

### APPLICATIONS

- Laser entertainment (light show) displays
- Optical Coherence Tomography (OCT)
- Confocal Microscopy / Raster Imaging
- Optical Layout Templates
- Laser Marking

### UNIQUE ScannerMAX FEATURES

- Stronger magnetic field
- Stronger rotor and shafts
- Integrated back-supporting mirror mount design
- Long-life, SV30/silicon dioxide ceramic, hybrid bearings
- Trapezoidal position sensor with high output and low noise
- Cooler-running motor magnetic design

### BENEFITS

- High speed mirror positioning
- Wide-angle scanning, up to 110 degrees optical
- Low coil resistance for low heat generation during scanning
- Low thermal resistance for enhanced heat removal
- Low wobble and jitter



Pictured with 5mm Y mirror

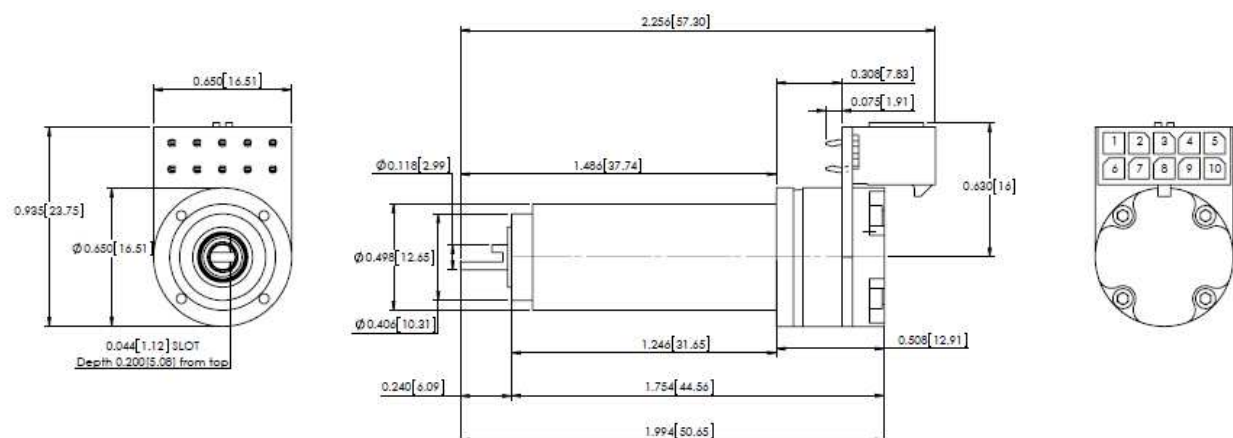
### GENERAL DESCRIPTION

The *Saturn 5B* optical scanner is specifically designed to meet the high acceleration and high RMS duty cycle demands of projection and imaging applications such as laser entertainment displays, raster imaging, Confocal Microscopy and Optical Coherence Tomography. The *Saturn 5B* is capable of moving a 5mm beam through an optical angle of 40° at a frequency of over 1 kHz with a sinusoidal drive. Step response times with a 5mm beam can be as fast as 120 microseconds for a small optical step, and 600 microseconds for a 60° optical step, easily delivering scanning speeds of ILDA 60K / 5kHz small signal bandwidth, with a true 5mm beam.

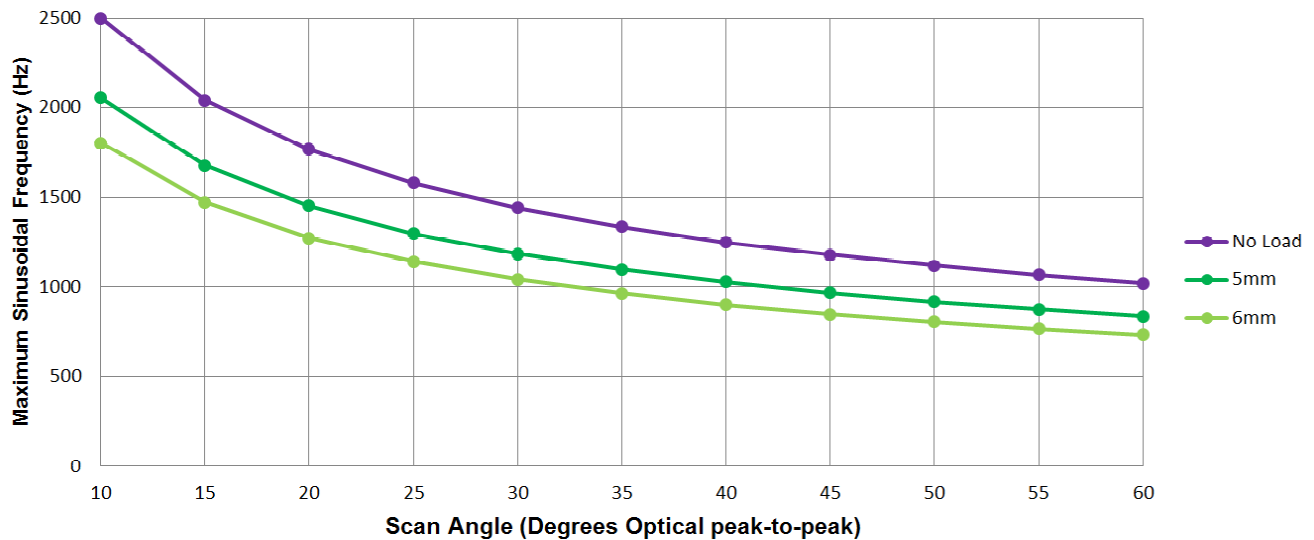
The patented X3 magnetic circuit boasts air gap flux densities of over 14,000 Gauss. The intense magnetic field strength, combined with the very low coil resistance and low rotor inertia, gives the *Saturn 5B* the highest RMS-torque-to-inertia ratio of any commercially-available optical scanner capable of moving a 5mm beam. The new -74S version utilizes a coil optimized for raster imaging, further reducing heat generated by both the scanner and driver.

