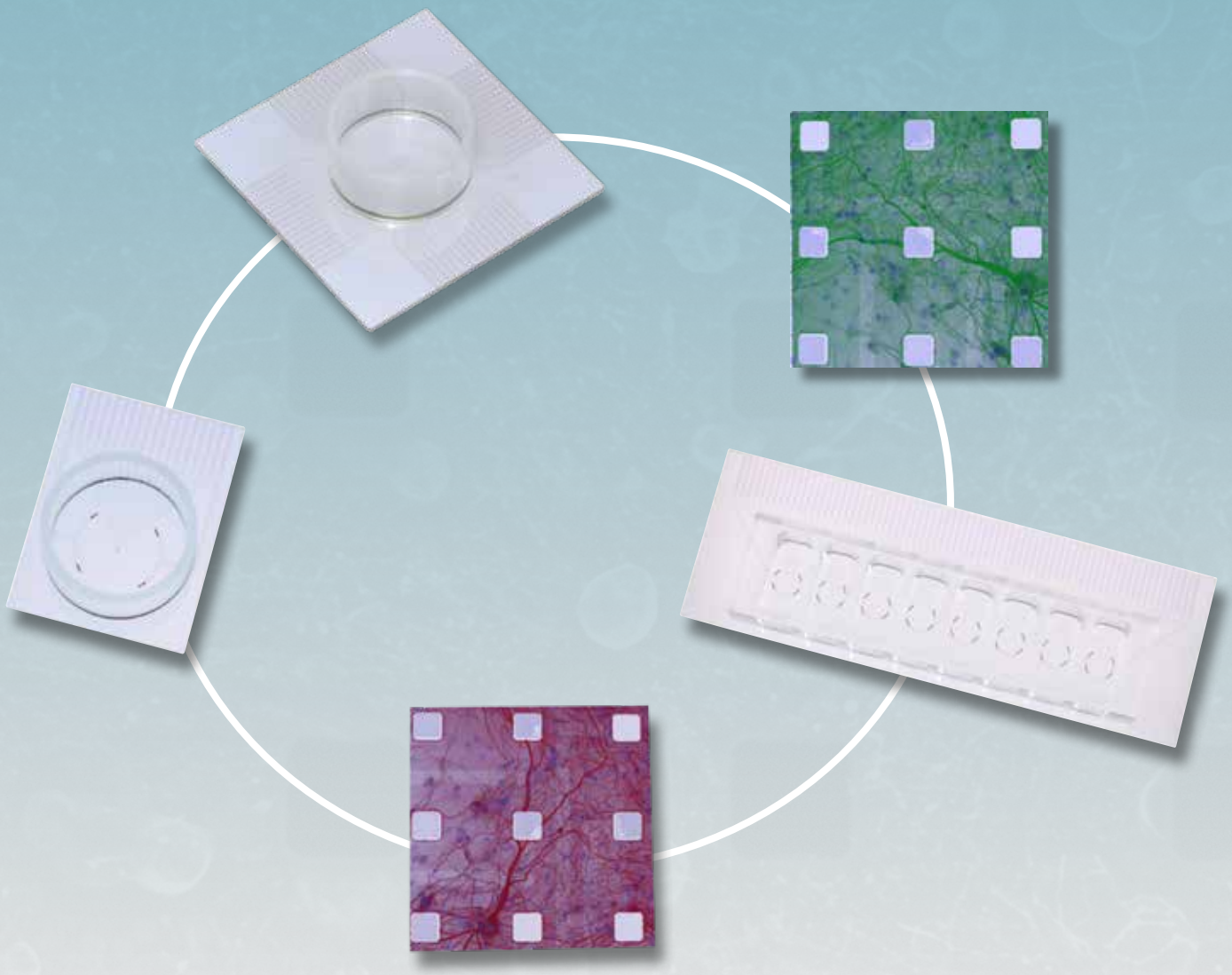
