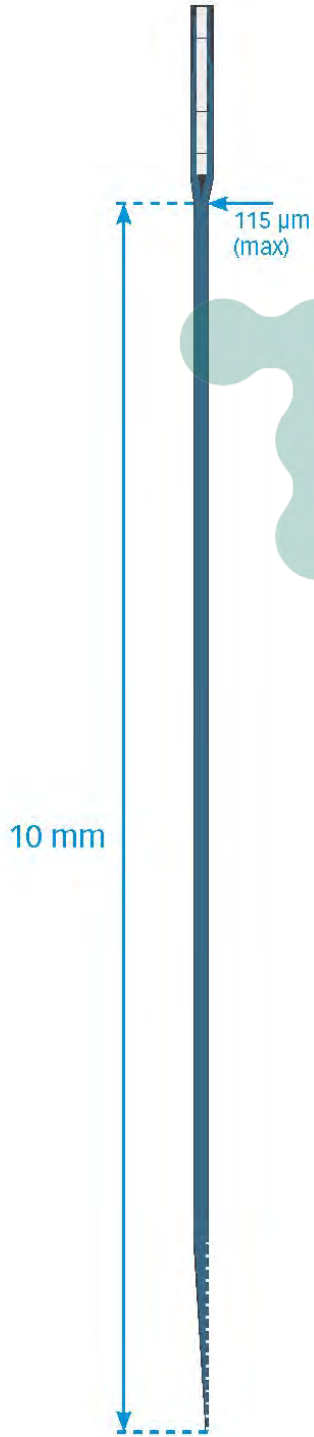
Channel Count	16, 32, 64
Total Length*	70 mm or 110 mm
Silicon Electrode Length	10 mm
Silicon Electrode Width	20 µm min (Edge design), 75 µm min (Poly2 design), 275 µm max
Silicon Electrode Thickness	50 µm
Site Area	177 μm^2
Site Coverage	375 µm - 6300 µm, depending on design
Electrode Site Material	Iridium
Site Target	Single Unit or LFP/ Stimulation
Support Body Diameter	315 µm OD (16-channels)
	400 µm OD (32- and 64-channels)

**64-channel Vector Arrays can only be configured for 70 mm implantable lengths*

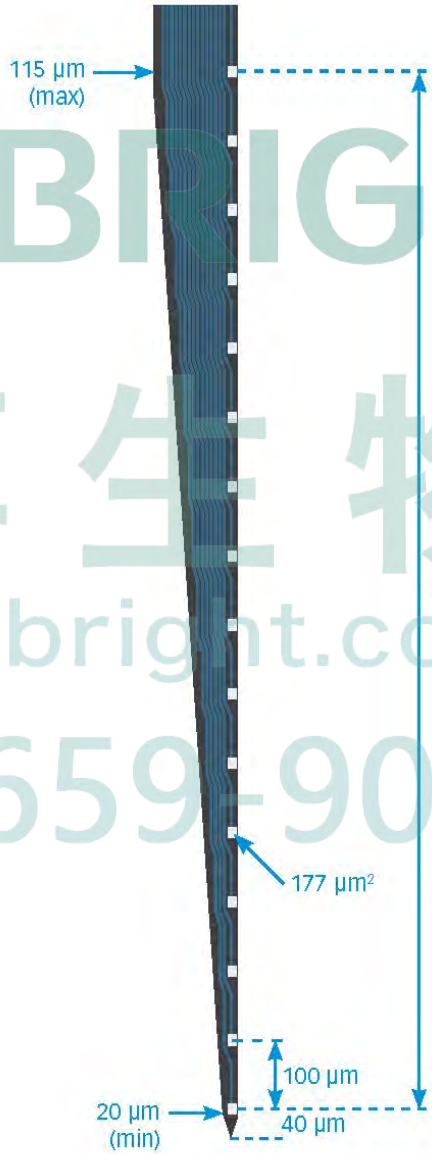
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V1x16-Edge-10mm-100-177



TIP DETAIL



available packages

ACUTE
V16_60_50
V16_100_50
VZ16_60_50
VZ16_100_50

CHRONIC
VC16
VZC16

OPTOGENETICS
OV16_60_50
OV16_100_50

(Package_Length_Thickness)

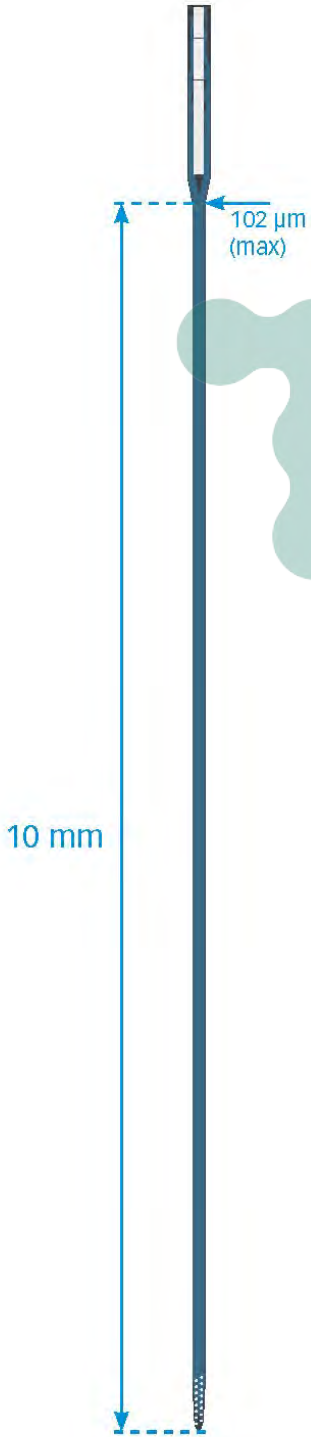
thickness

50 µm

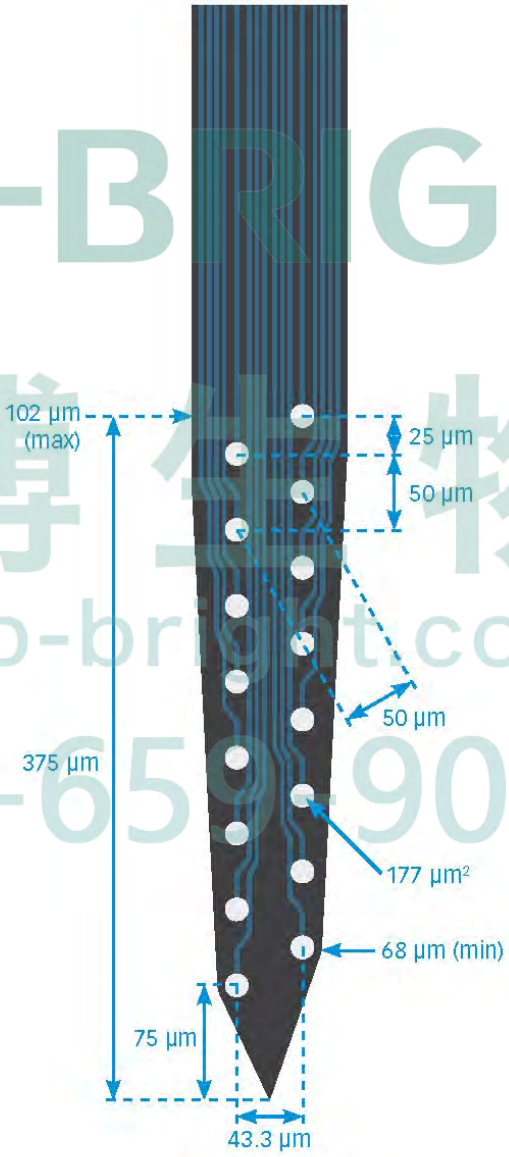
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V1x16-Poly2-10mm-50s-177



TIP DETAIL



available packages

ACUTE
V16_60_50
V16_100_50
VZ16_60_50
VZ16_100_50

CHRONIC
VC16
VZC16

OPTOGENETICS
OV16_60_50
OV16_100_50

(Package_Length_Thickness)

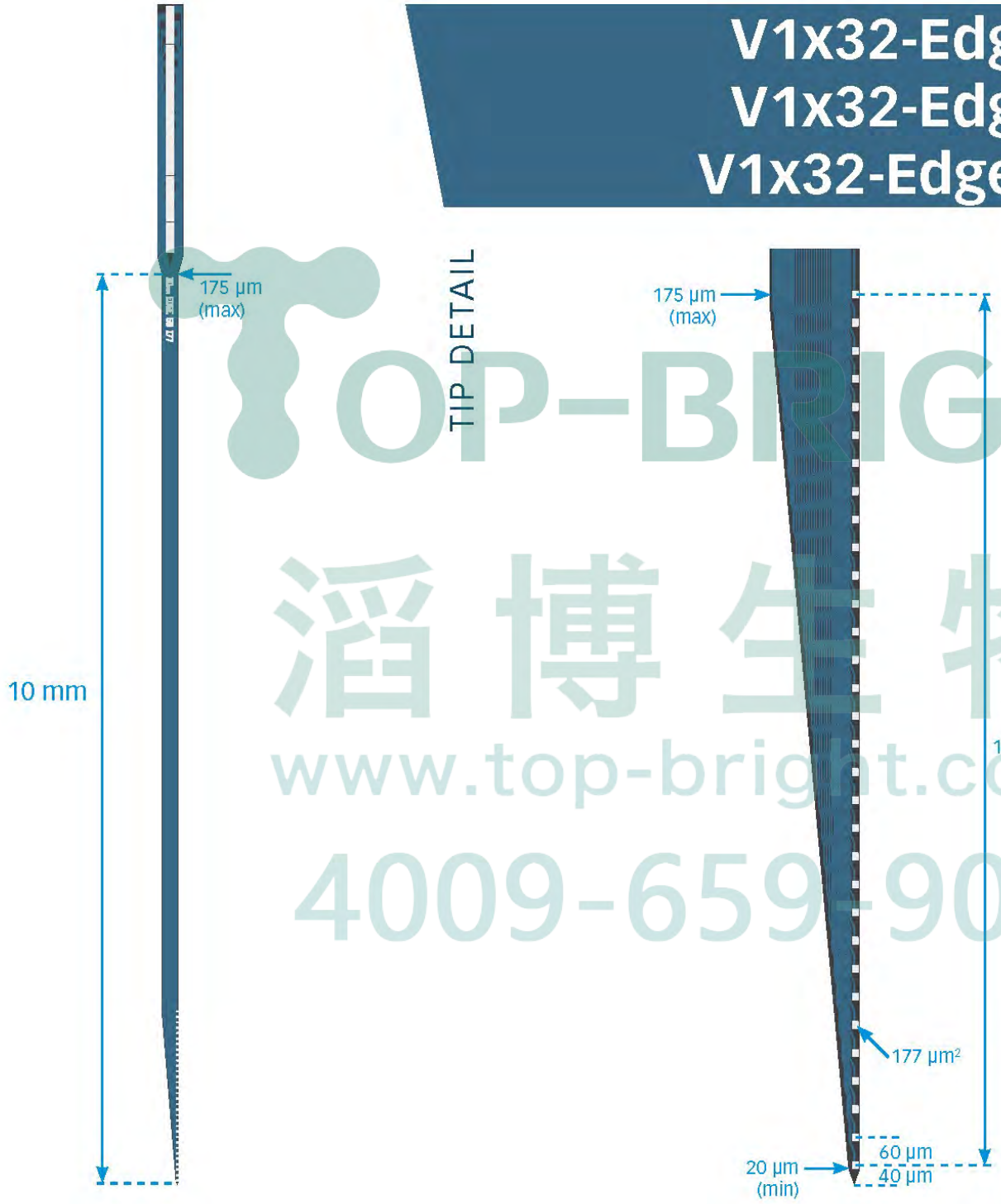
thickness

50 µm

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V1x32-Edge-10mm-50-177
V1x32-Edge-10mm-60-177
V1x32-Edge-10mm-100-177



available packages

ACUTE
V32_60_50
V32_100_50
VZ32_60_50
VZ32_100_50

CHRONIC
VC32
VZC32

(Package_Length_Thickness)

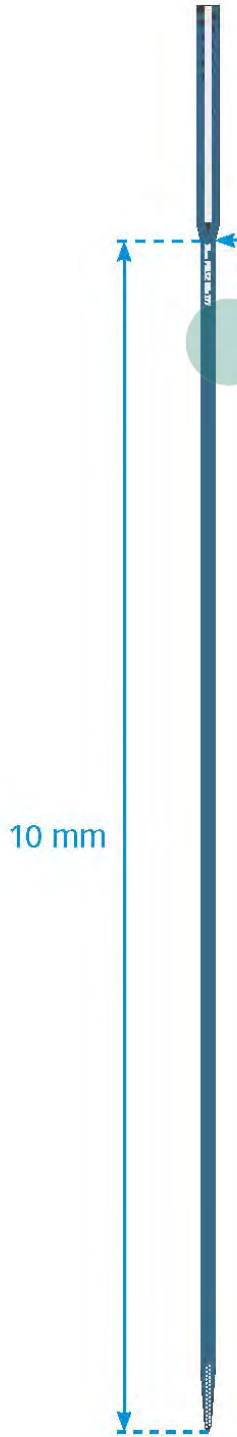
thickness

50 µm

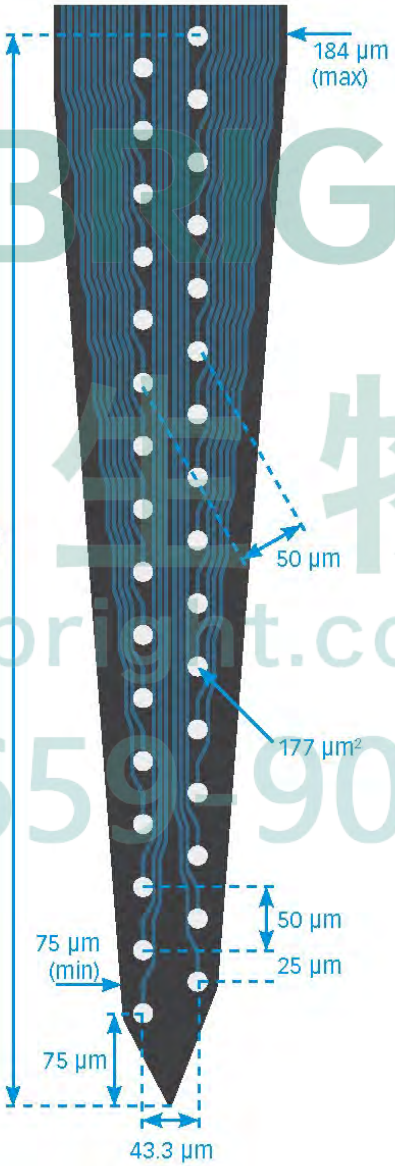
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V1x32-Poly2-10mm-50s-177



TIP DETAIL



available packages

ACUTE
V32_60_50
V32_100_50
VZ32_60_50
VZ32_100_50

CHRONIC
VC32
VZC32

(Package_Length_Thickness)

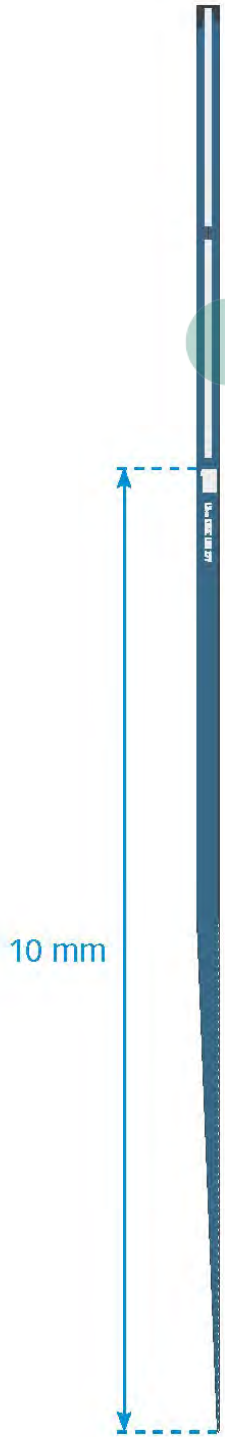
thickness

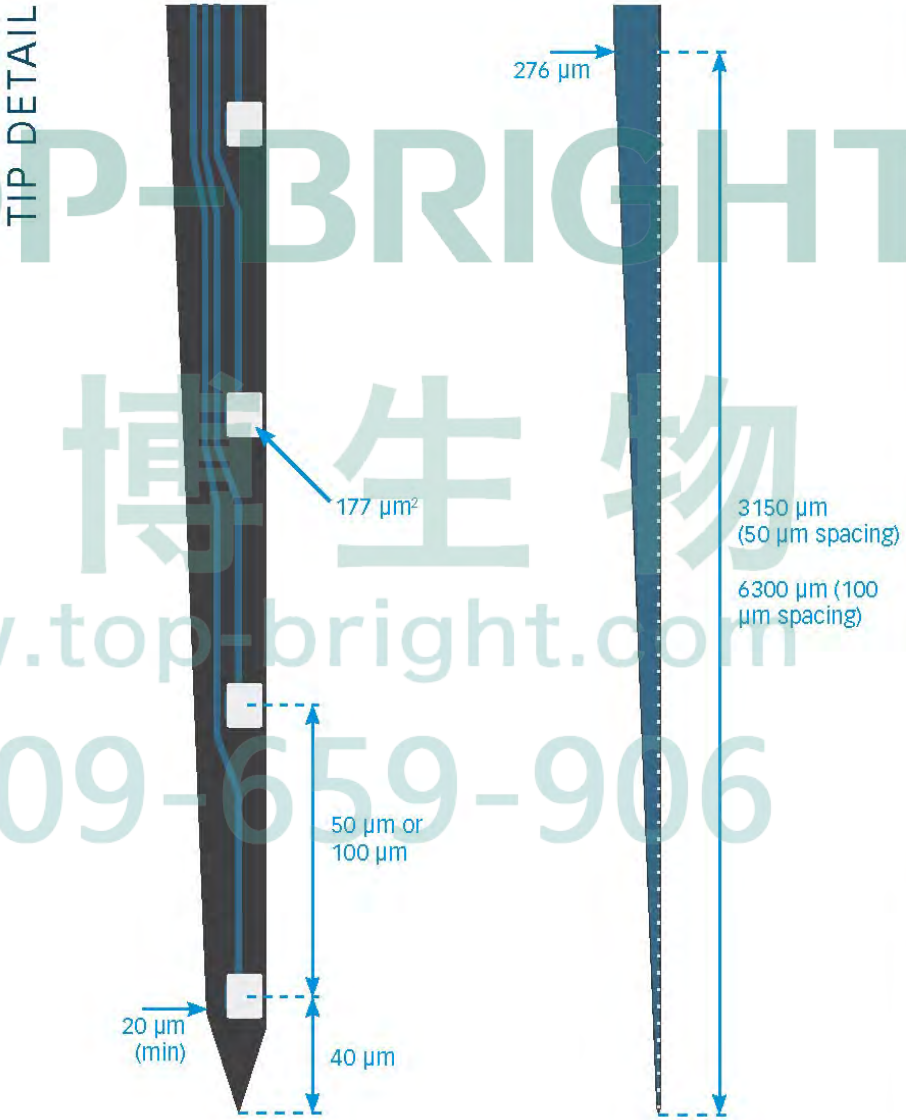
50 µm

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V1x64-Edge-10mm-50-177
V1x64-Edge-10mm-100-177





available packages

ACUTE
V64_60_50

(Package-Length-Thickness)

thickness

50 µm

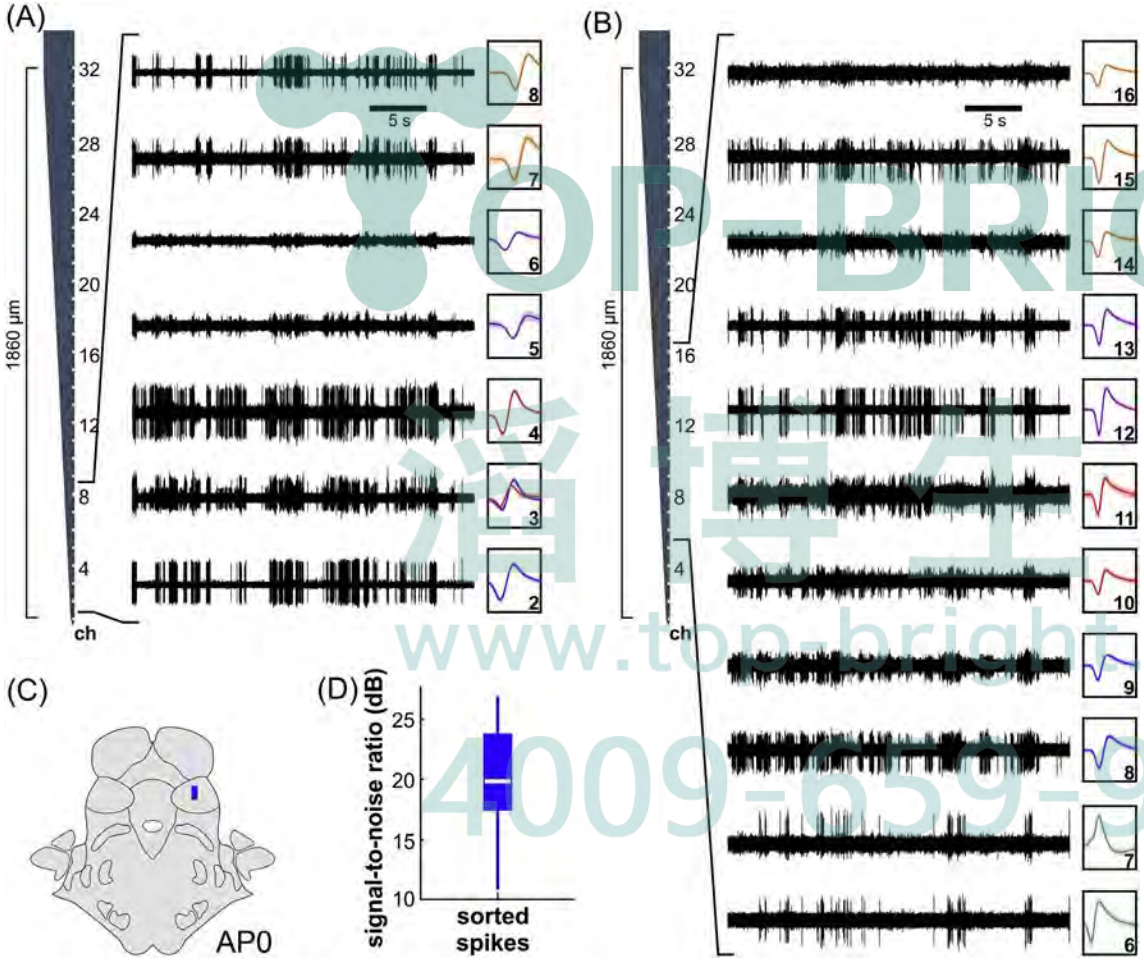
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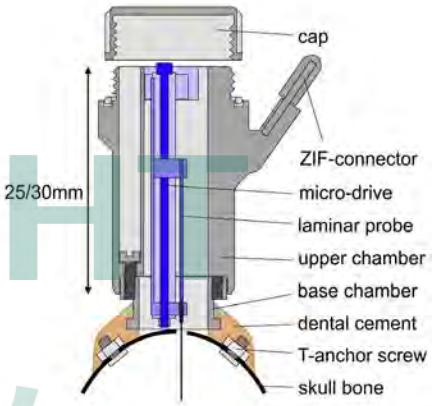
pDrive

CHAMBER MICRODRIVE SYSTEM

BACK TO INDEX



Above: *Chronic recordings obtained from behaving marmosets.*
Pomberger T, Hage SR (2019) Semi-chronic laminar recordings in the brainstem of behaving marmoset monkeys. Journal of Neuroscience Methods 311, 186–192.
Image courtesy of Dr. Steffen Hage of the Hage Lab.



The new **pDrive** is a chronically head-mounted microdrive designed to be used in primate prep. Based on the widely used dDrive, the pDrive microdrive can increase the effectiveness and longevity of chronic experiments.

- Compatible with Vector Arrays™ and standard probes
- 7 mm drive range (customizable)
- 150 µm/turn drive resolution (customizable)
- Probe position can be adjusted in 3 axes (x, y, z)
- Multi-drive capable
- Compatible with commercially available recording chambers such as those from Grey-Matter Research

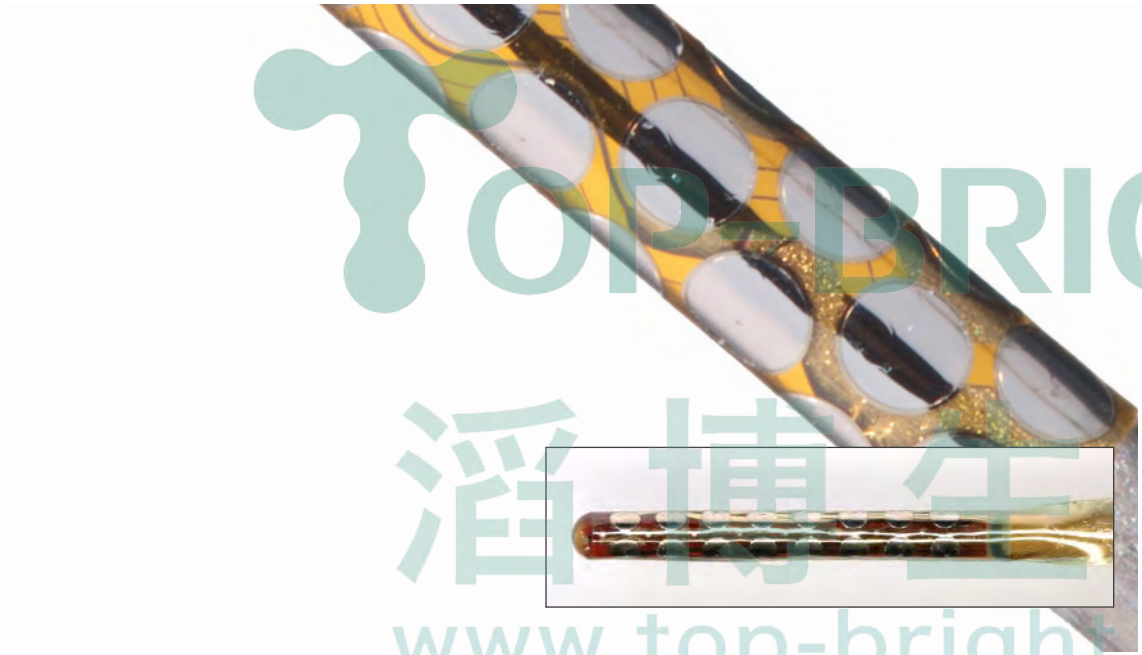
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rDBSA

HIGH RESOLUTION DEEP BRAIN STIMULATION

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SPECIFICATIONS

Electrode Site Material	Platinum
Substrate Material	Polyimide
Lead Diameter	0.75 mm
Implantable Length	Up to 45 mm
Electrode Contact Shape	Elliptical
Channel Count	32

Left: *Acute rDBSA probe*
Inset: *Detail view of rDBSA tip, showing stimulation sites*

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The **rDBSA (research-Deep Brain Stimulation Array)** is the research-grade version of an innovative clinical DBS technology developed by NeuroNexus.

- **Acute or Chronic** – the rDBSA is available in both acute and chronic versions.
- **High Resolution** – Our 32-channel design enables precise, selective, and tunable microstimulation of deep brain structures.
- **Precise** – With more flexibility in microelectrode positioning, current delivery and stimulation programming can be more selective.

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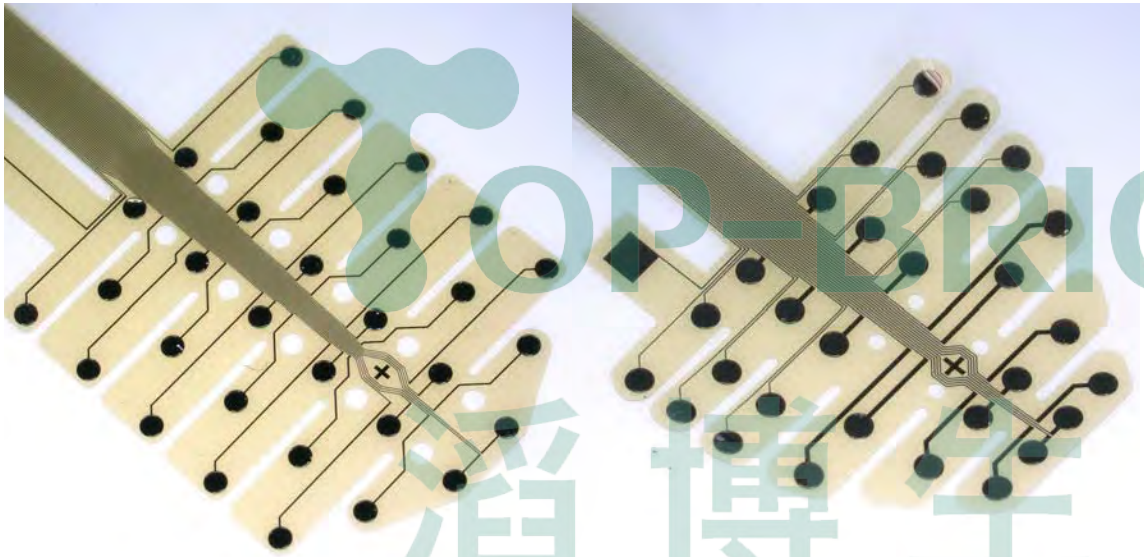
Surface Arrays

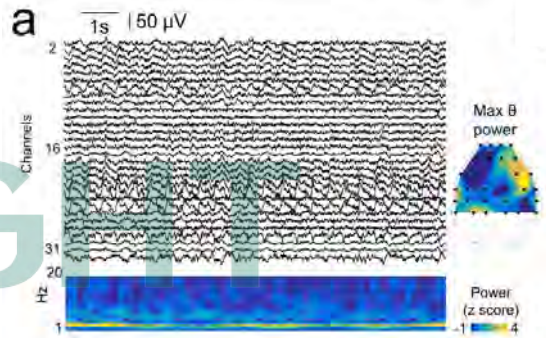
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EEG

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ABOVE: EEG grids allow assessment natural brain rhythms such as exploratory and REM theta (4-12 Hz) during periods free of epileptiform activities. Image courtesy of Dr. Liset de la Prida, Instituto Cajal - CSIC. https://hippo-circuitlab.com/2017/03/eeg-grids/

NeuroNexus **EEG probes** are ultra-flexible surface grids optimized for electroencephalography.

- **Flexible and Durable** – Fabricated with our polymer MEMS technology, our EEG probes easily conform to the skull. Use a drop of water to adhere the probe to the skull.
- **Stable** – High quality EEG recordings have been obtained over months.
- **Optimized array designs** – Select from a variety of EEG array designs featuring different recording site placements, for different applications or animal models.

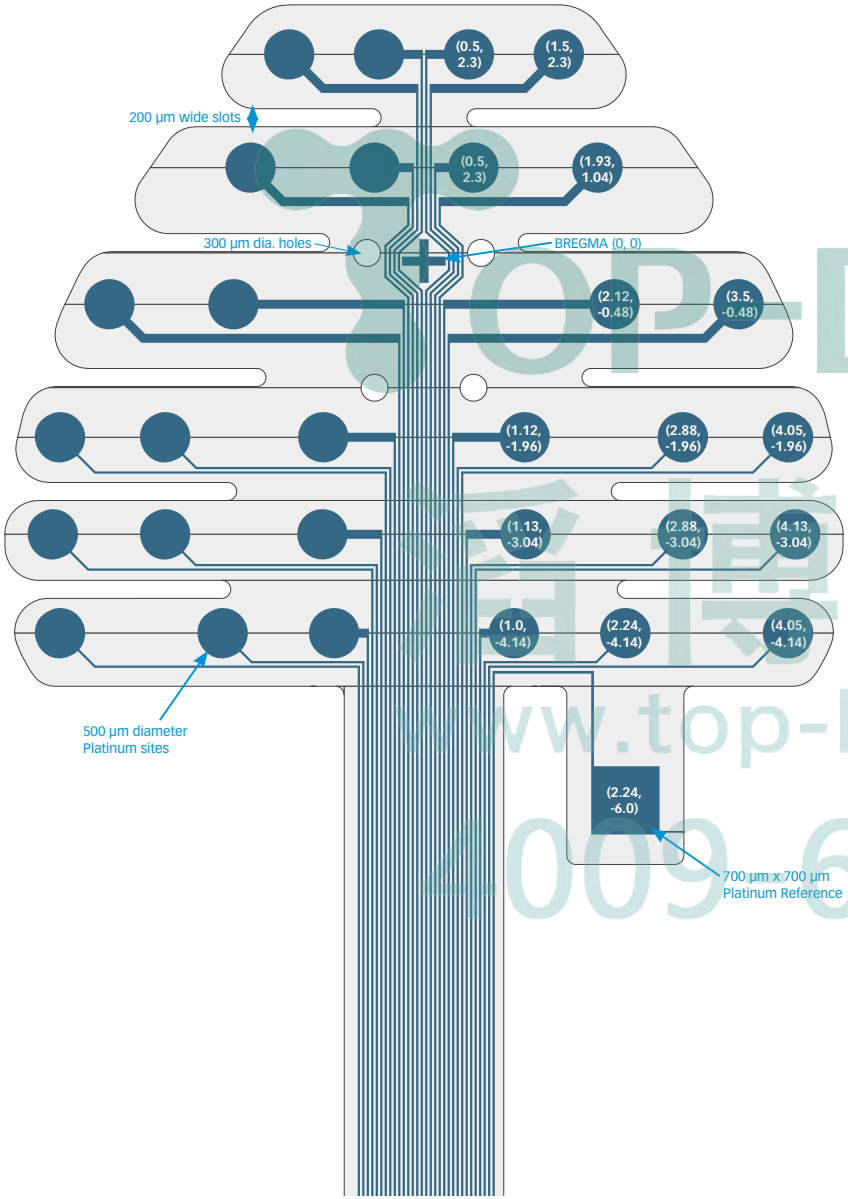
SPECIFICATIONS

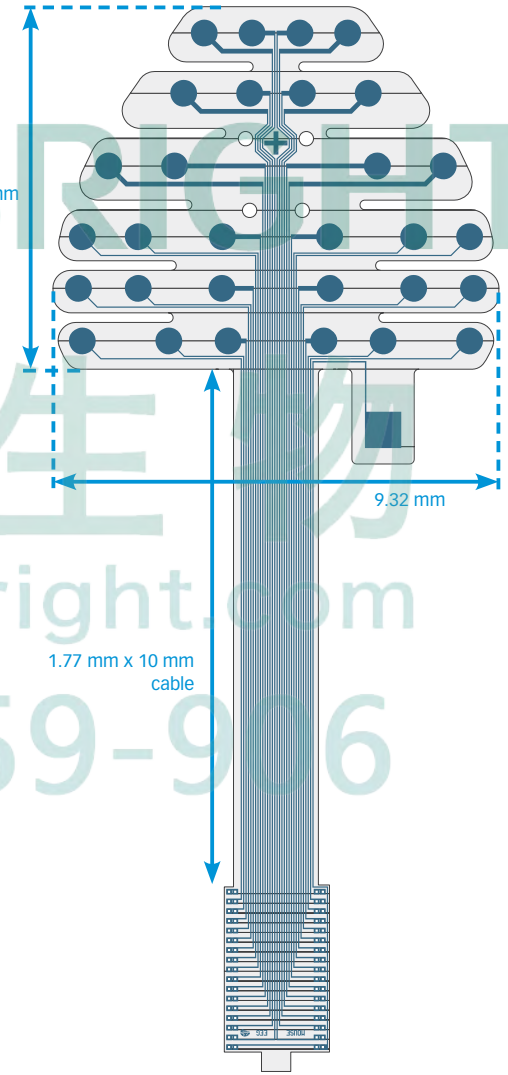
Substrate Material	Polyimide
Electrode Site Material	Platinum
Array Thickness	20 µm
Cable Length	10 mm
Channel Count	30 (Mouse EEG), 32 (all other designs). Custom options available.
Available Packages	H32, HC32, HZ32

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Mouse EEG





available packages

CHRONIC
H32

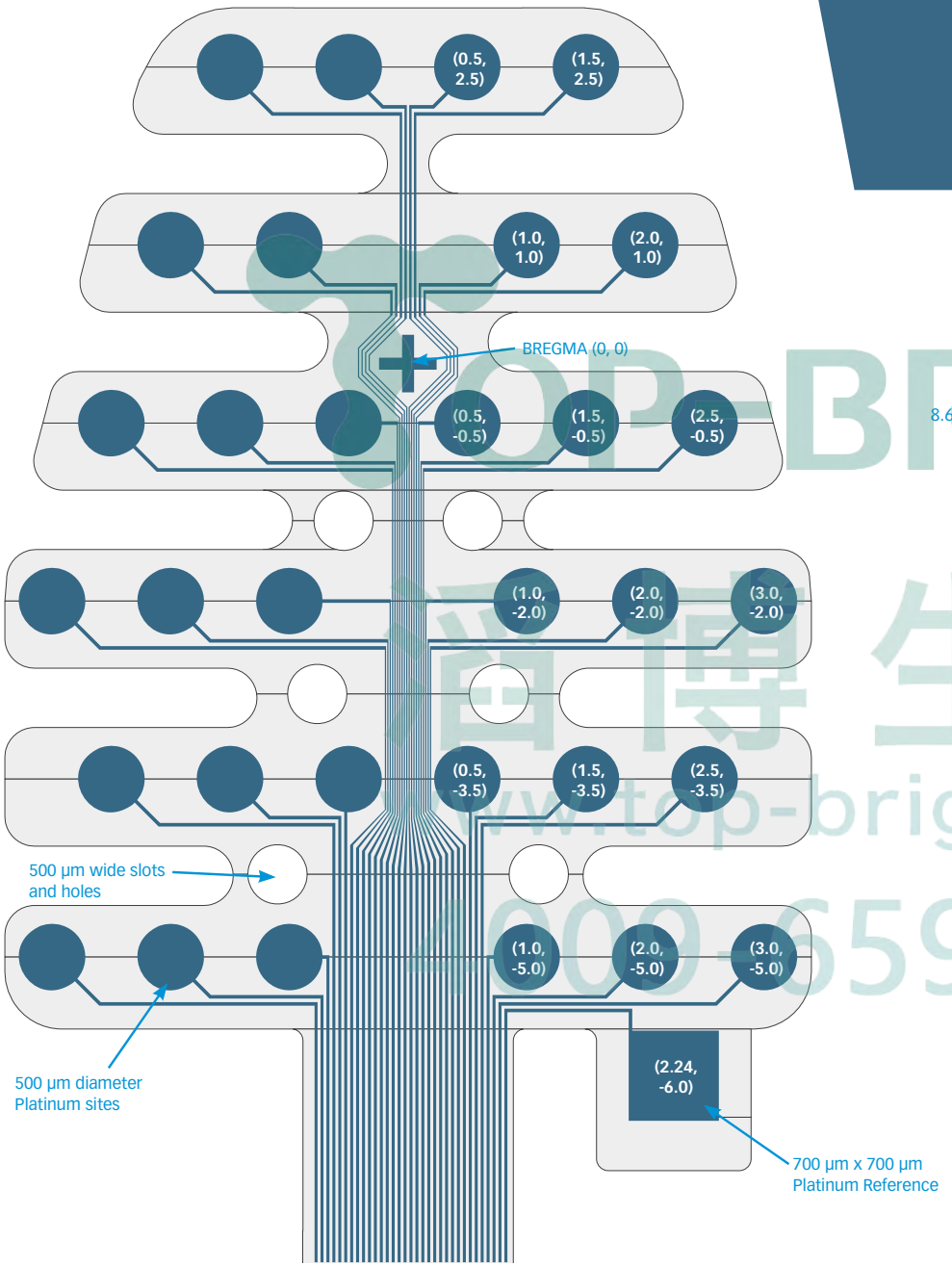
thickness

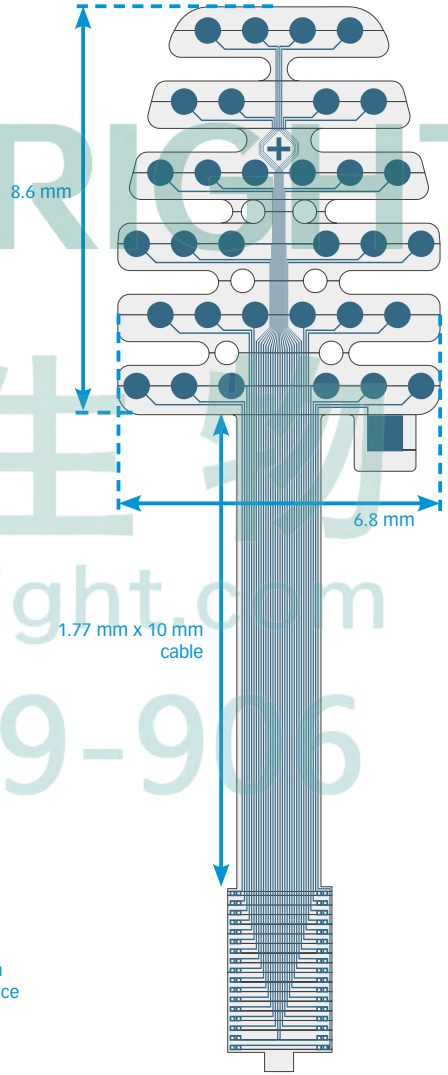
20 µm

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Mouse EEG (Reticular)





available packages

CHRONIC
H32

thickness

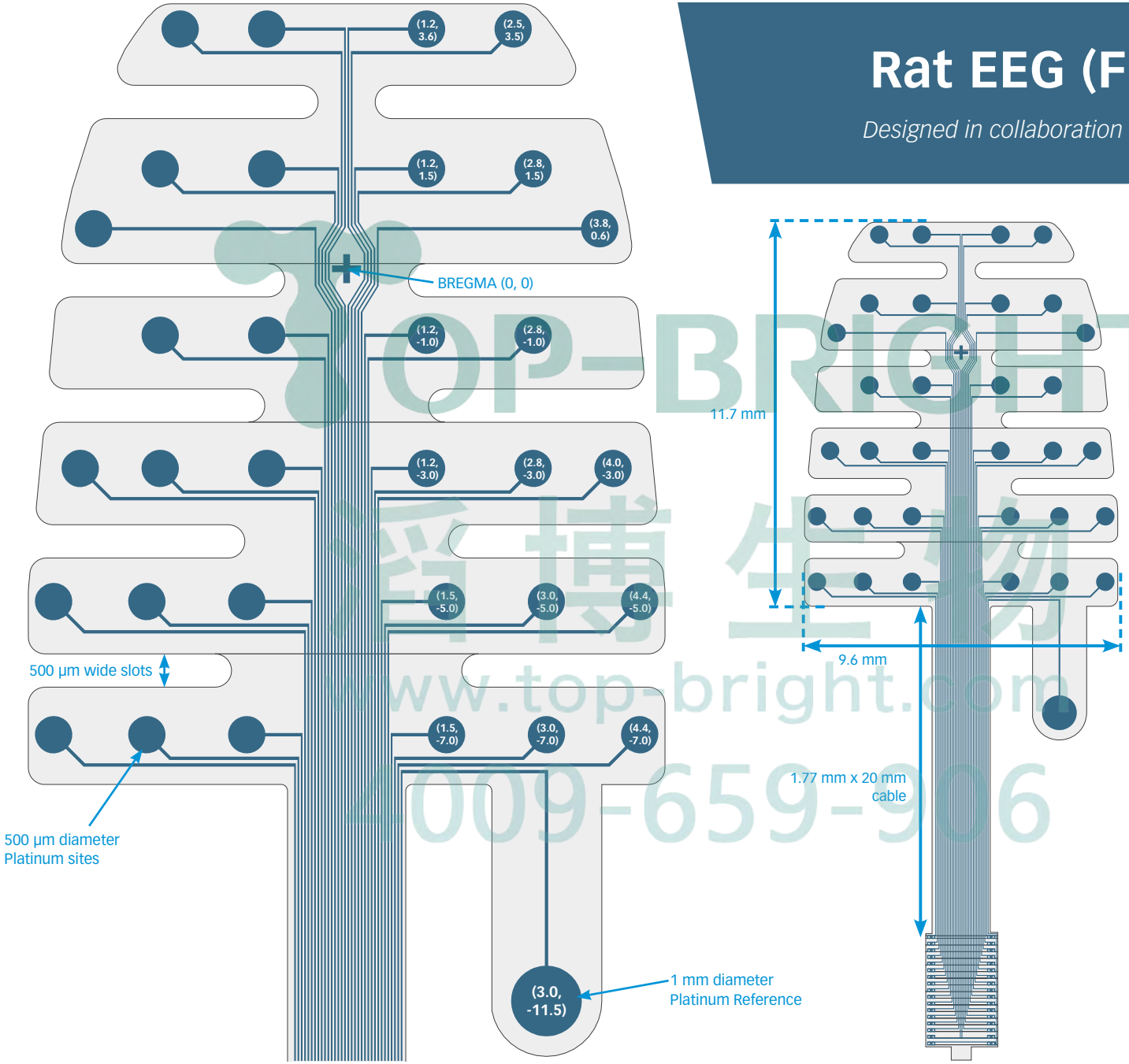
20 µm

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Rat EEG (Functional)

