

MN SERIES (Helium-sealed design) NAS HDD

Toshiba's MN series of 3.5-inch^[1] 7200 rpm Helium-sealed hard disk drives (HDD) deliver up to 16 TB^[2] of storage capacity, making it suitable for NAS applications that value high-capacity and optimal power efficiency. To address NAS-class requirements, the MN series provide an up to 1 200 000 hour MTTF^[3], 180 TB/year workload^[4] rating and support 24/7 power-on operation. The MN series also feature vibration compensation technology to help deliver consistent performance in up to 8 drive bay storage enclosures.



Product image may represent a design model.

KEY FEATURES

- 16 TB Capacity (14 and 12TB model also available)
- 7200 rpm Performance
- SATA 6.0 Gbit/s Interface^{[5][6]}
- 180 total TB Transferred per Year Workload Rating
- Rotational Vibration (RV) Sensors for Great Scalability and Good Performance
- 24/7 operation

APPLICATIONS

- Branch-office / Remote-office Networked File Storage
- File and Object storage solutions
- Archiving and data back-up
- Consumer NAS file storage
- Private cloud storage

SPECIFICATIONS

Item		MN08ACA16T	MN07ACA14T	MN07ACA12T
Interface		SATA-3.3		
Formatted Capacity		16 TB	14 TB	12 TB
Performance	Interface Speed	6.0 Gbit/s, 3.0 Gbit/s, 1.5 Gbit/s		
	Rotation Speed	7200 rpm		
	Buffer Size	512 MiB ^[6]	256 MiB	
	Max Data Transfer Speed (Sustained) (Typ.)	262 MiB/s	248 MiB/s	242 MiB/s
Logical Data Block Length		HOST: 512 B, DISK: 4096 B ^[7]		
Supply Voltage	Allowable Voltage	12 V ^[8] ± 10 % 5 V ^[8] +10% -7% ^[9]	12 V ^[8] ± 10 % 5 V ^[8] ± 5% ^[9]	
Power Consumption	Operating ^[10] (Typ.)	6.91 W	6.77 W	6.49 W
	Active Idle (Typ.)	4.03 W	4.54 W	4.28 W
Acoustics ^[11] (Sound Power)	Active Idle (Typ.)	20 dB		
	Seek (Typ.)	32 dB	35 dB	

ENVIRONMENTAL LIMITS

Item		MN08ACA16T	MN07ACA14T MN07ACA12T
Temperature	Operating (surface)	0 °C to 65 °C (No condensation)	5 °C to 60 °C (No condensation)
	Non-Operating (ambient)	- 40 °C to 70 °C ^[15] (No condensation)	- 40 °C to 70 °C ^[15] (No condensation)
	Storage condition & Period	0 °C to 70 °C (No condensation) 6 months within shipping package	
Humidity	Operating	5 % to 90 % R.H. (No condensation)	
	Non-Operating	5 % to 95 % R.H. (No condensation)	
Shock	Operating	686 m/s ² { 70 G } (2 ms duration)	
	Non-Operating	2450 m/s ² { 250 G } (2 ms duration)	
Vibration ^[12]	Operating ^[13]	7.35 m/s ² { 0.75 G } (5 to 300 Hz) 2.45 m/s ² { 0.25 G } (300 to 500 Hz)	
	Non-Operating ^[14]	29.4 m/s ² { 3.0 G } (5 to 500 Hz)	
Altitude	Operating	- 305 m to 3048 m (No condensation) (5 °C to 55 °C ambient)	
	Non-Operating	- 305 m to 12 192 m ^[15] (No condensation)	

RELIABILITY

Item	MN08ACA16T	MN07ACA14T MN07ACA12T
MTTF	1 200 000 h	1 000 000 h
Non-recoverable Error Rate	1 error per 10 ¹⁴ bits read	
Load / Unload	300 000 times	
Availability	24 hours/day, 7 days/week	
Rated Annual Workload (Total TB Transferred per Year, R/W)	180 TB/year	

[1] "3.5-inch" mean the form factor of HDDs. They do not indicate drive's physical size.

[2] Definition of capacity: Toshiba defines a terabyte (TB) as 1 000 000 000 000 bytes. A computer operating system, however, reports storage capacity using powers of 2 for the definition of 1TB = 2⁴⁰ = 1 099 511 627 776 bytes and therefore shows less storage capacity. Available storage capacity (including examples of various media files) will vary based on file size, formatting, settings, software and operating system, such as Microsoft Operating System and/or pre-installed software applications, or media content. Actual formatted capacity may vary.

