TOSHIBA

MN09 SERIES

NAS HDD

Toshiba MN09 series of 3.5-inch [1] 7200 rpm hard disk drives (HDD) deliver up to 18 TB [2] of storage capacity, making it higher storage capacities as work-from-home customers need fast access to data and the ability to archive and share data in private cloud environments.

The new 18 TB NAS offering is a 9-platter helium-sealed conventional magnetic recording (CMR) drive, which leverages Toshiba's new innovative Flux Control Microwave-Assisted Magnetic Recording (FC-MAMR) technology. FC-MAMR advances CMR capacity to 18 TB and delivers increased density per platter over previous designs. The MN09 is the 3rd generation to use Toshiba's pioneering 9-platter helium-sealed mechanical design.

Product image may represent a design model.

KEY FEATURES

- Up to 18 TB Capacity
- 7200 rpm Performance
- SATA 6.0 Gbit/s [3] Interface
- MTTF / MTBF [16] of 1 200 000 hours
- 180 total TB Transferred per Year Workload Rating [17]
- Rotational Vibration (RV) Sensors for Great Scalability and Good Performance
- 24/7 operation

APPLICATIONS

- Home and SOHO NAS
- Small business server and storage
- Archiving and data back-up
- Private cloud storage

SPECIFICATION

Item		MN09ACA18T	MN09ACA16T	MN09ACA14T	MN09ACA12T
Interface		SATA-3.3			
Formatted Capacity [2]		18 TB	16 TB	14TB	12 TB
Performance	Interface Speed [3]	6.0 Gbit/s, 3.0 Gbit/s, 1.5 Gbit/s			
	Rotation Speed	7200 rpm			
	Buffer Size [4]	512 MiB			
	Maximum Sustained Data Transfer Speed [6] (Typ.)	268 MiB/s			
Logical Data Block Length [6]		HOST 512 B, DISK 4096 B			
Supply Voltage	Allowable Voltage	12 V [7] ±10 % / 5 V [7] +10 % / -7 % [8]			
Power Consumption	Random R/W [9](Typ.)	7.48 W		7.38 W	6.85 W
	Active Idle (Typ.)	4.14 W		3.77 W	3.30 W
Acoustics [11] (Sound Power)	Active Idle (Typ.)	20 dB			
	Seek (Typ.)	32 dB			

ENVIRONMENTAL LIMITS

Item		Specification
Enclosure surface temperature	Operating	5 °C to 60 °C (No condensation)
Ambient temperature	Non-Operating [11]	-40 °C to 70 °C (No condensation)
Relative Humidity	Operating	5 % to 90 % R.H. (No condensation)
	Non-Operating [11]	5 % to 95 % R.H. (No condensation)
Altitude	Operating	-305 m to 3048 m
	Non-Operating [14]	-305 m to 12 192 m
Shock [12]	Operating	686 m/s^2 { 70 G } (2 ms duration)
	Non-Operating	2450 m/s^2 { 250 G } (2 ms duration)
Vibration [12][13]	Operating	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 [15]	29.4 m/s^2 { 3.0 G } (5 to 500 Hz)