Designed in collaboration with Dr. Anthony Hudetz



available packages

CHRONIC
H32

thickness

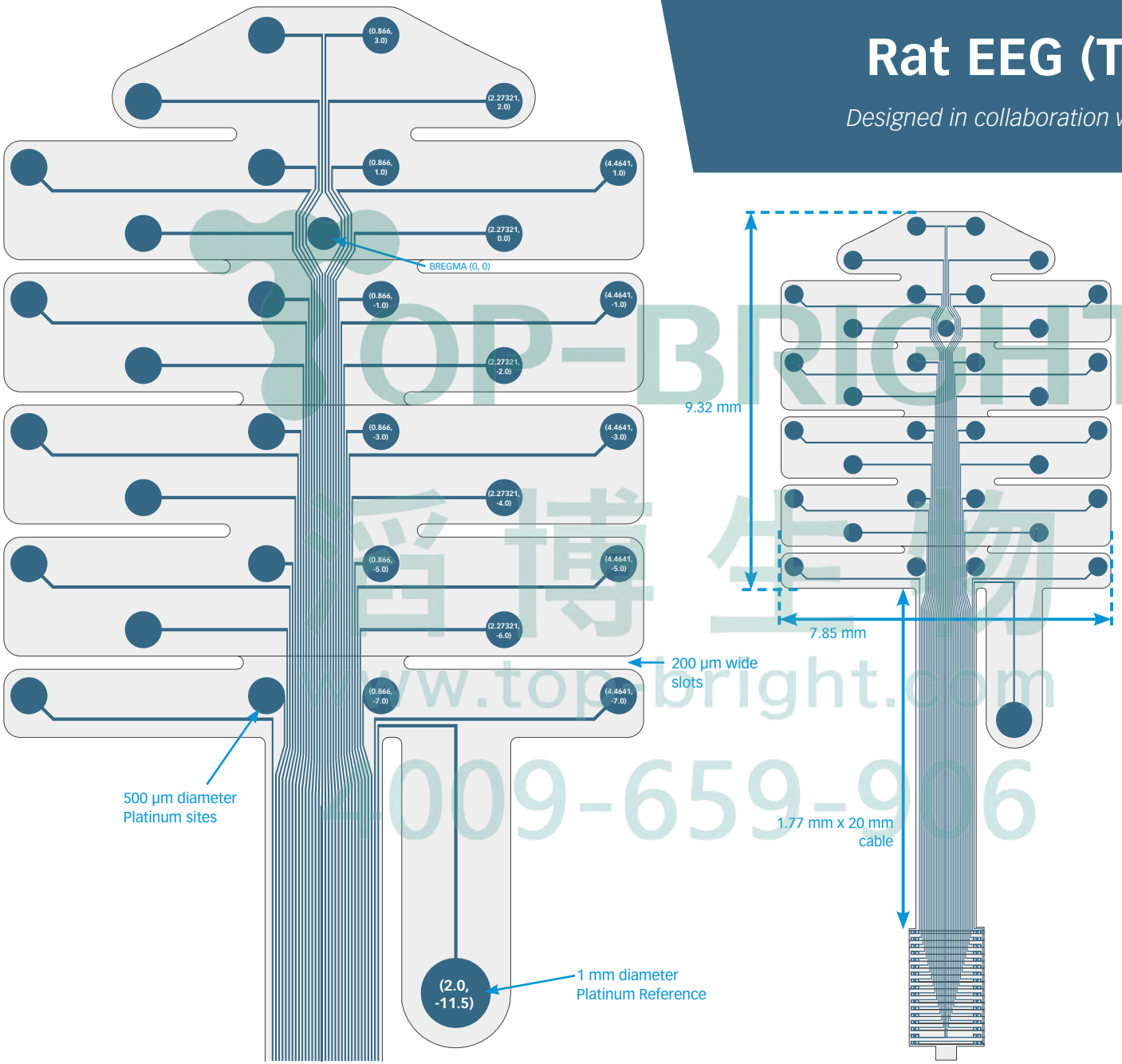
20 µm

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Rat EEG (Triangular)

Designed in collaboration with Dr. Anthony Hudetz



available packages

CHRONIC
H32

thickness

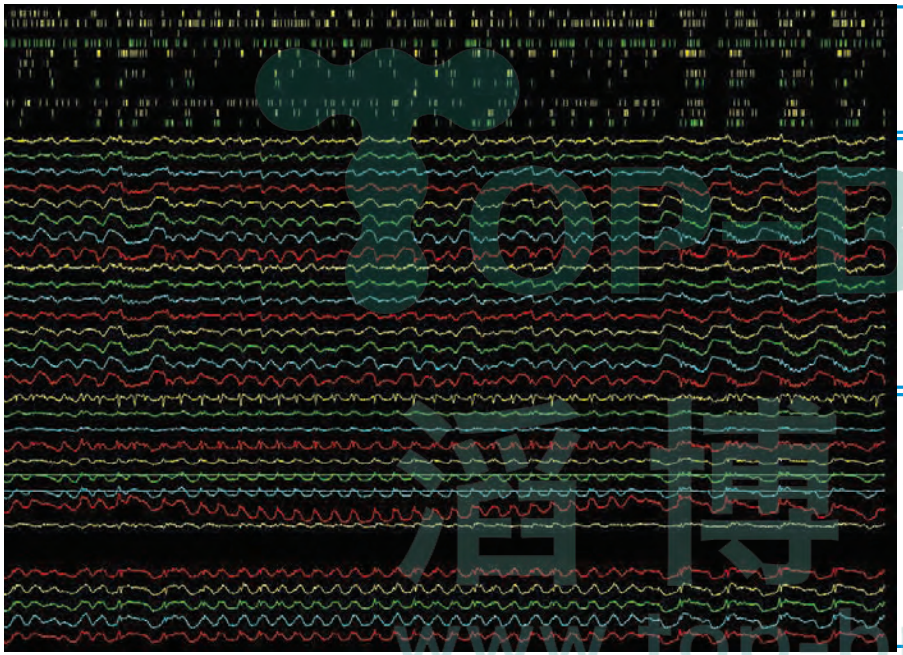
20 µm

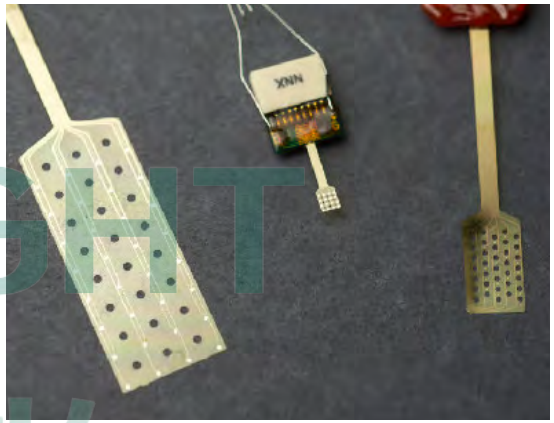
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ECoG

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ABOVE: ECoG probes are available in different sizes and site configurations for different applications.

NeuroNexus **ECoG probes** are ultra-flexible surface grids with high recording resolution, designed to conform closely to the brain surface for electrocorticography.

- **Flexible and Durable** – Fabricated with our polymer MEMS technology, our ECoG probes conform to the brain surface.
- **Optimized array designs** – Select from a variety of ECoG array designs featuring different site spacings, for different applications or animal models.
- **Versatile** – Combine an ECoG probe with a NeuroNexus penetrating array to establish concurrent surface and intracortical interfaces.

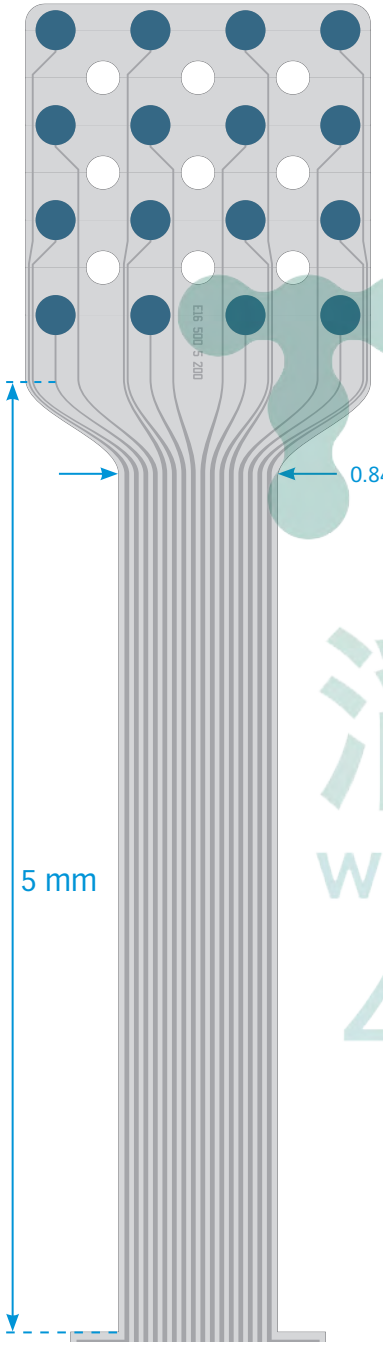
SPECIFICATIONS

Substrate Material	Polyimide
Electrode Site Material	Platinum
Array Thickness	20 µm
Cable Length	5 - 30 mm (varies by design)
Channel Count	16, 32, 64 (varies by design)
Available Packages	H16, HC16, HZ16, H32, HC32, HZ32, H64, H64LP, HC64, HZ64

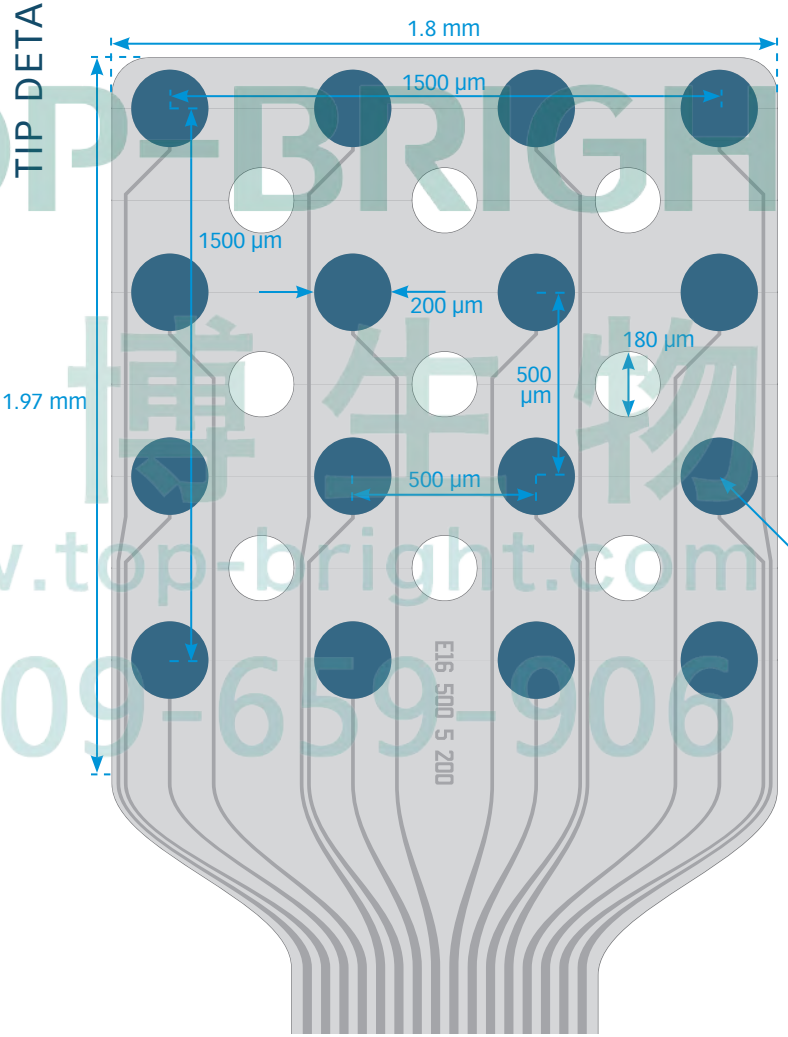
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E16-500-5-200



TIP DETAIL



available packages

CHRONIC
H16
HC16
HZ16

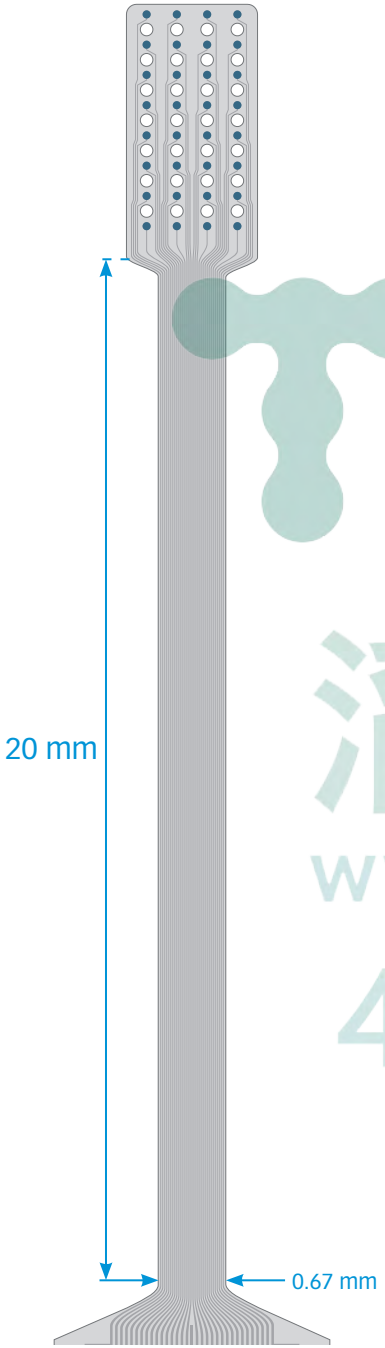
thickness

20 µm

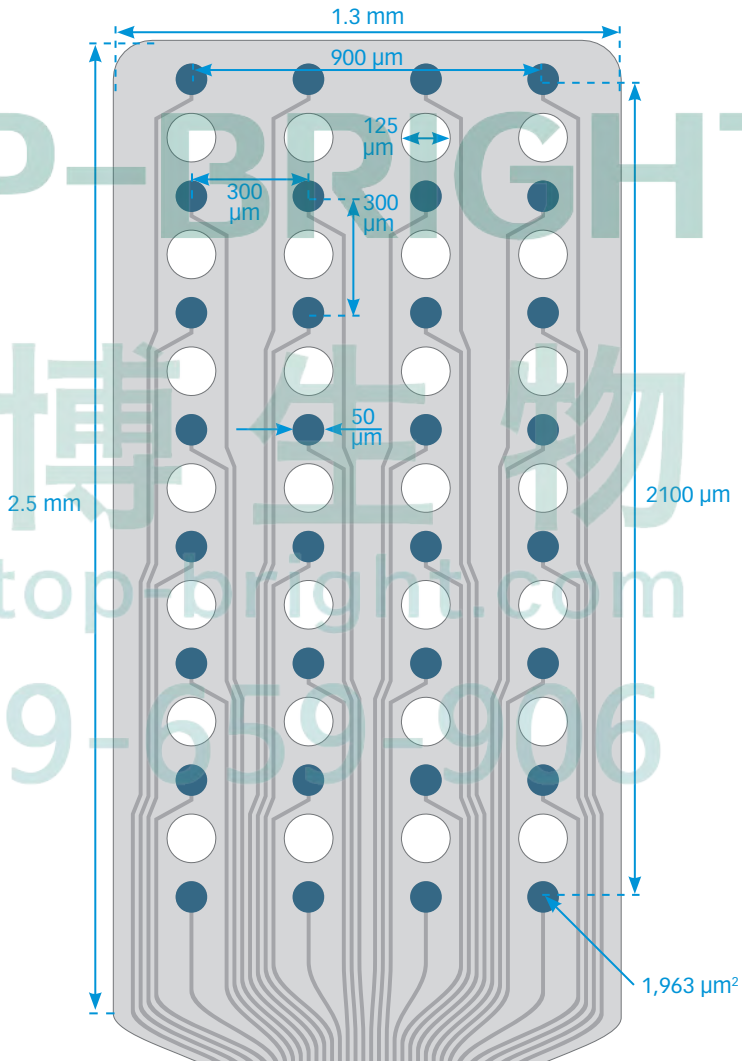
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E32-300-20-50



TIP DETAIL



available packages

CHRONIC
H32
HC32
HZ32

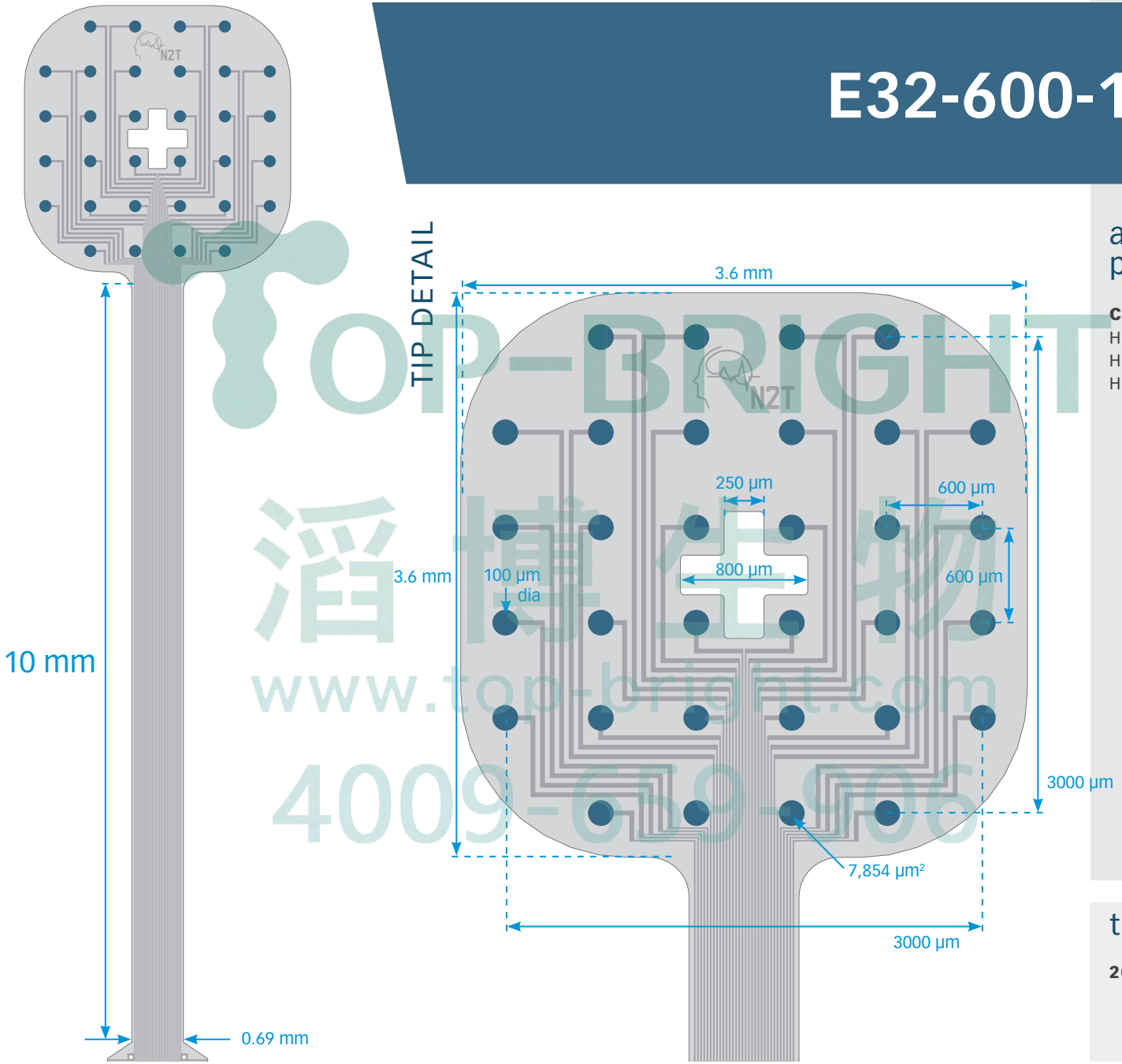
thickness

20 µm

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E32-600-10-100



available packages

CHRONIC
H32
HC32
HZ32

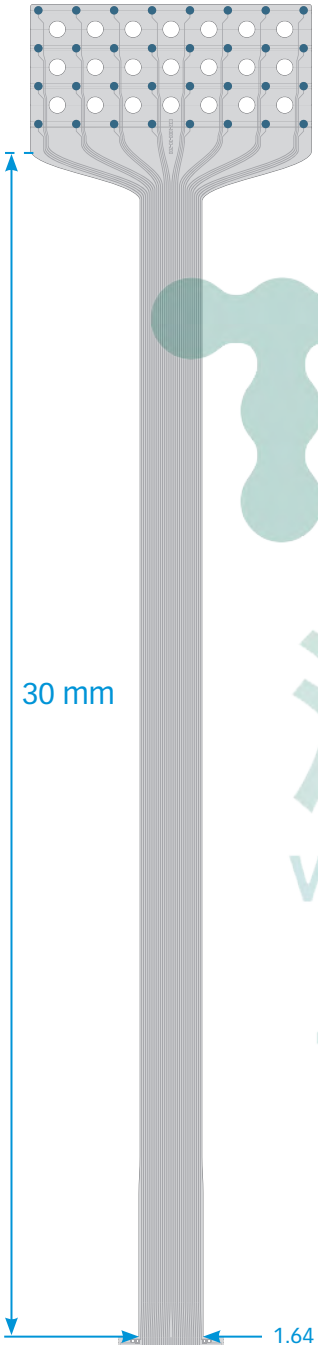
thickness

20 µm

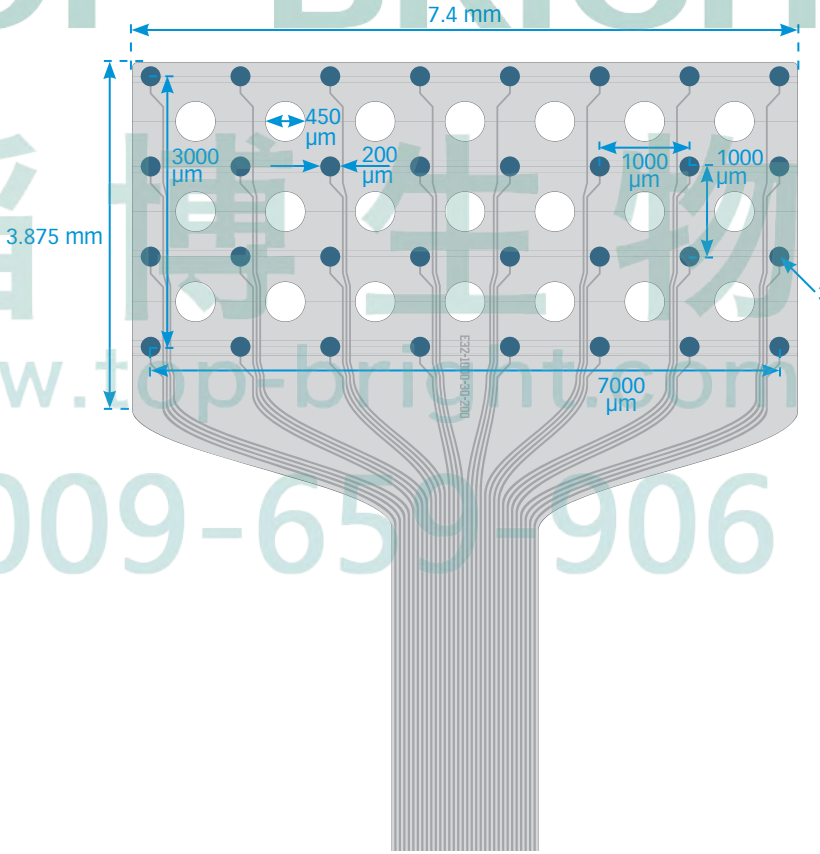
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E32-1000-30-200



TIP DETAIL



available packages

CHRONIC
H32
HC32
HZ32

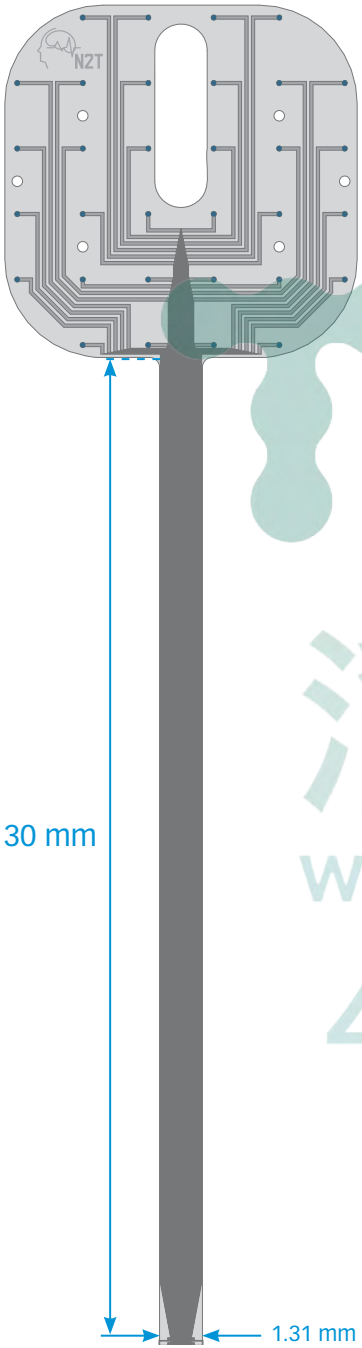
thickness

20 µm

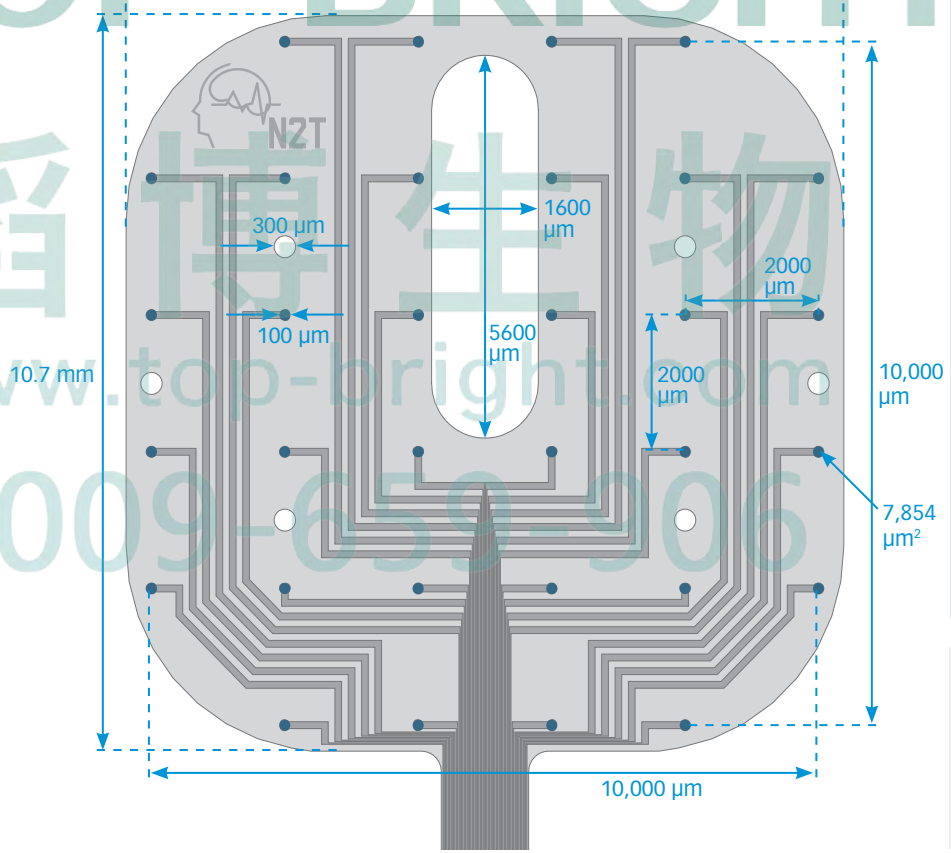
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E32-2000-30-100



TIP DETAIL



available packages

CHRONIC
H32
HC32
HZ32

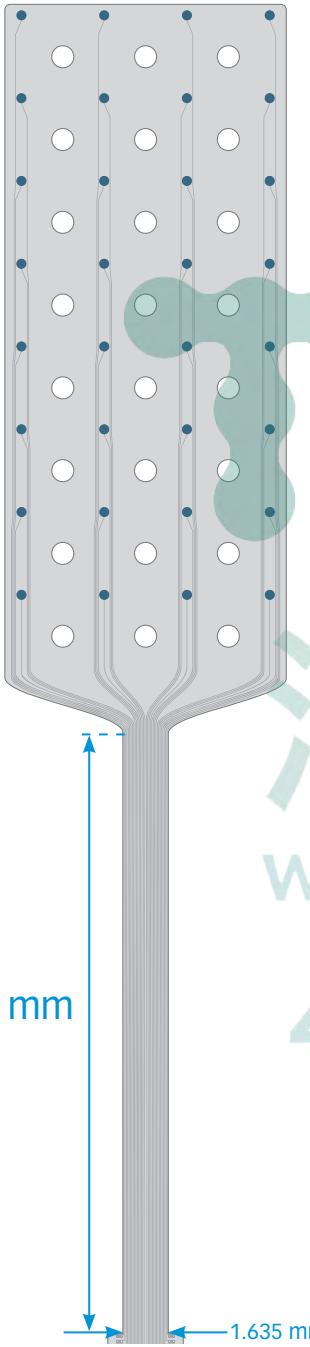
thickness

20 µm

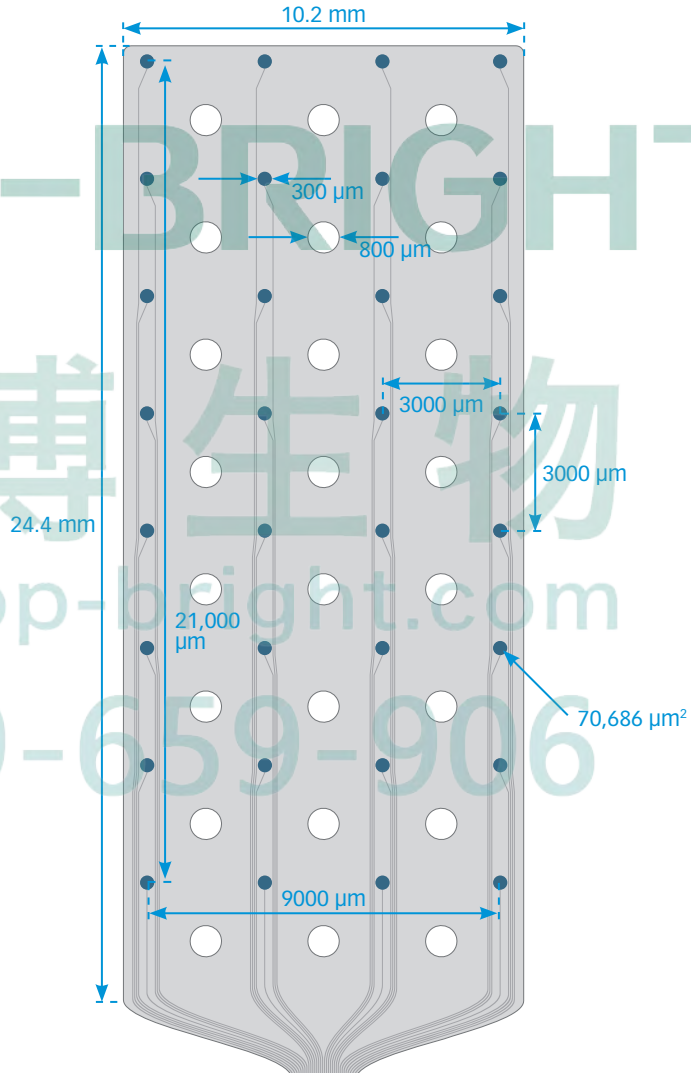
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E32-3000-20-300



TIP DETAIL



available packages

CHRONIC
H32
HC32
HZ32

thickness

20 µm

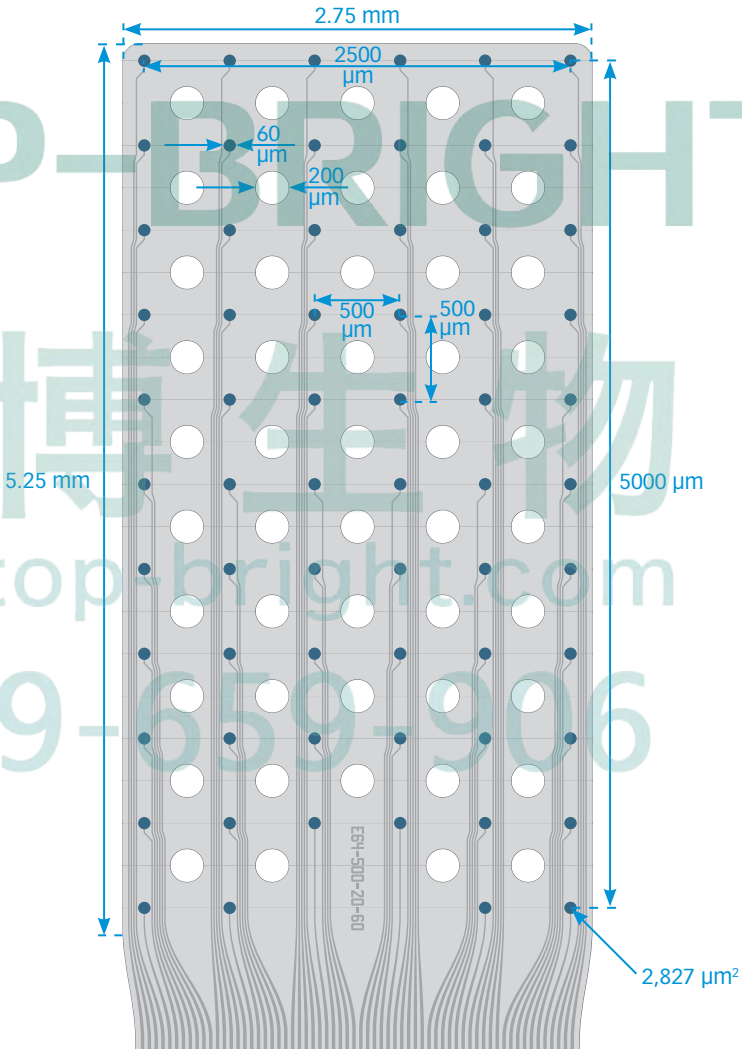
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E64-500-20-60



TIP DETAIL



available packages

CHRONIC
H64
H64LP
HC64
HZ64

thickness

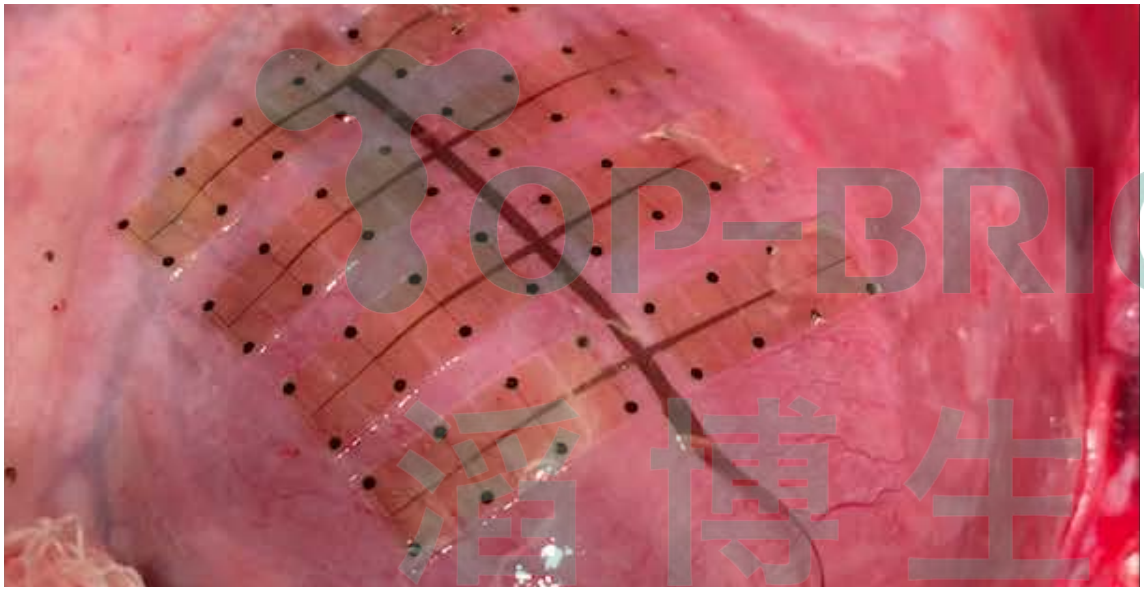
20 µm

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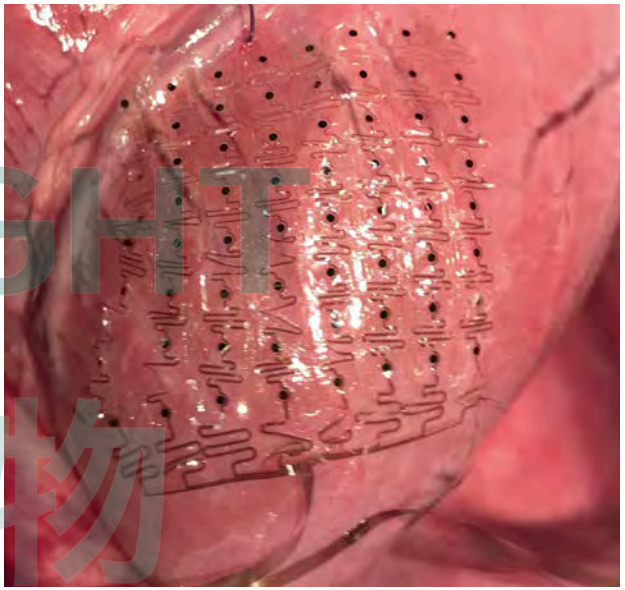
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Cardiac Surface Grids

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ABOVE: NeuroNexus Cardiac Surface Grid on heart surface



ABOVE: NeuroNexus Cardiac Surface Grid on heart surface

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NeuroNexus **Cardiac Surface Grids** are fabricated using our polymer MEMS technology, resulting in an ultra-flexible substrate designed to conform to the cardiac surface. Cardiac Surface Grids can be combined with penetrating probes.