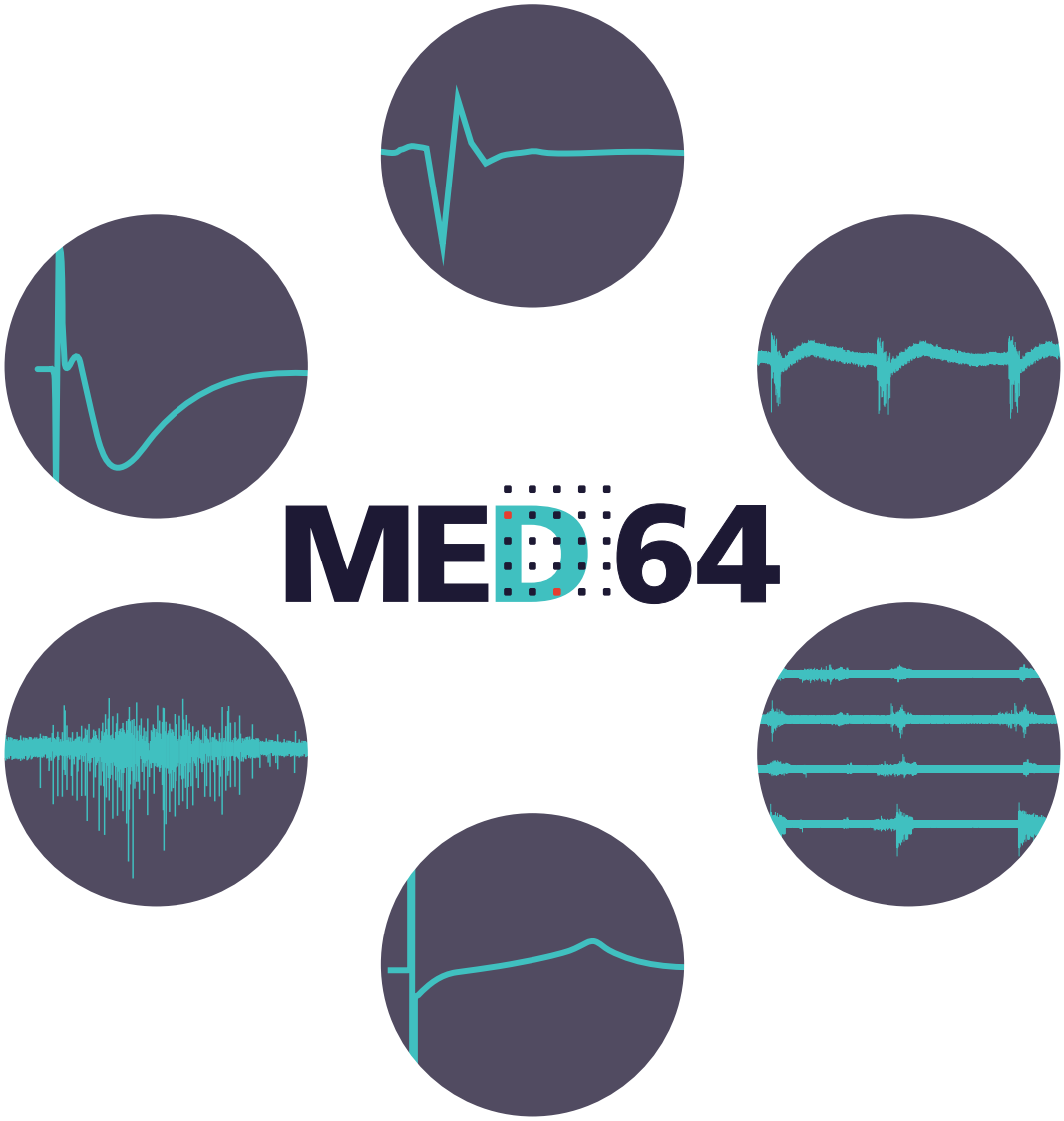
MED64