RELIABILITY

Item	Specification
MTTF / MTBF (AFR) [16]	1 200 000 hours (0.73 %)
Non-recoverable Error Rate	1 per 10^{14} bits read
Load / Unload	300 000 times
Availability	24 hours/day, 7 days/week
Rated Annual Workload [17]	180 TB per 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 = 2^{40} = 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] Read and write speed may vary depending on the host device, read and write conditions, and file size.
[4] A mebibyte (MiB) means 2^{20}, or 1 048 576 bytes.
[5] The maximum sustained data rate and interface speed may be restricted to the response speed of host system and by transmission characteristics. 1 Gbit/s = 1 000 000 000 bits/s. 1 MiB/s = 1 048 576 bytes/s
[6] Read–modify-write is supported.
[7] Input voltages are specified at the HDD connector side, during HDD ready state.
[8] Make sure the value is not less than -0.3 V DC (less than -0.6 V, 0.1 ms) when turning on or off the power.
[9] Operating watt is measured using 80 % random read / write and 20% performance idle.
[10] The measuring method is based on ISO 7779.
[11] Non-operating condition (except storage condition) assumes short term transportation.
[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] The range of altitude is 3048 m or less. Up to 55 °C at 7620 m. Up to 40 °C at 12 192 m.
[15] At power-off state after installation
[16] MTTF / MTBF (Mean Time to Failure / Mean Time Between Failures) of the HDDs during its life time is 1 200 000 hours and AFR (Annualized Failure Rate) is 1.46 %. (POH: 8760 hours per one year (24 hours per one day, 7 days per one week). Average HDA surface temperature: 40 °C or less, workloads: 180 TB per one year, which is defined as the amount of data written, read or verified by commands from host system). Continual or sustained operation at case HDA surface temperature above 40 °C may degrade product reliability.
[17] Workload is defined as the amount of data written, read or verified by commands from host system.

MODEL NUMBER

Model Number	Interface	Capacity	Sector Format	Optional Security
MN09ACA18T	SATA-3.3	18 TB	512e	-
MN09ACA16T	SATA-3.3	16 TB	512e	-
MN09ACA14T	SATA-3.3	14 TB	512e	-
MN09ACA12T	SATA-3.3	12 TB	512e	-

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。

中华人民共和国环保使用期限

SAFETY / EMI STANDARDS

Item
UL (Underwriters Laboratories)
CSA (Canadian Standard Association)
TÜV (Technischer Überwachungs Verein)
BSMI (Bureau of Standards, Metrology and Inspection)
KC (Korea Certification)
RCM (Regulatory Compliance Mark)

(Note) KC Mark		
Made in Japan		1. 기기의 명칭(모델명): MN09ACA18T/16T/14T/12T 2. 인증번호: R-R-T48-MG09ACA18TE 3. 인증받은 자의 상호: TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION 4. 제조년월일: 2020-05 5. 제조자 / 제조국가: TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 일본
Made in Philippines		1. 기기의 명칭(모델명): MN09ACA18T/16T/14T/12T 2. 인증번호: R-R-T48-MG09ACA18TE 3. 인증받은 자의 상호: TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION 4. 제조년월일: 2020-05 5. 제조자 / 제조국가: TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 필리핀

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CE Marking

Category	Applied standard	Issued year	Comment
EMC 2014/30/EU	Emission: EN55032	2015	Class B (including domestic environment)
	Immunity: EN55035	2017	Product immunity standard for IT-equipment
RoHS 2011/65/EU	EN IEN63000	2018	Category 3