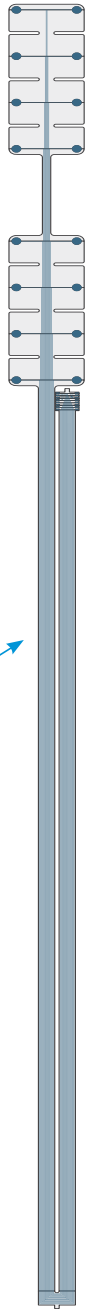
- **High Recording Resolution** – Discover fine detail with our unique high-resolution cardiac grids.
- **Vast design space** – Grids can be customized to your specific needs. Adjust size, channel count, contact density, and more. Special features can be integrated to cope with the particular demands of neurocardiology.
- **Low noise from tissue movement** – Our cardiac grids have been engineered and tested to minimize noise from tissue movement.

SPECIFICATIONS

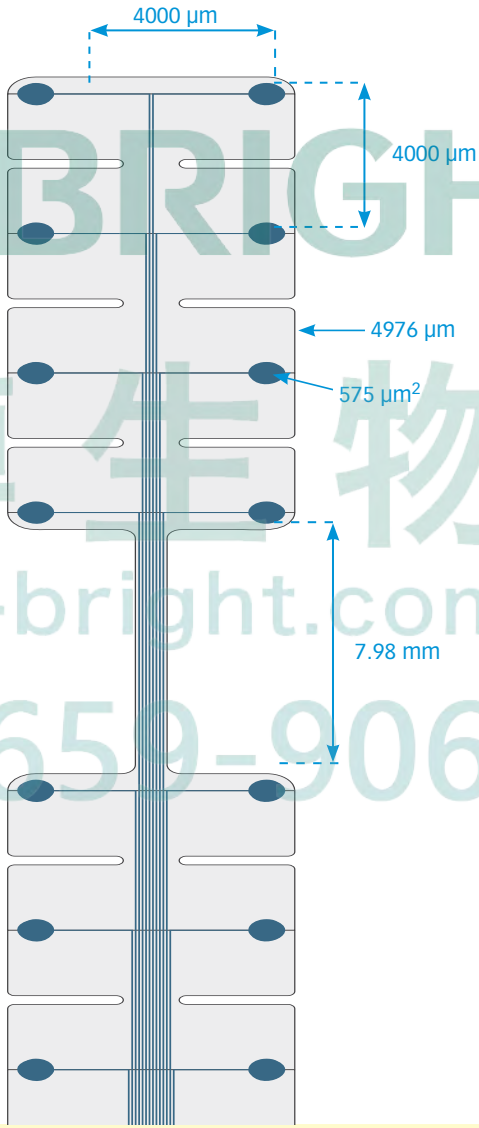
Substrate Material	Polyimide
Electrode Site Material	Platinum
Array Thickness	20 µm
Channel Count	16, 32, 64 (varies by design)
Available Packages	H16, H32, H64, H64LP

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CS2x2x4-accord-4000-150-575



TIP DETAIL



available packages

CHRONIC
H16

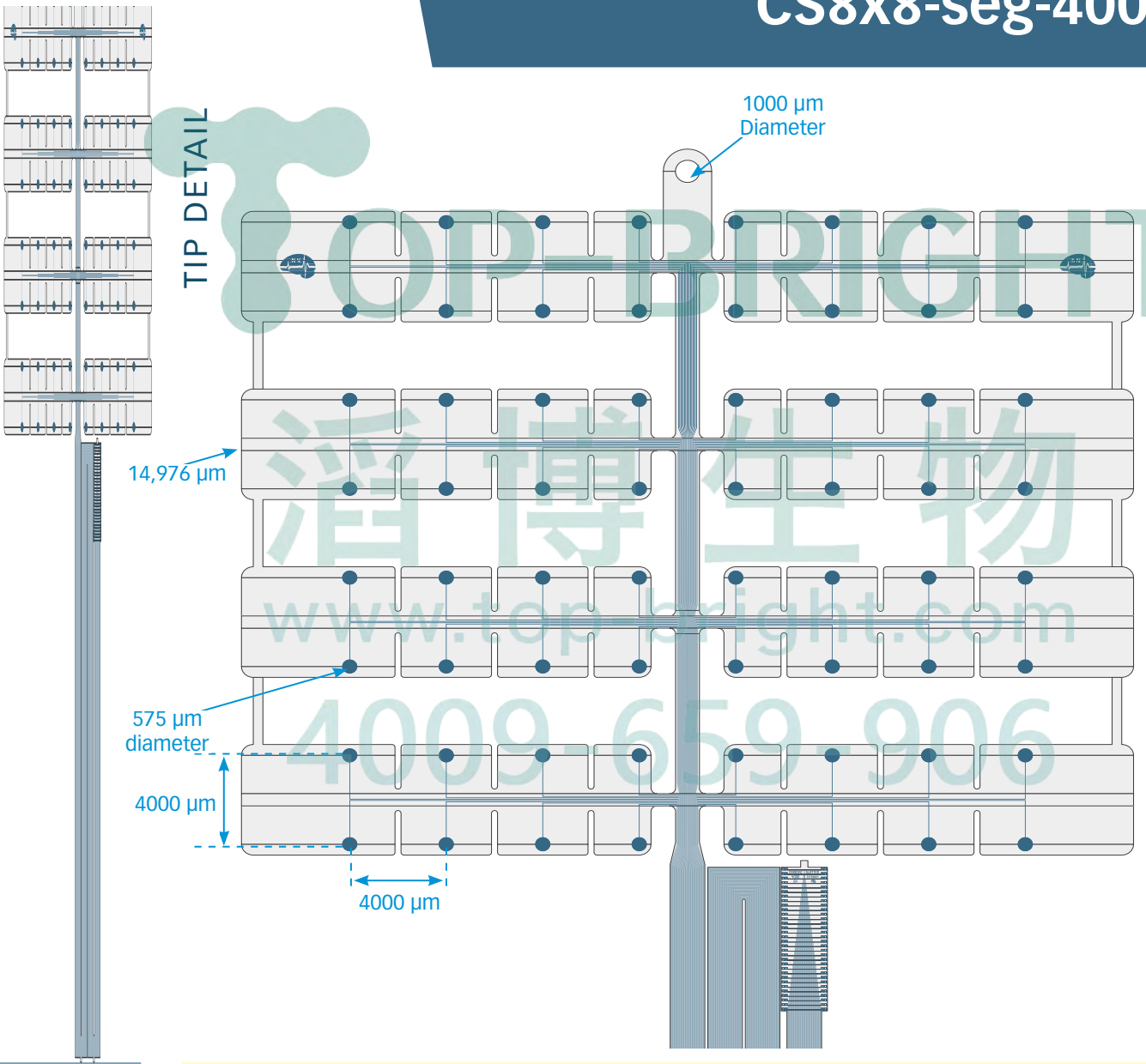
thickness

20 µm

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CS8x8-seg-2000-150-575
CS8x8-seg-4000-150-575



available packages

CHRONIC
H64

thickness

20 µm

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Peripheral Nerve Cuffs

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ABOVE: NeuroNexus Nerve Cuffs can be pre-curved to fit any diameter.

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NeuroNexus **Nerve Cuffs** enable high-resolution recording and stimulation in peripheral nerve applications. Nerve Cuffs can be custom designed and pre-curved to interface with a variety of nerves.

With a thickness of merely 20 µm, the Nerve Cuff is extremely flexible, allowing it to be wrapped around a nerve. Our versatile MEMS process lets you design recording and stimulation sites in almost any configuration to meet your experimental needs.

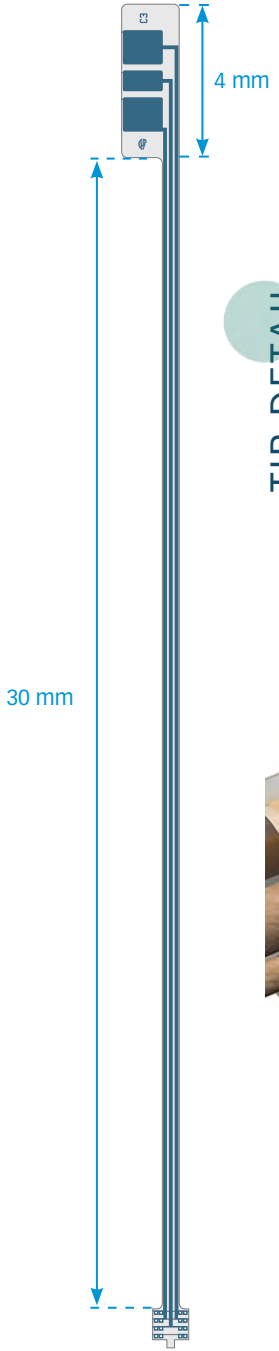
Alternatively, a sieve-type microelectrode array can be realized by designing arrays with holes, which can be seeded with neural growth factor to promote axonal growth through the microelectrode sites.

SPECIFICATIONS

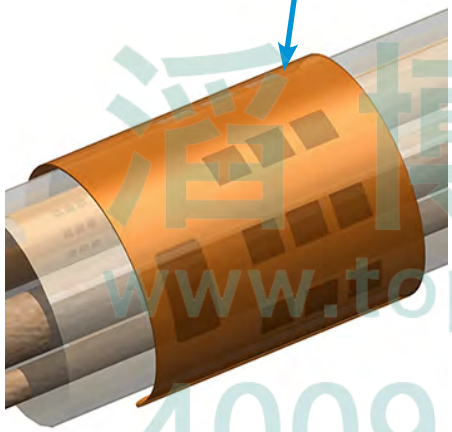
Substrate Material	Polyimide
Electrode Site Material	Platinum
Array Thickness	20 µm
Channel Count	3, 24 (varies by design)
Available Packages	H16, H32

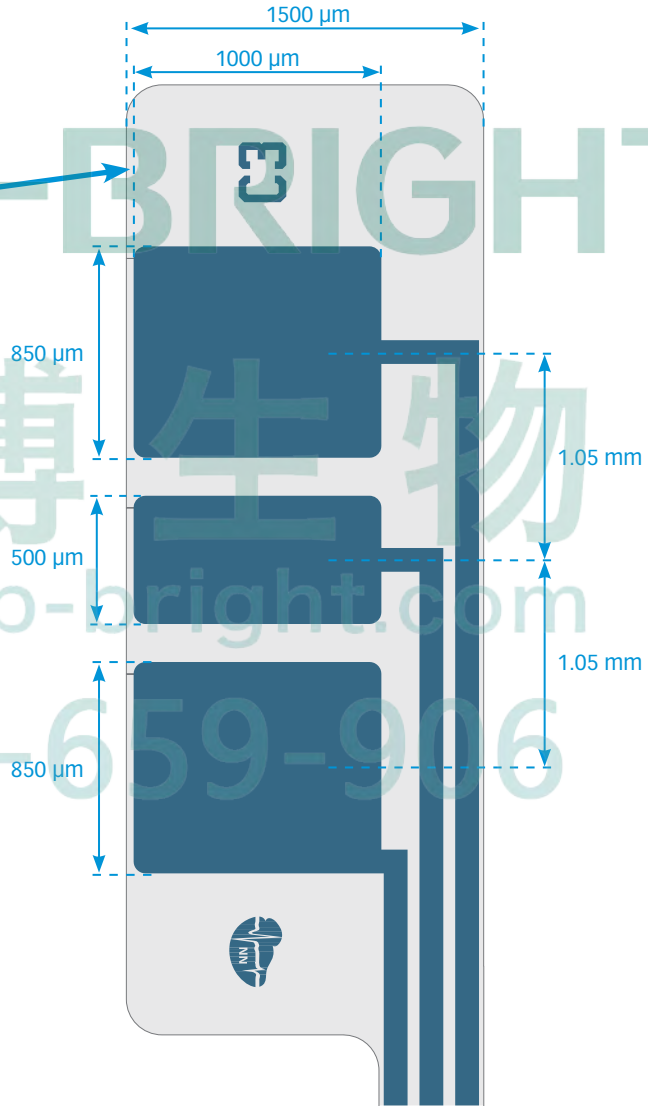
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C3



TIP DETAIL





C3 Cuff designed for 350 µm
diameter nerve (customizable)

available packages

CHRONIC
H16

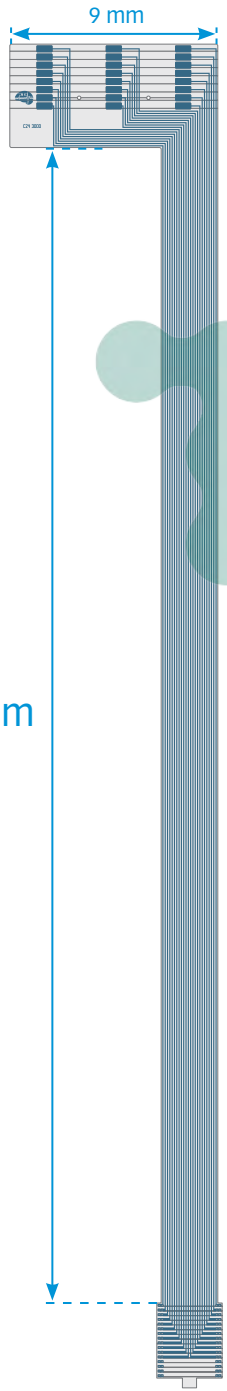
thickness

20 µm

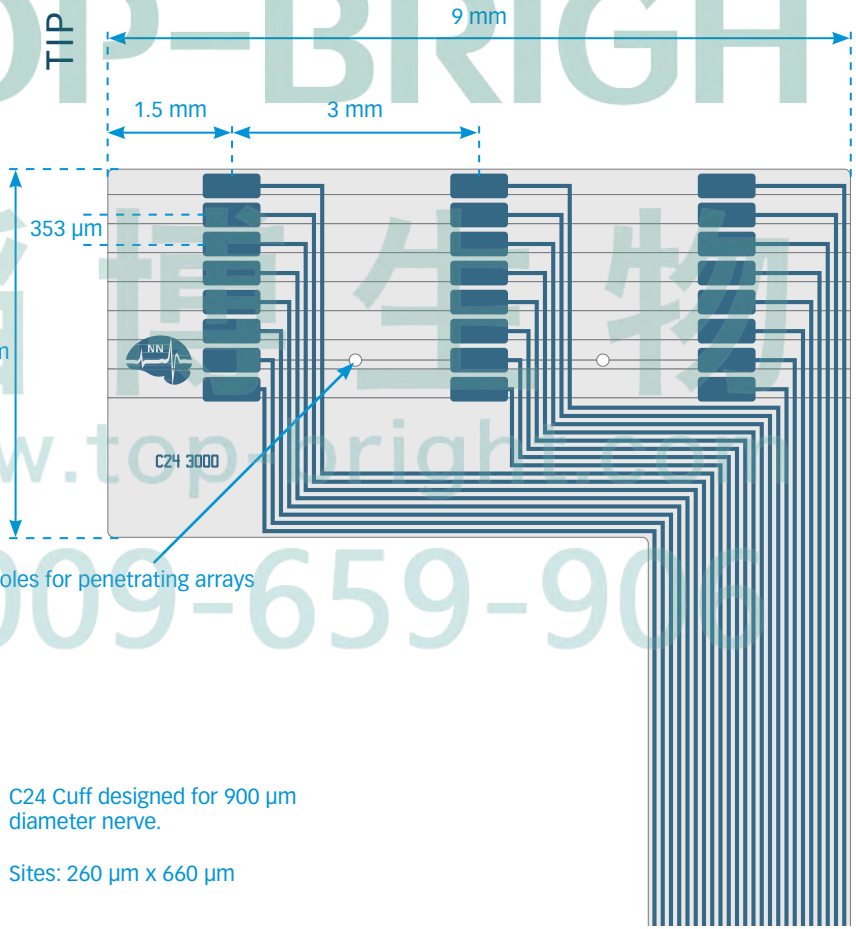
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C24



TIP DETAIL



C24 Cuff designed for 900 µm diameter nerve.

Sites: 260 µm x 660 µm

available packages

CHRONIC
H32

thickness

20 µm

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Package Specifications

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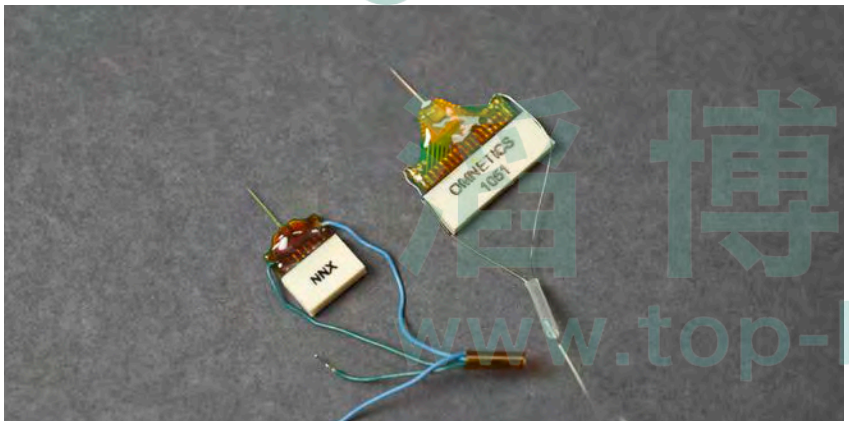
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Headstage Interfaces

NeuroNexus probes interface with most commercially available headstages via the **connector package**. We also provide the SmartLink headstage for use with the SmartBox.

To configure a package for your headstage, you will first need to know what type of connector your headstage uses. Then, find the compatible packages that match up to your headstage.

OMNETICS NANO CONNECTORS



Omnetics Nano connectors are widely available. NeuroNexus offers a large range of packages that connect to headstages with Omnetics Nano connectors:

16 channel: CM16LP, H16, HC16, OCM16LP, DM16, MR_CM16, V16_60_50, V16_100_50, OV16_60_50, OV16_100_50

32 channel: CM32, H32, HC32, OCM32LP, MR_CM32, V32_60_50, V32_100_50, OV32_60_50, OV32_100_50, CV32

64 channel: H64, H64LP, HC64, V64_60_50, V64_60_50

DUAL INLINE PIN (DIP)



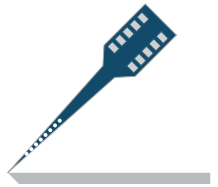
Dual Inline Pin connectors offer a versatile, reliable connection for acute applications.

16 channel: A16, OA16LP, D16, OD16

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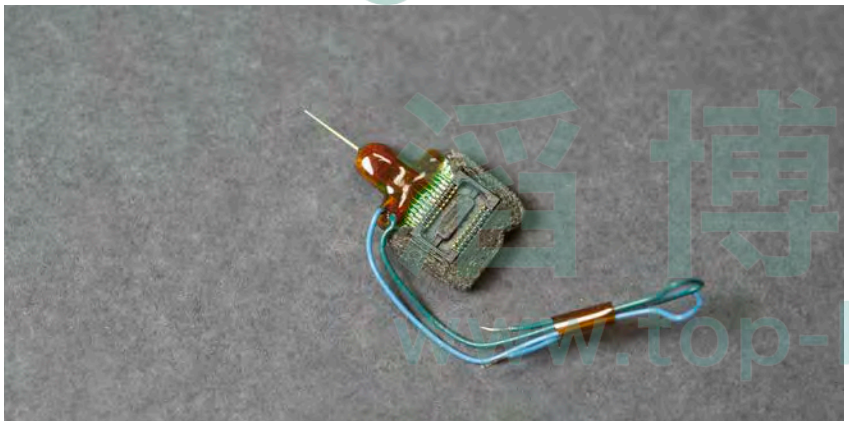
Headstage Interfaces



If you have a headstage that does not connect directly to any of our packages, you might need an adaptor. A complete list of adaptors can be found on our website.

If you cannot find an adaptor that meets your setup needs, contact us for a custom adaptor or cable.

TDT ZIF-CLIP™



TDT Zif-Clip™ headstages utilize miniature, low insertion force connectors. Because of their small size, we recommend Zif-Clip™ headstages and packages for chronic use.

16 channel: Z16, HZ16, OZ16LP, VZ16
32 channel: Z32, HZ32, OZ32LP, VZ32
64 channel: Z64, HZ64

SAMTEC



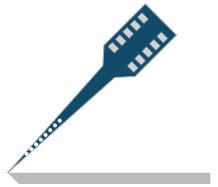
SAMTEC connectors are reliable, stable, high-density connectors standard in acute applications.

32 channel: A32, OA32LP, OA32LP_v2, OXA32LP
64 channel: A64, OA64LP, OA64LP_v2, OXA64LP

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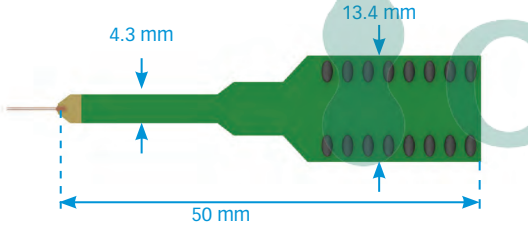
Connector Package Specifications



A-SERIES (ACUTE)

A16

The A16 package is ideal for acute experiments using 16 channel electrode arrays.

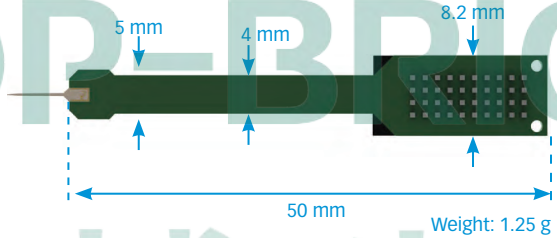


Weight: 1.25 g

CONNECTOR TYPE: Dual Inline Pin (DIP); pin length 5.5 mm, spacing 2.5 mm
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

A32

The A32 package is ideal for acute experiments using 32 channel electrode arrays.

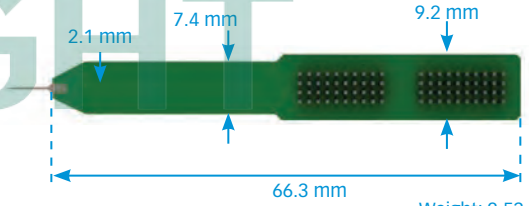


Weight: 1.25 g

CONNECTOR TYPE: SAMTEC MOLC-110-01-S-Q
MATING CONNECTOR: SAMTEC FOLC
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

A64

The A64 package is ideal for acute experiments using 64 channel electrode arrays.



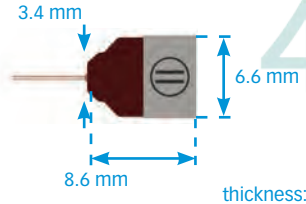
Weight: 2.53 g

CONNECTOR TYPE: (2x) SAMTEC MOLC-110-01-S-Q
MATING CONNECTOR: (2x) SAMTEC FOLC
COMPATIBLE ELECTRODES: Any 64 channel Standard (A-type) electrode array

CM-SERIES (CHRONIC)

CM16LP

The compact CM16LP package is ideal for chronic experiments using 16 channel electrode arrays.

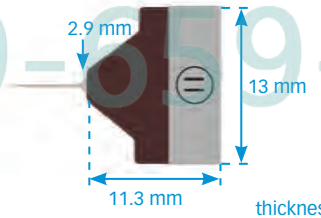


thickness: 1.73 mm
weight: 0.17 g

CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

CM32

The compact CM32 package is ideal for chronic experiments using 32 channel electrode arrays.



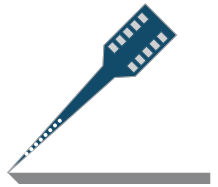
thickness: 1.78 mm
weight: 0.32 g

CONNECTOR TYPE: Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

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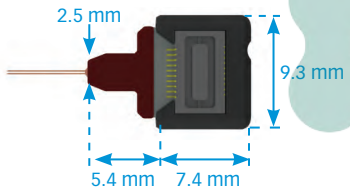
Connector Package Specifications



Z-SERIES (CHRONIC)

Z16

The Z16 package is ideal for chronic experiments using 16 channel electrode arrays. It connects directly to a TDT ZC16 or ZC32 headstage.

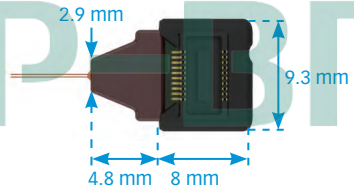


thickness: 2 mm
weight: 0.25 g

MATING CONNECTOR: TDT ZC16/ZC32 headstage
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

Z32

The Z32 package is ideal for chronic experiments using 32 channel electrode arrays. It connects directly to a TDT ZC32 headstage.

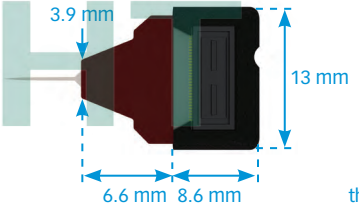


thickness: 2 mm
weight: 0.25 g

MATING CONNECTOR: TDT ZC32 headstage
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

Z64

The Z64 package is ideal for chronic experiments using 64 channel electrode arrays. It connects directly to a TDT ZC64 headstage.



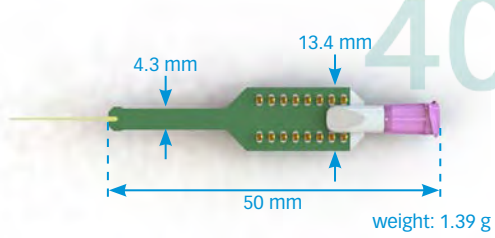
thickness: 2 mm
weight: 0.44 g

MATING CONNECTOR: TDT ZC64 headstage
COMPATIBLE ELECTRODES: Any 64 channel Standard (A-type) electrode array

D-SERIES (DRUG DELIVERY)

D16

The D16 package is ideal for acute fluidic or **drug delivery** experiments using the E16-20mm-100-177 electrode array.

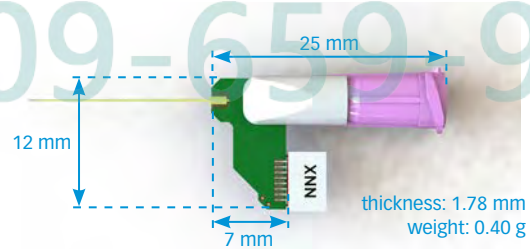


weight: 1.39 g

CONNECTOR TYPE: Dual Inline Pin (DIP); pin length 5.5 mm, spacing 2.5 mm
COMPATIBLE ELECTRODES: E16-20mm-100-177

DM16

The DM16 package is ideal for chronic fluidic or **drug delivery** experiments using the E16-20mm-100-177 electrode array.



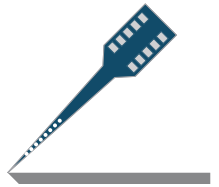
thickness: 1.78 mm
weight: 0.40 g

CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: E16-20mm-100-177

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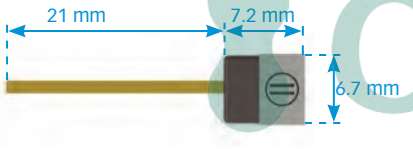
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Connector Package Specifications



H16

The H16 package is ideal for chronic experiments requiring connector standoff.

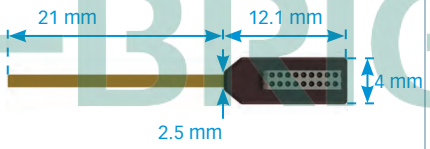


thickness: 1.78 mm
weight: 0.18 g

CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

HC16

The HC16 package is ideal for chronic experiments requiring connector standoff.

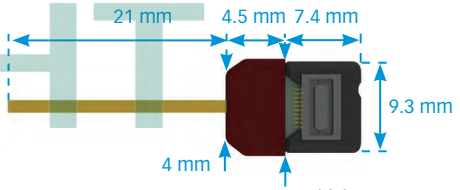


thickness: 5.4 mm
weight: 0.19 g

CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

HZ16

The HZ16 package is ideal for chronic experiments requiring connector standoff. It connects directly to a TDT ZC16 or ZC32 headstage.

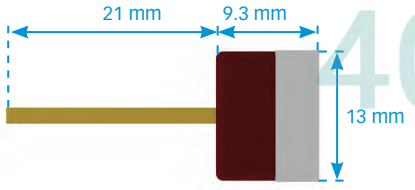


thickness: 2 mm
weight: 0.26 g

MATING CONNECTOR: TDT ZC16/ZC32 headstage
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

H32

The H32 package is ideal for chronic experiments requiring connector standoff.

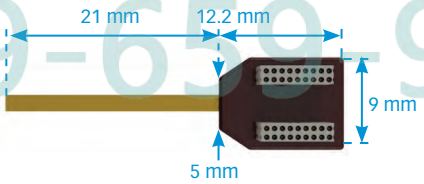


thickness: 1.78 mm
weight: 0.38 g

CONNECTOR TYPE: Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

HC32

The HC32 package is ideal for chronic experiments requiring connector standoff.

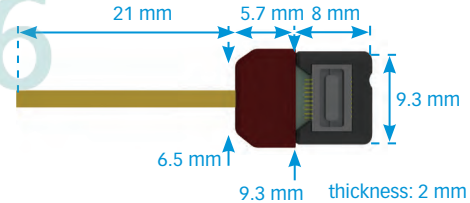


thickness: 5.4 mm
weight: 0.52 g

CONNECTOR TYPE: (2x) Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: (2x) Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

HZ32

The HZ32 package is ideal for chronic experiments requiring connector standoff. It connects directly to a TDT ZC32 headstage.



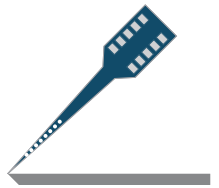
thickness: 2 mm
weight: 0.26 g

MATING CONNECTOR: TDT ZC32 headstage
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

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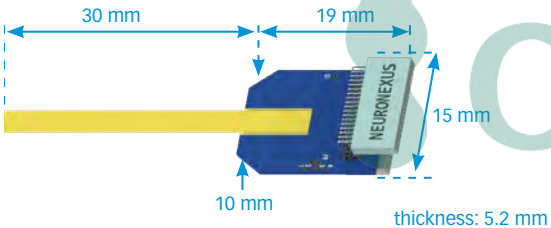
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Connector Package Specifications



H64

The H64 package is ideal for chronic experiments requiring connector standoff.

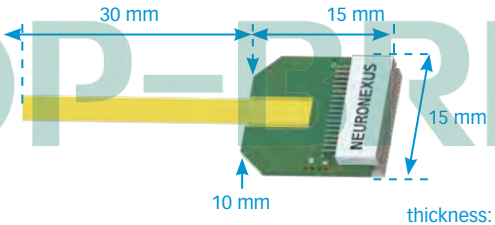


thickness: 5.2 mm
weight: 1.07 g

CONNECTOR TYPE:	(2x) Omnetics NPD36 (4 guideposts)
MATING CONNECTOR:	(2x) Omnetics NSD36 (4 guideposts) 4-5 mm center-to-center spacing
COMPATIBLE ELECTRODES:	Any 64 channel Standard (A-type) electrode array

H64LP

The H64LP package is similar to the H64 package (left), but more compact.

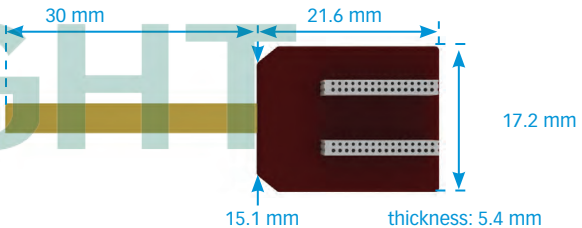


thickness: 4.2 mm
weight: 1.05 g

CONNECTOR TYPE:	(2x) Omnetics NPD36 (4 guideposts)
MATING CONNECTOR:	(2x) Omnetics NSD36 (4 guideposts) 2.8 mm center-to-center spacing
COMPATIBLE ELECTRODES:	Any 64 channel Standard (A-type) electrode array

HC64

The HC64 package is ideal for chronic experiments requiring connector standoff.

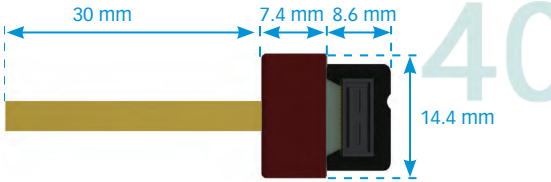


thickness: 5.4 mm
weight: 1.4 g

CONNECTOR TYPE:	(2x) Omnetics NPD36 (4 guideposts)
MATING CONNECTOR:	(2x) Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES:	Any 64 channel Standard (A-type) electrode array

HZ64

The HZ64 package is ideal for chronic experiments requiring connector standoff. It connects directly to a TDT ZC64 headstage.

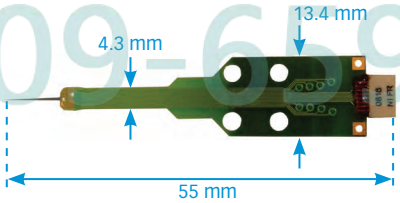


thickness: 2 mm
weight: 0.54 g

MATING CONNECTOR:	TDT ZC64 headstage
COMPATIBLE ELECTRODES:	Any 64 channel Standard (A-type) electrode array

MR_A16

The MR_A16 package is ideal for acute MRI applications.

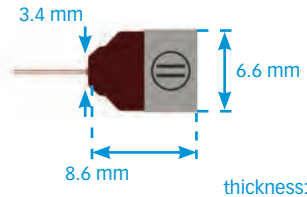


weight: 1.3 g

CONNECTOR TYPE:	Omnetics NPD18 (2 guideposts)
MATING CONNECTOR:	Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES:	Any 16 channel Standard (A-type) electrode array

MR_CM16

The compact MR_CM16 package is ideal for chronic MRI applications.



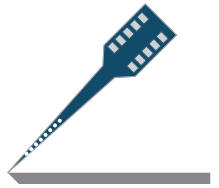
thickness: 1.73 mm
weight: 0.17 g

CONNECTOR TYPE:	Omnetics NPD18 (2 guideposts)
MATING CONNECTOR:	Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES:	Any 16 channel Standard (A-type) electrode array

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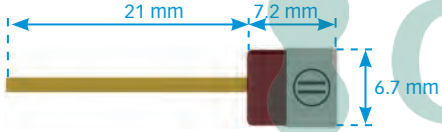
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Connector Package Specifications



MR_H16

The MR_H16 package is ideal for chronic MRI experiments requiring connector standoff.

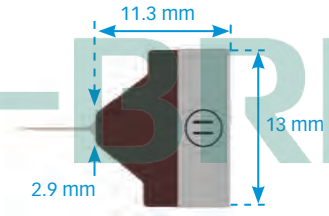


thickness: 1.78 mm
weight: 0.19 g

CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

MR_CM32

The MR_CM32 package is ideal for chronic MRI applications.

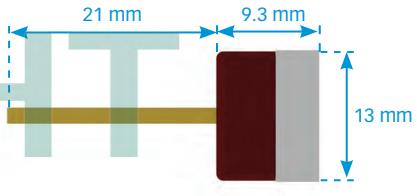


thickness: 1.78 mm
weight: 0.32 g

CONNECTOR TYPE: Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

MR_H32

The MR_H32 package is ideal for chronic MRI experiments requiring connector standoff.

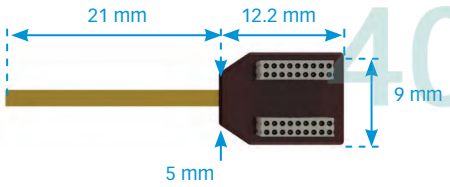


thickness: 5.4 mm
weight: 0.38 g

CONNECTOR TYPE: Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

MR_HC32

The MR_HC32 package is ideal for chronic MRI experiments requiring connector standoff.

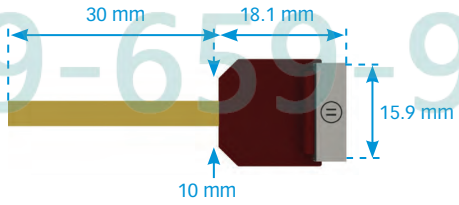


thickness: 5.4 mm
weight: 0.52 g

CONNECTOR TYPE: (2x) Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: (2x) Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

MR_H64

The MR_H64 package is ideal for chronic MRI experiments requiring connector standoff.

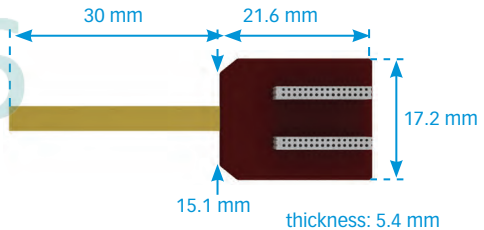


thickness: 5.2 mm
weight: 1.07 g

CONNECTOR TYPE: (2x) Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: (2x) Omnetics NSD36 (4 guideposts)
4-5 mm center-to-center spacing
COMPATIBLE ELECTRODES: Any 64 channel Standard (A-type) electrode array

MR_HC64

The MR_HC64 package is ideal for chronic MRI experiments requiring connector standoff.



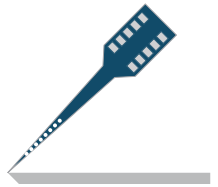
thickness: 5.4 mm
weight: 1.4 g

CONNECTOR TYPE: (2x) Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: (2x) Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 64 channel Standard (A-type) electrode array

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Connector Package Specifications



S128

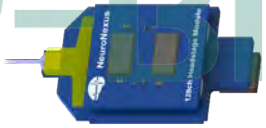
The S128 is a 128-channel electrode, designed for chronic applications.



CONNECTOR TYPE: Micro HDMI
MATING CONNECTOR: Micro HDMI
COMPATIBLE ELECTRODES: Any 128 channel electrode array

S256

The S256 is a 256-channel electrode, designed for chronic applications.



CONNECTOR TYPE: Micro HDMI
MATING CONNECTOR: Micro HDMI
COMPATIBLE ELECTRODES: Any 256 channel electrode array

H128

The H128 is a 128-channel electrode, designed for chronic applications.



CONNECTOR TYPE: Micro HDMI
MATING CONNECTOR: Micro HDMI
COMPATIBLE ELECTRODES: Any 128 channel electrode array

H256

The H256 is a 256-channel electrode, designed for chronic applications.

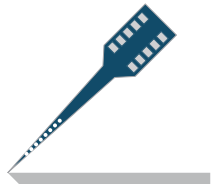


CONNECTOR TYPE: Micro HDMI
MATING CONNECTOR: Micro HDMI
COMPATIBLE ELECTRODES: Any 256 channel electrode array

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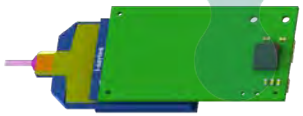
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Connector Package Specifications



I128

The H128 is a 128-channel electrode, designed for chronic applications.



