

## Long-Life™ MCP Selection Guide



### Long-Life™ Microchannel Plates

**Long-Life™** Microchannel Plates exclusively from PHOTONIS provide sustained output up to five times longer than other MCPs.

**Extended Dynamic Range™** MCPs provide the highest dynamic range available (EDR).

**Detection Efficiency** - PHOTONIS offers small pore MCPs and optional enhancement coatings for the highest possible detection efficiency.

**Spatial Resolution** - PHOTONIS exclusive 2-micron pore MCPs provide the highest spatial resolution available.

**Temporal Resolution** - PHOTONIS 2-micron pore MCPs are the fastest charged particle detectors in the world.



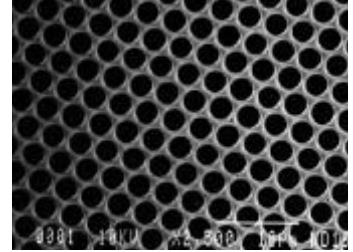
## PHOTONIS brings you the most advanced MCP technology in the World

PHOTONIS products have led the industry in electro-optics and fiber optics for over 35 years. We supply standard and custom made products and offer personal expert service designed to meet the rigorous demands of radiation detection and signal amplification applications. Our unrivaled expertise in designing and manufacturing Long-Life™ Microchannel Plates and related technology ensures the most sensitive and highly-integrated systems available for today and tomorrow.

Our diverse manufacturing capabilities provide solutions for any detection application, no matter how unique. PHOTONIS is the largest microchannel plate manufacturer in the world with the most advanced equipment for producing MCPs and MCP Detector Assemblies (APDs) to add additional value.

PHOTONIS Long-Life™ Microchannel Plates use an exclusive material which has demonstrated superior lifetime characteristics in a wide range of detection and imaging applications.

Long-Life™ Microchannel Plates are the foundation for a variety of applications including image intensification, remote detection, surface science, space science, high energy physics, and mass spectrometry. They offer longer life, higher gain, and lower dark current than any other commercially available microchannel plate.



PHOTONIS 2-micron pore MCP provide the highest spatial and temporal resolution in the world.

The Long-Life™ Microchannel Plates enhanced stability and extended dynamic range provide outstanding system performance and reliability for even the most demanding applications.

This table will help you to select the right configuration for your specific application. If you have any questions or need assistance, do not hesitate to contact us at [sales@usa.photonis.com](mailto:sales@usa.photonis.com).

### MCP 18 / 6 / 5 / 12 D 60:1 6.4CH EDR CSI 80FLAT, MS

Quality Diameter (mm)	Pitch C-To-C (microns)	Pore Size Diameter (microns)	MCP Grade	Geometry	Additional Coatings	Flatness
18	3	2	D - Detection	(Blank) - Rimmed	(Blank) - None	(Blank) - Standard
25	6	5	I - Image	MP - MountingPad™	AU - Gold	#FLAT - Microns out of Flat
40	10	8	P - Premium	NR - Rimless	CSI Cesium Iodide	
75	12	10		#CH - Center Hole (mm inner diameter)	MGF2 - Magnesium Fluoride	
120	32	25			MGO - Magnesium Oxide	
150					KBR - Potassium Bromide	
					CUI - Copper Iodide	

Quality Dimensions (mm)	Bias Angle (degrees)	Aspect Ratio (Thickness : Channel Diameter)	Bias Current	Multiples (Quantity MCPs)
1.4 x 1.3	0	40:1	(Blank) - Standard	(Blank) - Individual Plate (1)
12 x 11	5	46:1	EDR - Extended Dynamic Range™	MS - Matched Set (2)
80 x 100	8	60:1	#-#UA - Range (Microamps)	MZ - Matched Z-Stack (3)
100 x 15	12	80:1		TC - Tested Chevron™ (2)
100 x 80	19			TZ - Tested Z-Stack (3)
123 x 41				

direction of bias

Rectangular MCPs

### Custom MCPs

In addition to the most complete line of standard MCPs available, PHOTONIS also offers a wide range of custom products. Among the options available are: Custom formats (rectangular, annular sector, circular zone, virtually any shape and size), enhancement coatings, optimized bias currents, specialized performance testing, custom aspect ratios, custom electroding depths and Square Pore MCPs e.g. for UV and X-ray focusing.

### Pitch / Pore Size

The spatial and temporal resolution of microchannel plates varies inversely with their center-to-center spacing (Pitch). Our highest resolution 2µm pore MCPs are ideal for applications where image detail or fast response time is important.

### Bias Angle

The bias angle of a microchannel plate is the angle of the channel with the surface normal. It can be varied in order to optimize the angular dependency of UV and soft X-ray detection. Collimation applications primarily select 0° bias angles. High resolution analog detection applications are optimal at 5°. Chevron and Z-Stack assemblies perform best with 8° or 12° bias angle MCPs.