The most sensitive microelectrode array system for *in vitro* extracellular electrophysiology



MED64 product information
www.med64.com

DATA QUALITY THAT YOU CAN COUNT ON



Unrivaled Data Quality for the Highest ***Reliability*** and ***Reproducibility***

MED64 System is the first Microelectrode array system commercialized in the world. Since its launch in 1996, the MED64 System has offered advanced solutions for in-vitro extracellular electrophysiology.

The MED64 systems feature highly-sensitive electrodes and amplifiers. Engineered for low-noise, the MED64 provides the most reliable, highest-quality electrophysiology experiments. With its **unrivaled signal-to-noise**, the MED64 is the Microelectrode array system for scientists who value data quality.

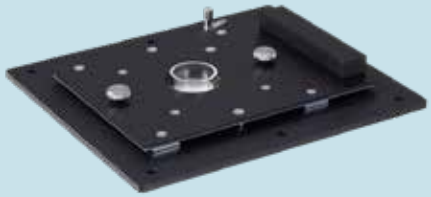
FEATURES

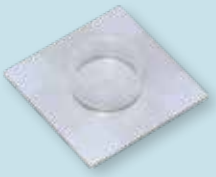
- Unrivaled signal-to-noise ratio with 0.8 μV RMS noise level
- High-quality evoked signals with small stimulus artifacts (No need for blanking circuit)
- Combination of low-noise and broad acquisition bandwidth allowing more reliable signal recording
- Large current-driven stimulation via any electrode
- Recording in an humidified incubator
- Easy and low-cost upgrade to another MED64 System
- In-house accessories validated carefully to support your experiments
- Extraordinary technical support based on our decades of experience

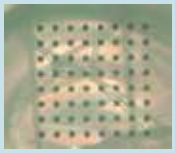
SYSTEM LINE-UP

MED64 Basic

- Basic system for all applications
- Recording from 64 electrodes





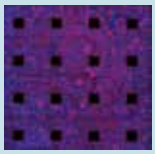


MED64 Quad

- Medium throughput system for all applications
- Parallel recording from 4 samples (16 electrodes / Probe)

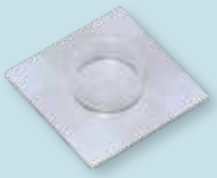
MED64 Allegro

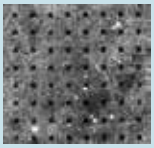
- Medium throughput system for cultured cells
- Parallel recording from 8 or 4 samples



MED64 Plex

- Recording from up to 8 samples at all 64 electrodes





Comparison Chart

	Number of samples	Number of electrodes/sample	Applications		
			Acute slices	Slice cultures	Cell cultures
MED64 Basic	1	64	○	○	○
MED64 Quad	4	16	○	○	○
MED64 Allegro	8 (or 4)	8 (for 8 well) / 16 (for 4 well)	○	○(4 well) / ×(8 well)	○
MED64 Plex 4/8	8 (or 4)	64	○	○	○

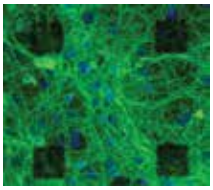
HIGH-SENSITIVITY MEA

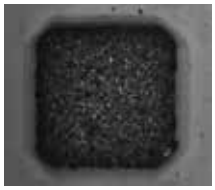
MED Probe

Microelectrode array with the industry's lowest-impedance electrodes

The MED Probe features the industry's lowest-impedance microelectrodes (8 kΩ at 1kHz). It provides low-noise and excellent signal-to-noise as well as stimulation capabilities. The new Carbon Nanotube electrodes create excellent cell adhesion due to its flat surface.

