

# MG10 SATA SERIES

## CLOUD-SCALE CAPACITY HDD



Product image may represent a design model.

The MG10 Series provides 20 TB <sup>[1]</sup> of conventional magnetic recording (CMR) capacity. The industry-standard 3.5-inch <sup>[2]</sup> form-factor provides 7200 rpm performance, and integrates easily into cloud-scale storage infrastructure, business-critical servers and storage, and File and Object storage solutions.

Toshiba's leadership in precision industrial laser welding technology is put to use to permanently seal helium inside the 10-disk mechanics. The helium-sealed design reduces aerodynamic drag to significantly lower the drive's operational power profile, which helps deliver critical TCO benefits for data center infrastructures. The sealed design and corrosion resistant electronics also mitigate against life-time failure modes due to air borne pollutants and other environmental factors.

The massive 20 TB CMR capacity is delivered using Toshiba's innovative Flux Control Microwave Assisted Magnetic Recording (FC-MAMR) technology. These advances help the MG10 Series to achieve optimum storage capacity and application compatibility, with unsurpassed data reliability. Available the MG10 Series models a SATA 6.0 Gbit/s <sup>[3]</sup>, integrate easily into standard 3.5-inch drive bays to help reduce the footprint and operational burden of cloud-scale storage infrastructure, File and Object storage systems, and business critical servers and storage systems.

### KEY FEATURES

- 20 / 18 / 16 TB capacity
- Conventional Magnetic Recording (CMR) for broad compatibility
- Toshiba Flux Control Microwave-assisted Magnetic Recording (FC-MAMR) Technology
- Industry-leading 10-disk helium-sealed design for superior storage density
- Industry Standard 3.5-inch 26.1 mm height Form Factor
- 7200 rpm Performance
- Lower operational power profile, providing excellent power efficiency (W/TB) for better TCO
- 550 Total TB Transferred per Year Workload Rating <sup>[4]</sup>
- 512e or 4Kn Advanced Format Sector Technology; (512e Model) Includes Toshiba Persistent Write Cache Technology for Data-Loss Protection in Sudden Power-Loss Events
- Power efficiency improvements vs. prior MG Series generations

### APPLICATIONS

- Cloud-scale Server and Storage Infrastructure
- Software-defined data center infrastructure
- File- and Object-based storage infrastructure
- Tiered Storage Infrastructure Solutions
- Workloads and Use-Cases that Benefit from High Capacity per Spindle disk drives
- Capacity-Optimized Cloud-scale and Rack-Scale Storage Systems
- Compliance Data Archives and Data Life-Cycle Management Storage Systems
- Data Center Data-Protection and Data Back-up Infrastructure

## SPECIFICATION

Item		MG10ACA20T	MG10ACA18T	MG10ACA16T
Interface		SATA-3.3		
Formatted Capacity		20 TB	18 TB	16 TB
Performance	Interface Speed <sup>[3]</sup>	6.0 Gbit/s, 3.0 Gbit/s, 1.5 Gbit/s		
	Rotation Speed	7200 rpm		
	Buffer Size <sup>[6]</sup>	512 MiB		
	Maximum Sustained Data Transfer Speed <sup>[6]</sup> (Typ.)	268 MiB/s		
Logical Data Block Length	MG10ACAxxxA ( fixed length )	4096 B		
	MG10ACAxxxE <sup>[7]</sup> ( emulation )	HOST 512 B, DISK 4096 B		
Supply Voltage	Allowable Voltage	12 V <sup>[9]</sup> ±10 % / 5 V <sup>[9]</sup> +10 % / -7 % <sup>[10]</sup>		
Power Consumption	Random Write/Read ( 4KB Q1 ) (Typ.)	8.11 W	7.86 W	
	Active Idle (Typ.)	4.38 W	4.17 W	
Acoustics <sup>[11]</sup> (Sound Power)	Active Idle (Typ.)	20 dB		
	Seek (Type.)	32 dB		