The *Saturn 5B* incorporates all of the other design features of other ScannerMAX Saturn-family scanners, including a half-inch round body diameter, back-supporting mirror mount design, and high-output, low-noise position sensor.

### OUTLINE DRAWING



**Saturn 5B-74S Performance with selected ScannerMAX mirror sets<sup>(1)</sup>**



## SPECIFICATIONS

Parameter	-46S	STD	-74S	Units
Optimal Mirror Size	4 – 8			Millimeters, clear aperture
Rotation Angle <sup>(2)</sup>	+/- 27.5			Degrees, Maximum (110 degrees optical)
Rotor Inertia	0.026			Gram • Centimeters <sup>2</sup>
Torque Constant	30,000	36,000	46,000	Dyne • Centimeters per Ampere
Maximum Rotor Temperature	110			Degrees Celsius
Operating Temperature Range <sup>(3)</sup>	-10 to +85			Degrees Celsius, non-condensing
Thermal Resistance	0.8	0.9	0.8	Degrees Celsius per Watt, Maximum
Coil Resistance	0.9	1.95	2.6	Ohms
Coil Inductance	98	135	225	µh
Back EMF Voltage <sup>(2)</sup>	52.3	62.8	80.2	µV per degree per second
Peak Current	25			Amperes, Maximum
RMS Current	7.2	4.7	4.3	Amperes at Tcase of 50°C
Electrical Power Handling Capacity	62	55	62	Watts at Tcase of 50°C
Small Angle Step Response	120	140	250	µS with ScannerMAX 5mm mirror set
PD Linearity over 20 degrees p-p <sup>(2)</sup>	99.9			% Minimum
PD Linearity over 40 degrees p-p <sup>(2)</sup>	99.5			% Typical
PD Output Signal (Common Mode) <sup>(2)</sup>	640			µA with LED current of 40mA
PD Output Signal (Differential Mode) <sup>(2)</sup>	43.6			µA per degree, with LED current of 40mA
Mass	30			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

- Graph denotes theoretical maximum performance of the scanner due to thermal limitations, with case at 50°C. Other factors may prevent the scanner from reaching this maximum, such as servo driver and power supply.
- Angular specifications are in mechanical degrees. For most applications, optical angle = 2x mechanical angle.
- Several factors impact the operating temperature range. Please contact us before operating at or outside the extremes.



## **Saturn 5B Optical Scanner for 5mm - 6mm apertures**

### **MORE INFORMATION**

More information about the Saturn series of optical scanners, including additional application hints and tips can be found at [www.ScannerMAX.com](http://www.ScannerMAX.com).

OEMs are strongly encouraged to work with us to make sure that the most appropriate scanner 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](http://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: 11,735,969  
US Utility Patent Number: 11,728,698  
US Utility Patent Number: 10,955,266  
US Utility Patent Number: 10,539,433  
US Utility Patent Number: 9,530,559  
US Utility Patent Number: 9,366,860  
US Utility Patent Number: 9,270,144  
German Patent (Utility Model) Number: 20 2020 000 007  
German Patent (Utility Model) Number: 20 2013 000 369.3  
German Patent (Utility Model) Number: 20 2014 000 846.9  
Chinese Utility Model No. ZL201420102156.6  
Chinese Utility Patent No. ZL201310128586.5

*Compact 506*, *Saturn 1B*, *Saturn 5B* and *ScannerMAX* are trademarks of Pangolin Laser Systems, Inc.

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