New Carbon Nanotube Technology



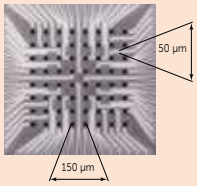


- Excellent cell adhesion (flat surface)
- High-sensitivity (Low-impedance)
- High-durability

Cross-section diagram for the carbon nanotube electrode (pink)

STANDARD 8X8 ARRAYS

Product Number		Array Size (mm)	Recording Electrodes		Chamber Depth (mm)
Carbon Nanotube Electrode	Platinum Black Electrode		Size (μm)	Spacing (μm)	
MED-R2105	MED-P2105	0.7 x 0.7	20 x 20	100	5
MED-R210A	MED-P210A	0.7 x 0.7	20 x 20	100	10
MED-R5155	MED-P5155	1 x 1	50 x 50	150	5
MED-R515A	MED-P515A	1 x 1	50 x 50	150	10
MED-R5305	MED-P5305	2 x 2	50 x 50	300	5
MED-R530A	MED-P530A	2 x 2	50 x 50	300	10
MED-R5455	MED-P5455	3 x 3	50 x 50	450	5
MED-R545A	MED-P545A	3 x 3	50 x 50	450	10



Zoom-up view for the MED-R515A

SPECIAL ARRAYS

Hippocampal slice placed on the MED-P5001A

MED-R5D15B

* See page 7 for the specifications of Special Array Probes

MED PROBE FOR QUAD SYSTEM

Hippocampal slice on the MED-RG501A

Product Number		Array	Recording Electrodes		Chamber Depth (mm)
Carbon Nanotube Electrode	Platinum Black Electrode		Size (μm)	Spacing (μm)	
MED-RG515A	MED-PG515A	4 x 4	50 x 50	150	10
MED-RG501A	MED-PG501A	2 x 8	50 x 50	150	10

MED PROBE FOR ALLEGRO SYSTEM

MED-R5N811

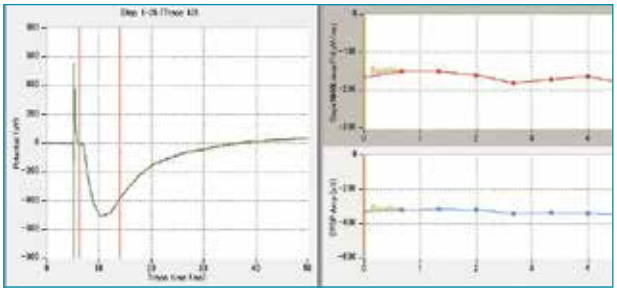
Product Number	Number of wells	Number of electrode / well	Well size (mm)	Electrode Size (μm)	Chamber Depth (mm)
Carbon Nanotube Electrode					
MED-R5NF30	4	8	Φ16	50	10
MED-R5N811	8	4	7.5 x 16	50	10

MED64 Mobius

Software that is Highly-sophisticated, User friendly, Hands-on

The MED64 Mobius is the data acquisition and analysis software for the all MED64 Systems. It is designed to be easy for beginners yet powerful enough for advanced users. Mobius comes in various application-specific packages including "Evoked Potential Measurements," "Spike Sorter," "QT," as well as combined packages for multi-application users. All analyses are performed at all acquisition channels both during acquisition as well as post acquisition, and all analyses as well as raw data are exportable into other software.

