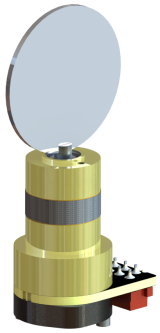
"Compact 506" Optical Scanner
for low-cost and light-weight applications

APPLICATIONS

- 3D printers
- LIDAR systems
- Compact, portable displays
- Hand-held medical instruments
- Laser Cleaning (paint / rust removal)



Pictured with 1-inch round mirror and Micro-Match connector

UNIQUE ScannerMAX FEATURES

- Stronger magnetic field
- Stronger rotor and shafts
- Stronger, integrated back-supporting mirror mount
- Stronger 6mm OD precision bearings
- Stronger position feedback with low noise
- Cooler-running motor magnetic design

BENEFITS

- Very compact, low-cost and lightweight design
- Wide-angle scanning, beyond 60 degrees optical
- Can be mounted from the front using two screws, or around the body

GENERAL DESCRIPTION

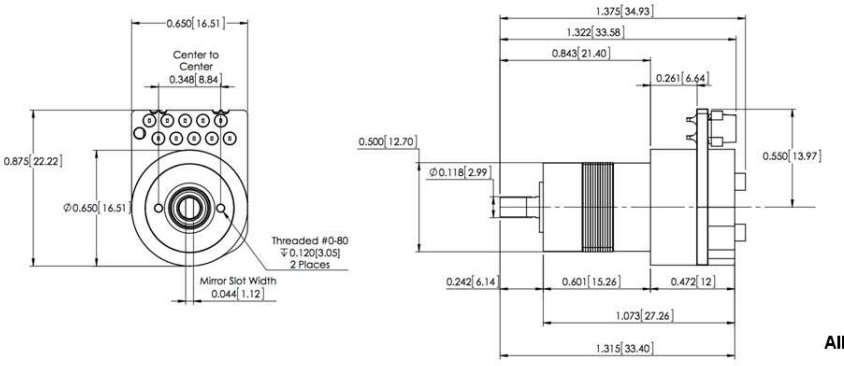
The ScannerMAX model *"Compact 506"* is believed to be the smallest, lowest-cost, lightest-weight, and most versatile galvo scanner ever made. It is particularly well suited for applications where size, cost and weight are paramount concerns, such as 3D printers, LIDAR systems, portable displays and handheld medical instruments.

Although the *Compact 506* is very small, it is built upon the *VRAD-506* actuator platform, which features very strong rotor construction and 6mm OD bearings. This construction allows the *Compact 506* optical scanner to move small mirrors as well as unusually large mirrors beyond 1 inch in diameter, and do so without a complicated servo loop. Moreover, torque-per-watt is unsurpassed for this package size, allowing this galvo to run cool in most applications.

The *Compact 506* optical scanner is available in two separate position sensor configurations: one that is compatible with conventional analog galvanometer servo drivers, and one that is compatible with our Mach-DSP digital servo driver and offers better linearity. Several connector options are also available including 10-pin Micro-Match (pictured on this datasheet), as well as 10-pin Molex/TE Mini-Fit Jr. where we offer both straight and right-angle configurations.

Given that the body parts are made from aircraft aluminum, this allows us to deliver an optical scanner whose weight is among the lightest of all galvanometer scanners ever made. Moreover, being based on the *VRAD-506* actuator, the mirror position is restored to a central rotation angle when power is removed, due to magnetic-spring-return action.