CONNECTOR TYPE:	Omnetics 12 pin SPI and Omnetics 6 pin
MATING CONNECTOR:	SPI interface cable
COMPATIBLE ELECTRODES:	Any 128 channel electrode array

I256

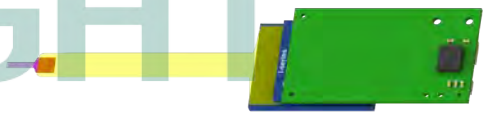
The I256 is a 256-channel electrode, designed for chronic applications.



CONNECTOR TYPE:	(2x) Omnetics 12 pin SPI and Omnetics 6 pin
MATING CONNECTOR:	SPI interface cable
COMPATIBLE ELECTRODES:	Any 256 channel electrode array

IH128

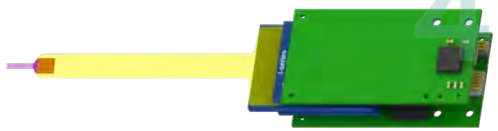
The H128 is a 128-channel electrode, designed for chronic applications.



CONNECTOR TYPE:	Omnetics 12 pin SPI and Omnetics 6 pin
MATING CONNECTOR:	SPI interface cable
COMPATIBLE ELECTRODES:	Any 128 channel electrode array

IH256

The IH256 is a 256-channel electrode, designed for chronic applications.

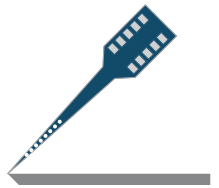


CONNECTOR TYPE:	(2x) Omnetics 12 pin SPI and Omnetics 6 pin
MATING CONNECTOR:	SPI interface cable
COMPATIBLE ELECTRODES:	Any 256 channel electrode array

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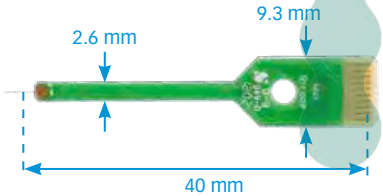
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Connector Package Specifications



Q4

The Q4 package is ideal for acute experiments with the 4-channel Qtrode.

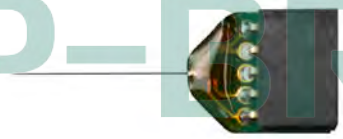


thickness: 2 mm
weight: 0.78 g

CONNECTOR TYPE:	Edge connector
MATING CONNECTOR:	Edge socket
COMPATIBLE ELECTRODES:	Any 4-channel electrode array (Qtrode)

CQ4

The CQ4 package is ideal for chronic experiments with the 4-channel Qtrode.



thickness: 3.1 mm
weight: 0.31 g

CONNECTOR TYPE:	Edge connector
MATING CONNECTOR:	Edge socket
COMPATIBLE ELECTRODES:	Any 4-channel electrode array (Qtrode)

HQ4

The HQ4 package is ideal for chronic experiments with the 4-channel Qtrode, or experiments using a microdriv.

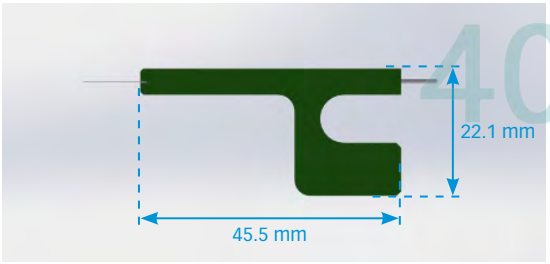


thickness: 3.1 mm
weight: 0.31 g

CONNECTOR TYPE:	Edge connector
MATING CONNECTOR:	Edge socket
COMPATIBLE ELECTRODES:	Any 4-channel electrode array (Qtrode)

OAQ4LP

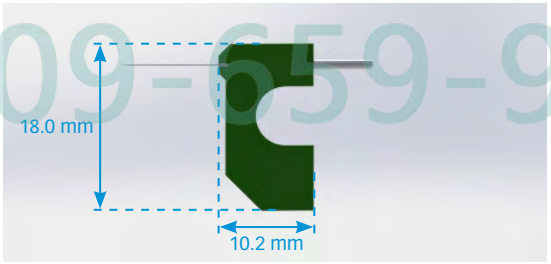
The OAQ4 package is designed for acute **optogenetics** experiments with the Qtrode.



CONNECTOR TYPE:	Edge connector
MATING CONNECTOR:	Edge socket
COMPATIBLE ELECTRODES:	Any 4-channel electrode array (Qtrode)

OCQ4LP

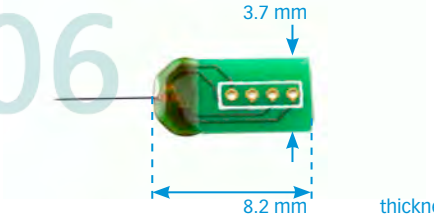
The OCQ4 package is designed for chronic **optogenetics** experiments with the Qtrode.



CONNECTOR TYPE:	Edge connector
MATING CONNECTOR:	Edge socket
COMPATIBLE ELECTRODES:	Any 4-channel electrode array (Qtrode)

EIB

The compact EIB package allows multiple 4-channel Qtrodes to be implanted in one animal.



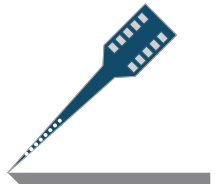
thickness: 0.6 mm
weight: 0.02 g

CONNECTOR TYPE:	Wires provided for connection to QIB
MATING CONNECTOR:	QIB
COMPATIBLE ELECTRODES:	Any 4-channel electrode array (Qtrode)

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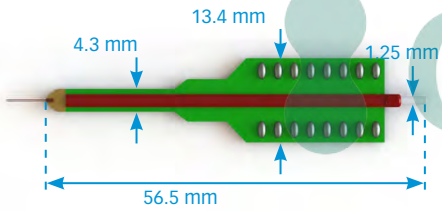
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Connector Package Specifications



OA16LP

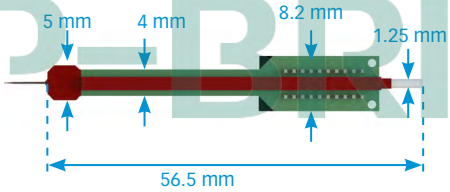
The OA16LP uses a bare ferrule fiber connection, and is suited for acute optogenetics experiments.



CONNECTOR TYPE: Dual Inline Pin (DIP); pin length 5.5 mm, spacing 2.5 mm
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

OA32LP

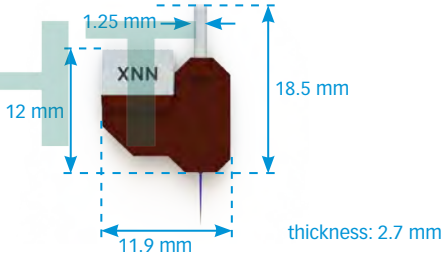
The OA32LP uses a bare ferrule fiber connection, and is suited for acute optogenetics experiments.



CONNECTOR TYPE: SAMTEC MOLC-110-01-S-Q
MATING CONNECTOR: SAMTEC FOLC
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

OCM16LP

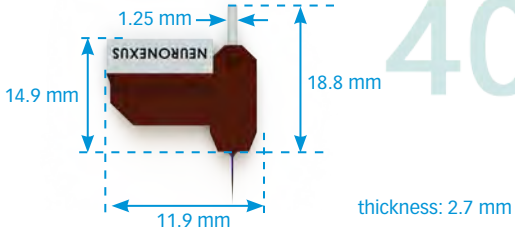
The OCM16LP uses a bare ferrule fiber connection, and is suited for chronic optogenetics experiments.



CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

OCM32LP

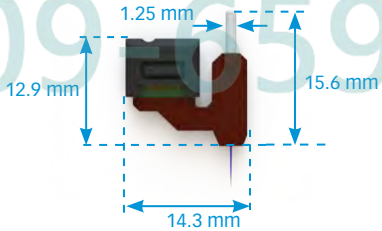
The OCM32LP uses a bare ferrule fiber connection, and is suited for chronic optogenetics experiments.



CONNECTOR TYPE: Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

OZ16LP

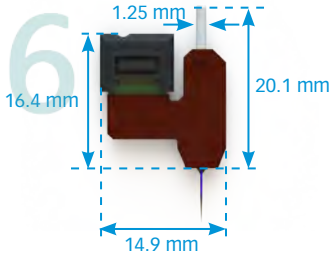
The OZ16LP uses a bare ferrule fiber connection, and is suited for chronic optogenetics experiments.



MATING CONNECTOR: TDT ZC16/ZC32 headstage
COMPATIBLE ELECTRODES: Any 16 channel Standard (A-type) electrode array

OZ32LP

The OZ32LP uses a bare ferrule fiber connection, and is suited for chronic optogenetics experiments.

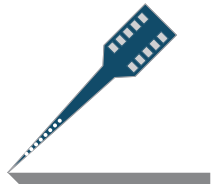


MATING CONNECTOR: TDT ZC32 headstage
COMPATIBLE ELECTRODES: Any 32 channel Standard (A-type) electrode array

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Connector Package Specifications



V16

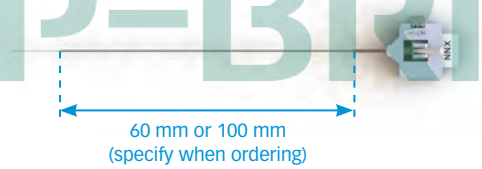
The V16 is a 16-channel Vector Array, designed for acute applications.



CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Vector (V-type) electrode array

OV16

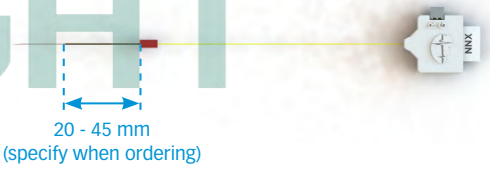
The OV16 is a 16-channel Vector Array, designed for acute optogenetics applications.



CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Vector (V-type) electrode array

VC16

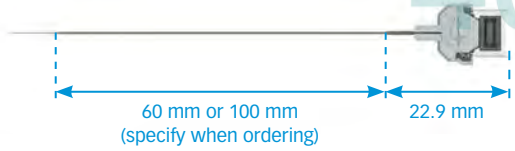
The VC16 is a 16-channel Vector Array, designed for chronic applications.



CONNECTOR TYPE: Omnetics NPD18 (2 guideposts)
MATING CONNECTOR: Omnetics NSD18 (2 guideposts)
COMPATIBLE ELECTRODES: Any 16 channel Vector (V-type) electrode array

VZ16

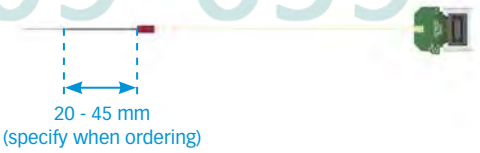
The VZ16 is a 16-channel Vector Array, designed for acute applications. It uses a TDT Zif-Clip connector.



MATING CONNECTOR: TDT ZC16/ZC32 headstage
COMPATIBLE ELECTRODES: Any 16 channel Vector (V-type) electrode array

VZC16

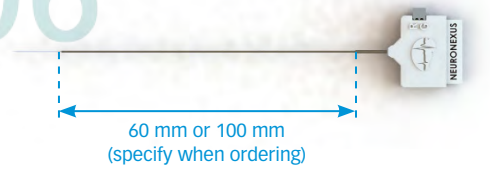
The VZC16 is a 16-channel Vector Array, designed for chronic applications. It uses a TDT Zif-Clip connector.



MATING CONNECTOR: TDT ZC16/ZC32 headstage
COMPATIBLE ELECTRODES: Any 16 channel Vector (V-type) electrode array

V32

The V32 is a 32-channel Vector Array, designed for acute applications.

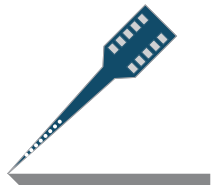


CONNECTOR TYPE: Omnetics NPD36 (4 guideposts)
MATING CONNECTOR: Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES: Any 32 channel Vector (V-type) electrode array

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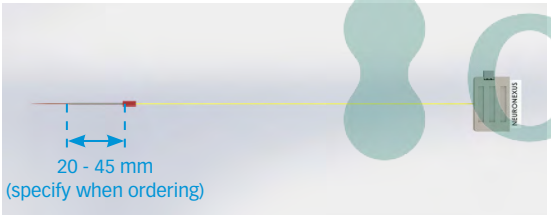
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Connector Package Specifications



VC32

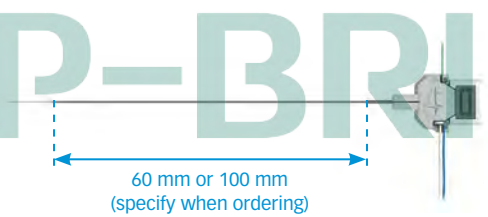
The VC32 is a 32-channel Vector Array, designed for chronic applications.



CONNECTOR TYPE:	Omnetics NPD36 (4 guideposts)
MATING CONNECTOR:	Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES:	Any 32 channel Vector (V-type) electrode array

CVZ32

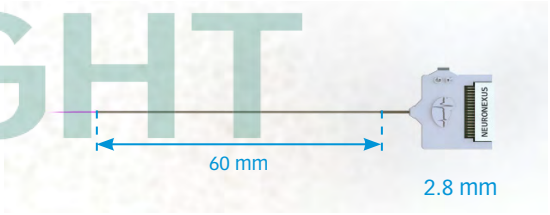
The CVZ32 is a 32-channel Vector Array, designed for acute applications. It uses a TDT Zif-Clip connector.



MATING CONNECTOR:	TDT ZC32 headstage
COMPATIBLE ELECTRODES:	Any 32 channel Vector (V-type) electrode array

V64

The V64 is a 64-channel Vector Array, designed for acute applications.



CONNECTOR TYPE:	(2x) Omnetics NPD36 (4 guideposts)
MATING CONNECTOR:	(2x) Omnetics NSD36 (4 guideposts)
COMPATIBLE ELECTRODES:	Any 64 channel Vector (V-type) electrode array

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5 Data Acquisition Systems

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SmartBox Pro

DATA ACQUISITION AND EXPERIMENT MANAGEMENT / PROBE CONDITIONING

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The **SmartBox Pro** is a high-performance, multi-functional instrument used for signal acquisition, experiment control, and probe diagnostics. The SmartBox Pro is plug-and-play compatible with all NeuroNexus probes – an important time-saving feature as probes become more complex, and channel counts increase. This integration between the SmartBox Pro and NeuroNexus probes means we can provide a fully configured system with high-end performance and features at a comparatively low price.

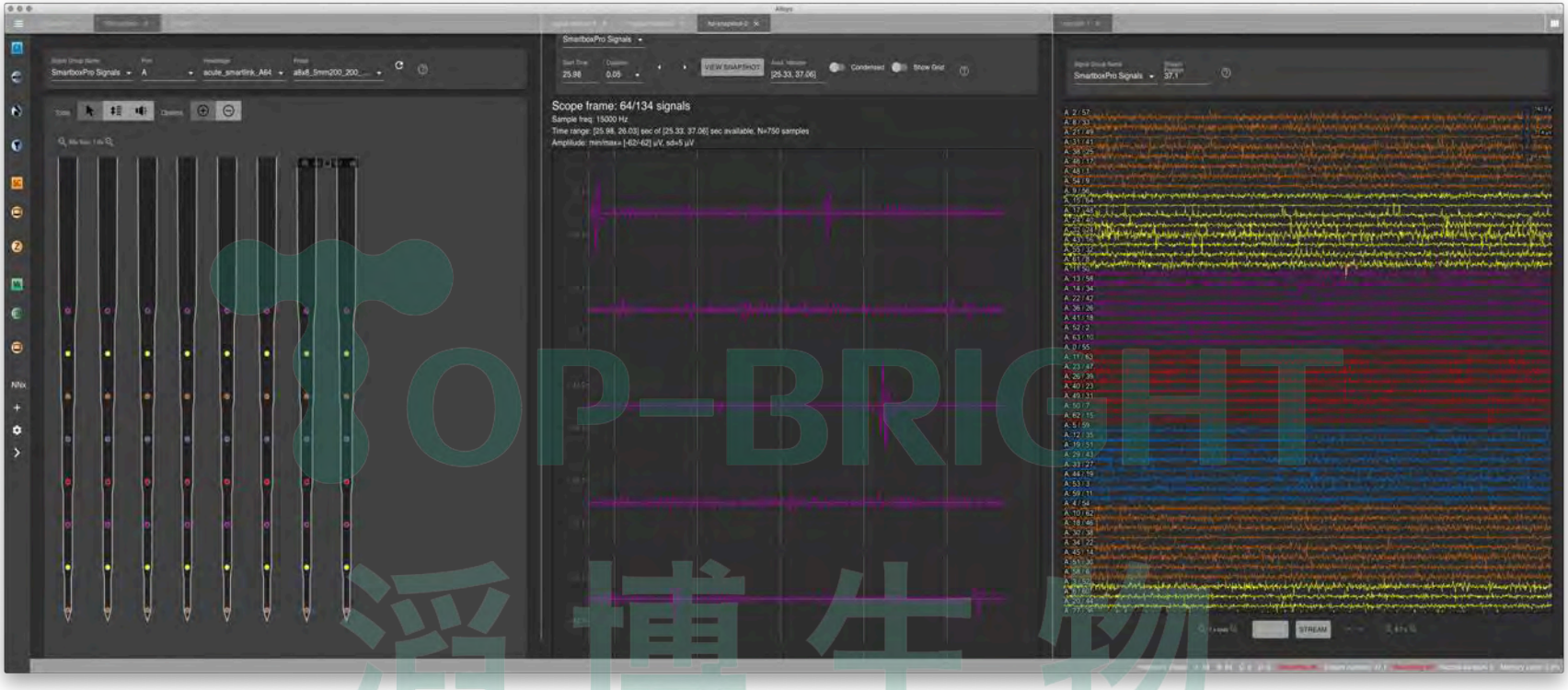
The Smartbox Pro is an upgrade of the existing SmartBox.

SPECIFICATIONS

Acquisition Channel Count	Up to 512
A/D Resolution	16-bit
Sampling Rates	1 kS/s - 30 kS/s per channel
Peripheral Output	2 Analog, BNC (0 - 3.3 V) 2 Digital, BNC (0 - 5 V)
Peripheral Input	2 Analog, BNC (0 - 3.3 V) 2 Digital, BNC (3.3 V)
Audio Monitoring	1 stereo line out (3.5 mm), user selectable
Cutoff Frequency	Adjustable; Lower: 0.1 - 500 Hz, Upper: 100 Hz - 20 kHz
Low Input-referred Noise	2.4 µVrms typical
Input/Output Range	± 9 V, ± 25 mA
Smallest Detectable Signal	≈ 15 µV

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The SmartBox Pro relates recording sites and their respective position on the electrode array with the recorded signals

- **Powerful** – record up to 512 channels simultaneously at a sample rate of 30 kHz
- **Portable** – Take your recording system and laptop with you and record from anywhere
- **Seamless Probe Integration** – Obtain new insight into your experiment with real-time spatial estimates of spike locations
- **Flexible Post-processing** – Raw data is streamed to disk for maximum options in post-processing. Read data into MATLAB or export to other programs for analysis.
- **Connect to peripherals** – A total of 8 I/O connections (4 analog, 4 digital) enable signal synchronization with digital and analog peripherals.
- **Ready to go** – USB 3.0 plug-and-play with Windows, Mac, and Linux

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SmartLink Headstages

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SmartLink headstages connect conventional high impedance probes (such as NeuroNexus Standard Probes) to the SmartBox system.

- **Reduced noise and motion artifact** – Because signal digitization occurs right at the implant location, SmartLink headstages allow probes to perform better in the noisy environments typically found in surgical suites.
- **Options** – SmartLink headstages are available in 16, 32, and 64 channel options, each with acute and chronic variants.

SPECIFICATIONS

A/D Resolution	16-bit, 0.15 µV
Sampling Rates	1 kS/s - 30 kS/s per channel
Cutoff Frequency	Adjustable; Lower: 0.1 - 500 Hz, Upper: 100 Hz - 20 kHz
Low Input-referred Noise	2.4 µVrms typical
Input Range	± 5 mV
Smallest Detectable Signal	≈ 15 µV
Amplifier Differential Gain	192 V/V (45.7 dB)
Amplifier DC Differential Gain	0 (Complete DC rejection)
Amplifier Input Impedance	1300 MΩ at f = 10 Hz 13 MΩ at f = 1,000 Hz

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6 Accessories & Services

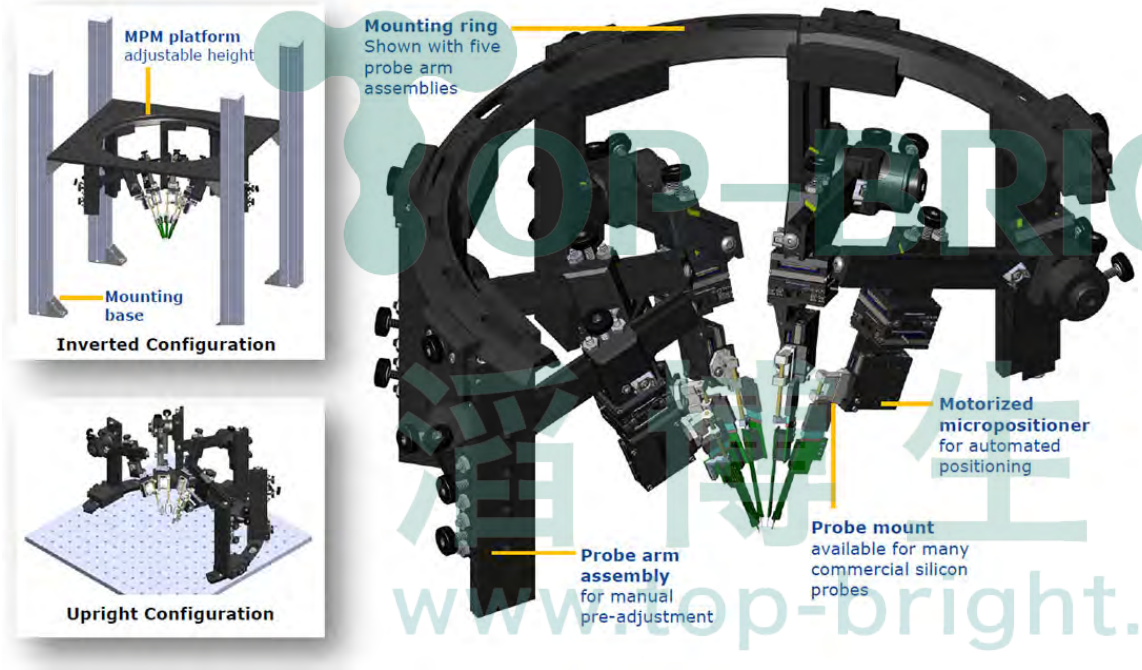
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Multi-Probe Manipulator (MPM)

MULTI-PROBE SIMULTANEOUS RECORDING

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Master multiple simultaneous recordings with the New Scale **Multi-Probe Manipulator (MPM),** the only micromanipulator designed specifically for positioning the newest silicon probes used in acute recordings.

- **Compact size** – Independently position multiple probes in a small space
- **Get creative with your experiments** – isolate neurons with one probe, record LFPs with a second probe, and stimulate with third, all while recording mapped signals with the SmartBox Pro data acquisition system. The sky's the limit!
- **Easily control 5 or more probes** – Up to 24 axes of automated motion (3 axes/micropositioner), all controlled by a single computer application.
- **Gross manual + Fine automated control** – four-axis arms enable quick setup, and three-axis automated micromanipulators adjust probe position with sub-micrometer precision.
- **Flexible device compatibility** – Use any combination of probes, tetrodes, optical fibers, and waveguides to take your experiment to the next level.

Images courtesy of New Scale Technologies

SPECIFICATIONS

Travel Range	15 mm/axis
Payload	100 g (recommended), 200 g (maximum)
Speed	4 mm/s
Resolution	0.5 µm
Bi-directional Repeatability	< 5 µm
Accuracy	< 20 µm
Dimensions	32 mm x 32 mm x 11 mm with each embedded controller

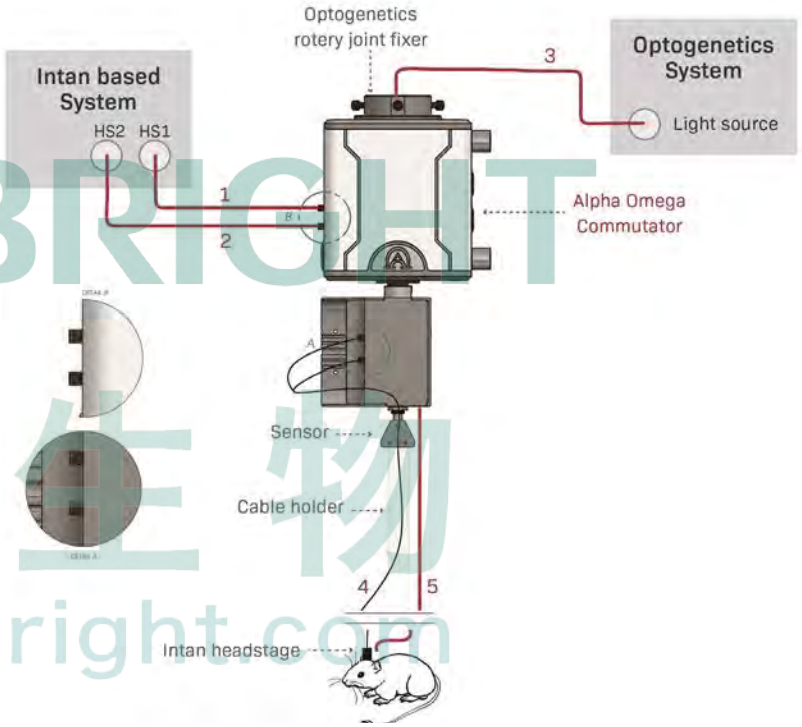
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AlphaComm-I

MOTORIZED COMMUTATOR

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The Alpha Omega **AlphaComm-I** is a motorized slip ring commutator that facilitates smooth tethering to research animals. It supports both neural recording and stimulation. The commutator actively tracks the rotation of the headstage cable and compensates, eliminating turn-induced torques on the research subject.

Key Features:

- Supports 16-256 channels
- High resolution sensing
- Controllable commutator speed and sensitivity
- Compatibility with Intan Headstages
- Compatibility with optogenetics up to 4 fibers
- Compatibility with liquid tubes
- Allows electrical stimulation on all the channels
- Additional 10 wires (general purpose)
- Compatibility with variety of arena sizes and shapes
- Allows video tracking/recording

Images courtesy of Alpha Omega

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NeuralGlider

NEURAL IMPLANT INSERTION SYSTEM

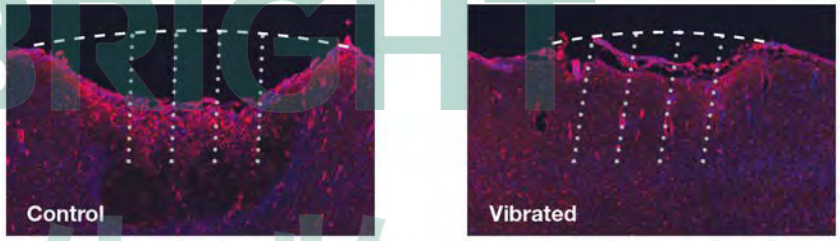
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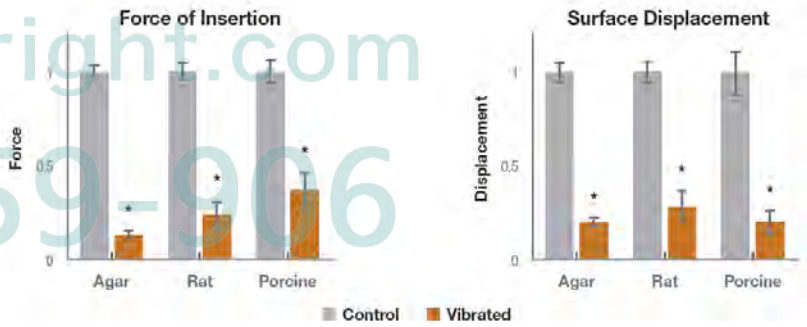
Images courtesy of Actuated Medical

The **NeuralGlider**-Cortical System from Actuated Medical maximizes the quality of chronic neural implant recordings in pre-clinical neuroscience studies.

- **Reduced Insertion Force** - Micron-scale, ultrasonic vibration during insertion reduces the force required to penetrate the brain surface
- **Accurate** - Reduced insertion force facilitates slow (0.1 mm/s or slower), accurate array insertions while minimizing dimpling or tissue displacement
- **Preserve Tissue Integrity** - Slow and accurate insertions with minimal tissue displacement can result in better signal-to-noise ratio compared to conventional insertions.
- **Integrated software** controls insertion velocity and depth



Above: *Compared to a standard control insertion (left), NeuralGlider reduced cortical surface damage and blood brain barrier leakage (IgG staining, red) at the insertion site (right). Images show 20µm rat cortical sections, 2 weeks after implantation. Source: Actuated Medical.*



Above: *Ultrasonic vibration of microwire arrays during insertions with NeuralGlider significantly reduced penetration force in an agar brain model, and ex vivo rat and porcine cortex (reductions in force = 86.3%, 76.5% and 62.7%, respectively). The reduction of force correlates to a 70 – 80% reduction in cortical surface displacement/dimple during array insertion, for all tissues. Source: Actuated Medical.*

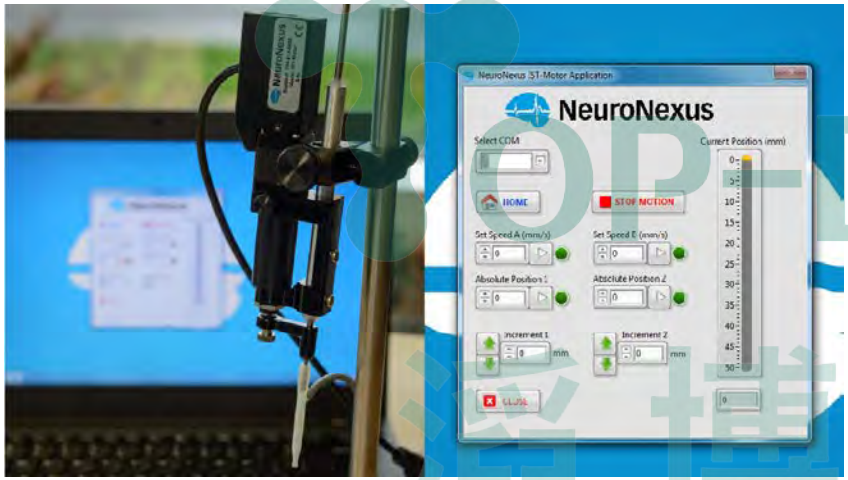
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Insertion Tools

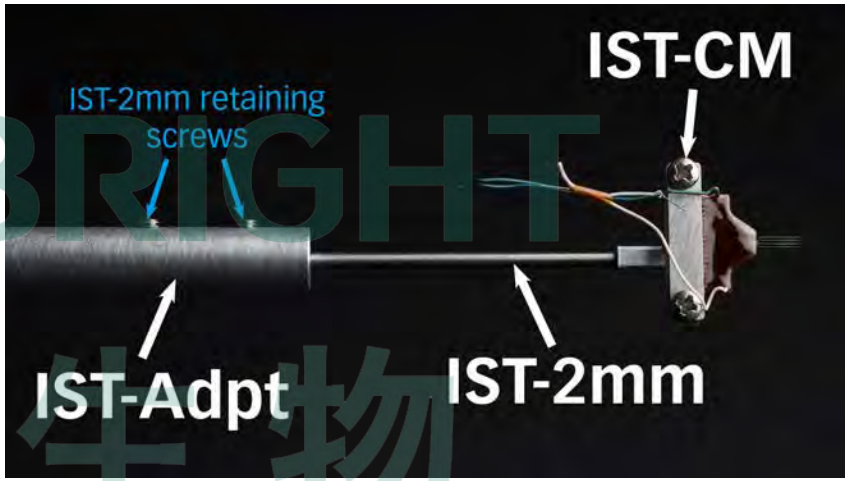
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AUTOMATIC INSERTION TOOLS



The IST-Motor is a computer-controlled insertion tool developed to allow precise, micron-accurate probe insertions. The IST-Motor is designed to interface directly with standard stereotaxic frames. To complement the macro-scale adjustments of a stereotaxic frame, the IST-Motor is capable of 50 mm of movement. Insertion speed is adjustable between 0.22 µm/s – 8 mm/s, and insertion can be performed by absolute position or in increments as small as 0.05 µm.

MANUAL INSERTION TOOLS



Manual Insertion tools attach to the probe package and terminate with a 2 mm rod. To attach the 2 mm rod to a standard Kopf 7.9 mm stereotactic frame, you will need an adaptor (IST-ADPT). Custom rods with a diameter less than 8 mm are also available.

ORDERING

IST-ADPT	Adaptor to connect 2 mm mounting rod to 7.9 mm stereotactic frame
IST-CM	Insertion tool for CM and Zif-Clip packages
IST-CM_Kit	Includes IST-CM and IST-ADPT

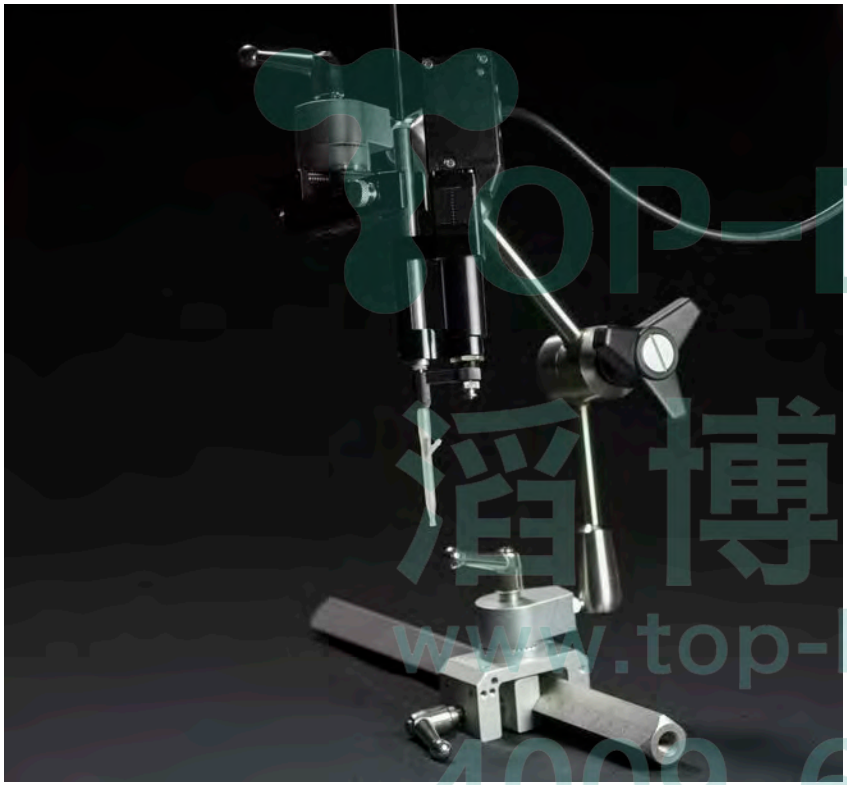
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All-Angle Manipulator

FULLY ARTICULATED POSITIONING ARM

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Quickly and easily position a probe for implant with the NeuroNexus **All-Angle Manipulator,** a fully articulated positioning arm with 90° pivotable and 360° rotatable ends, and a 360° rotatable elbow.

- **Simple operation** – One locking knob loosens the arm, and the entire device can be operated quickly and precisely with two hands. Tighten the knob to lock the arm in place.
- **Two-axis fine tuning** – the Insertion Platform allows fine adjustment of the probe position once the arm has been set.
- **Kopf® compatibility** – a Kopf® adaptor enables easy mounting to a Kopf® stereotaxic frame.

SPECIFICATIONS

Total Length: 245 mm

Insertion Platform: ± 5 mm in two axes

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Headstage Adaptors

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If you have a headstage that does not connect directly to one of our probe packages, you might need a **headstage adaptor.** NeuroNexus offers a range of adaptors, listed on our website. If you cannot find an adaptor to meet your needs, custom adaptors can be fabricated.

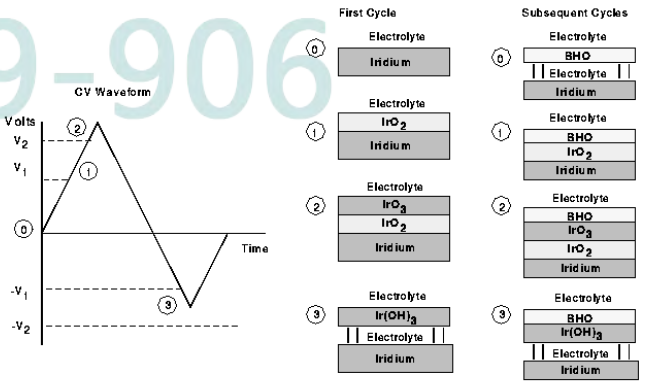
NOTE: When mapping electrode sites to the headstage with an adaptor, the adaptor map must be taken into consideration. Adaptor maps describe the channel routing through the adaptor.

Activation

Activation is a process which alters the charge capacity and impedance characteristics of a probe with iridium contacts, without affecting biocompatibility:

- Activated iridium increases the amount of charge that can be delivered during stimulation.
- For recording applications, activated iridium sites exhibit lower impedance than non-activated sites.

Our technical note on iridium activation, accessible on the NeuroNexus website, provides an in-depth analysis.



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Training Kits

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Mock probe assemblies are available for training purposes. These assemblies are designed for insertion practice or mock surgeries, and are not functional. The mock probe assemblies do not include actual PCBs or connectors.

New users looking to move up from training kits may consider trying B-Stock probes, which are irregular probes and are offered at discounted prices.

Tools



Some probe packages come with insulated wires for grounding and reference channel customization. NeuroNexus recommends cutting or stripping these wires with a wire stripper optimized for small conductor cross sections.

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MR Accessories

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MR Accessories utilize trace to no amounts of ferromagnetic material to minimize MRI interference.

CATALOG #	DESCRIPTION
MR-Brainamp-Jumper	Jumper cable between adaptor and BrainAmp. Length can be customized. **NOTE:** Contains nickel-plated material.
MR-BrainAmp-Omnetics16x2	BrainAmp adaptor (32-channel)
MR-Omnetics16-Wire	Mate to Omnetics connector on the probe. Nickel-free material. Cable length ≈ 10" (254 mm)
MR-Omnetics16-Jumper	Jumper cable between adaptor and NeuroNexus probe. Nickel-free material.

Consulting

Adapting to a new technology and technique can involve steep learning curves.

NeuroNexus staff engineers and scientists bring together decades of pioneering experience in neuroscience and microfabrication. Our practical expertise can reduce your ramp-up time and allow you to focus on your research. We work with you side-by-side to plan out your experiment and come up with a strategy to minimize known and anticipated issues.

Surgical techniques often have a very significant impact on the outcome of an experiment, especially in chronic applications. We can help train your group and get you up and running quickly.

NeuroNexus can provide consultation on the following:

- Perform surgery and implant electrodes for you on-site
- Assist with the design of the experiment
- Assist with pre-surgery planning
- Training in surgical techniques necessary to maximize the performance of your probe
- Assist with data analysis

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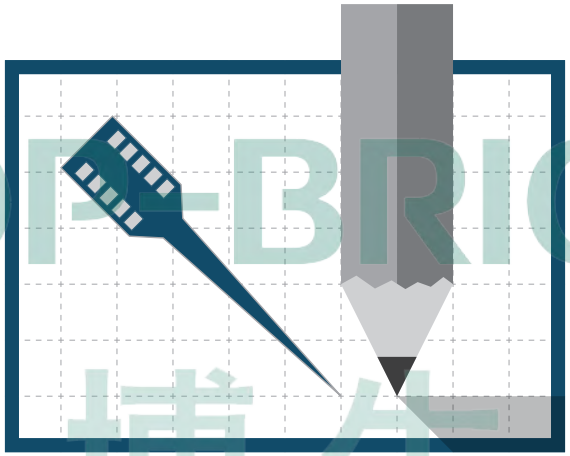
Custom Design & Collaborators

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Designing Your Own Probe

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NeuroNexus offers a **custom probe design service** that provides unique access to a virtually unlimited design space. Almost any feature of a probe can be tailored to suit your application - and all it takes to get started is a sketch.

Each custom probe includes:

- Consultation with our engineering team to validate feasibility of your proposed design
- Translation of your design into a CAD layout
- Formal design review with our technical team
- State-of-the-art microfabrication of your design
- Packaging and testing of the fabricated probes

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Custom Probe Design Services

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There are three main time-consuming elements in the Custom Design process: time to get into the design queue, time for fabrication, and time for assembly. The first element is usually the rate-limiting step in the process since there is not always room to put a new design onto an upcoming mask set. Since we run new mask sets only once every few months, getting a priority position on an upcoming mask can make months-worth of difference in delivery time. Our Custom Design Service has tiered pricing allowing us to give customers more options for access to leading edge silicon microelectrode technology, and at lower price points.