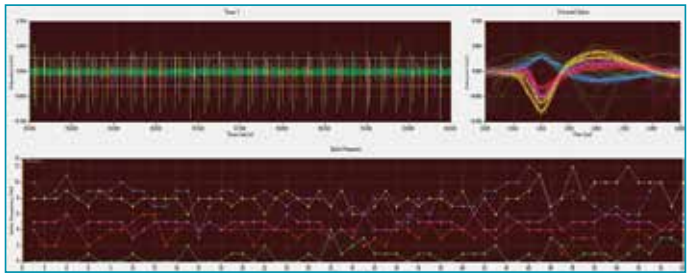
EVOKED POTENTIAL MEASUREMENT PACKAGE



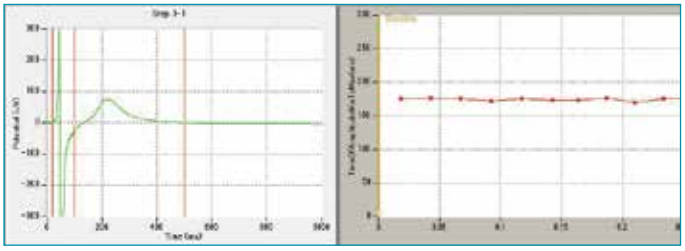
- Extractions of evoked local field potentials (e.g. fEPSPs).
- A broad set of waveform analysis (e.g., amplitude, slope, area, time).
- Automated cumulative plots for the analysis during (and post-) aquisition.
- Capability to design and apply complex stimulation sequences (e.g., theta burst stimulation)

SPIKE SORTER

- Extractions of spikes exceeding user-defined thresholds.
- Set thresholds by various methods:1) moving bars at the all channels (or single channel) display, 2) typing numbers in the chart, or 3) a percentage of the RMS noise.
- Advanced spike sorting based on algorithm of waveform similarities.
- Spike frequency analysis at all channels and automated cumulative plots.



QT

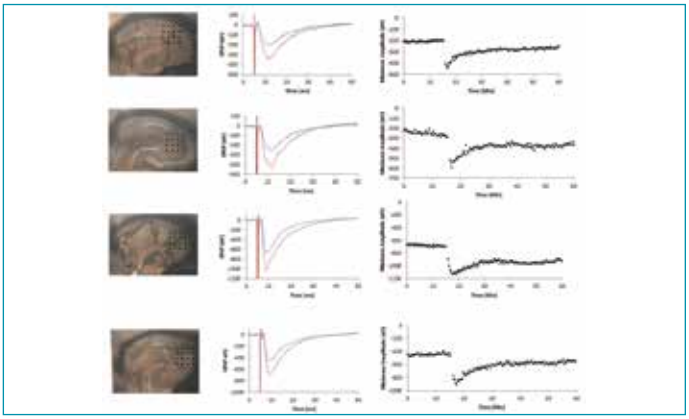


- Extractions of cardiac signals exceeding user-defined thresholds.
- Beat frequency analysis (with computation and graphs).
- Inter-spike intervals analysis (with computation and graphs).
- Field potential duration analysis via several different methods.

ADVANCED RECORDING AND ANALYSIS

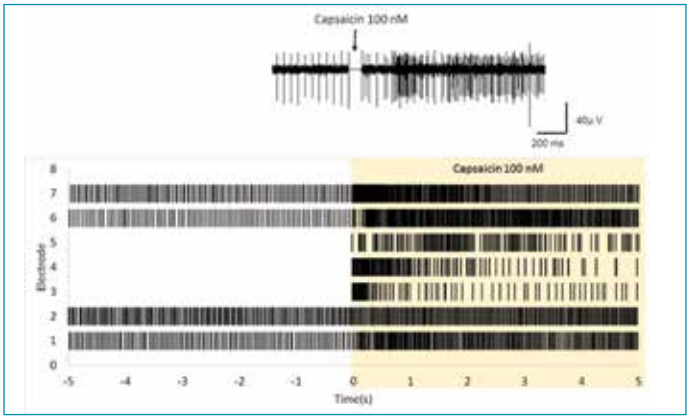
The MED64's high-sensitivity provides excellent quality of data without the need for digital filtering. Smaller electrical signals that could be hidden by other systems are reliably detected by high-sensitive systems, and the reproducible data can be analyzed using advanced Mobius software.