[3] MTTF (Mean Time to Failure) is not a guarantee or estimate of product life; it is a statistical value related to mean failure rates for a large number of products which may not accurately reflect actual operation. Actual operating life of the product may be different from the MTTF.

[4] Workload is defined as the amount of data written, read or verified by commands from host system.

[5] Read and write speed may vary depending on the host device, read and write conditions, and file size.

[6] A mebibyte (MiB) means 2²⁰, or 1 048 576 bytes, and a gibibyte (GiB) means 2³⁰, or 1 073 741 824 bytes.

[7] Read-modify-write is supported.

[8] Input voltages are specified at the HDD connector side, during HDD ready state.

[9] Make sure the value is not less than -0.3V DC (less than -0.6V, 0.1ms) when turning on or off the power.

[10] Operating watt is measured using 80% random read/write and 20% performance idle.

[11] The measuring method is based on ISO 7779.

[12] Vibration applied to the HDD is measured at near the mounting screw hole on the frame as much as possible.

[13] At random seek write/read and default on retry setting with log sweep vibration.

[14] At power-off state after installation.

[15] The range of altitude is 3048 m or less.

Up to 55 °C at 7620 m. Up to 40 °C at 12 192 m.

MARKING

1) WEEE

Following information is only for EU-member states:

The use of the symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.



2) Names and Contents of Hazardous Substances or Elements in Products

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
HDD (硬盘驱动器)	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。
○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。



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SAFETY / EMI STANDARDS

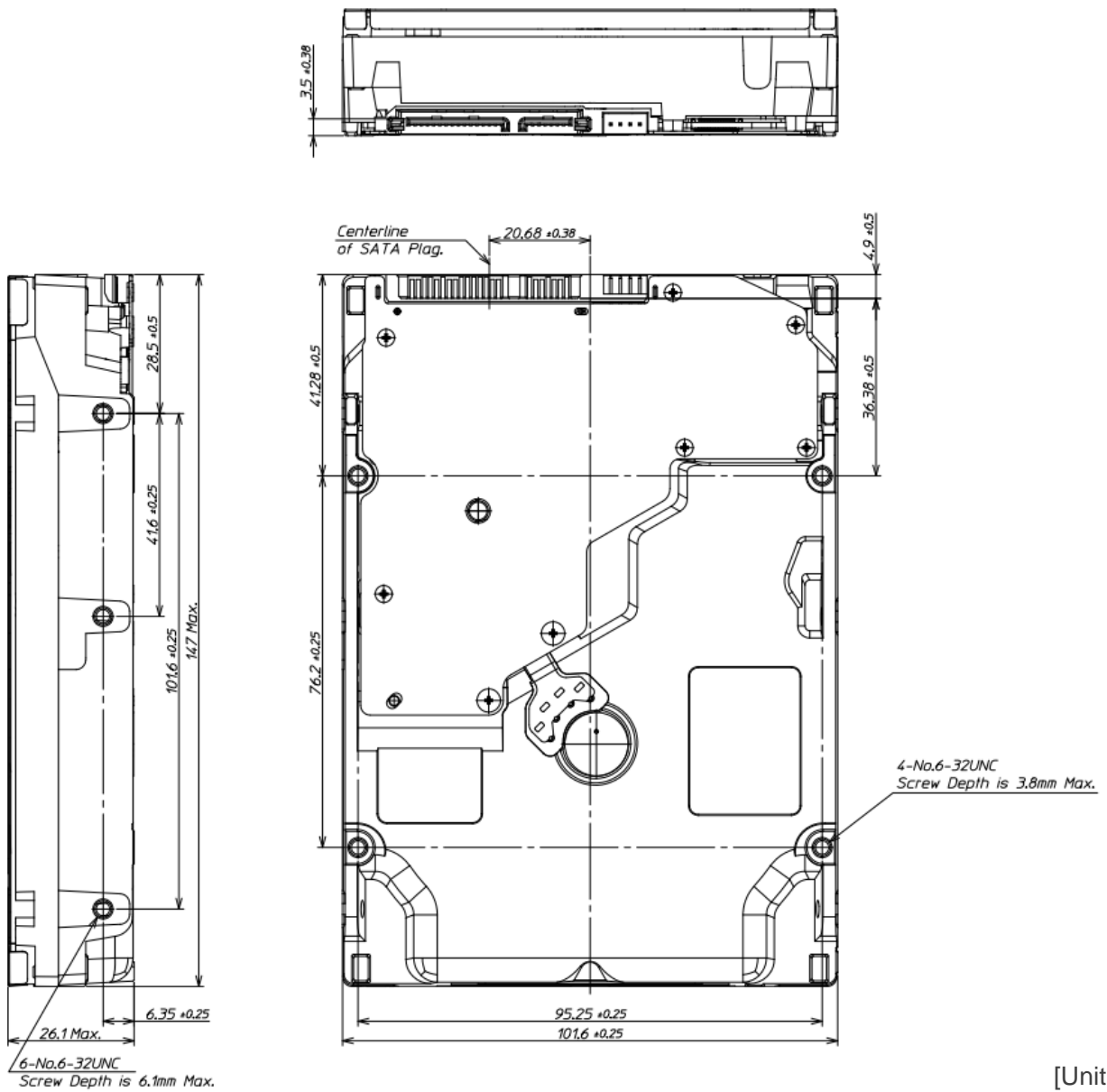
Title	Region
UL (Underwriters Laboratories)	USA
CSA (Canadian Standard Association)	Canada
TÜV (Technischer Überwachungs Verein)	Germany
BSMI (Bureau of Standards, Metrology and Inspection)	Taiwan
MSIP (Ministry of Science, ICT & Future Planning)	Korea
ACMA (Australian Communications and Media Authority)	Australia