	16 Channel	32 Channel	64 Channel	Vector Array	Matrix Array
MINIMUM ORDER	≈6-14 probes	≈6-12 probes	≈6-12 probes	≈5 probes	≈3-5 probes

Unit pricing for custom design requests are dependant on channel count, feature spacing, packaging, shank length and site material.

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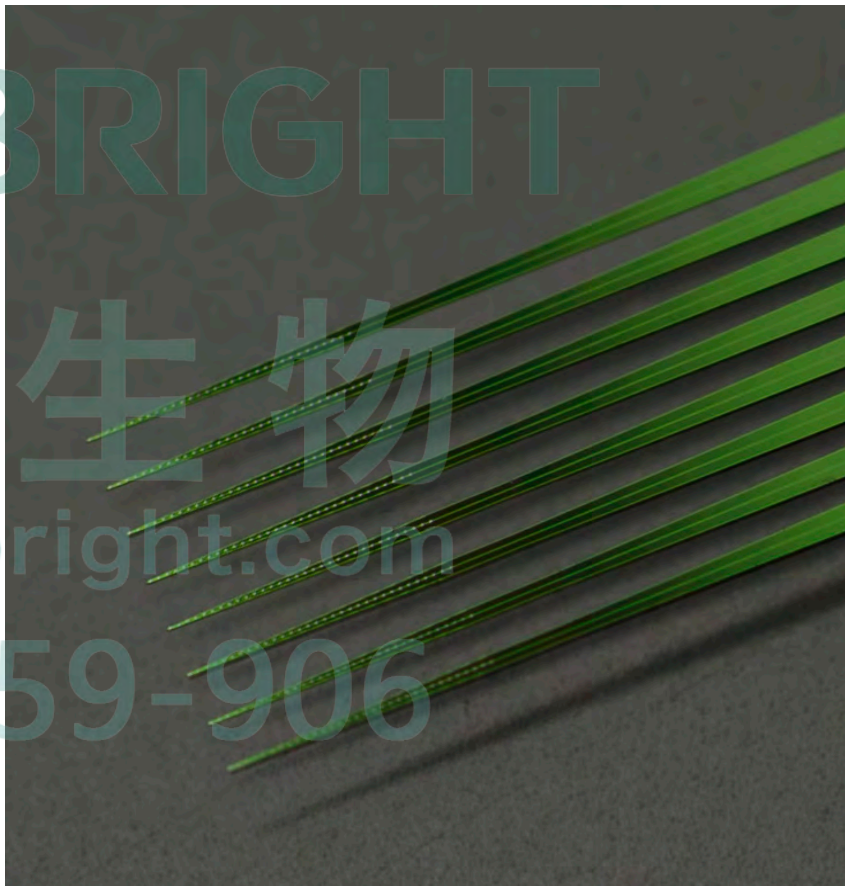
Custom Design Process

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NeuroNexus probes are manufactured using state-of-the-art design, microfabrication and packaging techniques. Design is accomplished using a semiconductor computer-aided design (CAD) tool that results in a multi-layer mask set. These photolithographic masks are used in the fabrication process to transfer patterns of the probe features onto thin-films that have been deposited on a silicon wafer.

Thin-film fabrication is a batch process that permits us to fabricate a variety of probe designs simultaneously on a silicon wafer. NeuroNexus offers a Custom Design Service where customer-submitted designs can be fabricated on the same wafer as our standard catalog designs, and then packaged for use per the customer's specs.

RIGHT: Buz256 probe



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Dr. Gyorgy Buzsaki



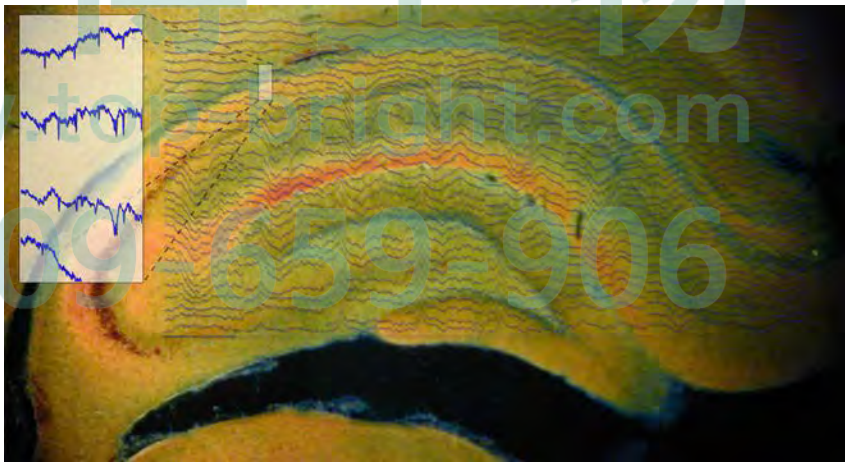
NEW YORK UNIVERSITY (NYU), USA

VISIT LAB WEBSITE

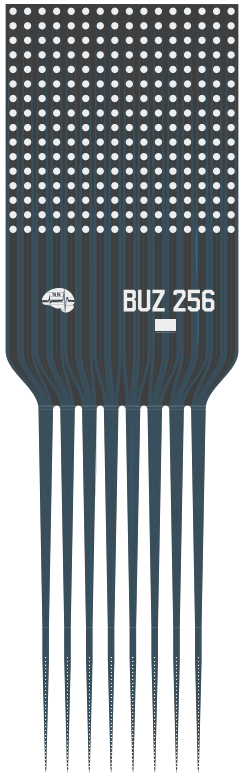
"Since NeuroNexus began fabricating probes with high reliability and reasonable costs, we virtually stopped using wire electrodes and monitor electrical activity with silicon probes. It is a one-way process: once one begins to record with silicon probes, he/she never goes back to wires."

Dr. Buzsaki

Dr. Buzsaki's group records large numbers of neurons simultaneously in the hippocampus and various cortical and subcortical structures for understanding how information is transferred across networks. He has designed seven custom probes through NeuroNexus that he uses to determine the geometrical distribution of extracellular currents, so that spiking activity can be related to the global behavior of the circuits.



Snapshot of a 256 channel recording (32 sites x 8 shanks), superimposed on the histological image reflecting the signal locations. Image courtesy of A Berenyi and G Buzsaki.



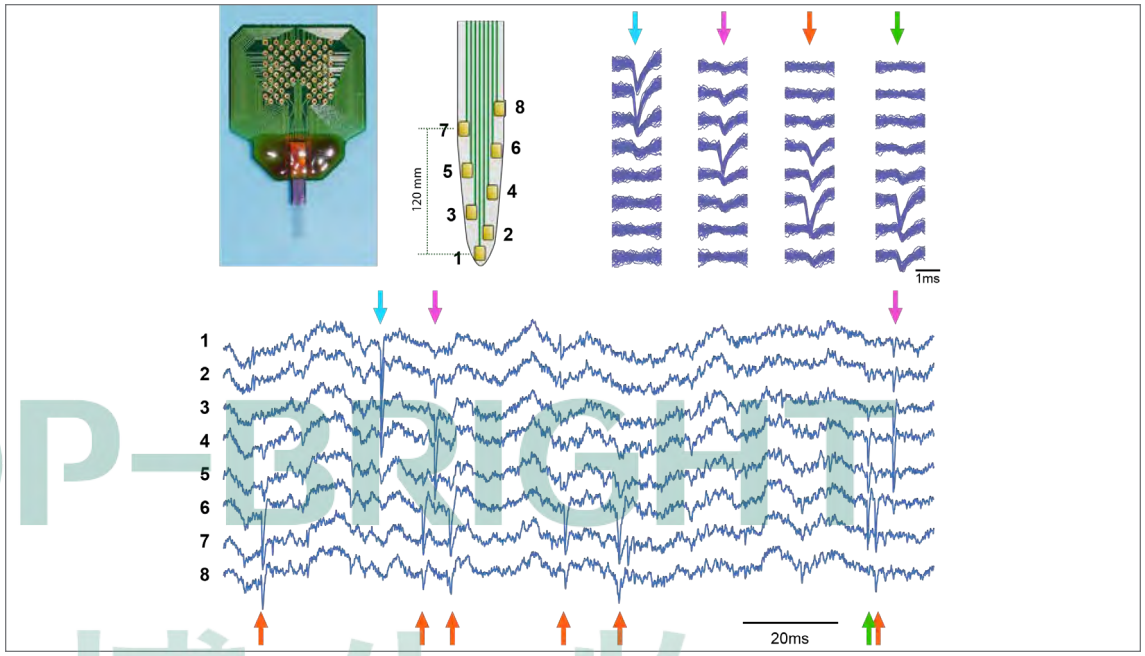
Buzsaki256 probe

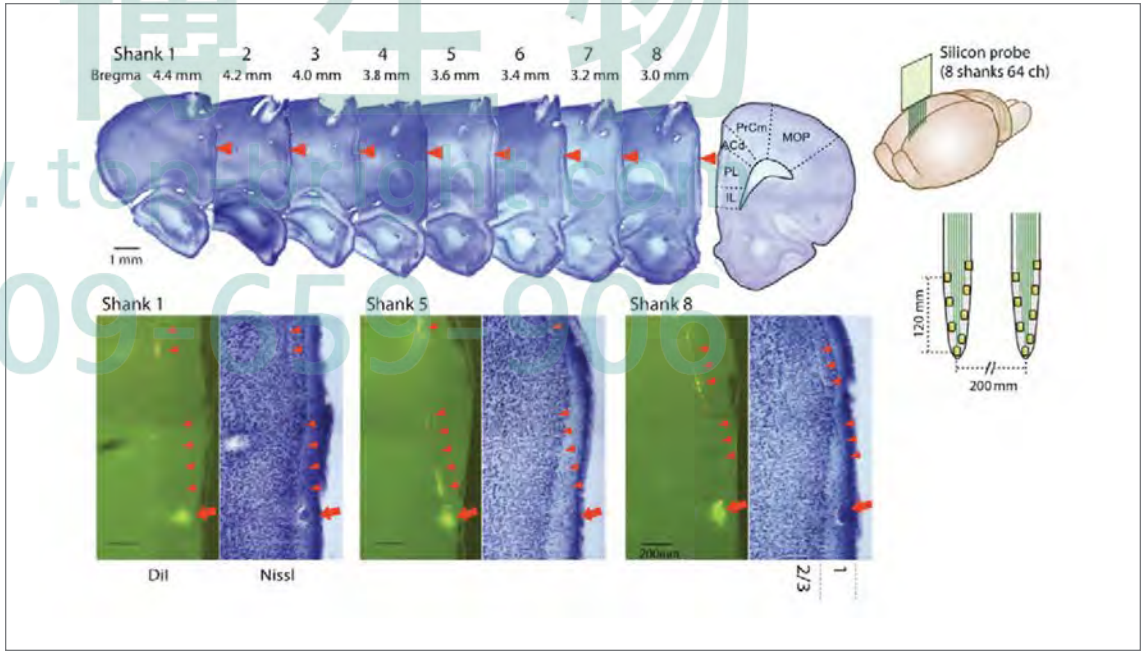
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The **Buzsaki32** and **Buzsaki64** designs have become Dr. Buzsaki's workhorse probes. They were designed to record and segregate neurons in areas of packed cell densities as in the hippocampus and various neocortical layers. The inter-shank intervals allow for high-density sampling yet neighboring shanks record from independent populations. These custom designs allow for recording from representative samples of neurons in local circuits and monitoring of neuronal interactions with high temporal precision.

Many of Dr. Buzsaki's probes have become popular catalog designs. He continues to push the envelope of the NeuroNexus design space as evidenced by his most recent design, a 256-channel probe which incorporates minimum feature sizes.





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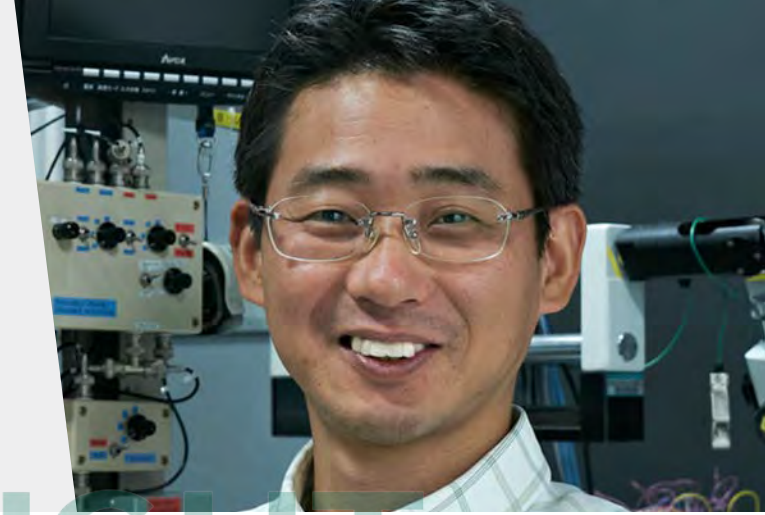
IMAGES

Right, Top: Wideband recording from a Buzsaki64 probe. Lower plot shows 8 channels of recordings from one shank.

Right, Bottom: Histology data from an 8-shank Buzsaki64 probe.

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Dr. Yoshikazu Isomura



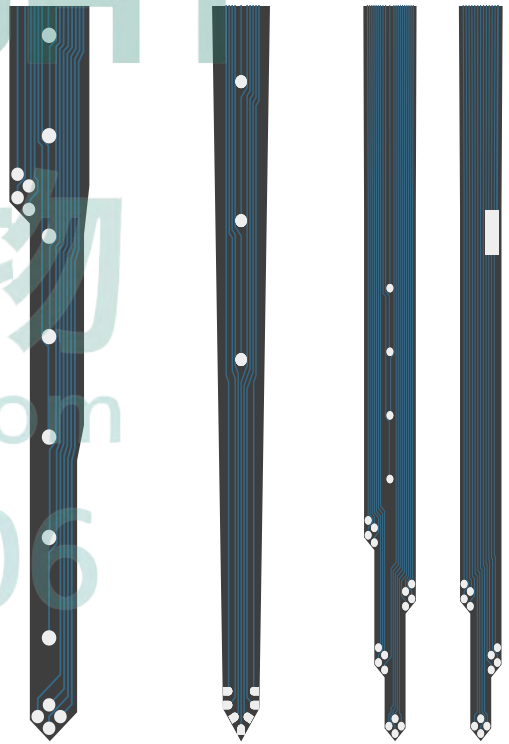
TAMAGAWA UNIVERSITY, JAPAN

VISIT LAB WEBSITE

"I feel truly grateful for being introduced to NeuroNexus probes and multi-neuron recording techniques in Dr. Gyorgy Buzsaki's lab. The probe I designed allows simultaneous comparison of cell-firing activity between different layers of cortex from rats or mice, in one experimental session. Moreover, it's suitable for CSD analysis of LFPs. I would recommend this for your first recording from cortex."

Dr. Isomura

Dr. Isomura investigates the microcircuitry and mechanisms in behaving rat primary motor cortex underlying preparation, initiation, and expression of voluntary movements. His 16-channel custom probe permits him to simultaneously record local field potentials (LFPs) and spike activity from multiple single neurons across cortical layers. His probe includes nine recording sites for LFPs (0 to 1,200 µm deep at 150 µm intervals) and two tetrode configurations (400 and 1,200 µm deep) for recording spike activity at superficial and deep layers. The two tetrode configurations are placed on leading edges of the array for interfacing with healthy tissue. This probe provides valuable information on functional processing in superficial and deep layers through simultaneous single-cell and population recordings.



LFP8-TetrodeSD, Isomura2, and Isomura32

Close-up views of Dr. Isomura's Custom Designs. (Not to scale.)
Left: LFP8-Tetrode SD. Middle: Isomura2. Right: Isomura32

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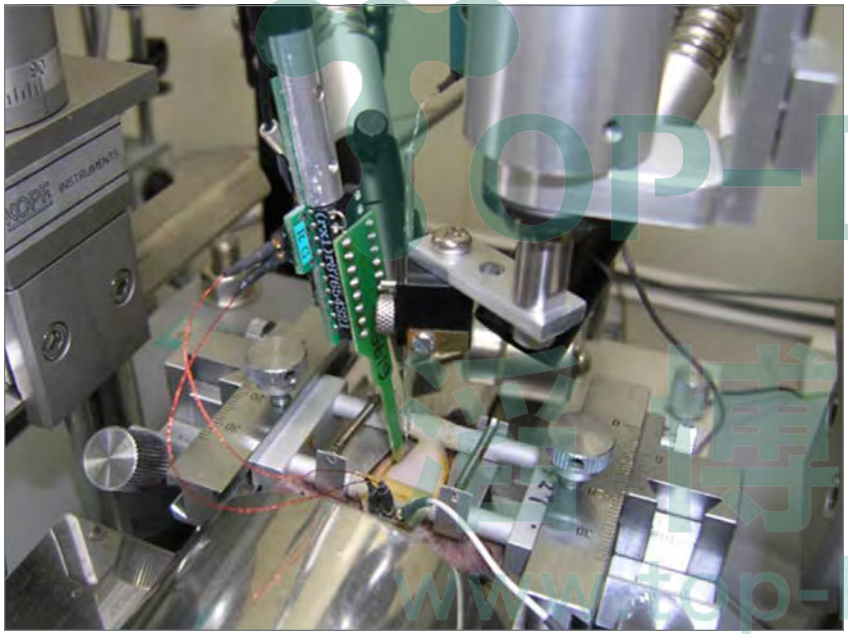
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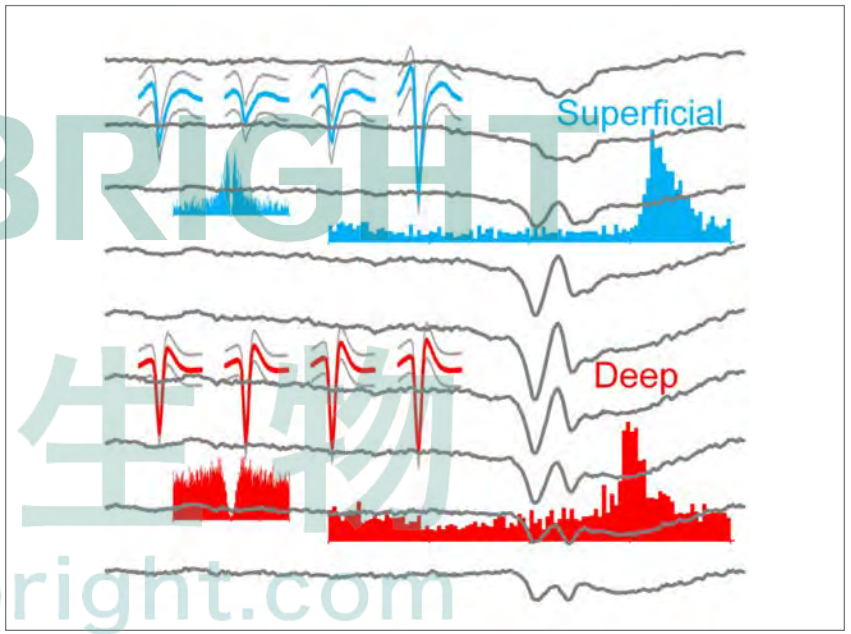
RESULT

Dr. Isomura and his colleagues performed multi-neuron and LFP recordings from various layers of the motor cortex during forelimb movements. They showed different motor-related functions of pyramidal cells and interneurons across the cortical layers (Nat. Neurosci., 12: 1586-1593, 2009). More recently, they have found that spiking activity of motor cortex neurons was often phase-locked to slow and fast gamma oscillations in the LFP activity, which might be functionally associated with motor preparation and motor expression, respectively.

PROBE STATUS

The electrode design is available in the catalog as a special order. Dr. Isomura appreciates maintaining contact with users of his custom design and learning about other applications and results.





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IMAGES

LEFT: Dr. Isomura's lab setup
RIGHT: Recordings from the LFP8-TetrodeSD probe.
Data and images courtesy of Isomura lab. Used with permission.

SCIENCE UPDATE

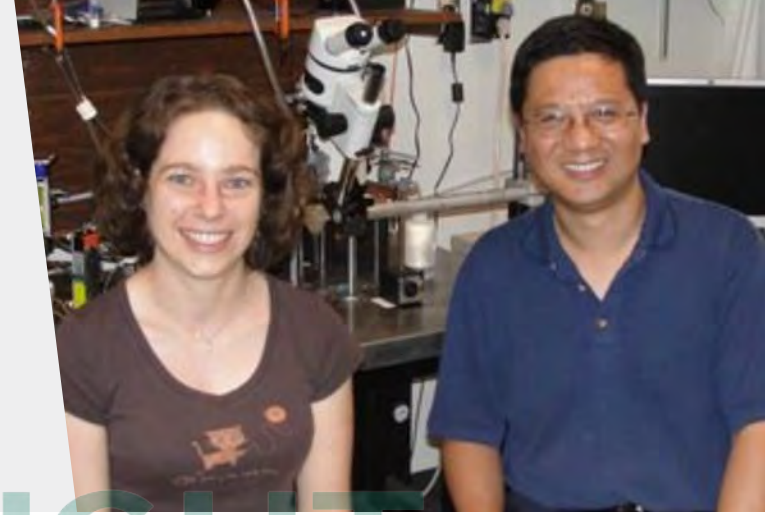
Isomura, Yoshikazu et al. "Reward-Modulated Motor Information in Identified Striatum Neurons." J Neurosci 2013

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Drs. Hong Lei & Cecile Faucher

UNIVERSITY OF ARIZONA, USA

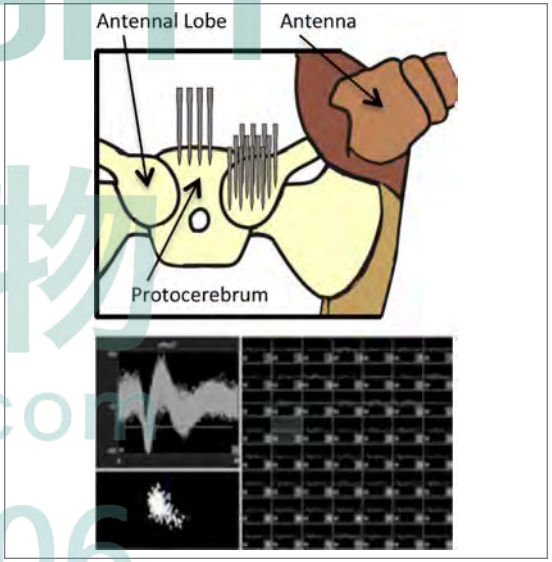
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"Having such a high number of recording sites in two locations will significantly increase the chance to detect synchronous activity in one region of the moth brain and observe correlated responses in the target region."

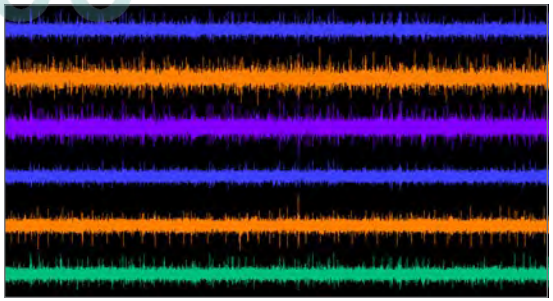
Drs. Hong Lei and Faucher

The University of Arizona group is interested in how olfactory information is processed in insect brains, more particularly how synchronous activity in the antennal lobes is detected by downstream protocerebral neurons. They therefore needed to record simultaneously from two different locations in the small moth brain. NeuroNexus was tasked to design a high density probe to allow access to such a small brain region without excessive damage. A 64-channel array was designed that was comprised of a 3D stack of three 16-channel A-Probes and a single 16-channel A-Probe with flexible cable attached. The two units were integrated to one single connector, allowing access to two brain regions while minimizing the bulk of the probe assembly.



PROBE DETAIL

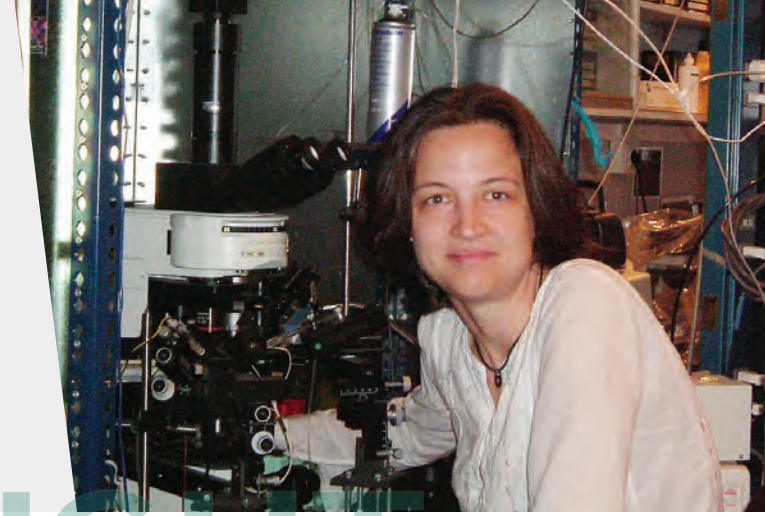
The Matrix Array™ concurrently spans cortical columns and layers, interfacing with a volume of tissue. Specify different 2D arrays for a customized 3D neural interface.



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Dr. Liset Menendez de la Prida

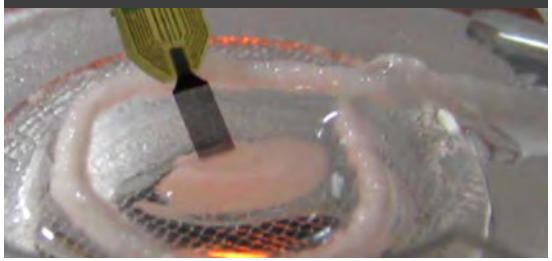


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"Both single cell activity and field potential population events can be easily recorded. The linear array allows for propagation studies both in vitro and in vivo and it can be used for current source density analysis in slices."

Dr. Menendez de la Prida



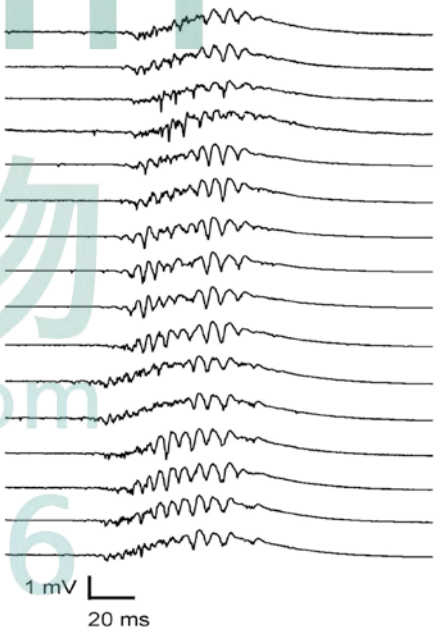
Dr. Menendez de la Prida is interested in performing linear array recordings to understand the generating mechanisms of brain oscillations. She designed a 16-channel comb silicon probe that can be used for both *in vitro* and *in vivo* applications. It allows current source density analysis of field potential events in slices, but is also used to record activity from different orientations. *In vivo,* it can be used for propagation studies or topographic localization of sensory responses.

RESULT

Dr. Menendez de la Prida has mostly used her design for *in vitro* studies. Use of the probe has revealed extremely useful information. Both single-cell and local field potential activity can be simultaneously recorded. The probe easily penetrates the slice and it can be repositioned several times over the course of a single experiment.

PROBE DETAIL

The A16x1 electrode array features 1 electrode site at the tip of each of its 16 shanks.



IMAGES

EXTREME LEFT: The A16x1 probe inserted in an *in vitro* slice.

ABOVE: Propagation studies of one type of population activity record from rat hippocampal slices

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Drs. Hubert Lim & Malgorzata Straka

UNIVERSITY OF MINNESOTA, USA

VISIT LAB WEBSITE



"I have been a user of these probes for over ten years and have not found any other available technology that can allow me to reliably stimulate and record from similar populations of neurons across numerous brain regions simultaneously. The enormous amount of neural data that can be collected from each probe makes animal experiments more efficient and consistent."

Dr. Lim

Dr. Lim's group uses the new probe design to study the auditory pathway through multichannel stimulation and simultaneous recording of small populations of neurons. The power of these probes lies with the ability to stimulate as well as record from neurons using the same probe by electrochemically activating the sites to form iridium-oxide. Dr. Lim's group is able to record neural activity across numerous sites during placement to identify areas of interest, even within deep structures (e.g., inferior colliculus Fig. 1) without aspirating the cortical structures above it by using long shanks. Then those same sites can be electrically stimulated to activate the desired brain regions. In addition, the flexibility in the probe design allows Dr. Lim's group to record and stimulate different yet specific populations of neurons to better understand network coding within the auditory system.

RESULT

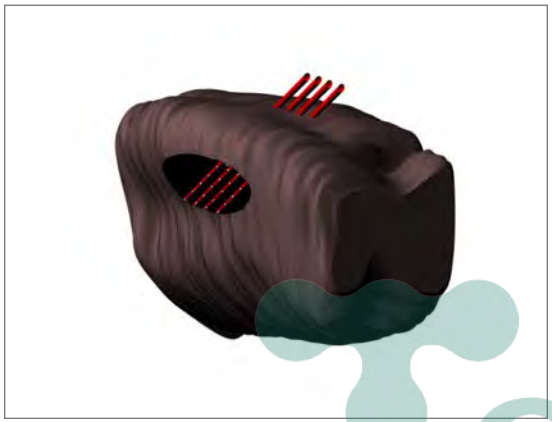
Dr. Lim's group has been able to position sites (e.g., Ch1 and Ch2 in Fig. 2) within the same frequency region of the inferior colliculus. They then stimulated these sites individually or collectively to elicit varying activation within the auditory cortex (local field potentials and spiking activity) with a separate NeuroNexus probe. Understanding how higher cortical structures respond to precisely delivered electrical stimulation allows Dr. Lim's group to not only better understand the auditory pathways but also improve stimulation techniques for new types of central auditory neuroprostheses.

PROBE DETAIL

The A4x8-8mm-100-500-703 electrode array is available as a special order.

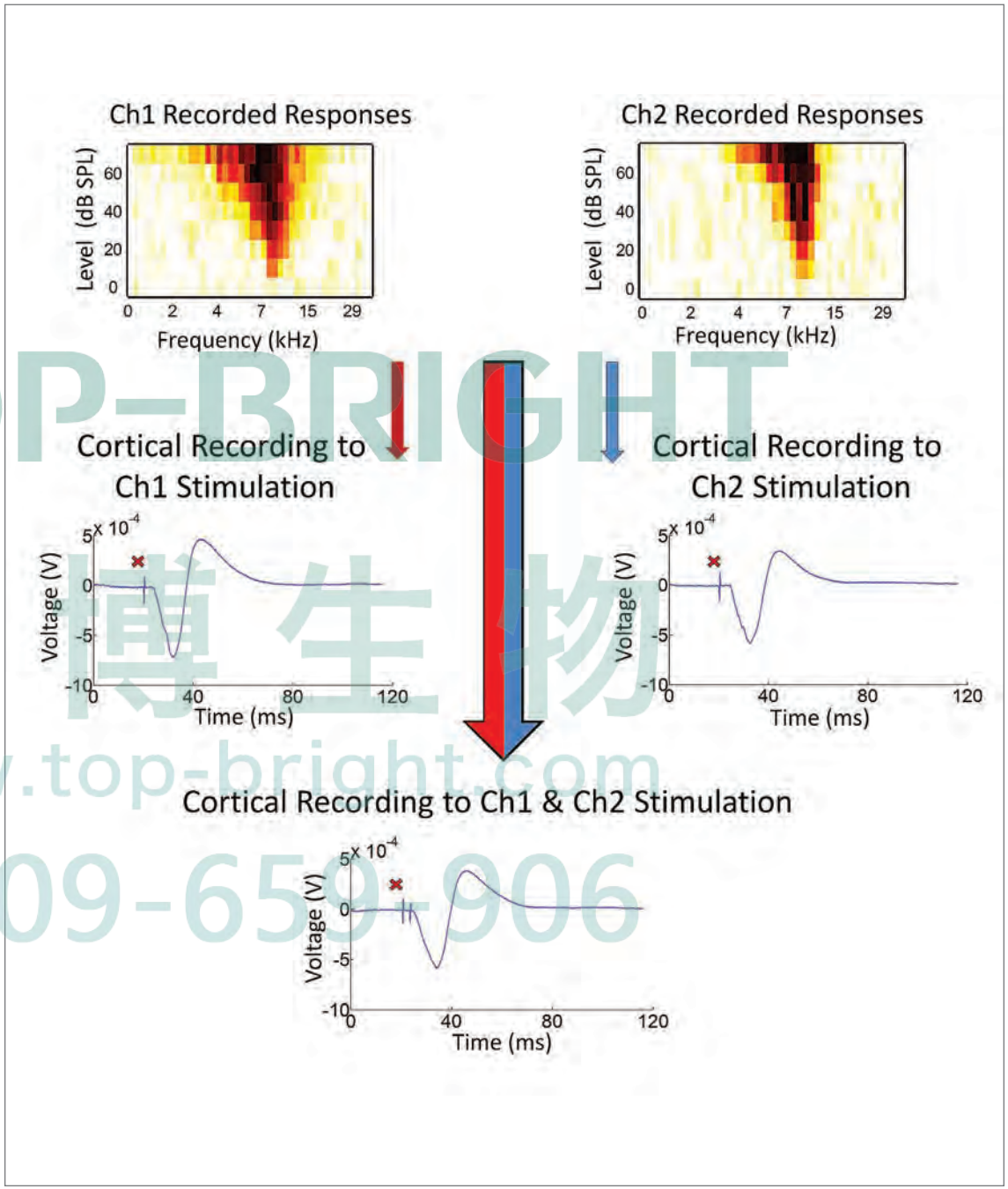
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ABOVE (FIG.1):
A three-dimensional rendering of the guinea pig inferior colliculus with an inserted probe.

RIGHT (FIG. 2):
Top: Examples of responses within the inferior colliculus on two separate recording sites (Ch1 and Ch2) selected for their similar activation patterns. Tones were played at different levels and frequencies, and the total spikes to each stimulus is displayed in separate bins (stimuli eliciting more activity appears darker). Both sites correspond to neurons responding best to 8 kHz tones. Bottom: Auditory cortical field potentials in response to stimulation of Ch1 or Ch2 individually or collectively with a specific delay. The electrical artifact to each electrical pulse is included (red cross).



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Drs. Daniel Moran & Matthew MacEwan

WASHINGTON UNIVERSITY, USA

VISIT LAB WEBSITE



"I am very pleased with the outcome of this project. It would have taken a considerable amount of funds and, more importantly, time if I were to pursue this on my own or with an academic partner."

Dr. Moran

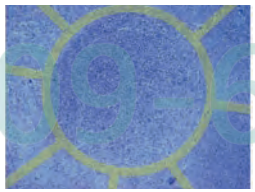
Dr. Moran's group approached NeuroNexus with a need for a dual-layer macro sieve electrode capable of recruiting distal musculature through selective stimulation of regenerated motor axons integrated into the device. NeuroNexus turned the novel design specifications/concept into a packaged system including a polymer based array and a custom printed circuit board.

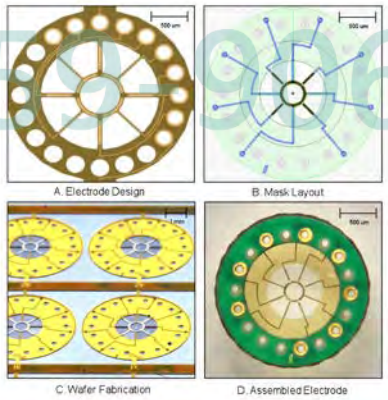
RESULT

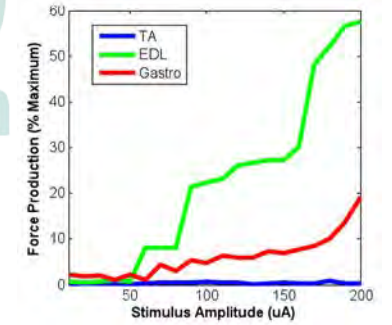
Dr. Moran's group was able to successfully demonstrate selective activation of multiple muscles within the lower leg of a rat through electrical activation of independent metalized sites with the device. Additional studies are currently underway to further investigate the functional resolution and functional capabilities of this unique 8-channel array.

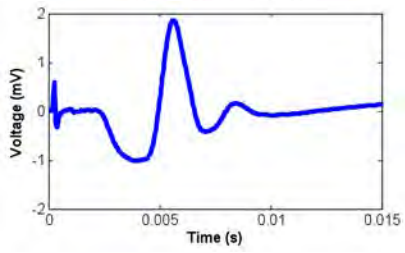
PROBE DETAIL

Dr. Moran's **nerve probe** is a custom designed Surface array.









IMAGES

LEFT: Peripheral nerve regeneration through the implanted macro sieve electrode
MIDDLE: Designing the macro sieve electrode
RIGHT, TOP: Selective recruitment of distal musculature via bipolar stimulation
RIGHT, BOTTOM: Successful recruitment of regenerated nerve tissue via implanted electrode

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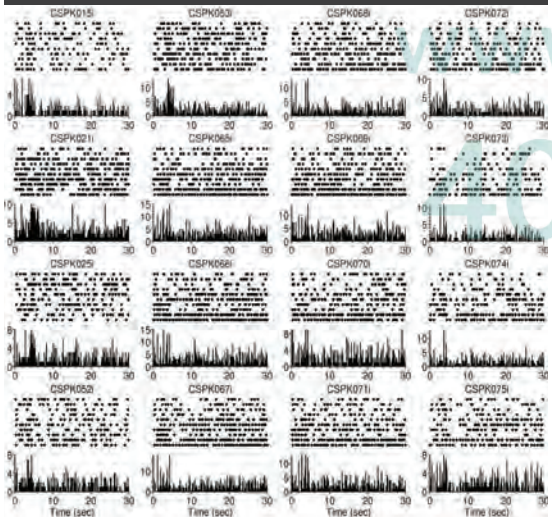
Dr. Antonio Paolini



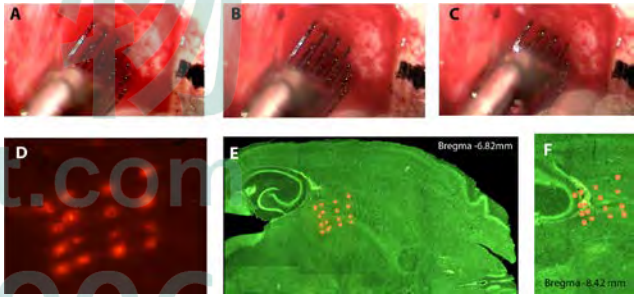
FLOREY INSTITUTE OF NEUROSCIENCE AND MENTAL HEALTH, AUSTRALIA

VISIT LAB WEBSITE

> *"The 3D probe enables unparalleled ability to map neural responses across an entire structure."*
>
> *Dr. Paolini*



Dr. Paolini's focus is currently directed toward understanding how auditory and olfactory information is processed through the amygdala. The presentation of olfactory stimuli can be laborious, and since cells adapt relatively quickly to the stimuli generating enough trials to ascertain the neural profile to a smell can be difficult. The 3-D probe allows Dr. Paolini to simultaneously map a large portion of the structure of interest and obtain a profile of the neural responses across 128 channels. The custom NeuroNexus 3D structure allowed the electrode shanks and sites to be configured to maximize sampling efficiency. A strong feature of the array is that it robust enough to allow deep brain recording from predictable trajectories.



RESULT

One of the most significant advantages of this custom design is that it allows electrodes to be inserted deep within the brain with little deviation from the 3-D configuration of the array. The figure to the right shows the ease of insertion of the 16 electrode prongs arranged in a 4 X 4 grid (A-C). The electrodes have been dipped in DiI allowing histological verification of recording positions (D-F). Electrodes remained in their 4x4 configuration deep within the brain indicated by dots (showing DiI locations) superimposed onto Fluorescent Nissl stained sections (E,F). The figure to the left shows the response of 16 of the 128 sites responding to an odor stimulus.

PROBE DETAIL

The Matrix Array™ concurrently spans cortical columns and layers, interfacing with a volume of tissue. Specify different 2D arrays for a customized 3D neural interface.

Data and images courtesy of Paolini lab, used with permission.