LTP ASSAYS



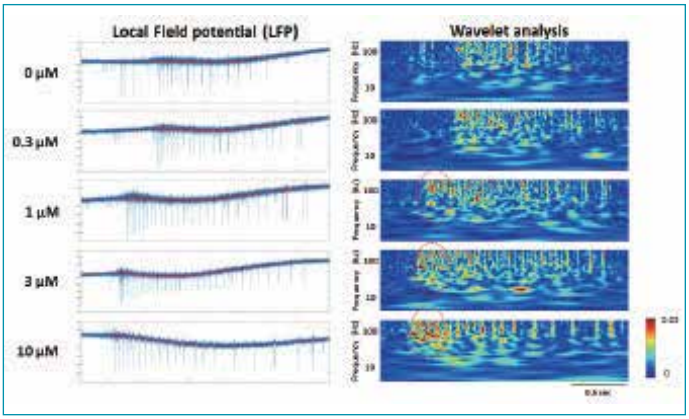
LTP assays from 4 slices using MED64 Quad

PAIN STUDY

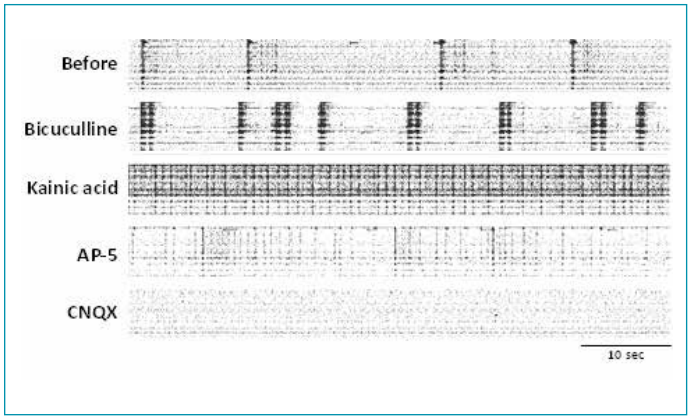


Changes of DRG neural activity with capsaicin

NEUROTOXICOLOGY STUDY

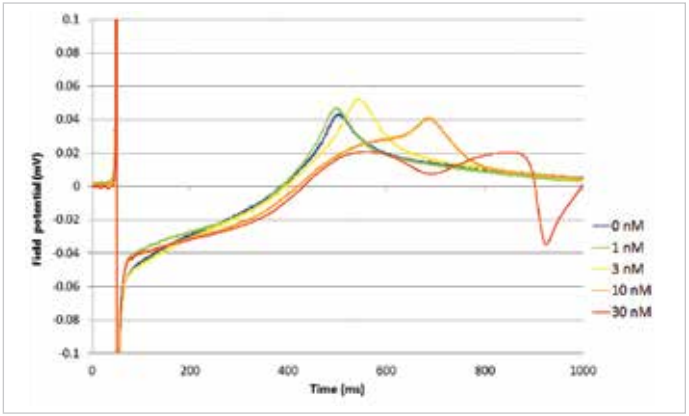


Local field potential and wavelet analysis



Raster plot of network bursting

CARDIAC SAFETY SCREENING



Field Potential Duration Analysis

APPLICATIONS

- Brain slice evoked activity (fEPSPs)
- Synaptic plasticity (LTP/LTD), learning & memory
- Spontaneous activity (Spikes)
- Rhythmic activity/oscillation
- Network Activity
- Evaluation for Field Potential Duration (FPD) prolongation
- Stem cell research
- Drug discovery using acute tissue preparations (epilepsy, Alzheimer, pain, feeding behavior, arrhythmias etc.)
- Neurotoxicity screening
- Cardiac safety screening (e.g., QT prolongation)
- Chronic drug testing with cultures
- And more!

