



## WD® SATA 3.5-inch Form Factor

# Mounting and Screw Locations and Depths

## 1 Executive Summary

This document describes the screw mounting capability for WD's SATA 3.5-inch hard drives. WD meets all specification requirements as defined by the industry-standard Small Form Factor (SFF) Committee (details of applicable documents provided).

On chassis which utilize the side mounting holes, there are no changes or differences to any of WD's current SATA hard drive products.

For those customers who are using the bottom mount holes, WD hard drives may support either standard hole locations or alternate hole locations, as defined by the SFF Committee.

Please ensure that both standard and alternate bottom mount hole locations are supported by your chassis or disk drive trays to ensure maximum flexibility with current and future WD SATA 3.5-inch hard drives.

*Note:* While this whitepaper only covers WD's SATA 3.5-inch hard drives, other brands and manufacturers are also adhering to the latest industry specifications, including support for alternate bottom mount hole locations. Having both standard and alternate hole locations supported will ensure maximum compatibility for your system

## 2 Applicable Documents

The governing document from the SFF committee for 3.5-inch screw mount is defined in SFF-8300. The detailed locations for OEM bottom mount holes, including the addition of alternative bottom mount locations, are defined in SFF-8301 rev 1.6.

*Note:* The tap specification requirements were omitted from this rev level; the tap dimensions are therefore grandfathered from SFF-8301 rev 1.4, which is embedded in SFF-8300 rev 1.2.

## 3 Background

Over the years, the number of disks within the hard drive casting has increased. With hard drive designs of 3 disks or less, there were minimal vertical space challenges, which allowed maximized screw penetration. As 4- and greater-disk platforms were being designed, the vertical spacing was challenged which in some instances forced minimization of the amount of bottom hole penetration while still staying within the industry standard requirements. To help

avoid any additional changes in the future, WD has moved newer designs to the "alternate" screw location for bottom mounts. Your design or adoption of bottom mount carriers to accept either set of screw locations provides WD with the maximum flexibility to provide high-capacity and high-efficiency hard drive designs moving forward. This document describes the different mounting conditions of present and future WD hard drives.

Described in this document are the details of the following four different mounting conditions. See section 4.2, Tapped depth, fastener penetration, and thread engagement for detail.

- Current 1 to 3-disk SATA products. These provide the deepest bottom hole screw depth penetration.
- Current 4-disk SATA products. These reduce the screw depth penetration capability while still meeting the SFF standard.
- Current 5-and greater disk SATA products. These further reduce the screw depth penetration capability while also still meeting the SFF standard.
- Future alternate locations are being planned for some products.
  - While still meeting the SFF industry standard requirements, please be aware that anyone using bottom mount hole locations must prepare to accommodate both current bottom hole locations as well as the alternate locations.

## 4 Details

### 4.1 Screw positions

Source: SFF Committee, SFF-8301 Specification for Form Factor of 3.5" Disk Drives Rev 1.6 March 16, 2010

"The pair of bottom mounting holes located by dimension A7 is required. One additional pair of bottom mounting holes are required, either the pair of mounting holes located by dimension A6 or the pair of mounting holes located by dimension A13. Providing all three pairs of mounting holes (located by dimensions A7, A6 and A13) is allowed."

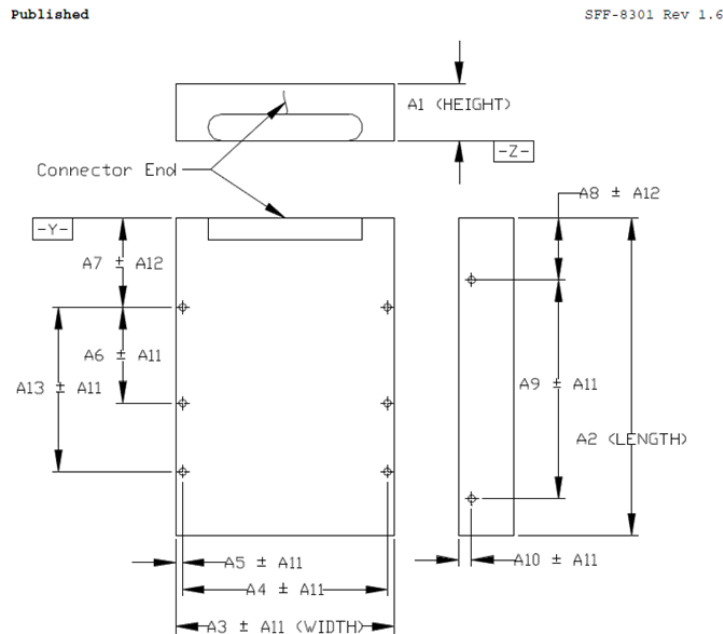


TABLE 4-1 3.5" DISK DRIVE DIMENSIONS

Dimension	Millimeters	Inches
A 1	17.80 *	0.700 *
A 1	26.10 *	1.028 *
A 1	42.00 *	1.654 *
A 2	147.00 *	5.787 *
A 3	101.60	4.000
A 4	95.25	3.750
A 5	3.18	0.125
A 6	44.45	1.750
A 7	41.28	1.625
A 8	28.50	1.122
A 9	101.60	4.000
A10	6.35	0.250
A11	0.25	0.010
A12	0.50	0.020
A 13	76.20	3.000