OUTLINE DRAWING

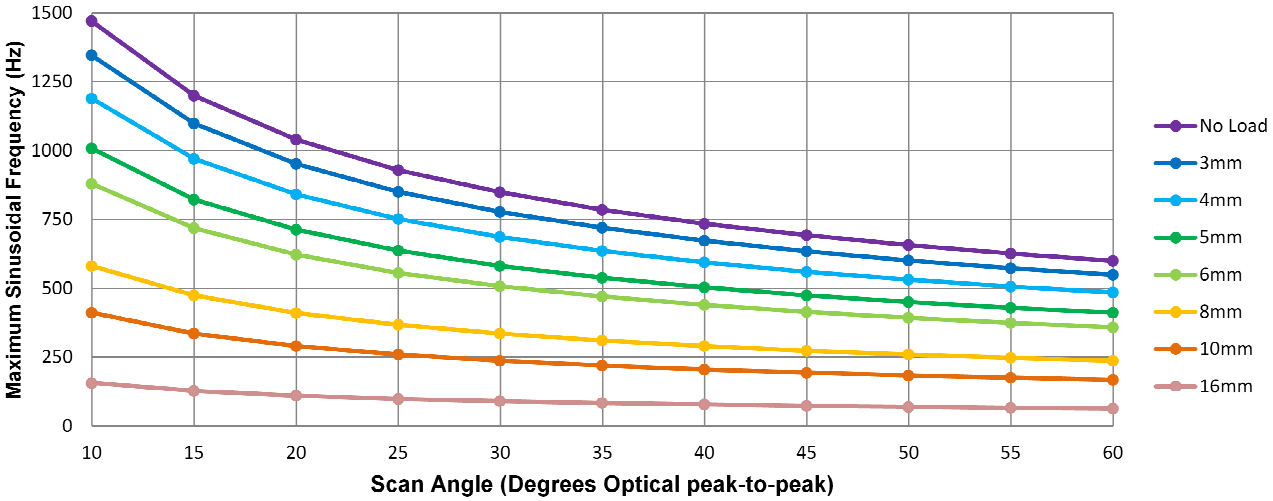


PIN	FUNCTION
1	Photodiode A
2	Photodiode Com
3	LED Cathode
4	Photodiode B
5	LED Anode
6	Motor Body / Shield
7	Motor Coil –
8	Motor Coil +
9	Motor Coil –
10	Motor Coil +

All dimensions are in Inches [mm]

(Connector depicted above is TE Connectivity Micro-Match connector part number 8-215079-0.)

Compact 506 performance with selected ScannerMAX mirror sets[1]



SPECIFICATIONS

Parameter	Value	Units
Optimal Mirror Size	up to 1 inch	Diameter (with typical 1.1mm mirror thickness)
Rotation Angle [2]	> +/-25	Degrees (> 100 degrees optical)
Rotor Inertia	0.014	Gram • Centimeters^2
Torque Constant	18,400	Dyne • Centimeters per Ampere
Maximum Coil Temperature	100	Degrees Celsius
Operating Temperature Range [3]	-10 to +85	Degrees Celsius, non-condensing
Thermal Resistance, Coil to Mount	5.6	Degrees Celsius per Watt, typical
Coil Resistance	1.8	Ohms
Coil Inductance	280	µh
Back EMF Voltage [2]	32.1	µV per degree per second
Peak Current	10	Amperes, Maximum
RMS Current	2	Amperes at Tmount of 50°C
Electrical Power Handling Capacity	9	Watts at Tmount of 50°C
Small Angle Step Response	150	µS with ScannerMAX 3mm mirror set
PD Linearity over 30 degrees [2]	99.5	% Minimum (with Mach-DSP polarity configuration)
PD Output Signal (Common Mode) [2]	300	µA (at 25mA LED current)
PD Output Signal (Differential Mode) [2]	20	µA per degree (at 25mA LED current)
Mass	12.8	Grams

Specifications are at a case temperature of 25° C. All mechanical and electrical specifications are +/-10%.
ScannerMAX scanners can easily be fabricated with alternative configurations. Please contact us with your requirements.

NOTES

1. Graph denotes theoretical maximum performance of the scanner due to thermal limitations, with case at 50°C.
2. Angular specifications are in mechanical degrees. For most applications, optical angle = 2x mechanical angle.
3. Several factors impact the operating temperature range. Please contact us before operating at or outside the extremes.

MORE INFORMATION

More information about the Compact and Saturn series of optical scanners and VRAD series of actuators, including additional application hints and tips, can be found at www.ScannerMAX.com.

OEMs are strongly encouraged to work with us to make sure that the most appropriate scanner or actuator is chosen and designed-in.

LASER SCANNING BOOK AVAILABLE

Detailed information about galvanometer scanners, servo driver techniques, and scanner applications can be found in the #1 best-selling book *LASER SCANNERS: Technologies and Applications*, written by Pangolin's President William R. Benner, Jr. The book can be found at www.LaserScanningBook.com.

SCANNERS AND ACTUATORS AVAILABLE FROM SCANNERMAX

- *VRAD 506:* a low-cost, open-loop rotary actuator capable of wide-angle rotation – perfect for shutters
- *Compact 506:* the lowest-cost, lightest-weight, and most versatile galvo scanner for 3mm to 1-inch beams
- *Saturn 1B:* providing the highest-speed vector scanning available, for 1mm to 4mm beams
- *Saturn 2B:* a resonant-scanner substitute for high-frequency sinusoidal scanning of 1mm to 4mm beams
- *Saturn 5B:* for both vector and raster scanning of 5mm and 6mm beams
- *Saturn 9B:* providing the best large-signal vector scanning performance for 8mm to 10mm beams
- *Saturn 9B Plus:* for 10mm raster scanning with 40% less heat generation
- *Beam Brush:* a Z-axis focusing / divergence control device for 3D laser marking and lightshow applications

PATENT AND TRADEMARK INFORMATION

US Utility Patent Number: 8,508,726
US Utility Patent Number: 8,963,396
US Utility Patent Number: 9,077,219
US Utility Patent Number: 9,195,061
US Utility Patent Number: 9,366,860
US Utility Patent Number: 10,284,038
US Utility Patent Number: 10,734,857
German Patent (Utility Model) Number: 20 2012 009 275.8
German Patent (Utility Model) Number: 20 2013 003 263.4
Chinese Patent No. ZL201210363949.9
Chinese Patent No. ZL201210363955.4
Chinese Patent No. ZL201310151544.3
Other US and International Patents Pending.

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