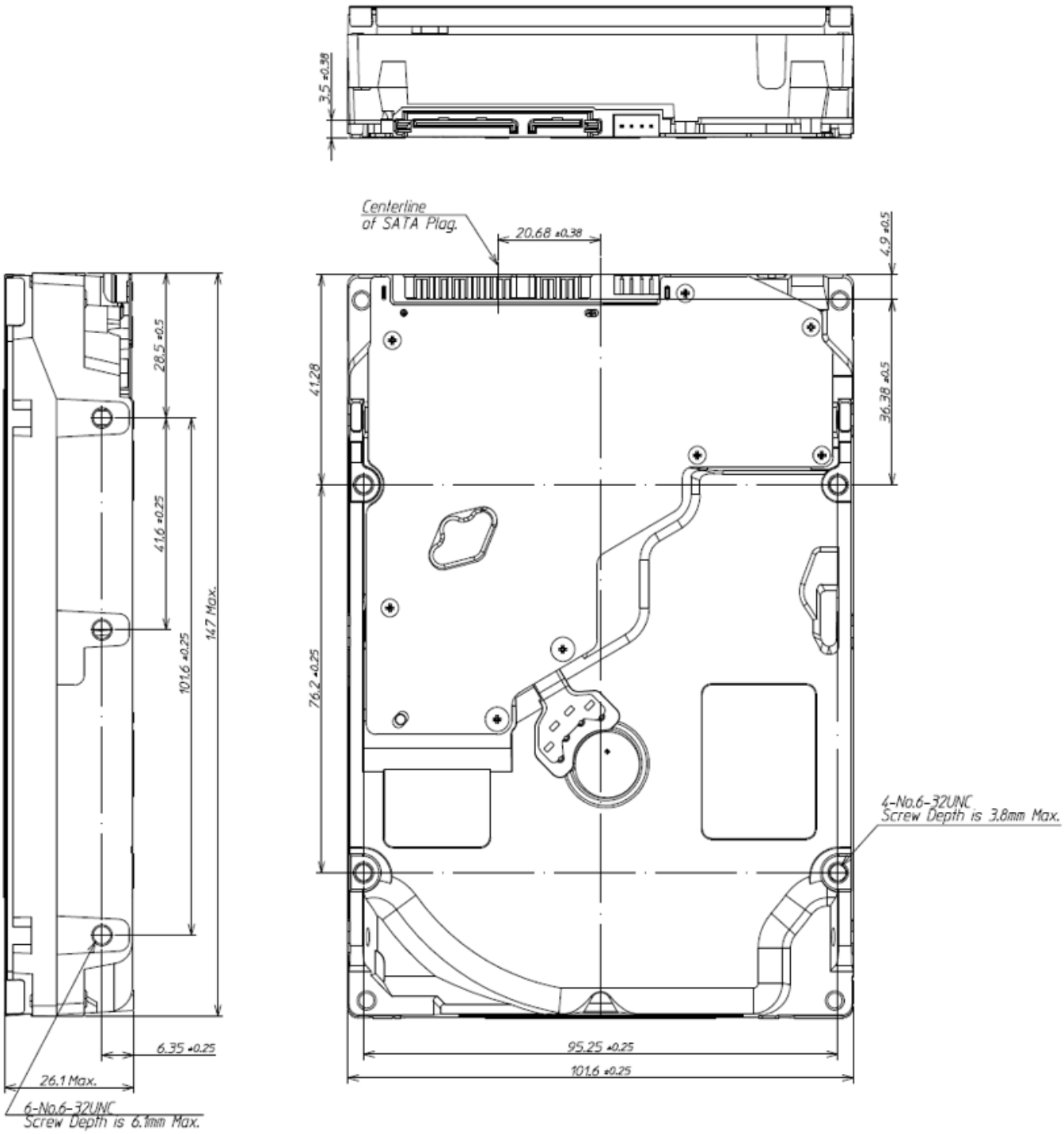
UKCA Marking

Category	Applied standard	Issued year	Comment
EMC	Emission: BS EN55032	2015	Class B (including domestic environment)
	Immunity: BS EN55035	2017	Product immunity standard for IT-equipment
RoHS	BS EN IEC63000	2018	Category 3