\* = maximum

Figure 1. Bottom mount OEM holes, SFF requirements for alternate screw locations

#### 4.1.1 Alternate screw locations

Shown in Figure 2 are the legacy bottom hole mounting locations for many currently-shipping WD products. Shown in Figure 3 are alternate bottom hole mounting locations already appearing in high capacity WD hard disk drives.

For future mounting designs utilizing bottom holes, please ensure your sled design accommodates both future and current hole locations.

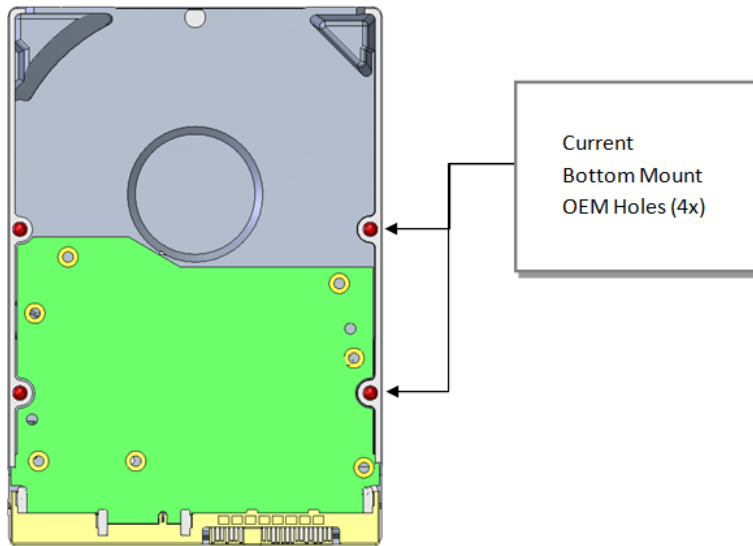


Figure 2. Bottom mount OEM holes, current locations

(Alternate High Capacity drive mount hold locations)

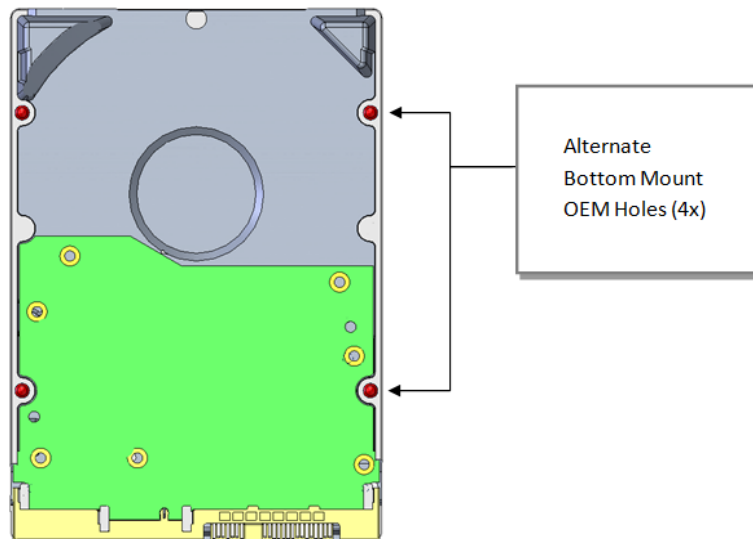


Figure 3. Bottom mount OEM holes, alternate locations

## 4.2 Tapped depth, fastener penetration, and thread engagement

Per SFF-8300 rev 1.2, all mounting holes must be tapped per 6-32UNC-2B, with depths and penetrations listed in Table 1 below in comparison to various WD products.