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Dr. Jorge Riera



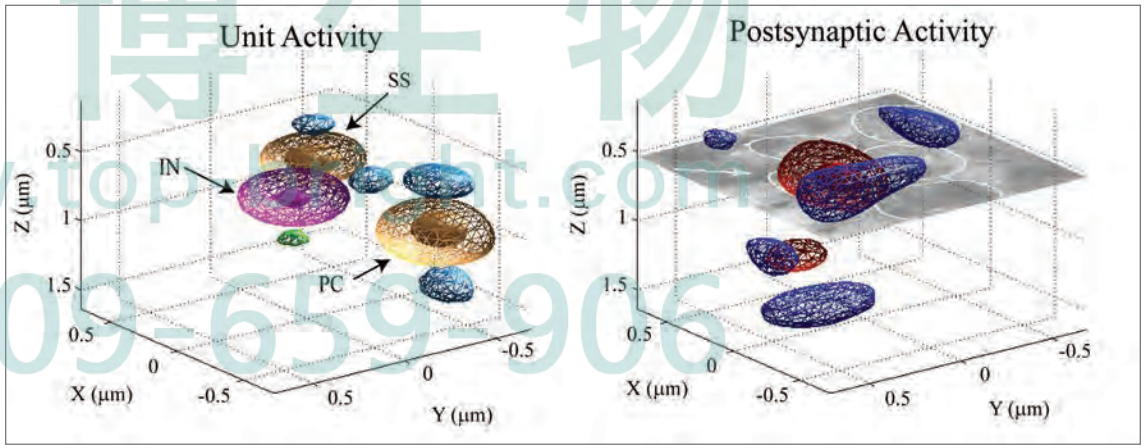
FLORIDA INTERNATIONAL UNIVERSITY, USA

VISIT LAB WEBSITE

"Electrophysiology, before and again: In the era of the colored revolution in neuroscience through fluorescent imaging techniques, the extracellular electric recording technique is recapitulating its role thanks to the rapid development of the silicon-based microelectrode arrays (MEA)."

Dr. Riera

Dr. Jorge Riera is interested in elucidating volumetric aspects of the neuronal coding in the neocortex of rodents, as well as in determining how these aspects are reflected in the slow- components of the extracellular electric potentials at either the small (LFP) or the large (EEG) scale. For that end, multi-laminar extracellular recordings obtained from extended portions of the cortical sheet are desirable. For about three years, Dr. Riera's group in Tohoku University has been working together with NeuroNexus in customizing a three-dimensional "3D" probe to achieve this goal in particular for the somatosensory barrel cortex.

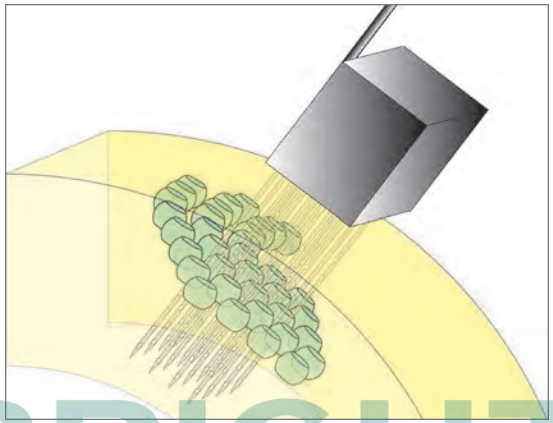


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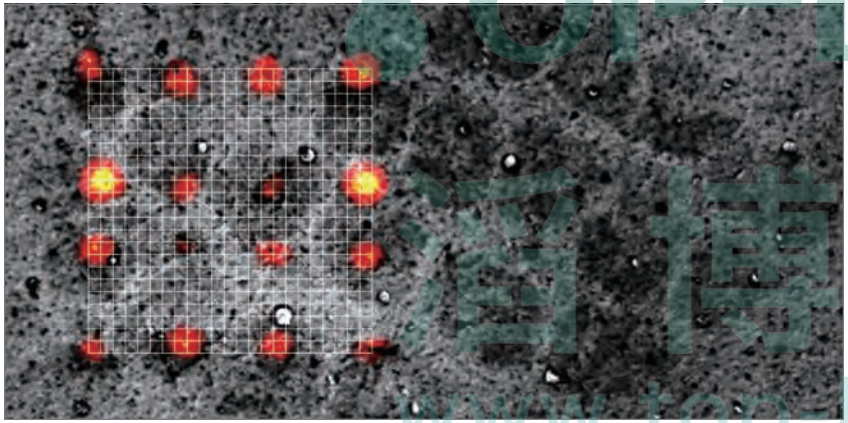
RESULT

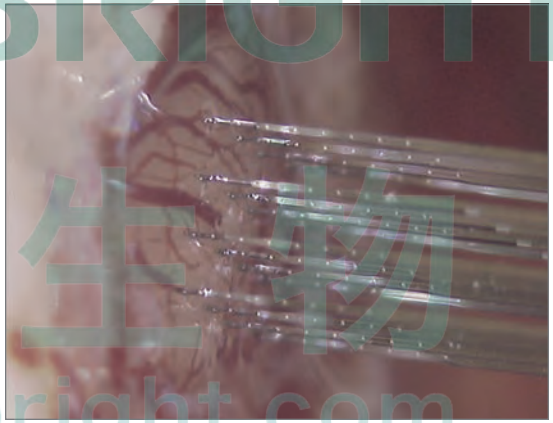
Dr. Takakuni Goto, a postdoc in Dr. Riera's group, has recently developed a new method to obtain 3D reconstructions of the neuronal current sources for unit/postsynaptic activity, which is robust to both noise and electrode resolution. This methodology is based on previous results about the conductive properties of the barrel cortex of Wistar rats (Goto et al., J Neurophysiol 104(6): 3388-3412, 2010). The group, currently in residence at Florida International University in Miami FL, is now working on determining the spatial codifiers of the whisker's velocity and direction. Please contact NeuroNexus for more information.



PROBE DETAIL

The Matrix Array™ concurrently spans cortical columns and layers, interfacing with a volume of tissue. Specify different 2D arrays for a customized 3D neural interface.





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IMAGES

LEFT: Peripheral nerve regeneration through the implanted macro sieve electrode
MIDDLE: Designing the macro sieve electrode
RIGHT, TOP: Selective recruitment of distal musculature via bipolar stimulation
RIGHT, BOTTOM: Successful recruitment of regenerated nerve tissue via implanted electrode

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Dr. Mesut Sahin

NEW JERSEY INSTITUTE OF TECHNOLOGY, USA

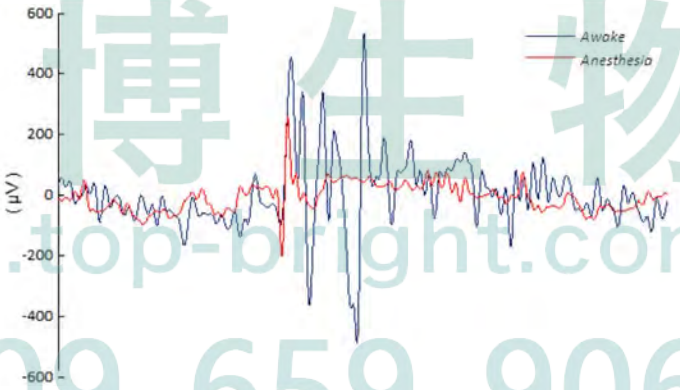
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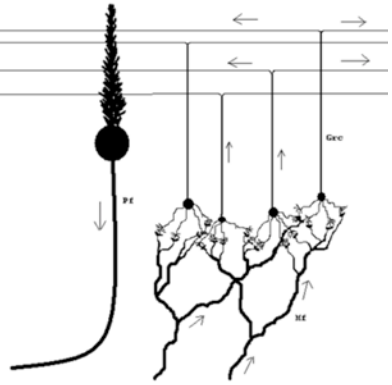
"(The) Chronic version of the Micro-ECoG electrodes from NeuroNexus made our implant procedure on the cerebellum much easier and more reliable. Electrode breakage is no longer a problem."

Dr. Sahin

Rat cerebellar cortex is a very delicate structure. In addition, the cerebellum experiences large displacements towards and away from the back of the skull with the flexions/extensions of the neck in a behaving animal. All of this makes it very challenging to record cerebellar activity in awake animals. Highly flexible NeuroNexus EcoG arrays are well suited for this application. They are durable enough to be handled with surgical instruments and yet sufficiently flexible not to cause tension on the neural tissue after implantation.







ABOVE: Effect of anesthesia on peripherally evoked cerebellar cortex potentials by an air puff on the face.
RIGHT, TOP: Electrode implant location on the paramedian lobule of the rat cerebellum (picture shows right anterior cerebellum).
RIGHT, BOTTOM: Neural connections in the cerebellar cortex. Pc: Purkinje cell; Pf: Parallel fiber; Mf: Mossy fiber; Grc: Granular cell. Drawing by Jonathan Groth, PhD student at NJIT.

PROBE DETAIL

Dr. Sahin's E32-80s-15-15 Surface array is available as a special order.

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Dr. Ingmar Schneider

LAURENT LAB, MPI FOR BRAIN RESEARCH
FRANKFURT AM MAIN, GERMANY

VISIT LAB WEBSITE



"Until I used the custom µECoG array, I never knew the precise extent of visually evoked activity, especially with this spatial and temporal resolution."

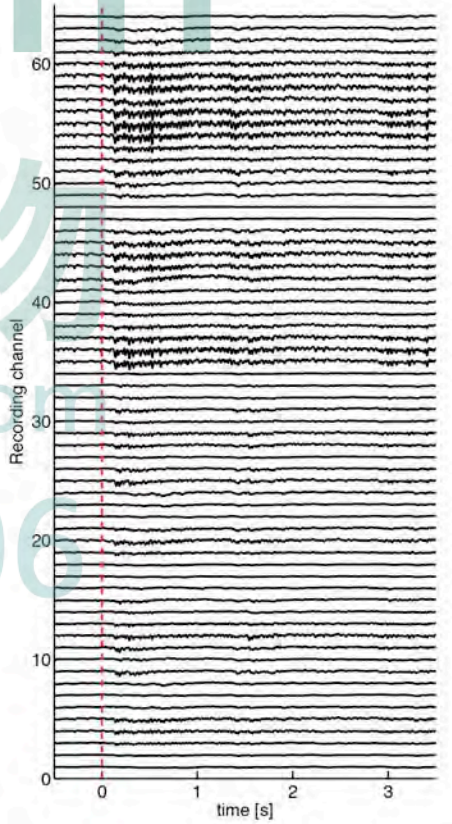
Dr. Schneider

The Laurent lab is interested in the behavior, dynamics and emergent properties of neural systems. Their efforts are focused on the cerebral cortex of turtles to facilitate the identification, mechanistic characterization and computational description of cortical functional principles. The aim of Ingmar's work is to functionally characterize visually responsive areas in turtle dorsal cortex and to analyze their spatiotemporal dynamics in response to naturalistic visual stimulation.

The size and flexible cabling of the µECoG array have been designed specifically to perform chronic recordings from the entire extent of dorsal cortex. Electrode density and package size have been carefully balanced to (i) achieve high electrode density (64 channels, pitch 500µm) and (ii) ensure connector compactness for chronic implantation, without restricting the animals' natural behavior. These µECoG electrodes allow routine recording of spatiotemporal patterns of both stimulus-evoked and spontaneous oscillatory activity in chronically implanted turtles.

PROBE DETAIL

Dr. Schneider's E64-500-20-60 can be viewed in detail in the Surface Probe section.



Evoked activity in response to video stimulation. Video onset marked by the dashed red line.

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Dr. Anton Sirota



LMU MUNICH, GERMANY

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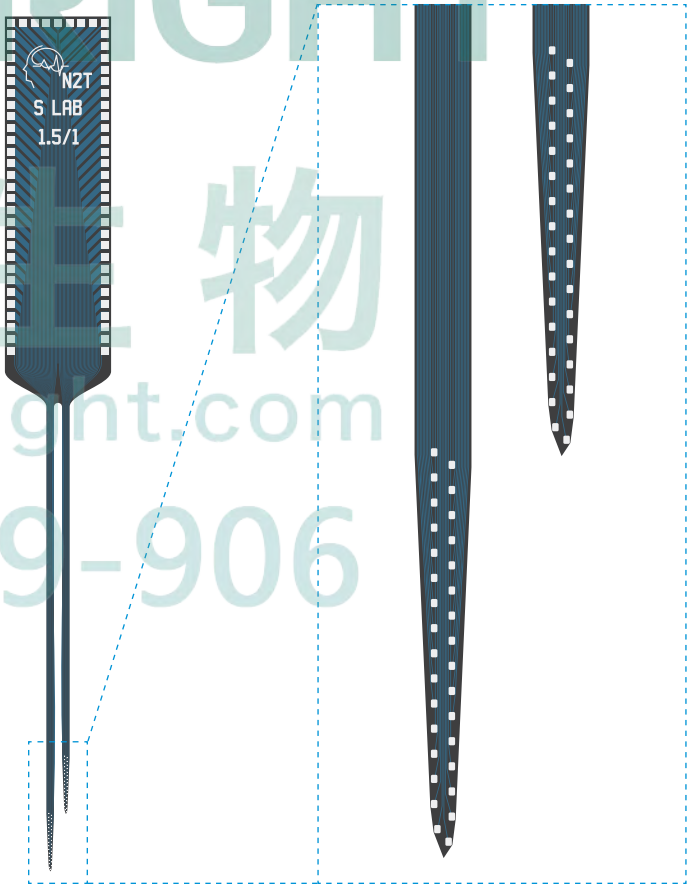
Extracellular recording of the local field potential (LFP) and spiking activity provide complementary information about the neural activity in freely moving animals.

Dr. Sirota has been using various types of catalog NeuroNexus probes to analyze multiple single neurons in a small volume, or LFPs across multiple layers/columns: close-spaced (15 µm) recording sites (Buzsaki32/64) or wide-spaced (100 µm) recording sites (A1x16-5mm-100-177).

Dr. Sirota's custom probe design is a high channel count, small feature probe that combines the advantages of both catalog designs while keeping shank width to a minimum. This custom probe is allowing Dr. Sirota to overcome existing recording limitations and analyze activity of neuronal populations across all layers of one cortical column in freely behaving rodents.

PROBE DETAIL

Dr. Sirota has two Custom Designs: the A1x64-Poly2-6mm-23s-160 and the A2x32-6mm-235-200-160. These are available as Special Order probes.



IMAGE

Dr. Sirota's custom A2x32-6mm-235-200-160 probe and a close-up view of the tip.

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Dr. Susumu Takahashi



DOSHISHA UNIVERSITY, JAPAN

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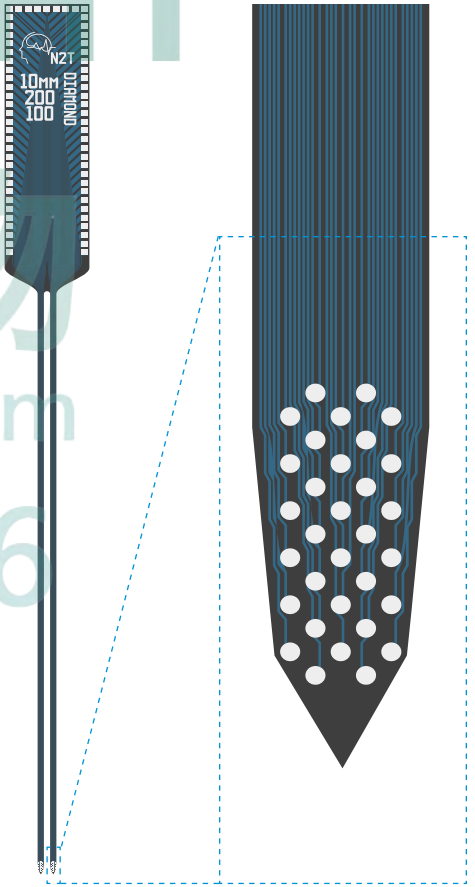
"The outstanding engineers at NeuroNexus realized my ideal probe design. The silicon probes with high density contacts made my experiments much finer and (more) convincing."

Dr. Takahashi

For several years, Dr. Takahashi has focused on the detailed information on action potentials in extracellular recordings using custom-made microwire electrode ('Dodecatrode,' Takahashi & Sakurai, Neurosci. 2005; Eur. J. Neurosci. 2007; Front. Neural Circuits. 2009). The major limitation of the microwire is that the arrangement of contacts in the brain is largely unknown. To overcome this limitation, Dr. Takahashi worked with NeuroNexus to realize a custom probe that has exceptionally high contact density to fully cover a pyramidal cell layer of the hippocampal CA1. This custom probe in conjunction with customized software will enable Dr. Takahashi to examine the details of extracellular activity originating from soma, dendrites, and axons in freely behaving animals.

PROBE DETAIL

Dr. Takahashi's A2x32-Poly5-10mm-200-100 electrode array features 5 columns of closely-spaced electrode sites on each of its 2 shanks. It is available as a special order.



IMAGE

Dr. Takahashi's custom A2x32-Poly5-10mm-200-100 probe and a close-up view of the tip.

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Dr. Doug Weber

UNIVERSITY OF PITTSBURGH, USA

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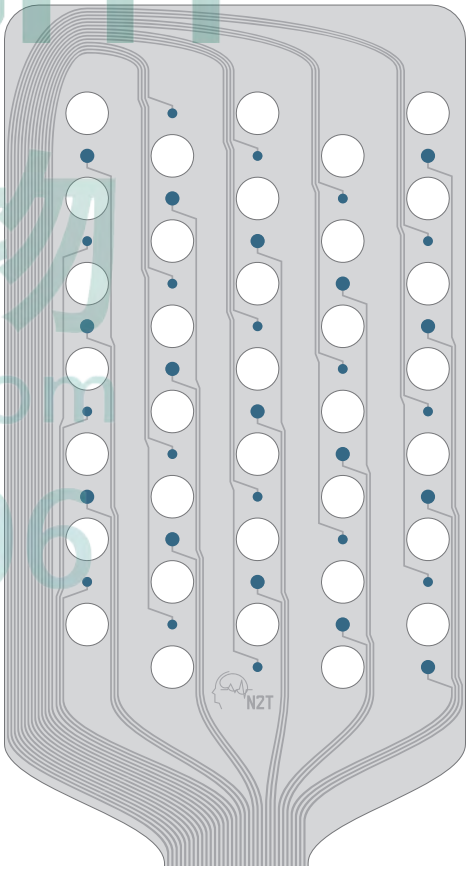
"The experienced team of engineers at NeuroNexus was very helpful in designing an electrode to meet our requirements. It would have been impossible for us to fabricate an electrode of this quality in-house."

Dr. Weber

Based on the excellent results obtained with existing E-Probes, and his experimental requirements for recording and stimulation, Dr. Weber designed a custom array. This customized array was designed to provide interleaved sites for neural recording and stimulation in spinal nerves. NeuroNexus E-Probe arrays are extremely flexible and conform well to the surface of the nerves, whose diameter require a high radius of curvature.

PROBE DETAIL

Dr. Weber's E32-1000-20-50/100 Custom Design is available in the catalog as a special order.



IMAGE

A close-up view of Dr. Weber's custom E32-1000-20-50/100 ECoG electrode.

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Dr. Cristopher Niell



UNIVERSITY OF OREGON, USA

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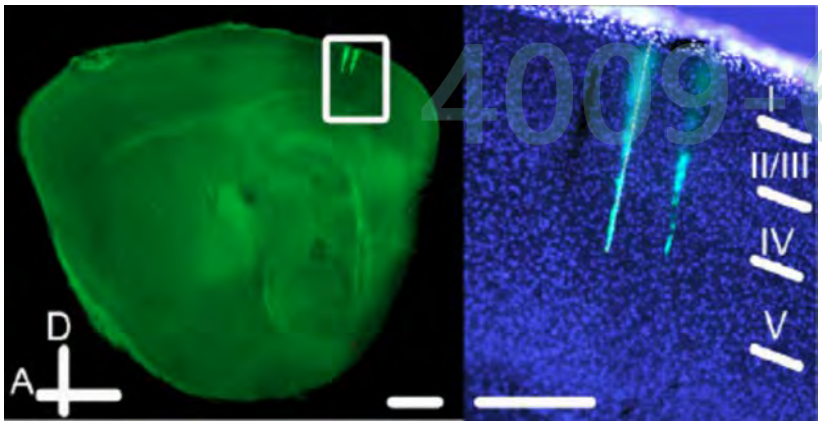
Dr. Niell has used a range of NeuroNexus probes for recordings in the mouse visual system. (Niell & Stryker, J Neurosci 2008; Niell & Stryker, Neuron 2010; Piscopo et al, J Neurosci 2013.) However, previous probes were not optimal for the mouse LGN and visual cortex, which are small structures and susceptible to damage. Therefore, Dr. Niell designed a probe to maximize the number of recording sites that could be placed in the small brain region, while decreasing the total tissue displacement that causes poor recording quality. These electrodes facilitate high-throughput recording and characterization of visual receptive fields in awake mice.

RESULT

This custom design has greatly increased the yield of isolated units in recordings from the LGN and visual cortex of awake mice. Ongoing experiments are studying the function and development of neural circuits in the visual system from eye-opening to adulthood.

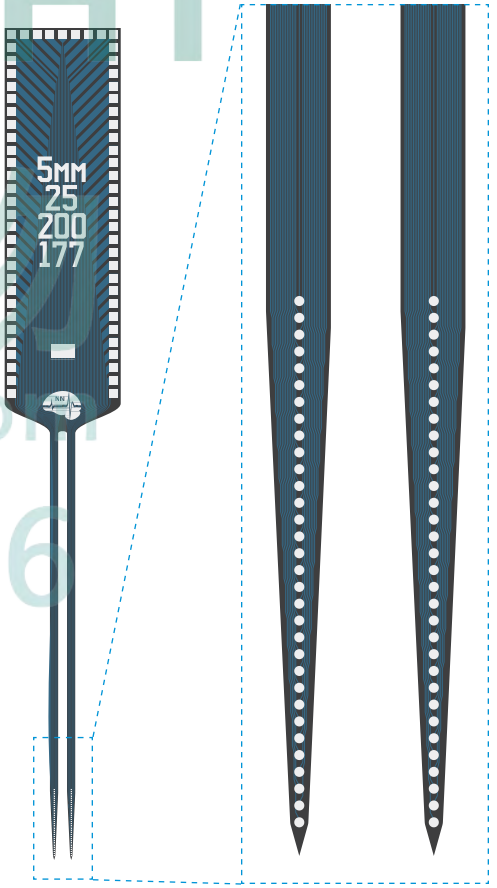
PROBE DETAIL

Dr. Niell's A2x32-5mm-25-200-177 electrode array features closely spaced sites, and is available in the catalog as a special order.



LEFT: Electrode tracks from mouse visual cortex, showing two shanks spanning multiple layers of cortex, reconstructed by coating the electrode with lipophilic dye. (Courtesy Dr. Jennifer Hoy)

RIGHT: Dr. Niell's custom A2x32-5mm-25-200-177.



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Dr. Rune W. Berg

UNIVERSITY OF COPENHAGEN, DENMARK

VISIT LAB WEBSITE



"A neuron should always be studied in context of a neuronal network. NeuroNexus helps provide the tools."

Dr. Berg

Dr. Berg's design is a modification of the Buzsaki probe with the electrode distance being larger to match the size and distance of neurons in the spinal cord as opposed to in the hippocampus. Having the contacts on the edges allows sampling from a larger volume of tissue, and sampling with multiple recording sites greatly improves spike sorting quality. Now, Dr. Berg and his lab can start unraveling the mystery of motor pattern generation in the spinal cord.

RESULT

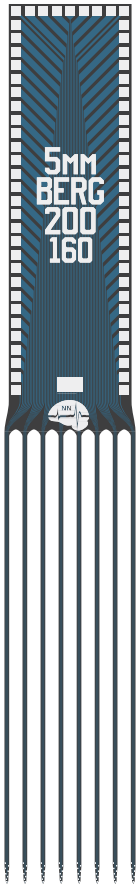
Electrophysiology from the spinal cord has revealed an intense communication among interneurons. How this interaction produces motor patterns and delicate coordination of muscles remains a mystery.

(R.W. Berg, M.-T. Chen, H.-C. Huang, M.-C. Hsiao, H. Cheng "A method for unit recording in the lumbar spinal cord during locomotion of the conscious adult rat", **J Neurosci Meth,** 182, 49-54, 2009)

(R.W. Berg, A. Alaburda and J. Hounsgaard "Balanced inhibition and excitation drives spike activity in spinal half-centers", **Science,** vol. 315(5810) 390-393, 2007)

PROBE STATUS

Dr. Berg's A8x8-5mm-200-160 Custom Design is available in the catalog as a special order.



RIGHT: Dr. Berg's 64-channel custom design.

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Dr. Heiko Luhmann

UNIVERSITY MEDICAL CENTER
MAINZ, GERMANY

VISIT LAB WEBSITE



"For our in vitro and in vivo studies on large-scale network activity we needed reliable and high-quality electrode arrays with a special design. We only found them at NeuroNexus."

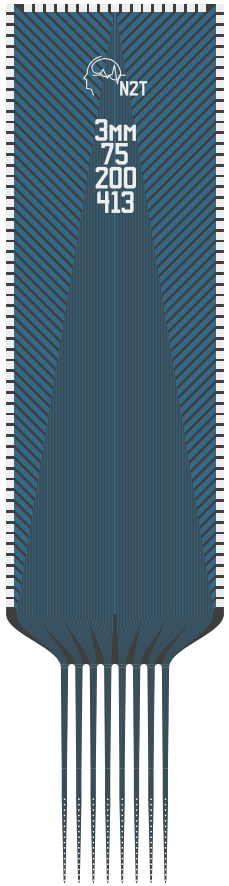
Dr. Luhmann

Dr. Luhmann's experimental studies with multi-electrodes arrays go back to the year 2006 (Nature 439: 79-83), when at that time electrodes were provided from the Michigan University Center for Neural Communication Technology (CNCT). Over the years our demands for special electrodes arrays (with up to 128 electrodes) became more complex and only NeuroNexus could provide these electrodes. Now Dr. Luhmann's lab is using various types of NeuroNexus electrodes on a daily basis to record field potentials (J. Neuroscience 2009, 2012, 2014; Cerebral Cortex 2013) and multi-unit activity (Cerebral Cortex 2014) in very young and adult rodent cortex. These technques are now combined with optogenetics.

PROBE DETAIL

Dr. Luhmann's A8x16-3mm-75-200-413 electrode array was designed for in vivo recordings in the barrel cortex of rodents. It features 128 channels, with 16 electrode sites on each of its 8 shanks.

The A8x16-3mm-75-200-413 electrode array is available in the catalog as a special order.



RIGHT: Dr. Luhmann's A8x16-3mm-75-200-413 custom design.

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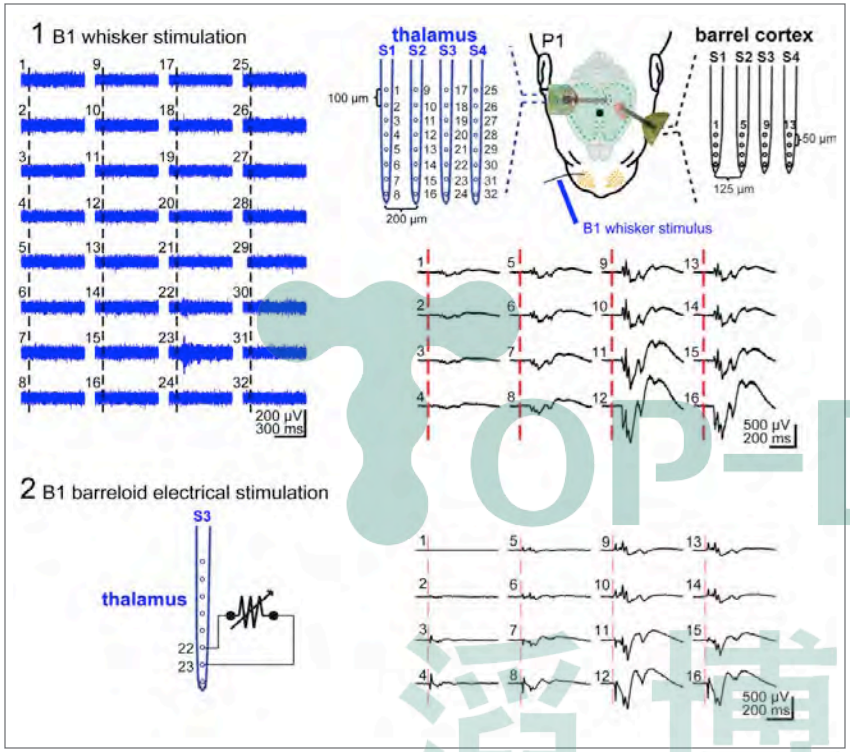


FIGURE 1: Simultaneous recordings with a 32-channel electrode in the somatosensory thalamus and with a 16-channel electrode in the barrel cortex of a 1 day old rat (from: Cerebral Cortex 23: 1299, 2013).

(1) Mechanical stimulation of whisker B1 elicits reponse at thalamic electrode #23 and at cortical electrodes 9-16.

(2) Local bipolar electrical stimulation at the thalamic electrode s #22 and #23 evokes a cortical response resembling the response to whisker stimulation.

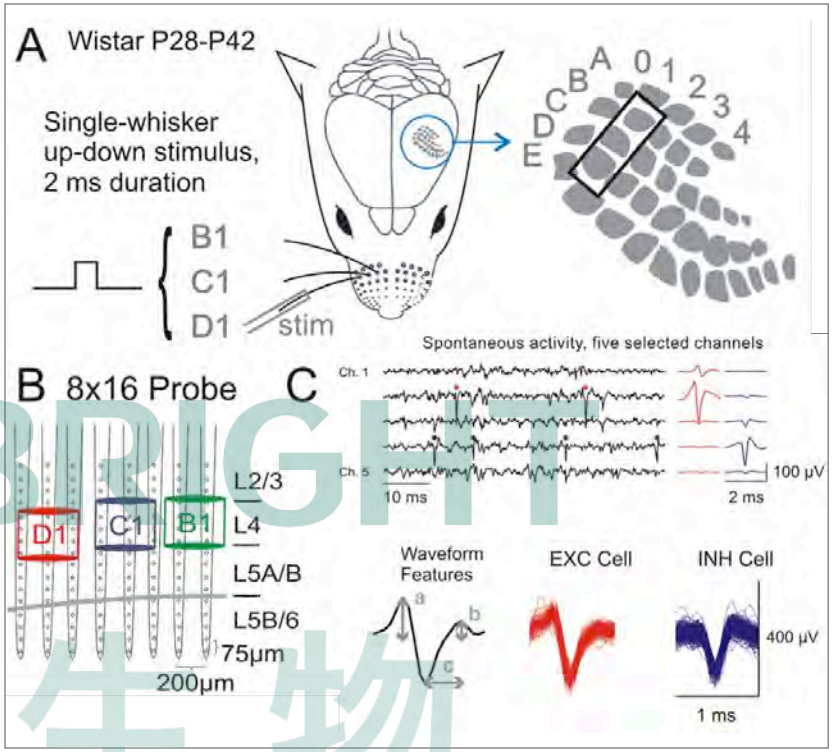


FIGURE 2: Recordings with 128-channel electrodes (8 shanks, 16 electrodes each) in three barrel-realted columns (B1, C1 and D1) adult rat. (A) Experimental setup with barrel field in somatosensory cortex (right). (B) Electrode design. (C) Recordings and identification of presumably excitatory (red) and inhibitory (blue) neurons based on spike waveform. From: Reyes-Puerta et al., Cerebral Cortex 2014, doi:10.1093/cercor/bhu007

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Special Order

BACK TO INDEX

The list below is a library of unique designs that can be placed on special order. (Selected designs are detailed on the following pages.) Special orders are subject to availability and may require a minimum order quantity. Please be advised that out-of-stock designs may take a longer time for delivery. Standard designs with alternative site areas (such as 312, 413, and 703 μm^2) and thickness options may also be placed on special order.

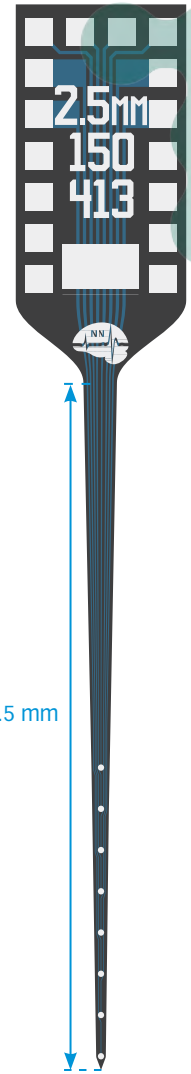
For further details, contact a NeuroNexus sales representative.

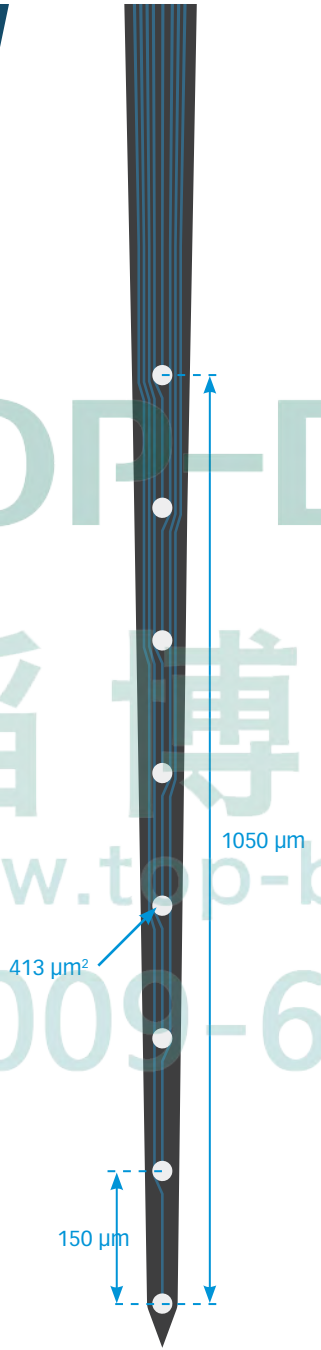
- A1x4-tet-1.6mm-150-121
- A1x5-1.68mm-200-500-177
- A1x8-4mm-200-1250
- A1x16-3mm-100-413
- A1x16-3mm-50-413
- A1x16-5mm-100-413
- A1x16-5mm-150-413
- A1x16-5mm-50-413
- A1x16-Poly2-5mm-50-177
- A1x16-10mm-100-413
- A1x16-10mm-100-703-Pt
- A1x16-Poly2-10mm-100-625
- A16x1-2mm-50-413
- A16x1-2mm-50-703
- A16x1-2mm-100-413
- A16x1-2mm-100-703
- A1x32-Edge-5mm-100-413
- A1x32-Edge-5mm-100-703
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- A1x32-Edge-10mm-100-413
- A1x32-Edge-10mm-100-703
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- A1x32-Poly3-10mm-50-413
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- A1x32-15mm-50-177
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- A1x32-15mm-50-413
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- A2x32-6mm-235-160
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- A2x32-Poly5-10mm-20s-200-100
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- A4x2tet-7mm-500-400-312
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- A4x4-3mm-200-200-177
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- A4x8-10mm-200-200-703
- A4x8-10mm-200-500-413
- A4x8-4mm-200-400-1250
- A4x8-5mm-100-200-413
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- A4x8-5mm-50-400-413
- A4x8-5mm-50-400-703
- A4x8-8mm-100-500-177
- A4x8-8mm-100-500-703
- A4x8-10mm-200-200-413
- A4x8-10mm-50-200-VAR
- A4x16-3.6/3mm-50-430-177
- A4x16-5mm-50-500-703
- A8x1tet-2mm-200-312
- A8x4-2mm-100-200-177
- A8x4-2mm-100-200-413
- A8x4-2mm-100-200-703
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- A8x8-2.5mm-200-200-413
- A8x8-2.5mm-200-200-703
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- A8x8-5mm-200-200-703
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- Buzsaki64sp
- Buzsaki256
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- E16-500-10-VAR
- E16-barrel-6-100
- E32-80s-15-15
- E32-1000-20-50/100
- LFP8-TetrodeSD
- Isomura2
- Isomura32
- rDBSA

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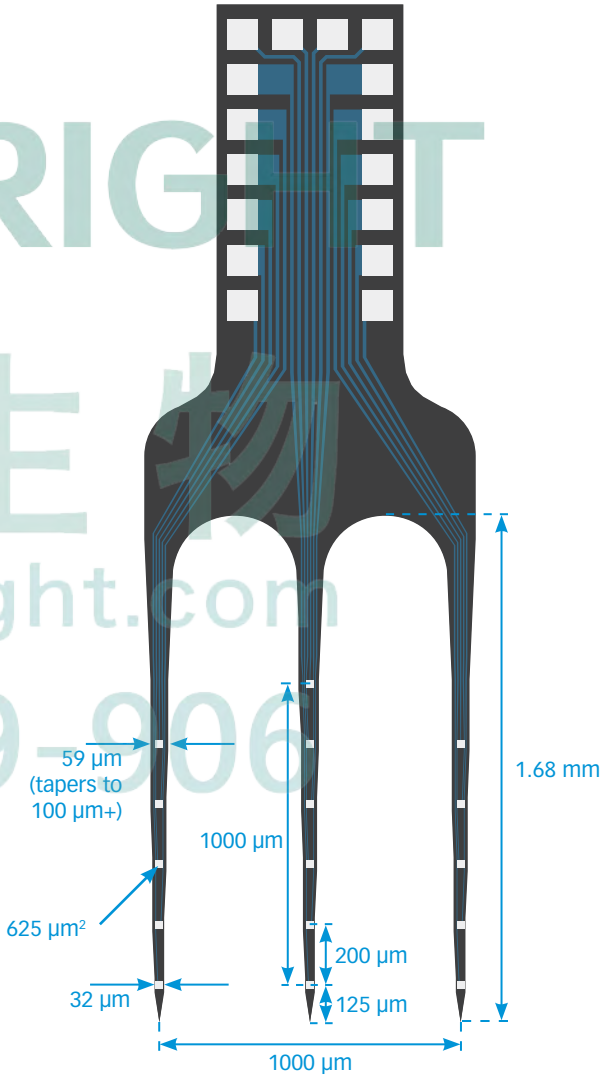
A1x8-2.5mm-150-413





A3x5-1.68mm-200-500-177

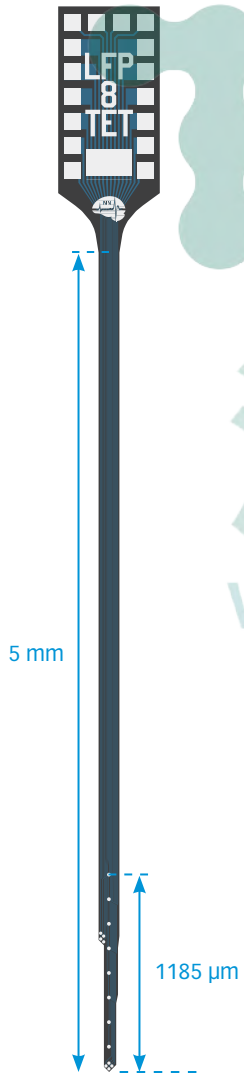
NOTE: Sharp tip angle (18°)

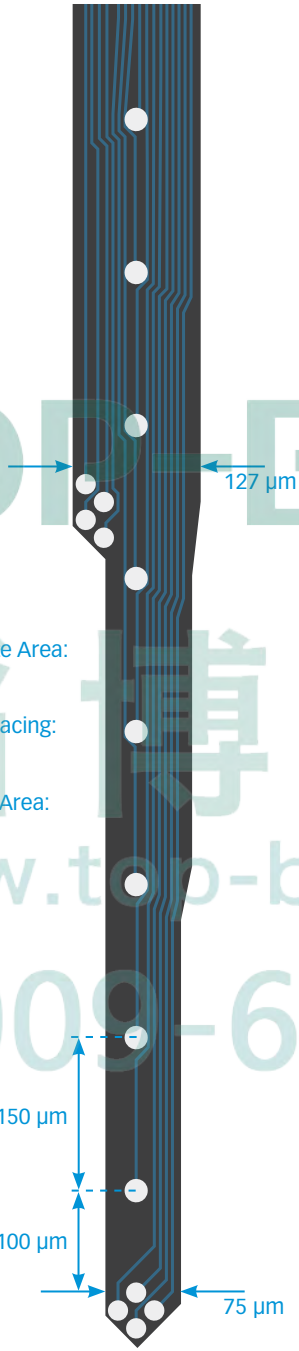


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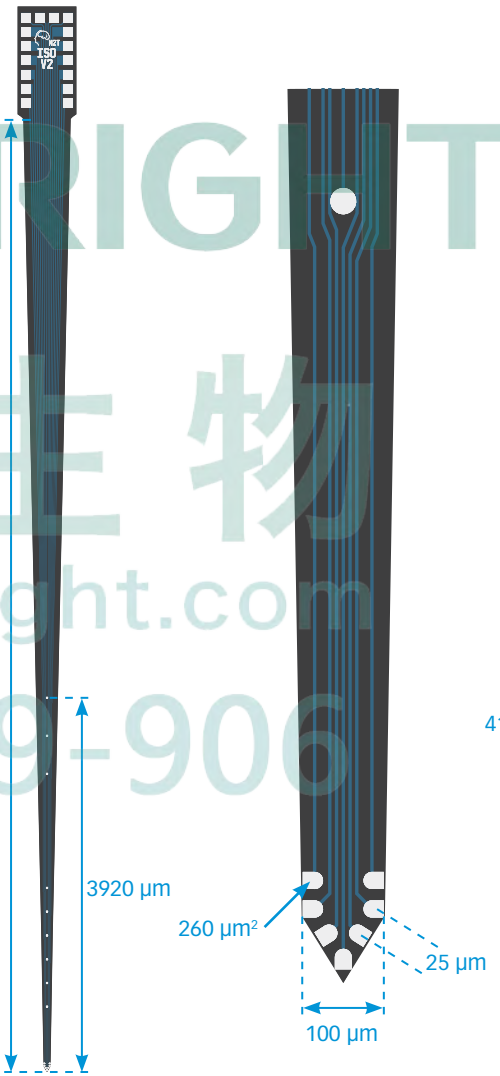
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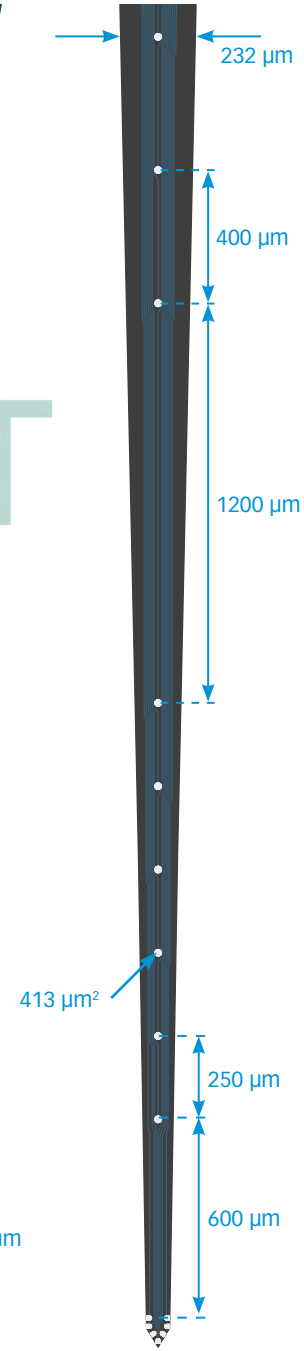
LFP8-TetrodeSD