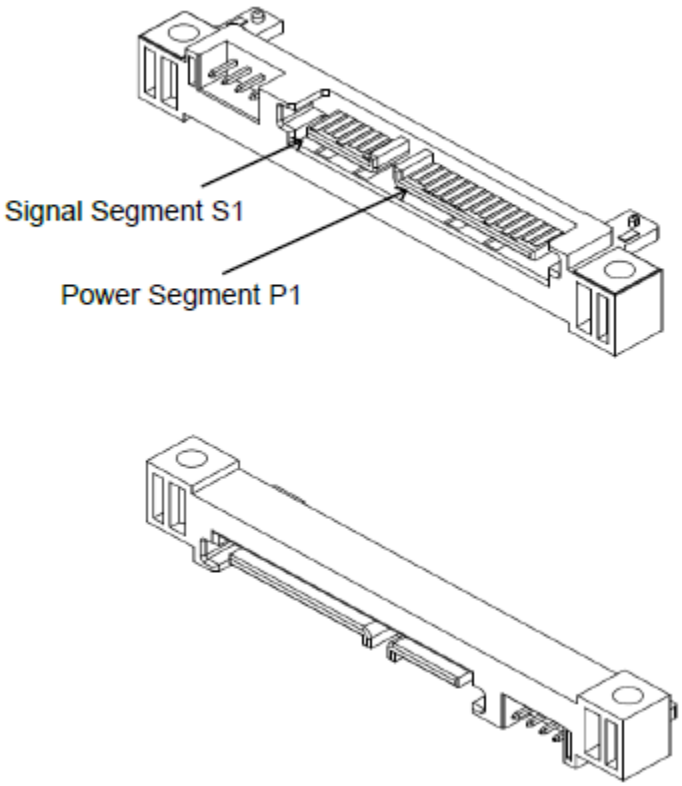
MECHANICAL SPECIFICATIONS

Item	MN09ACA18T	MN09ACA16T	MN09ACA14T	MN09ACA12T
Width (Max)	101.85 mm			
Height (Max)	26.1 mm			
Length (Max)	147.0 mm			
Weight (Max)	720 g		705 g	690 g

[Unit: mm]



INTERFACE CONNECTOR



SATA plug connector overview

INTERFACE CONNECTOR (SATA plug) SIGNAL ALLOCATION

Segment	Pin No.	Pin Definition	
Signal Segment	S1	GND	2nd Mate
	S2	A+	Differential Pair A from PHY (Device Rx+)
	S3	A-	Differential Pair A from PHY (Device Rx-)
	S4	GND	2nd Mate
	S5	B-	Differential Pair B from PHY (Device Tx-)
	S6	B+	Differential Pair B from PHY (Device Tx+)
	S7	GND	2nd Mate
Power Segment	P1	-	3.3V Power (Unused)
	P2	-	3.3V Power (Unused)
	P3	PWDIS	Enter/Exit Power Disable (Option)
	P4	GND	1st Mate
	P5	GND	2nd Mate
	P6	GND	2nd Mate
	P7	V5	5 V Power Pre-Charge 2nd Mate
	P8	V5	5 V Power
	P9	V5	5 V Power
	P10	GND	2nd Mate
	P11	Spin	Staggered Spin-up Mode Detect (Input)
		ACT	Activity LED Drive (Output)
	P12	GND	1st Mate
	P13	V12	12 V Power Pre-Charge 2nd 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.

SATA COMMAND TABLE (Part 1)

Op-Code	Command Name
E5h / 98h	CHECK POWER MODE
92h / 93h	DOWNLOAD MICROCODE (DMA)
90h	EXECUTE DIAGNOSTICS
E7h	FLUSH CACHE
EAh	FLUSH CACHE EXT
12h	GET PHYSICAL ELEMENT STATUS
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
47h	READ LOG DMA EXT
2Fh	READ LOG 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

SATA COMMAND TABLE (Part 2)

Op-Code	Command Name
10h	RECALIBRATE
7Ch	REMOVE ELEMENT AND TRUNCATE
0Bh	REQUEST SENSE DATA EXT
B4h	SANITIZE DEVICE
F6h	SECURITY DISABLE PASSWORD
F3h	SECURITY ERASE PREPARE
F4h	SECURITY ERASE UNIT
F5h	SECURITY FREEZE LOCK
F1h	SECURITY SET PASSWORD
F2h	SECURITY UNLOCK
70h	SEEK
77h	SET DATE & TIME EXT
EFh	SET FEATURES
F9h	SET MAX ADDRESS
37h	SET MAX ADDRESS EXT
C6h	SET MULTIPLE MODE
B2h	SET SECTOR CONFIGURATION EXT
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
57h	WRITE LOG DMA EXT
3Fh	WRITE LOG 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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