(Note) Marks of KC

Made in Japan	 <ul style="list-style-type: none"> 1. 기기의 명칭(모델명) : MN08ACA16T 2. 인증번호 : R-R-T48-MG08ACA16TE 3. 인증받은 자의 상호 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION 4. 제조년월일 : 2018-12 5. 제조자 / 제조국가 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 일본  <ul style="list-style-type: none"> 1. 기기의 명칭(모델명) : MN07ACA14T / MN07ACA12T 2. 인증번호 : MSIP-REM-T48-MG07ACA14TE 3. 인증받은 자의 상호 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION 4. 제조년월일 : 2017-09 5. 제조자 / 제조국가 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 일본
Made in Philippines	 <ul style="list-style-type: none"> 1. 기기의 명칭(모델명) : MN08ACA16T 2. 인증번호 : R-R-T48-MG08ACA16TE 3. 인증받은 자의 상호 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION 4. 제조년월일 : 2018-12 5. 제조자 / 제조국가 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 필리핀  <ul style="list-style-type: none"> 1. 기기의 명칭(모델명) : MN07ACA14T/ MN07ACA12T 2. 인증번호 : MSIP-REM-T48-MG07ACA14TE 3. 인증받은 자의 상호 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION 4. 제조년월일 : 2017-09 5. 제조자 / 제조국가 : TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 필리핀