Isomura2

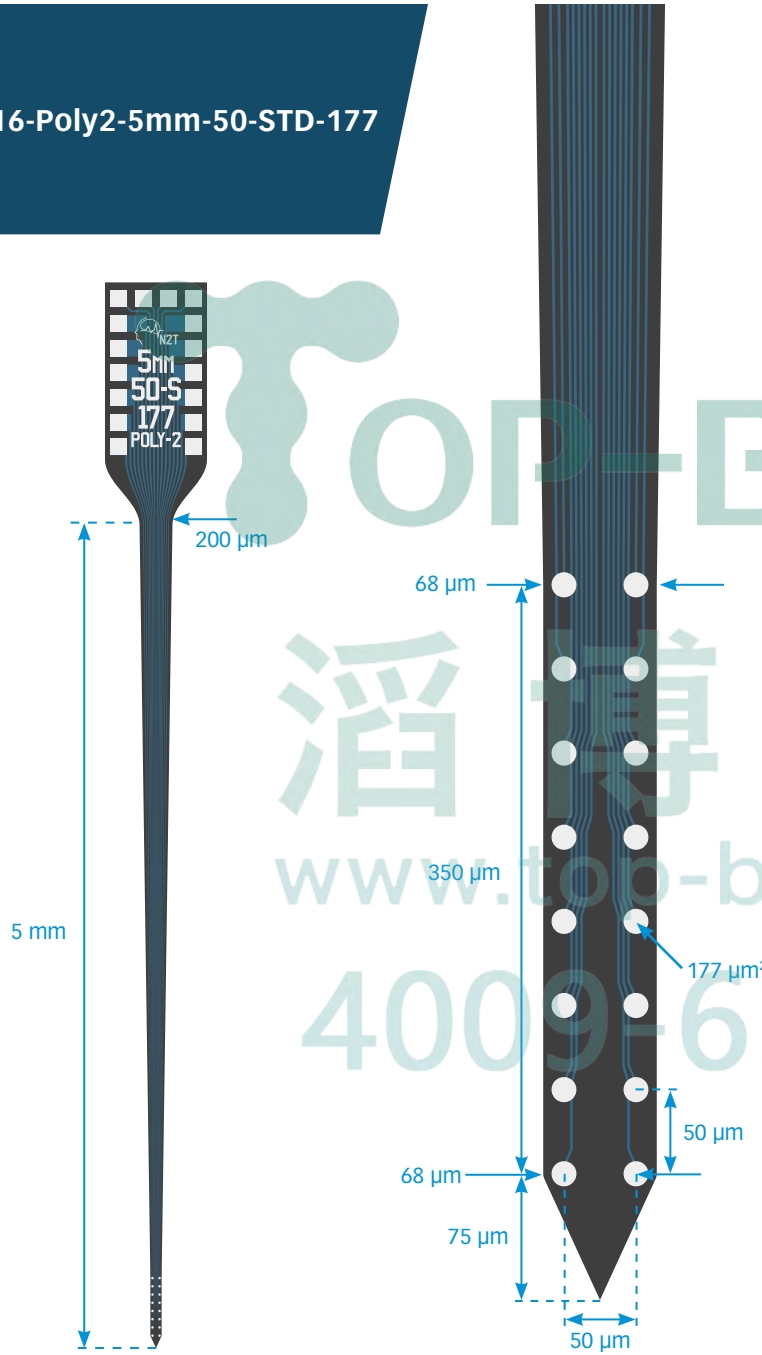




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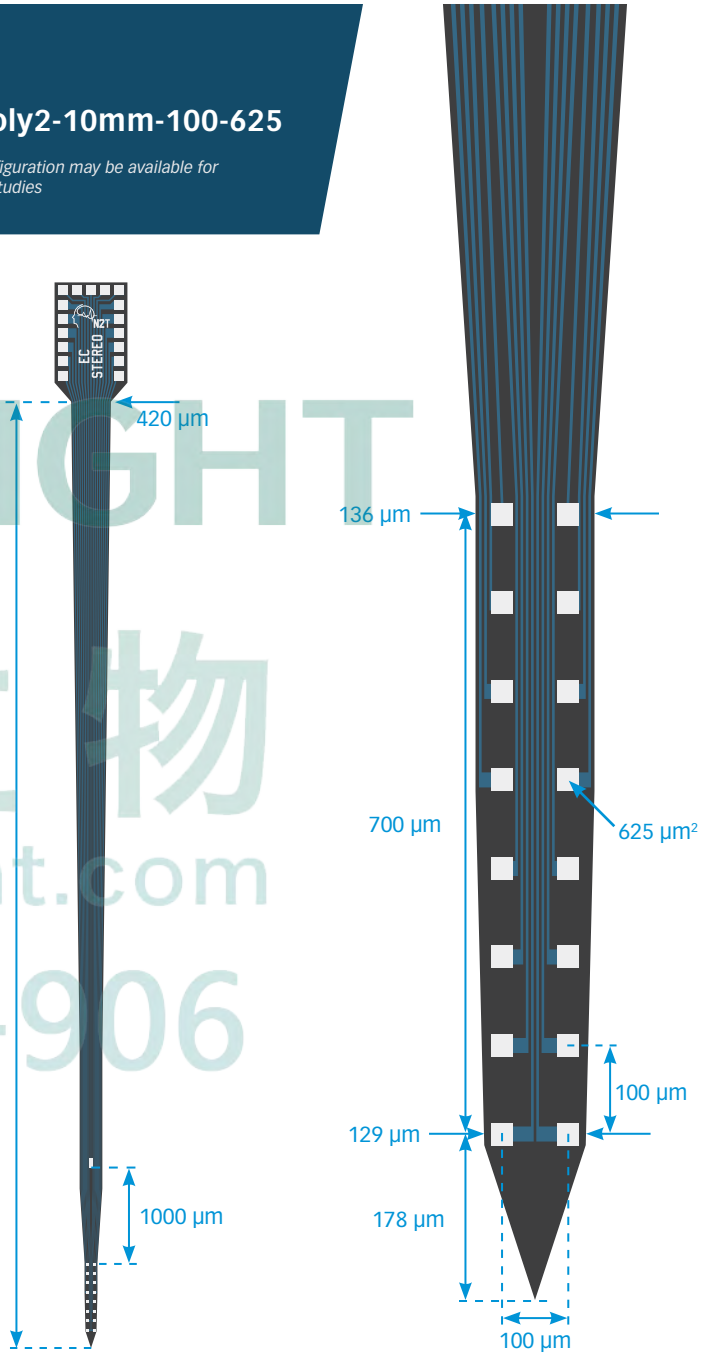
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A1x16-Poly2-5mm-50-STD-177



A1x16-Poly2-10mm-100-625

NOTE: Pt site configuration may be available for electrochemical studies

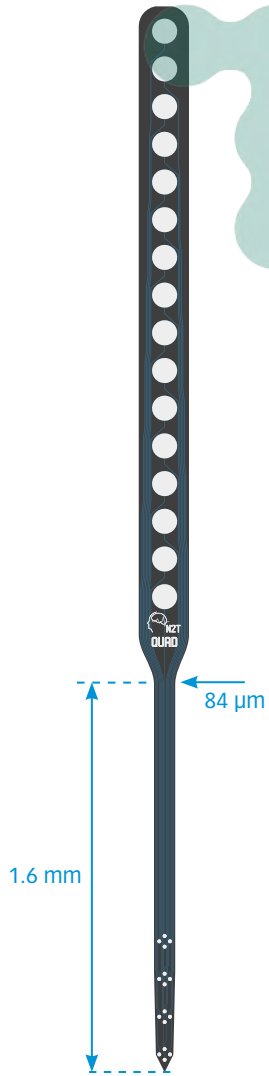


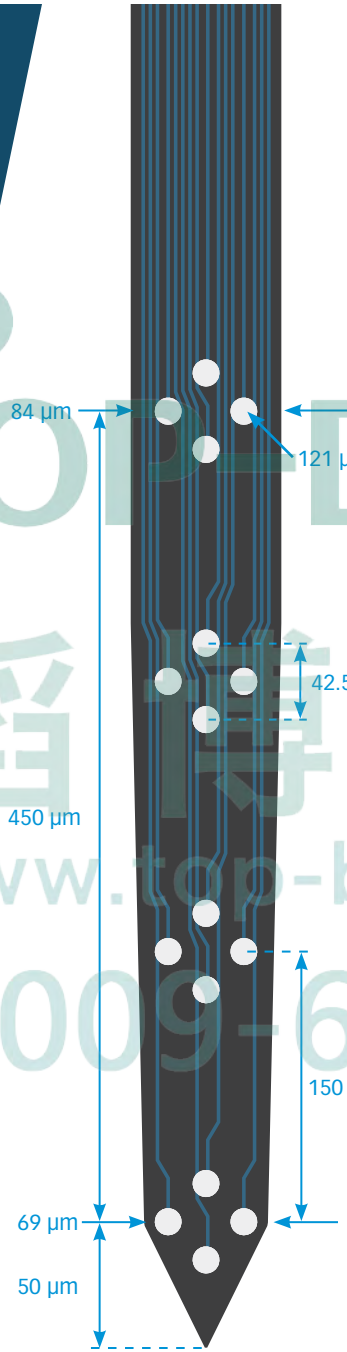
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A1x4-tet-1.6mm-150-121

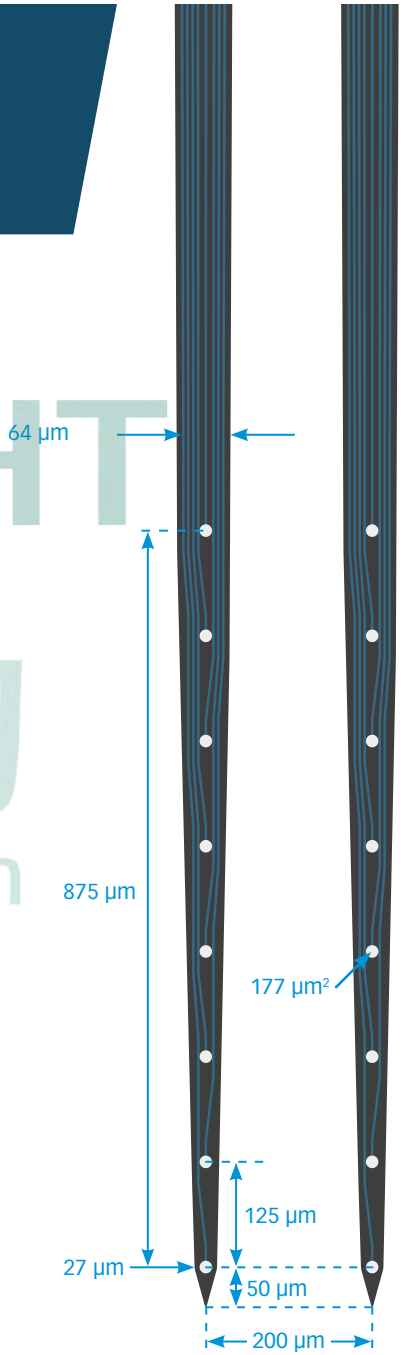
NOTE: Designed to interface with wire-based tetrode drives. Also available in a 3-tetrode configuration.





A2x8-11mm-125-200-177

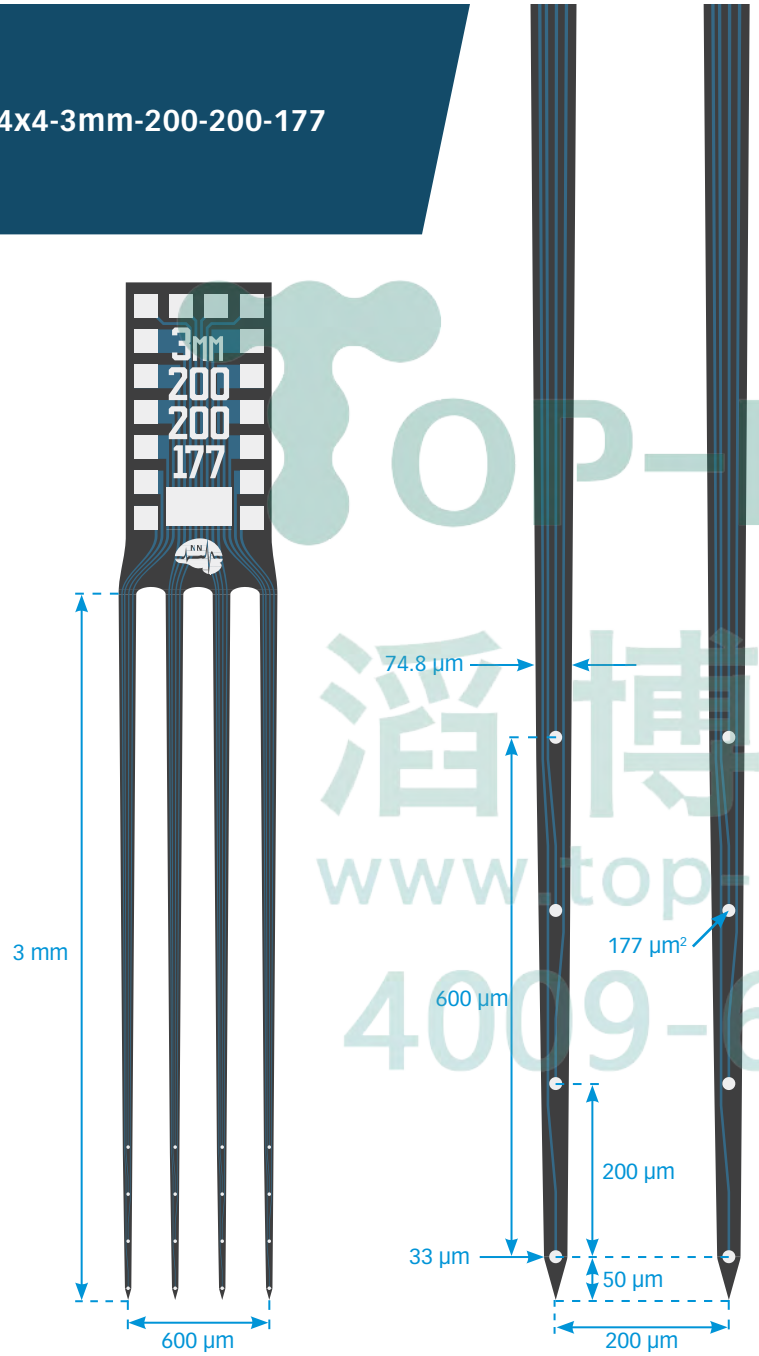




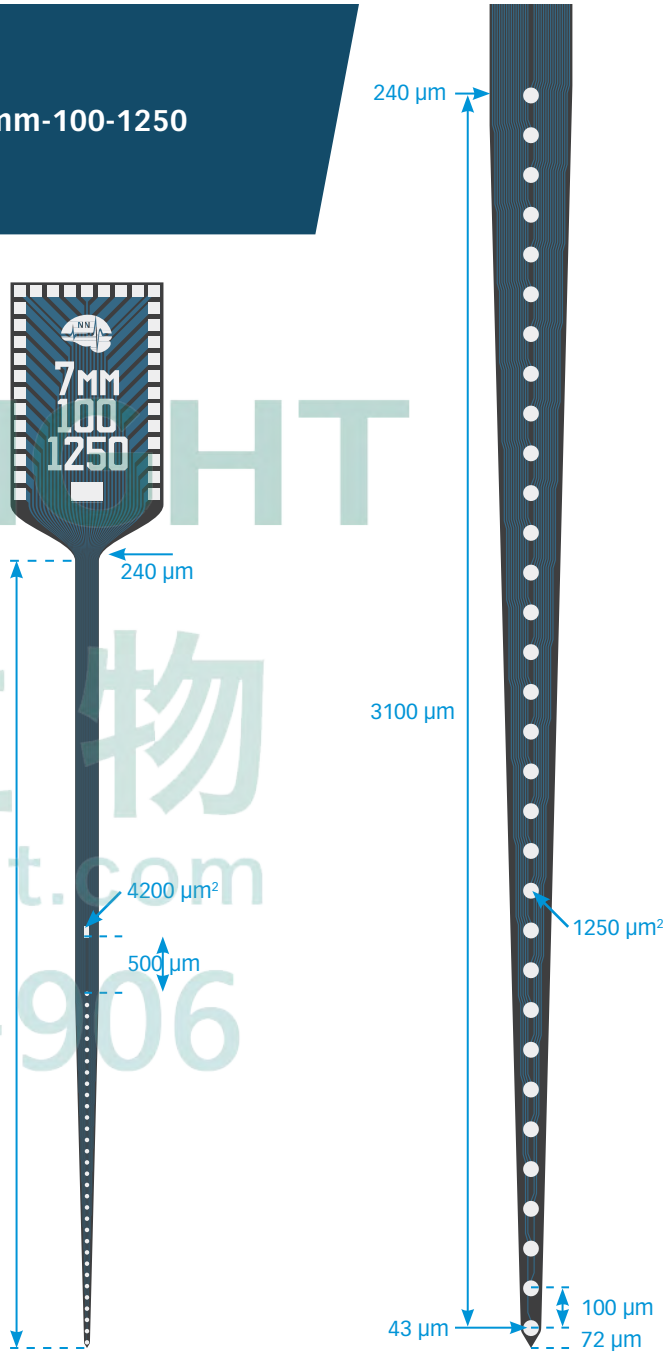
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A4x4-3mm-200-200-177



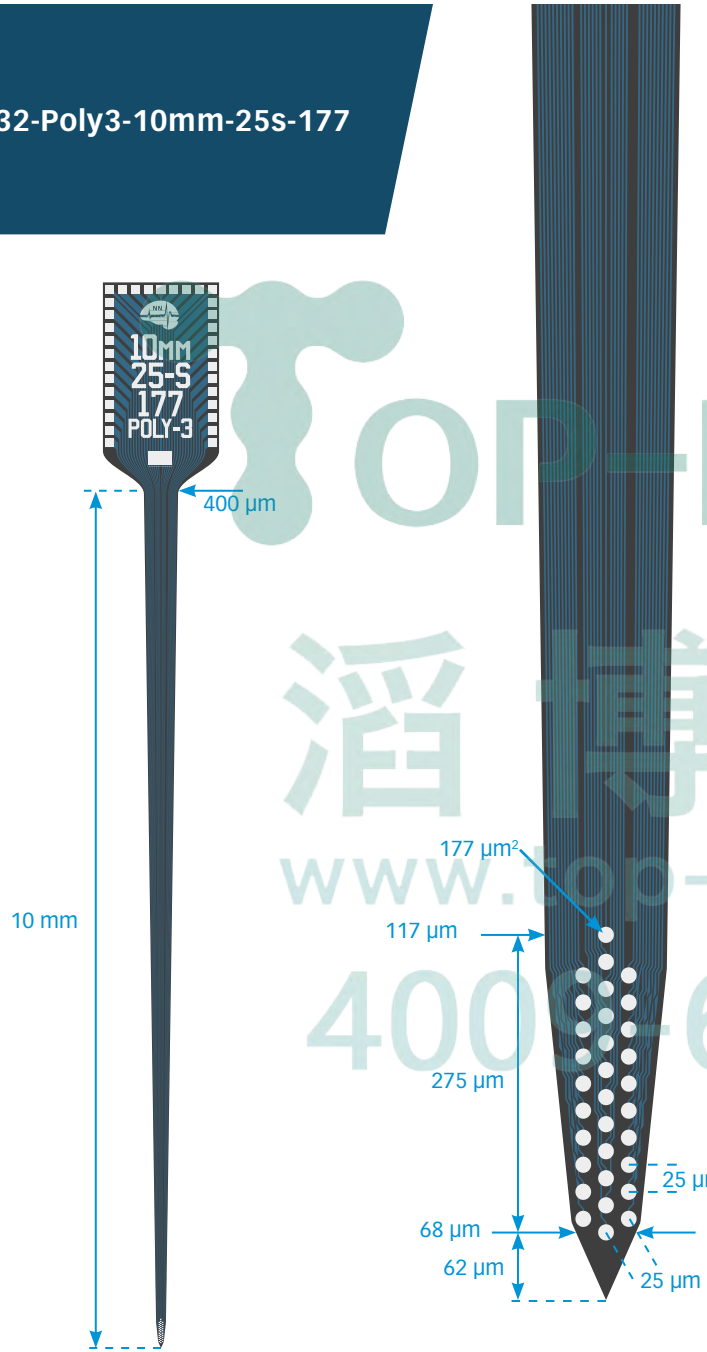
A1x32-7mm-100-1250



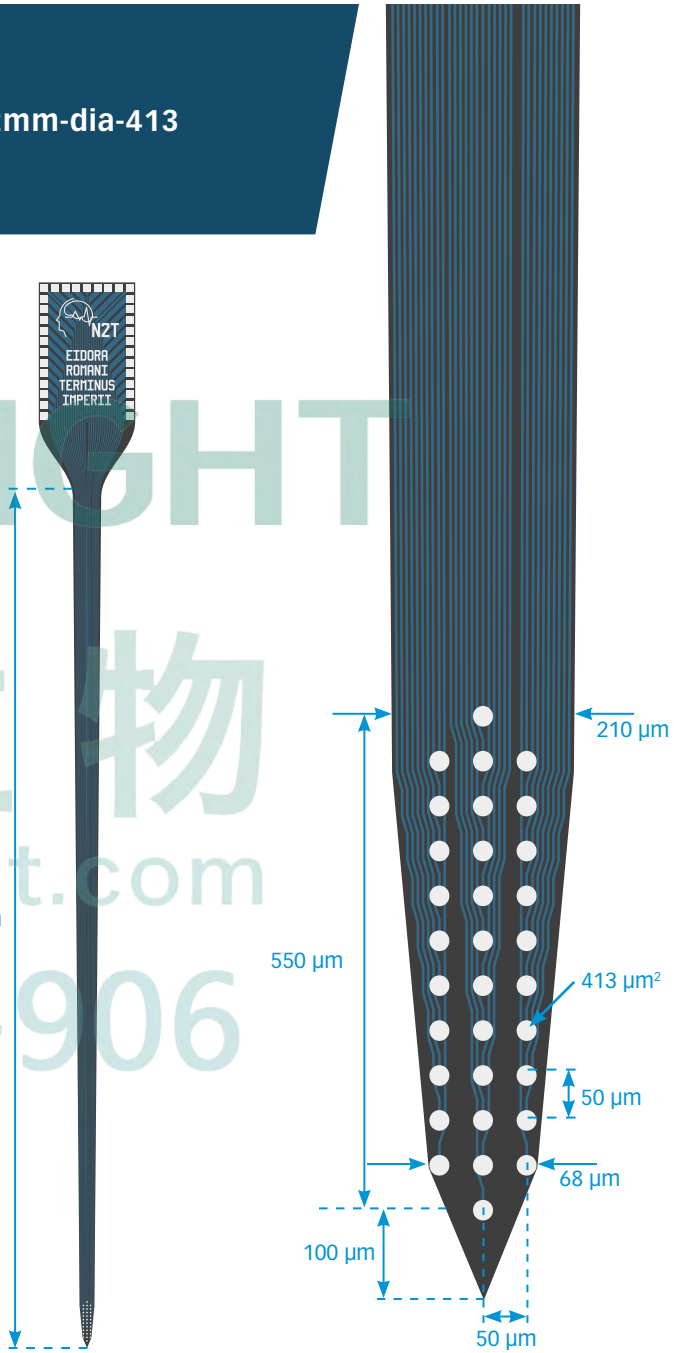
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A1x32-Poly3-10mm-25s-177



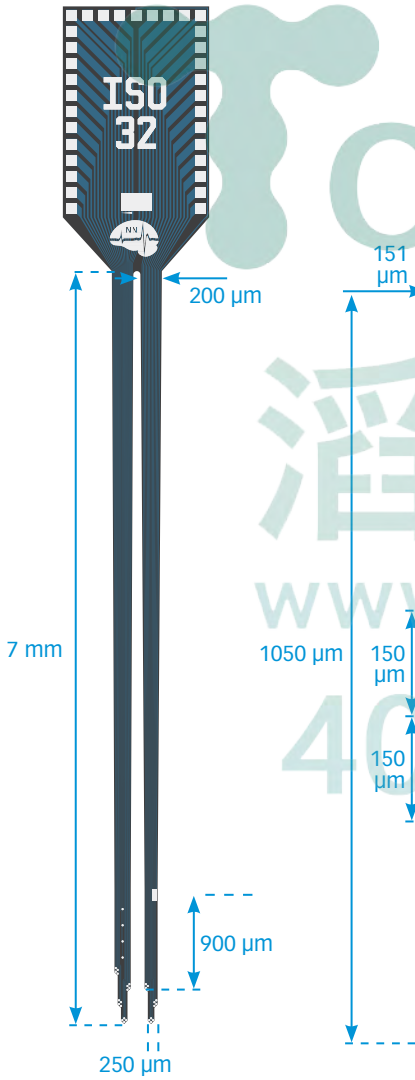
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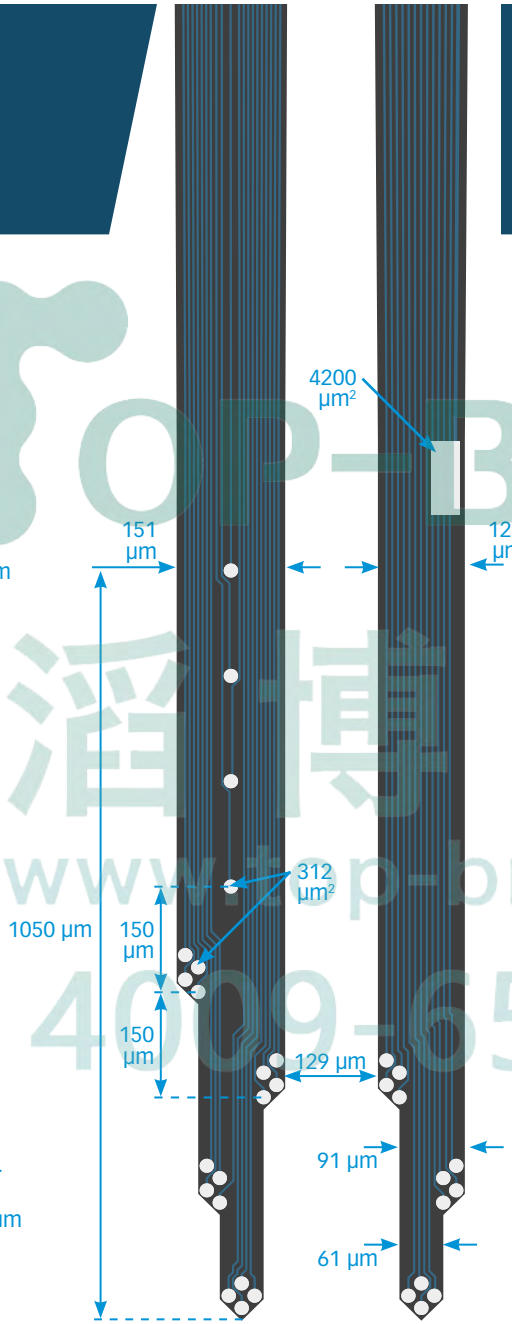


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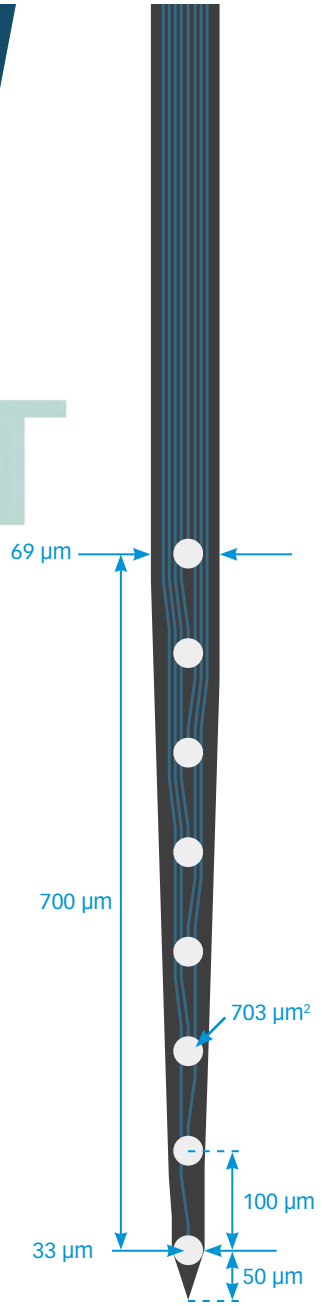
Isomura32





A4x8-8mm-100-500-703

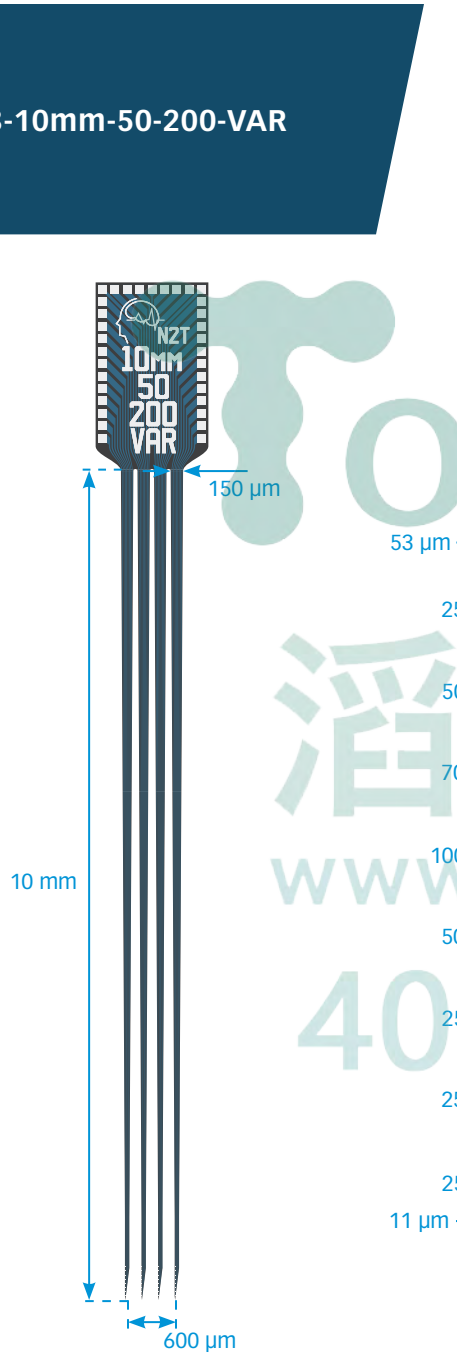


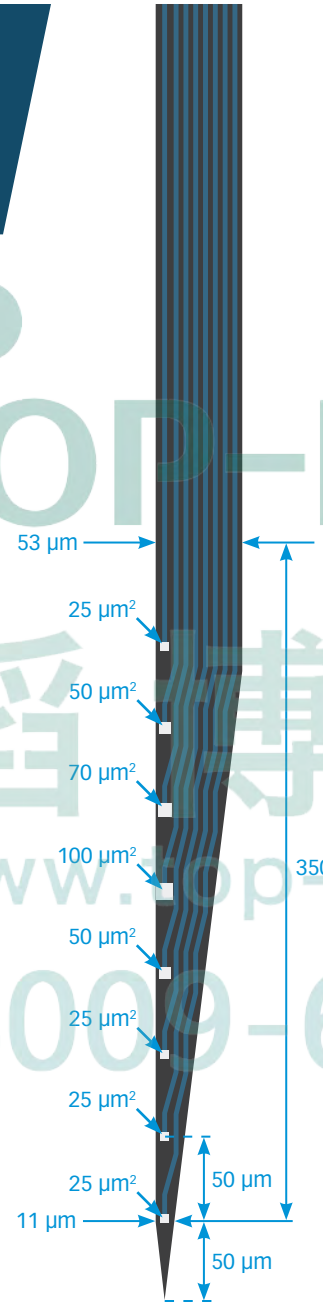


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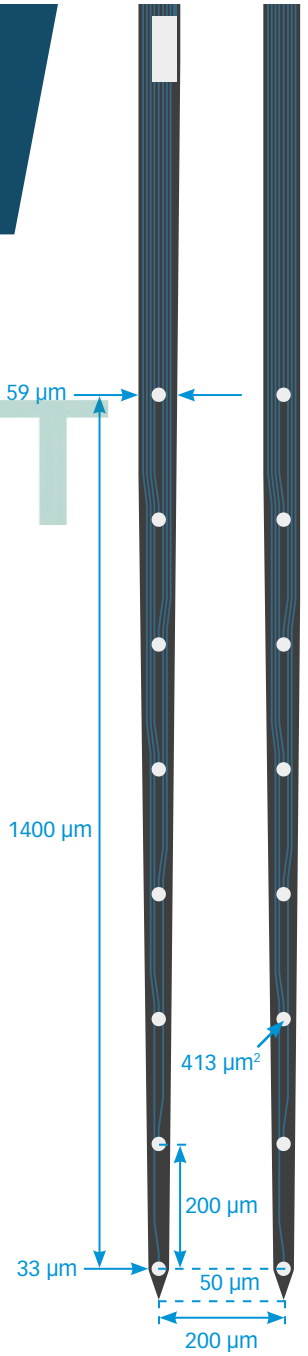
A4x8-10mm-50-200-VAR





A4x8-10mm-200-200-413

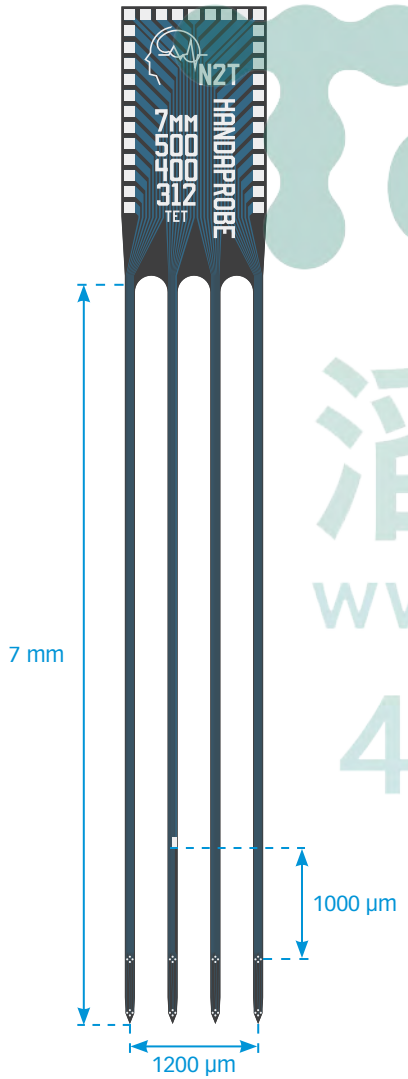


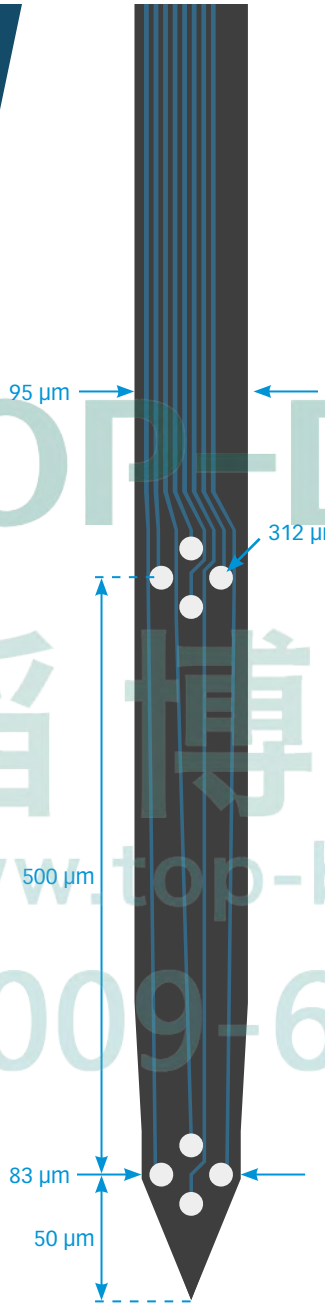


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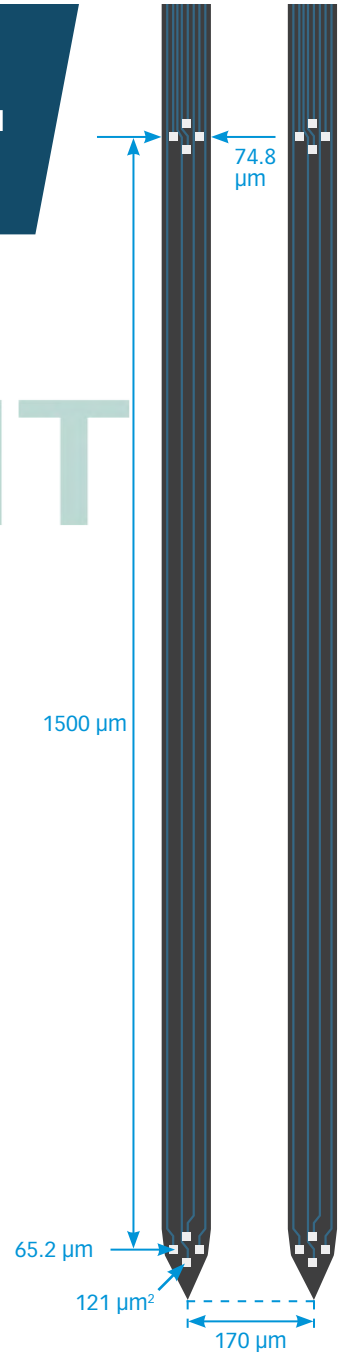
A4x2-tet-7mm-500-400-312





A4x2-tet-9mm-1500-170-121

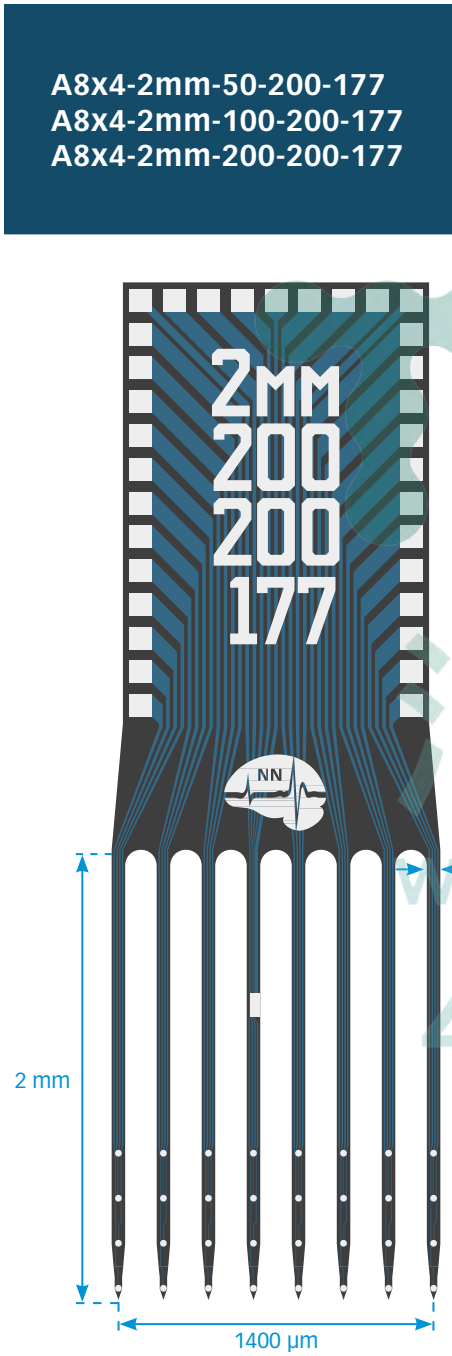


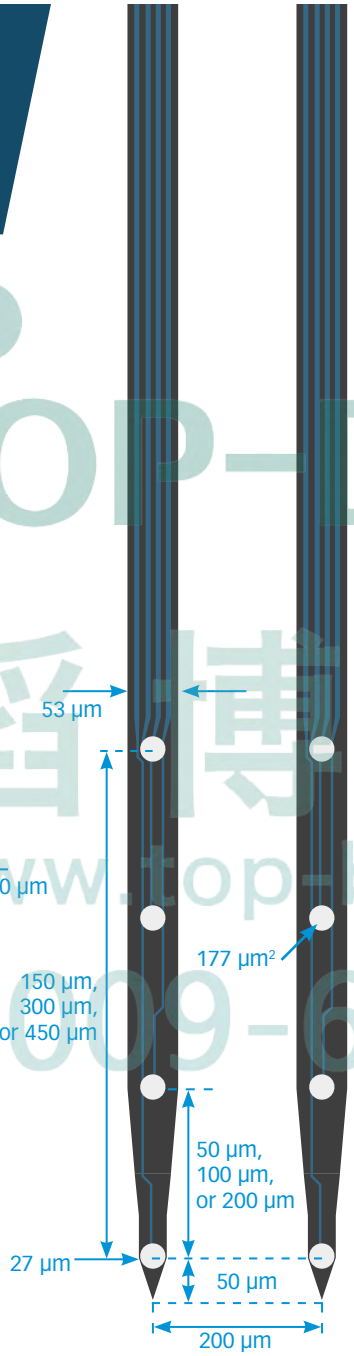


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A8x4-2mm-50-200-177
A8x4-2mm-100-200-177
A8x4-2mm-200-200-177

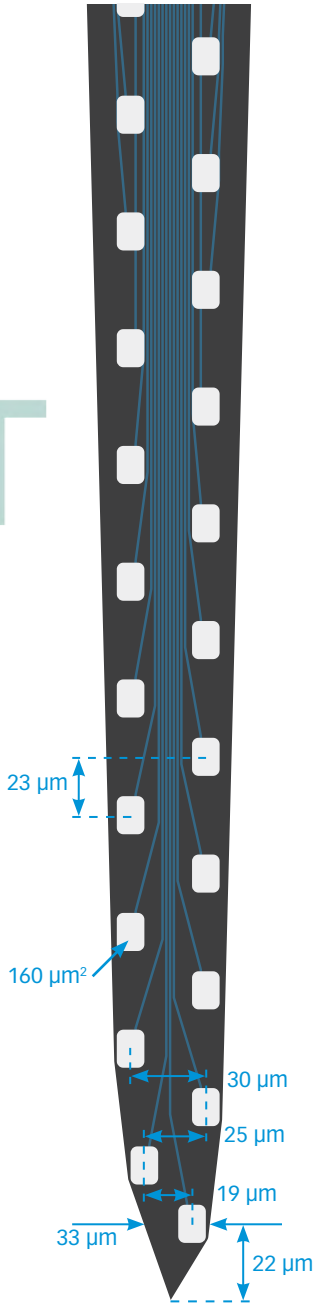




A1x64-Poly2-6mm-23s-160

NOTE: High Density Design. May contain up to 15% irregular sites.