SPECIFICATIONS

MED64 Amplifiers

MED64 Main Amplifier [MED-A64MD1A]			
Amplifier		**Degitizer**	
Number of channels	64	Resolution	16 bit
Gain	x 20-217	Sampling rate	20 kHz /channel
Bandwidth	0.1Hz - 10 kHz	Output	USB
Analog low-cut filter	0.1/ 1 / 10/ 100 Hz	**General**	
Analog high-cult filter	1 / 2 / 2.5 / 5.0 / 7.5 / 10 kHz	Power supply	AC 100-240V (50-60 Hz)
Input impedance	100 MΩ	Weight (without AC adaptor)	5.9Kg
		Dimensions (without AC adaptor)	W430 x L437 xx H74 (mm)
MED64 Head Amplifier [MED-A64HE1S]			
Number of channels	64	Number of channels	2
Gain	x 10	Output format	Current-driven
Bandwidth	0.1 Hz - 100 kHz	Maximum input voltage	+/-4 A
Input impedance	100 MΩ	Maximum output current	+/- 200 μV
Output impedance	10 kΩ		
r.m.s. noise (Typical)		**General**	
*Input short-circuited	14 nV r.m.s. / √Hz	Power supply	AC 100-240V (50-60 Hz)
*MED-P515A input		Weight (without AC adaptor)	6.6 Kg
f < 3kHz	0.8 μV r.m.s.	Dimensions (without AC adaptor)	W430 x L437 x H74 (mm)
f < 5 kHz	1.2 μV r.m.s.		
f < 10 kHz	1.8 μV r.m.s.		

MED64 Probes

Substrate/Chamber			**Recording Electordes**			
Substrate	Glass, T = 0.7 mm		Material		Carton nanotube	Platinum black
Conducting layer	Indium tin oxide (ITO), 0.15 μm				(MED-Rxxxxx)	(MED-Pxxxx)
Insulation layer	Polyimide (or Acrylic)		Impedance	□50 mm, f50 mm	8 kΩ (Typ.)	10 kΩ (Typ.)
Cylindrical chamber	Glass (OD:25 / ID:22 mm)			□20 mm, f20 mm	10 kΩ (Typ.)	15 kΩ (Typ.)
	Acrylic resin (for Allegro Probe)		at 1 kHz, 50 mV applied sinusoidal wave			
Substrate size	MED Probe (all types)	50 x 50 mm	Maximum stimulus output	Current-driven	±200 mA (t=300 mS)	
	MED Probe for Quad	30 x 40 mm		Voltage-driven	+/- 0.5 V	+/- 1 V
	MED Probe for Allegro	100 x 35 mm				

SPECIAL ARRAYS (HIPPOCAMPAL, HEXAGONAL, 32X2, 16X4)

Product Number		Array	Recording Electrodes	Chamber Depth (mm)
Carbon Nanotube Electrode	Platinum Black Electrode		Size / Spacing (μm)	
N/A	MED-P50015	Rat Hippocampus	ϕ50 / 150	5
	MED-P5001A	Rat Hippocampus	ϕ50 /150	10
	MED-P50025	Mouse Hippocampus	ϕ50 /150	5
	MED-P5002A	Mouse Hippocampus	ϕ50 /150	10
	MED-P2H075	Hexagonal	ϕ20 /70	5
	MED-P2H07A	Hexagonal	ϕ20 /70	10
MED-R50035	MED-P50035	32 (4x8) x 2	ϕ50 /150	5
MED-R5003A	MED-P5003A	32 (4x8) x 2	ϕ50 /150	10
MED-R50045	MED-P50045	16 (4x4) x 4	50 x 50 / 150	5
MED-R5004A	MED-P5004A	16 (4x4) x 4	50 x 50 /150	10

MULTI-SAMPLE PROBES

Product Number		Number of Wells	Number of Electrode / Well	Chamber Depth (mm)
Carbon Nanotube Electrode	Platinum Black Electrode			
MED-R5D15A	MED-P5D15A	2	32	10 (5)
MED-R5D15B	MED-P5D15B	2	32	10
MED-R5DF15	MED-P5DF15	2	32 ((16x2)	10
MED-R5FF15	MED-P5FF15	4	16	10

MED64 product information

www.med64.com

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Patents (owned by Panasonic)
U.S.: RE38323: RE37977: 5,810,725: 6,151,519: 6,297,025: 6,511,817: 6,890,762: CA: 2316213
Europe: EP0689051B1
Japan: 2949845: 3101122: 3193471: 32204875: 3577459: 361972
Korea: 150390: 291052: 4933913
Taiwan: 128335: 243483
CN: 988133156.6