MECHANICAL SPECIFICATIONS

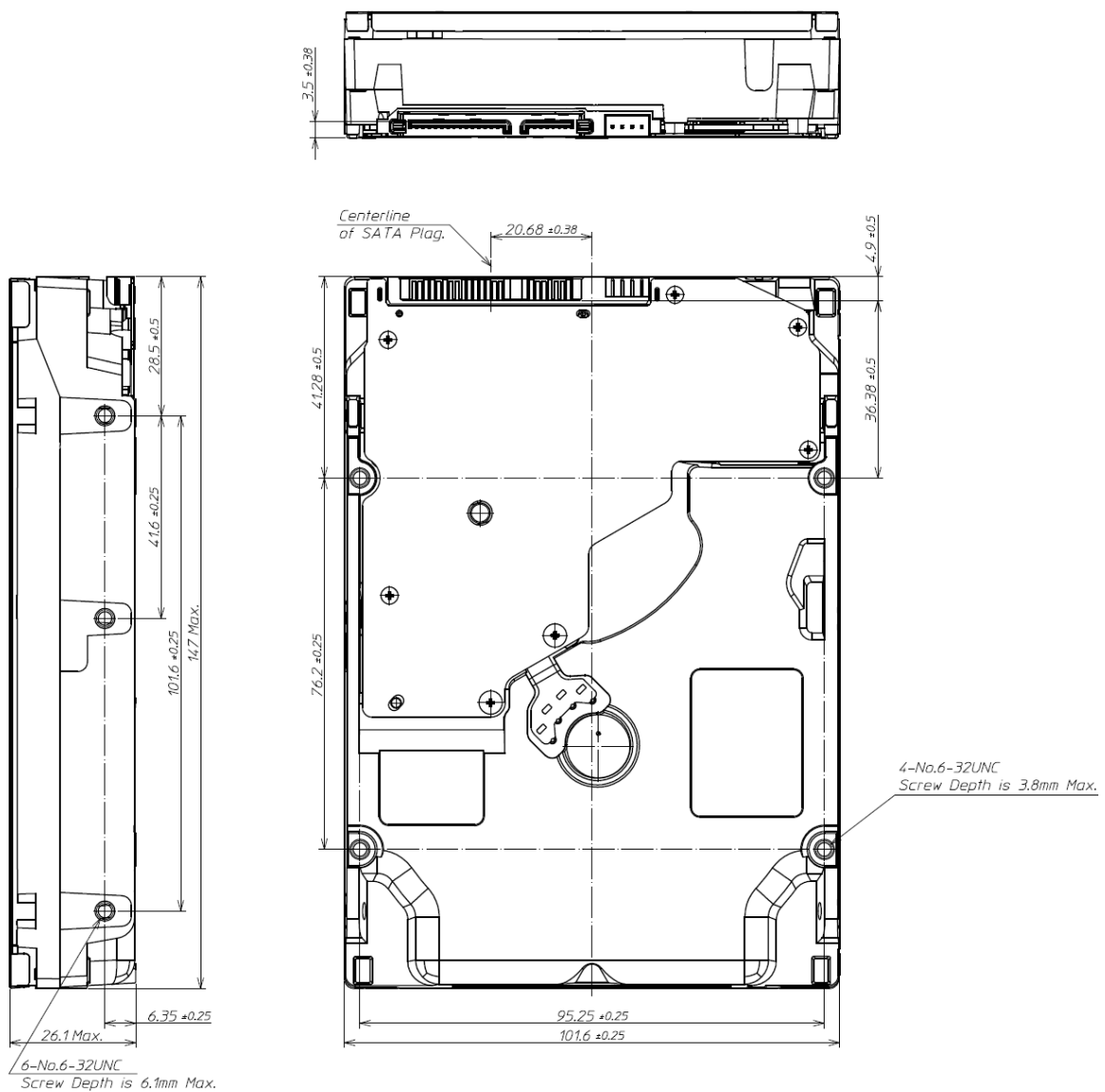
Item	MN08ACA16T
Width	101.85 mm Max
Height	26.1 mm Max
Length	147.0 mm Max
Weight	720 g Max



[Unit: mm]
(Reference)

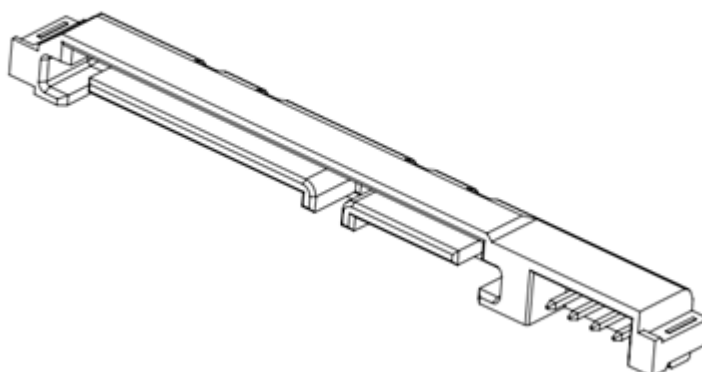
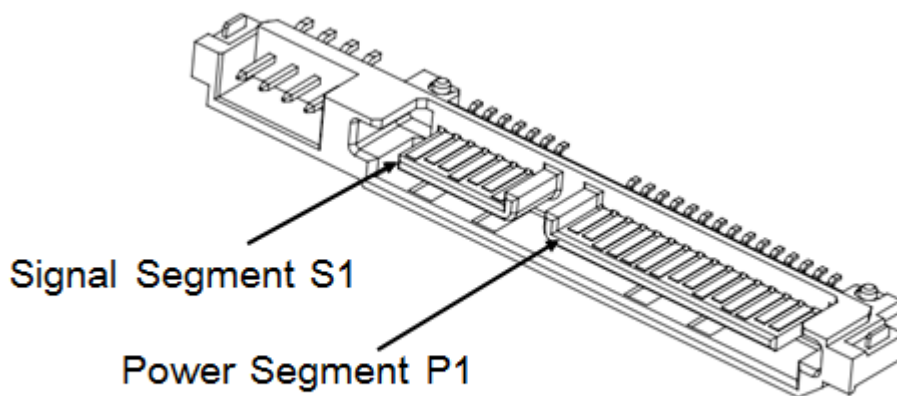
MECHANICAL SPECIFICATIONS