**Table 1. Minimum thread depth and max fastener penetration for different WD products**

		SFF-8300 rev 1.2 Figure 5-1		(1 to 3-disk)		(4-disk)		(5-disk)		(>5-disk)	
		Side	Bottom	Side	Bottom	Side	Bottom	Side	Bottom	Side	Bottom
Min Thread Depth Dim "A"	threads	3	3	3.8	8	3.8	3.8	3.8	3.8	3.8	4.8
	mm	2.38	2.38	3	6.35	3	3	3	3	3	3.8
Max Fastener Penetration Dim "B"	threads	3.8	3.8	8	8	8	6.3	8	3.8	7.7	4.8
	mm	3.02	3.02	6.35	6.35	6.35	5	6.35	3.02	6.1	3.8

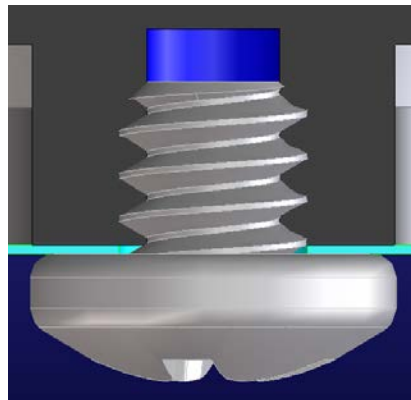
Industry form factor does not specify the minimum required thread engagement, but recommended screw lengths are included in Table 2 below.

*Note:* Using the screw length guidance in Table 2 based on sheet metal thickness, these screw options will work for all 3-, 4-, and 5-disk applications as well as future alternate locations.

**Table 2. Recommended screw lengths for 6-32UNC mounting screws for given sheet metal thicknesses**

Sheet Metal Thickness		Screw length	Engagement (in threads)
inches	mm	inches	
.006" to .038"	0.16 to 0.95	1/8"	2.8 to 3.8
.038" to .069"	0.95 to 1.75	** 5/32"	2.8 to 3.8
.069" to .100"	1.75 to 2.54	3/16"	2.8 to 3.8
.100" to .131"	2.54 to 3.33	** 7/32"	2.8 to 3.8
.131" to .163"	3.33 to 4.13	1/4"	2.8 to 3.8

\*\* Denotes less common screw lengths



**Figure 4. Bottom mount OEM hole, 6-32UNC X 1/8" (3.8 threads engagement)**

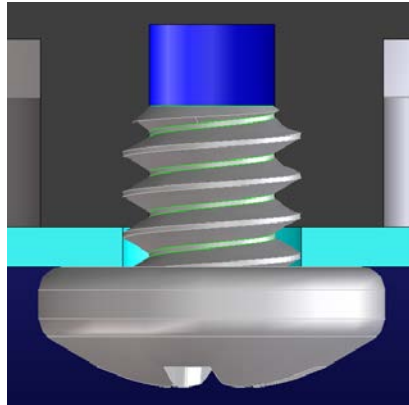


Figure 5. Bottom mount OEM hole, 6-32UNC X 1/8" (2.8 threads engagement)

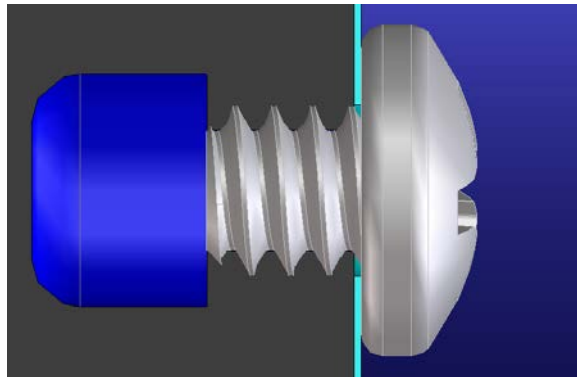


Figure 6. Side mount OEM hole, 6-32UNC x 1/8" (3.8 threads engagement)

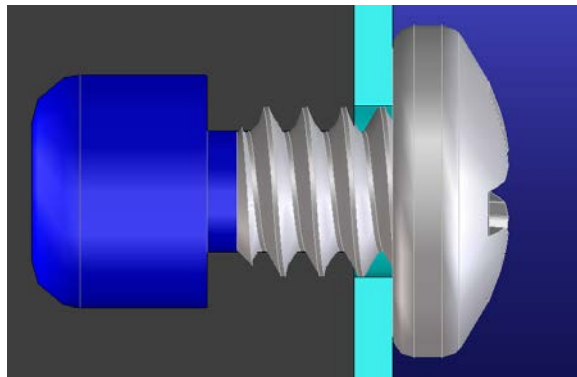


Figure 7. Option 2 – Side mount OEM hole, 6-32UNC X 1/8" (2.8 threads engagement)

## Appendix A

For further information on the 3.5-inch form factor, go to <http://www.sffcommittee.org>.

## Acknowledgments

Significant contributions to this paper were made by the following people:

May Kung  
Dan Reno  
Yu-Min Lee  
Michael Liebman  
Shahriar Tafreshi  
Don Shields

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2579-771970-A02 July 2016