## Three Classifications of MCPs

**Detection Grade** MCPs are designed for a wide range of signal detection applications where devices are used as single-point detectors and amplifiers. Detection grade is typical for Time-of-Flight mass spectrometry, residual gas analysis and point detectors. Detection grade is the best choice and value for non-imaging applications.

**Image Grade** MCPs are designed for imaging or position sensing applications. When used in conjunction with an appropriate readout, these devices provide an intensified high resolution image. Image grade is found in such applications as image intensifier tubes, ultra-fast cathode ray tubes and various analytical techniques such as ESCA, magnetic sector mass spectrometry and VUV spectrometry.

**Premium Grade** MCPs are manufactured to the highest quality specifications achievable. They are used in precision imaging applications requiring superior image quality such as high speed photography, image intensifiers and other electronic imaging applications. Premium grade MCPs are the preferred choice for space applications where product reliability and performance are critical.

## Extended Dynamic Range™

The dynamic range of an MCP is ultimately limited, at high count rates, by the bias current. Secondary electrons produce a region of charge depletion at the emissive surface. Further multiplication cannot occur until the charge is replenished. The Extended Dynamic Range™ (EDR) option will typically increase the detection limit by a factor of ten.

## Aspect Ratio

PHOTONIS offers Standard 40:1 Channel Length-to-Diameter (L/D) ratio or Advanced Performance 60:1 L/D ratio MCPs. Standard MCPs have been optimized and demonstrate superior performance for imaging applications. Advanced Performance MCPs are the preferred devices for most detection applications. Advanced Performance MCPs provide a higher gain and narrower Pulse Height Distribution and with their higher length-to-diameter ratio a thicker, more robust microchannel plate. This ensures greater mechanical durability and simplifies handling and assembly operations.

## MCP Configurations

Matching the bias currents of an MCP set allows the set to be operated by a single power supply, which eliminates the need for center tabs and voltage dividers, leading to improvements in spatial resolution and Pulse Height Distribution. There are two basic modes of MCP Operation, i.e. Pulse Counting detection and Current Amplifier Mode (or Analog Mode).

- **MS: Matched Set** – 2 matched resistance MCPs suitable for a Chevron™.
- **TC: Tested as a Chevron™** - 2 matched resistance MCPs tested in the high gain Chevron™ configuration.
- **MZ: Matched Z** – 3 matched resistance MCPs suitable for making a Z-Stack.
- **TZ: Tested as a Z-Stack** – 3 matched MCPs tested in the high gain Z-Stack configuration.

## Format

PHOTONIS offers a wide range of standard and custom formats i.e. rectangular, mounting holes, virtually any shape and size).

### MountingPad™ Technology

PHOTONIS, patent-pending MountingPad™ Technology provides advantages over both Rimmed and Rimless MCPs and virtually eliminates MCP warping and cracking that can occur with moisture absorption.

Mounting pads provide a rigid area to clamp the MCP without damaging any pores and allow for efficient degassing. These MCPs are also virtually warp-free, regardless of the storage environment.



## Coatings

The standard MCP electroding coating is NiCr. Cesium Iodide (CsI), Copper Iodide (CuI), and Magnesium Fluoride (MgF<sub>2</sub>) enhance the detection of ultraviolet photons from 20 to 200 nm. MgO improves electron detection efficiency. KBr improves detection efficiency of soft X-rays in the 0.2 to 9 keV range. Gold (Au) electrodes are available for rapid charge replenishment.

## MCP Performance characteristics

Configuration	L/D Ratio	Max. Voltage	Gain	Pulse Height
CEMA	40:1	1000	>4x10 <sup>5</sup>	Neg. Exp.
1 MCP	60:1	1200	>1x10 <sup>6</sup>	Neg. Exp.
Chevron™	40:1	2000	>4x10 <sup>6</sup>	<175%
2 MCPs	60:1	2400	>1x10 <sup>7</sup>	<100%
Z-Stack	40:1	3000	>3x10 <sup>7</sup>	<120%
3 MCPs	60:1	3600	>2x10 <sup>8</sup>	<60%

## Applications

Some of the PHOTONIS Advanced Performance Long-Life™ Microchannel Plate Detector Applications:

- Time-Of-Flight Mass Spectrometry
- Secondary Ion Mass Spectrometry
- Scanning Electron Microscopy (SEM)
- Focused Ion Beam (FIB)
- e-Beam/ X-Ray Lithography
- Particle Physics
- Residual Gas Analysis (RGA)
- Ion Beam Profiling
- Plasma Profiling
- Semiconductor Metrology
- High Energy Physics
- Space Exploration

# PHOTONIS

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For more information, please visit [www.photonis.com](http://www.photonis.com)

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