Item	MN07ACA14T MN07ACA12T	
	Width	101.85 mm Max
Height	26.1 mm Max	
Length	147.0 mm Max	
Weight	720 g Max	



[Unit: mm]
(Reference)

INTERFACE CONNECTOR



INTERFACE CONNECTOR (SATA plug) SIGNAL ALLOCATION

Segment	Pin No.	Pin Definition		
Signal Segment	S1	GND	2 nd Mate	
	S2	A+	Differential Pair A from PHY (Device Rx+)	
	S3	A-	Differential Pair A from PHY (Device Rx-)	
	S4	GND	2 nd Mate	
	S5	B-	Differential Pair B from PHY (Device Tx-)	
	S6	B+	Differential Pair B from PHY (Device Tx+)	
	S7	GND	2 nd Mate	
Power Segment	P1	-	(Unused)	
	P2	-	(Unused)	
	P3	-	(Unused)	
	P4	GND	1 st Mate	
	P5	GND	2 nd Mate	
	P6	GND	2 nd Mate	
	P7	V5	5 V Power Pre-Charge 2 nd Mate	
	P8	V5	5 V Power	
	P9	V5	5 V Power	
	P10	GND	2 nd Mate	
	P11	Spin	- Staggered Spin-up Mode Detect (Input)	
		ACT	- Activity LED Drive (Output)	
	P12	GND	1 st Mate	
	P13	V12	12 V Power Pre-Charge 2 nd Mate	
	P14	V12	12 V Power	
P15	V12	12 V Power		

Notice: This drive uses 5 V and 12 V power. 3.3 V power is not used.

HDA (Head Disk Assembly) and DC ground (ground pins on interface) are connected electrically each other.

COMMAND TABLE (Part 1)

Op-Code	Command Name
E5h / 98h	CHECK POWER MODE
92h	DOWNLOAD MICROCODE
93h	DOWNLOAD MICROCODE DMA
90h	EXECUTE DIAGNOSTICS
E7h	FLUSH CACHE
EAh	FLUSH CACHE EXT
ECh	IDENTIFY DEVICE
E3h / 97h	IDLE
E1h / 95h	IDLE IMMEDIATE
91h	INITIALIZE DEVICE PARAMETERS
00h	NOP
E4h	READ BUFFER
C8h	READ DMA
25h	READ DMA EXT
60h	READ FPDMA QUEUED
2Fh	READ LOG EXT
47h	READ LOG DMA EXT
C4h	READ MULTIPLE
29h	READ MULTIPLE EXT
F8h	READ NATIVE MAX ADDRESS
27h	READ NATIVE MAX ADDRESS EXT
20h	READ SECTOR(S)
24h	READ SECTOR(S) EXT
40h	READ VERIFY SECTOR(S)
42h	READ VERIFY SECTOR(S) EXT

COMMAND TABLE (Part 2)

Op-Code	Command Name
1xh	RECALIBRATE
0Bh	REQUEST SENSE DATA EXT
B4h	SANITIZE DEVICE
F1h	SECURITY SET PASSWORD
F2h	SECURITY UNLOCK
F3h	SECURITY ERASE PREPARE
F4h	SECURITY ERASE UNIT
F5h	SECURITY FREEZE LOCK
F6h	SECURITY DISABLE PASSWORD
70h – 76h, 79h – 7Fh	SEEK
77h	SET DATE & TIME EXT
EFh	SET FEATURES
F9h	SET MAX
37h	SET MAX ADDRESS EXT
C6h	SET MULTIPLE MODE
E6h / 99h	SLEEP
B0h	SMART Function Set
E2h / 96h	STANDBY
E0h / 94h	STANDBY IMMEDIATE
E8h	WRITE BUFFER
CAh	WRITE DMA
35h	WRITE DMA EXT
3Dh	WRITE DMA FUA EXT
61h	WRITE FPDMA QUEUED
3Fh	WRITE LOG EXT
57h	WRITE LOG DMA EXT
C5h	WRITE MULTIPLE
39h	WRITE MULTIPLE EXT
CEh	WRITE MULTIPLE FUA EXT
30h	WRITE SECTOR(S)
34h	WRITE SECTOR(S) EXT
45h	WRITE UNCORRECTABLE EXT
3Ch	WRITE VERIFY

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