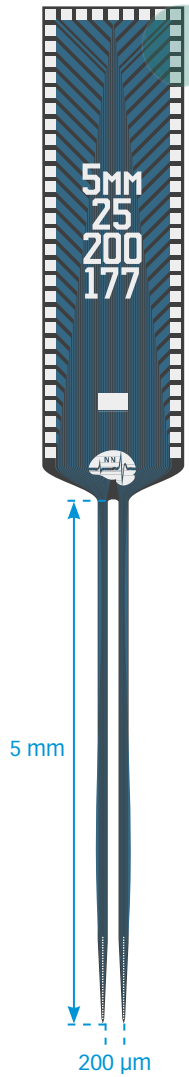


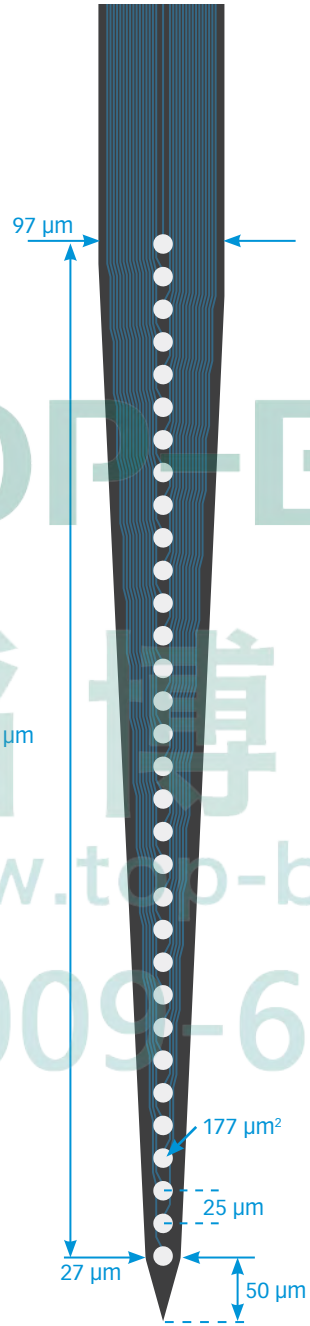


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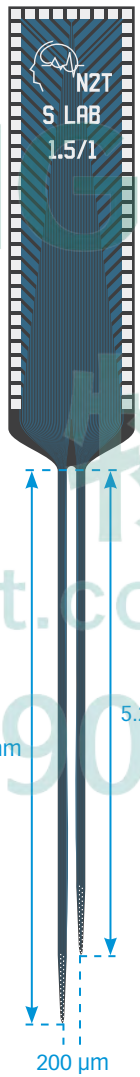
A2x32-5mm-25-200-177

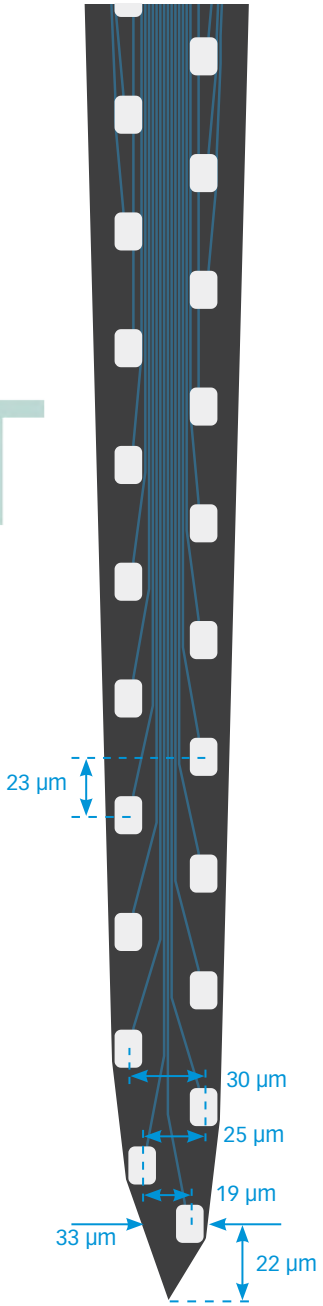




A2x32-Poly2-6mm-23s-200-160

NOTE: High Density Design. May contain up to 15% irregular sites.

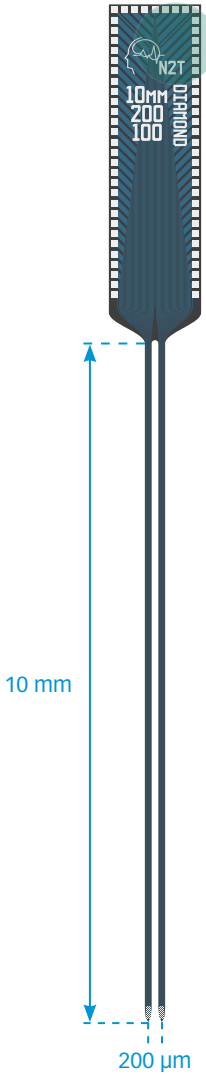




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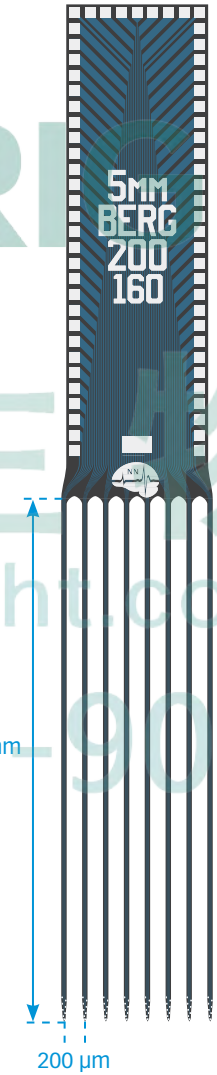
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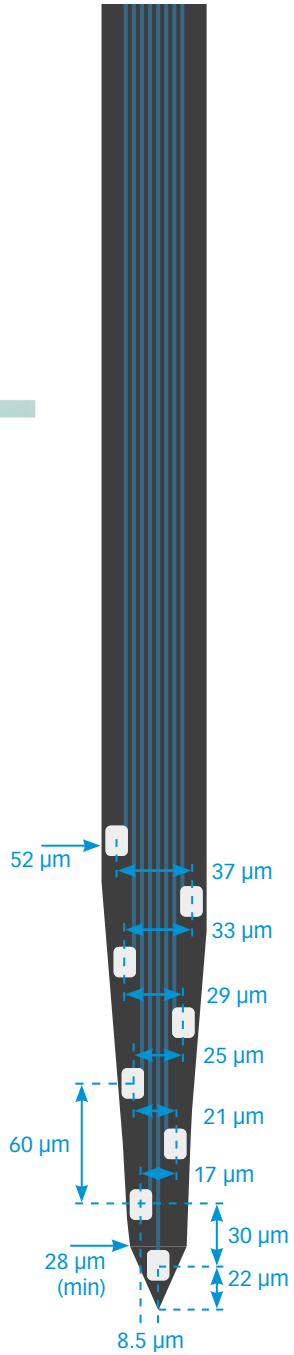
A2x32-Poly5-10mm-20s-200-100





A8x8-5mm-200-160

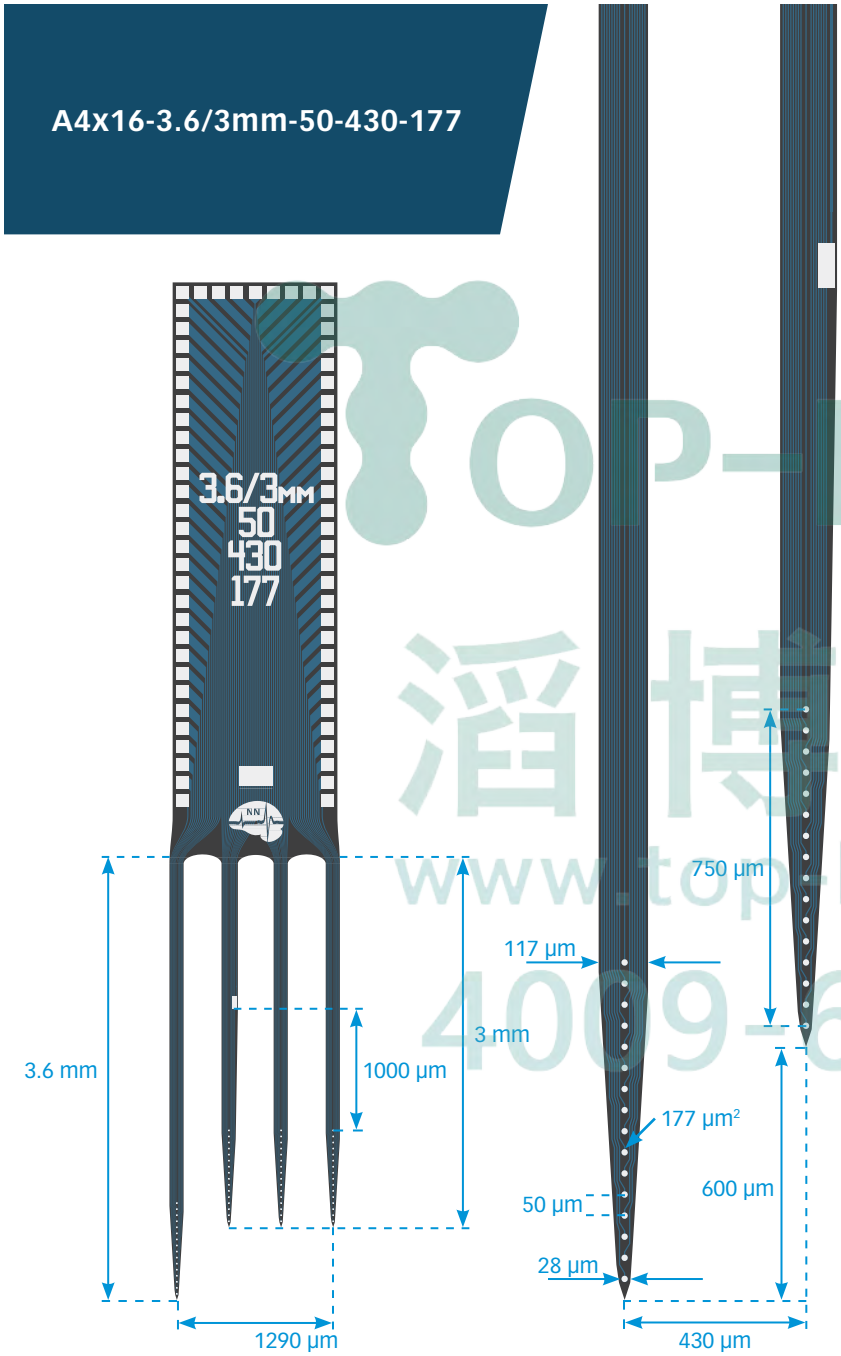




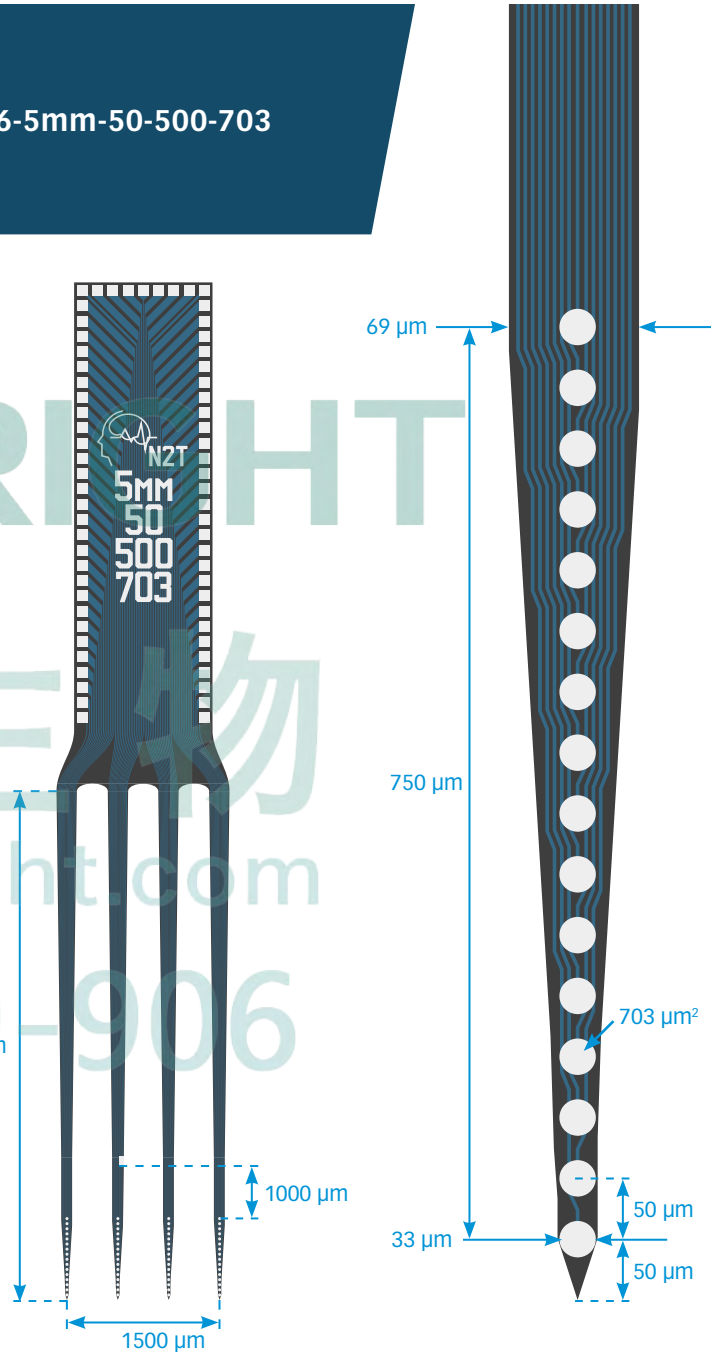
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A4x16-3.6/3mm-50-430-177



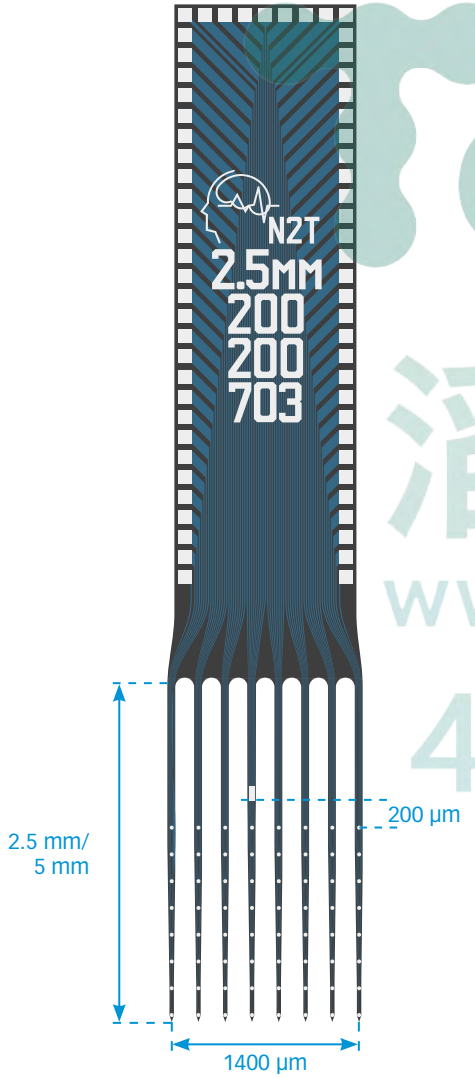
A4x16-5mm-50-500-703

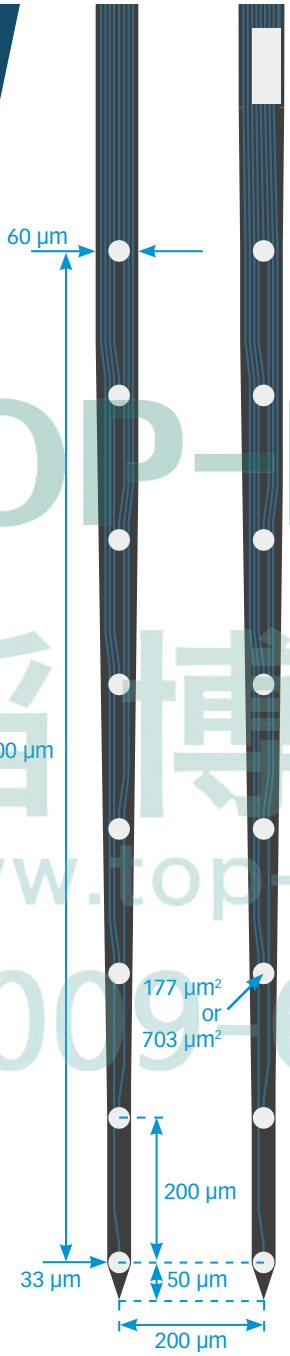


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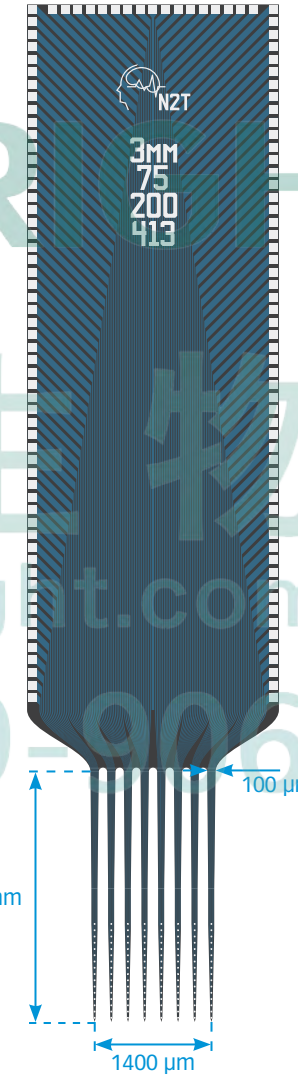
A8x8-2.5mm-200-200-177
A8x8-2.5mm-200-200-703
A8x8-5mm-200-200-177
A8x8-5mm-200-200-703

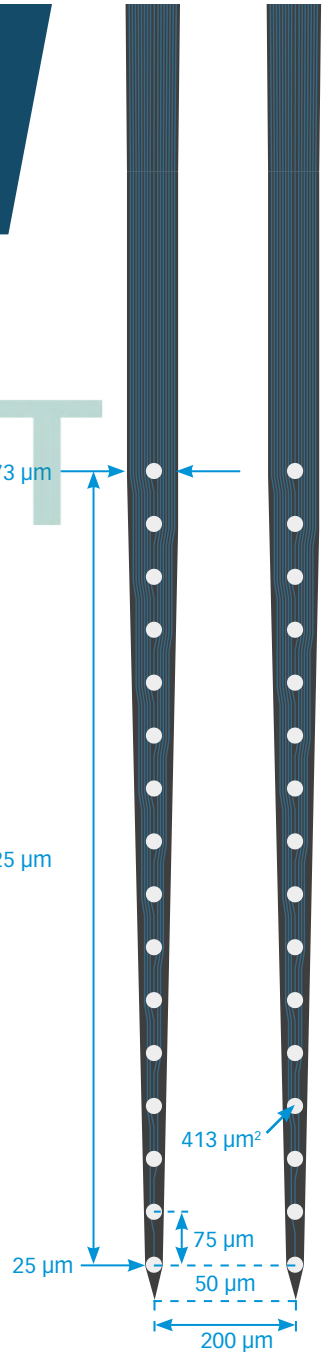




A8x16-3mm-75-200-413

NOTE: High Density Design - mates to a custom A-style board. May contain up to 15% irregular sites.

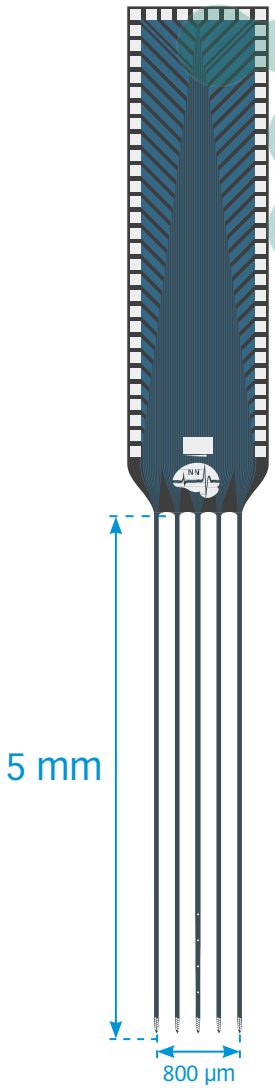


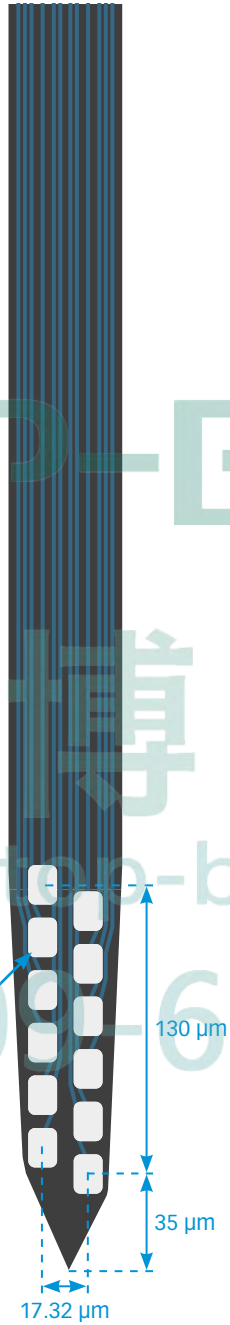


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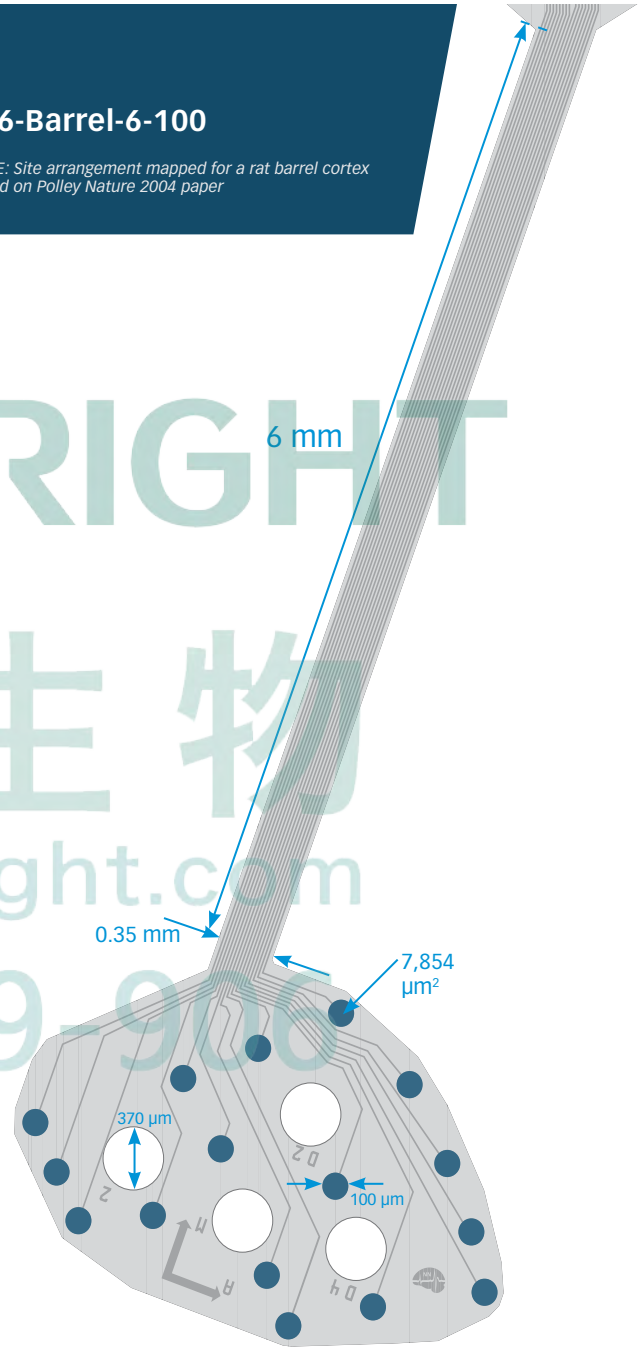
A5x12-Poly2-5mm-20s-lin-160





E16-Barrel-6-100

NOTE: Site arrangement mapped for a rat barrel cortex based on Polley Nature 2004 paper

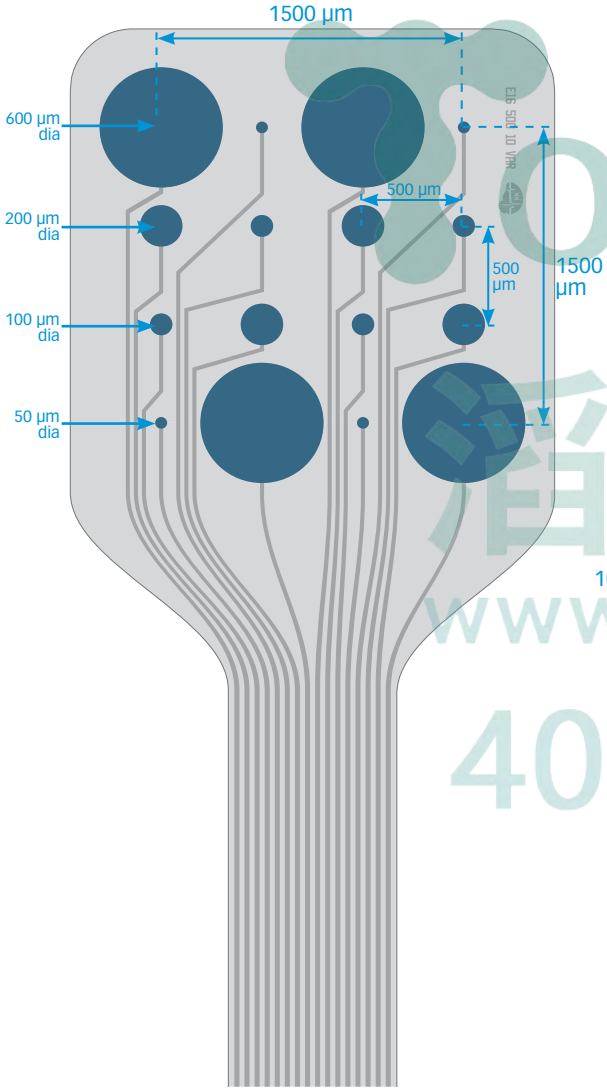


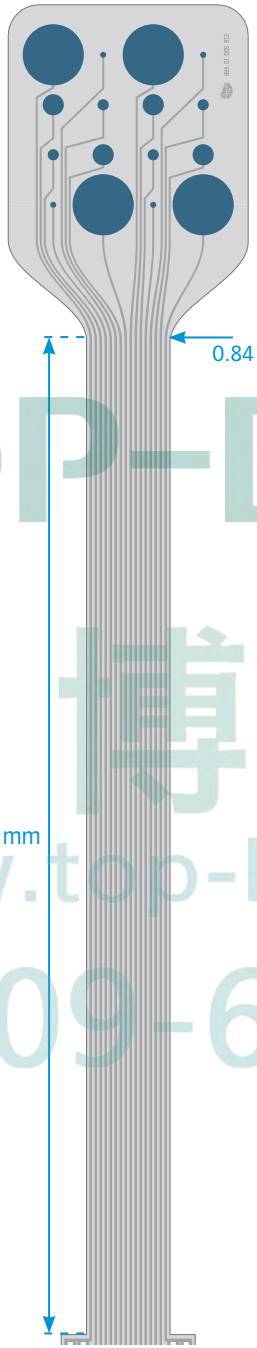
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E16-500-10-VAR

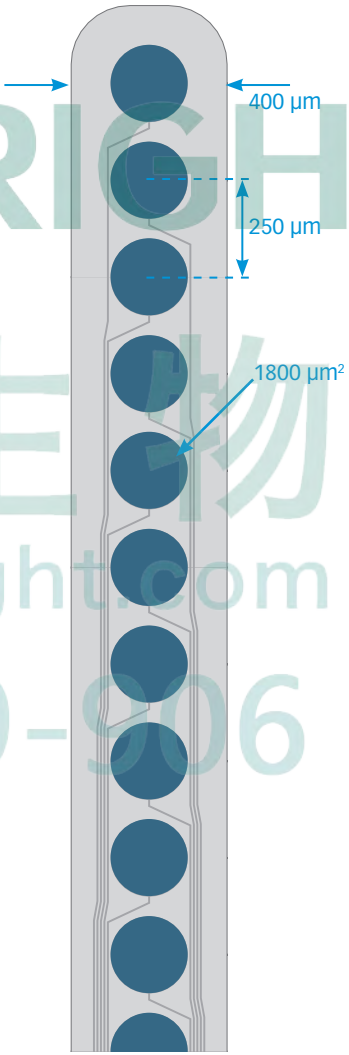
NOTE: Designed for investigating the relationship between site area and recorded ECoG

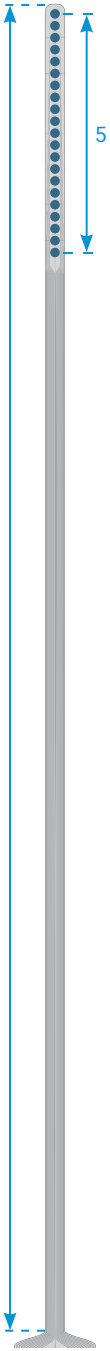




E1x27-27.8-250-1800

NOTE: Designed for cochlear use. The probe substrate is designed to be flexible to allow for integrating with a customized carrier to fit the user's specific application.



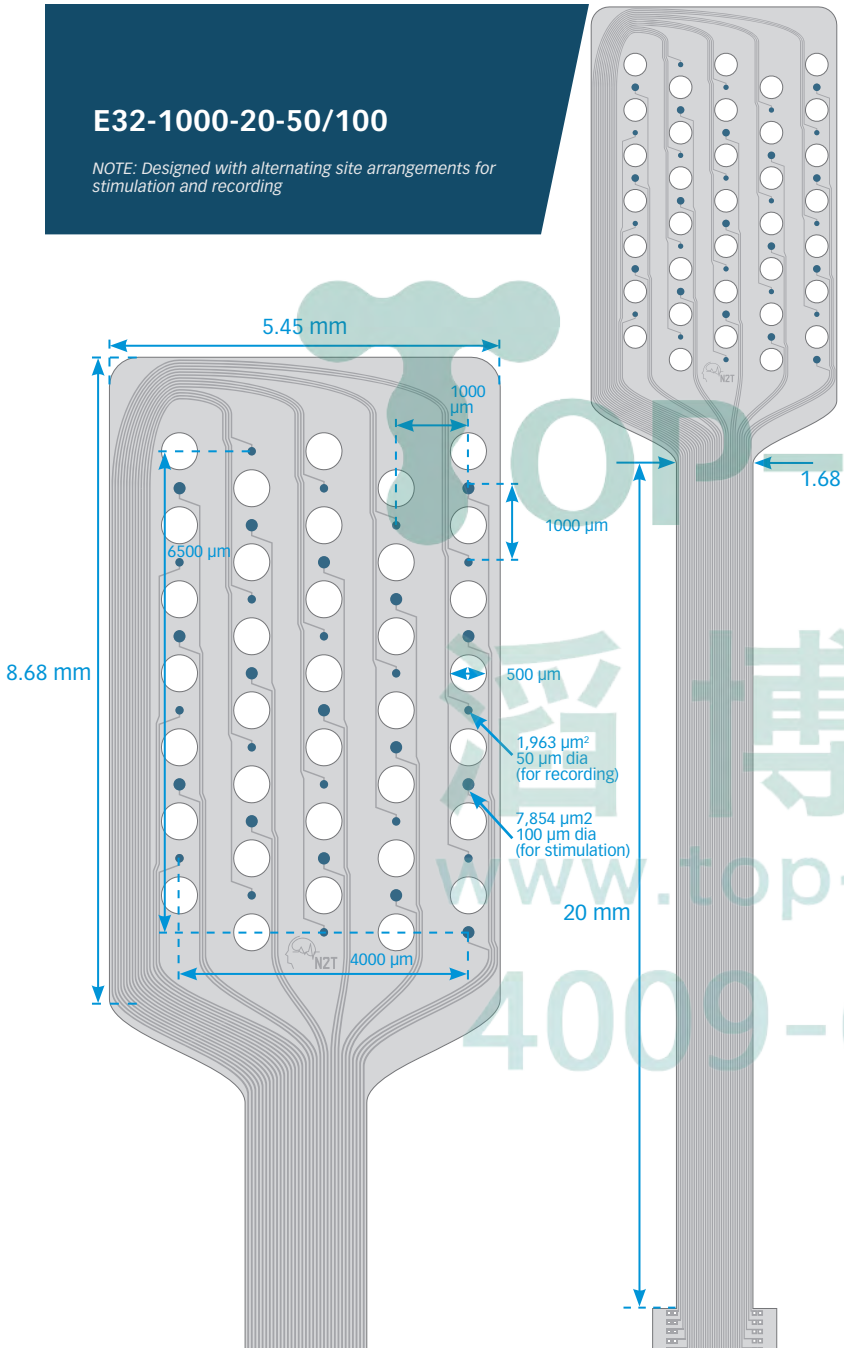


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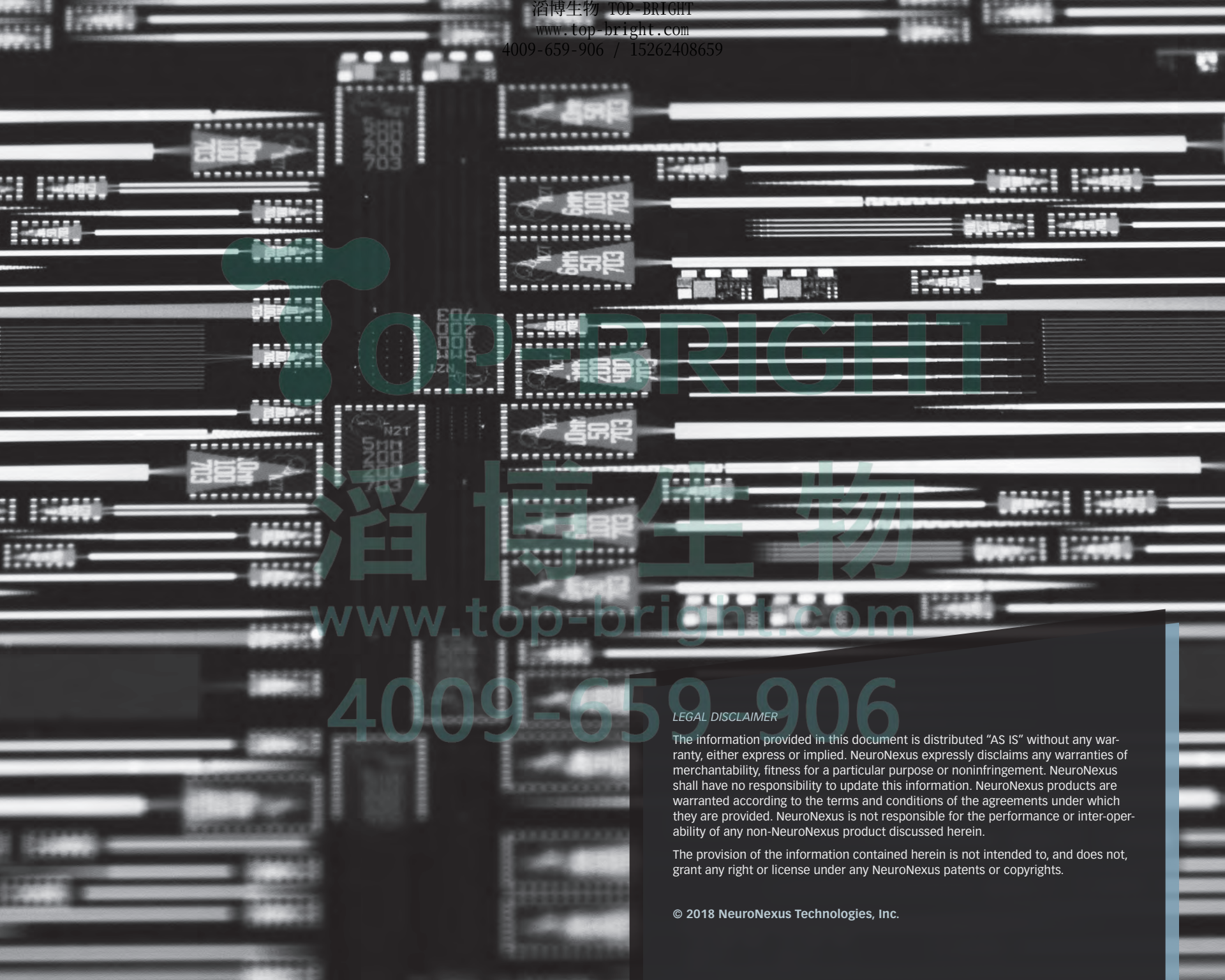
E32-1000-20-50/100

NOTE: Designed with alternating site arrangements for stimulation and recording



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