## ENVIRONMENTAL LIMITS

Item		Specification
Ambient Temperature	Operating	5 °C to 55 °C ( No condensation )
	Non-Operating <sup>[11]</sup> <sup>[12]</sup>	-40 °C to 70 °C ( No condensation )
Enclosure surface temperature	Operating	5 °C to 60 °C ( No condensation )
Relative Humidity	Operating	5 % to 90 % R.H. ( No condensation )
	Non-Operating <sup>[11]</sup>	5 % to 95 % R.H. ( No condensation )
Altitude	Operating	-305 m to 3048 m
	Non-Operating <sup>[11]</sup> <sup>[12]</sup>	-305 m to 12 192 m
Shock <sup>[13]</sup>	Operating	490 m/s <sup>2</sup> { 50 G } ( 2 ms duration )
	Non-Operating	1960 m/s <sup>2</sup> { 200 G } ( 2 ms duration )
Vibration <sup>[13]</sup>	Operating <sup>[14]</sup>	7.35 m/s <sup>2</sup> { 0.75 G } ( 5 to 300 Hz ) 2.45 m/s <sup>2</sup> { 0.25 G } ( 300 to 500 Hz )
	Non-Operating <sup>[15]</sup>	29.4 m/s <sup>2</sup> { 3.0 G } ( 5 to 500 Hz )

## RELIABILITY

Item	Specification
MTTF / MTBF ( AFR ) <sup>[16]</sup>	2 500 000 hours ( 0.35 % )
Non-recoverable Error Rate	10 per 10 <sup>16</sup> bits read
Load / Unload	600 000 times
Availability	24 hours/day, 7 days/week
Rated Annual Workload	550 TB per year

[1] 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<sup>40</sup> = 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.

[2] "3.5-inch" mean the form factor of HDDs. They do not indicate drive's physical size.

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

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

[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] A mebibyte (MiB) means 2<sup>20</sup>, or 1 048 576 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 -0.3 V DC (less than -0.6 V, 0.1 ms) when turning on or off the power.

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

[11] Non-operating condition (except storage condition) assumes short term transportation.

[12] The range of altitude is 3048 m or less. Up to 55 °C at 7620 m. Up to 40 °C at 12 192 m.

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

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

[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 2 500 000 hours and AFR (Annualized Failure Rate) is 0.35 %. (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: 550 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.

## MODEL NUMBER


Model Number	Interface	Capacity	Sector Format	Optional Security
MG10ACA20TA	SATA-3.3	20 TB	4Kn	
MG10ACA18TA	SATA-3.3	18 TB	4Kn	
MG10ACA16TA	SATA-3.3	16 TB	4Kn	
MG10ACA20TE	SATA-3.3	20 TB	512e	
MG10ACA18TE	SATA-3.3	18 TB	512e	
MG10ACA16TE	SATA-3.3	16 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)	×	○	○	○	○	○
<p>本表格依据 SJ/T 11364 的规定编制。</p> <p>○：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。</p> <p>×：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。</p>						



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 ) (Note)
RCM ( Regulatory Compliance Mark )

(Note) KC Mark											
Made in Japan	 <table> <tr><td>1. 기기의 명칭(모델명):</td><td>MG10ACA20T/18T/16T A/E</td></tr> <tr><td>2. 인증번호:</td><td>R-R-T48-MG10ACA20TE</td></tr> <tr><td>3. 인증받은 자의 상호:</td><td>TOSHIBA ELECTRONIC DEVICES &amp; STORAGE CORPORATION</td></tr> <tr><td>4. 제조년월일:</td><td>2022-01</td></tr> <tr><td>5. 제조자 / 제조국가:</td><td>TOSHIBA ELECTRONIC DEVICES &amp; STORAGE CORPORATION / 일본</td></tr> </table>	1. 기기의 명칭(모델명):	MG10ACA20T/18T/16T A/E	2. 인증번호:	R-R-T48-MG10ACA20TE	3. 인증받은 자의 상호:	TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION	4. 제조년월일:	2022-01	5. 제조자 / 제조국가:	TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION / 일본
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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 IEC63000	2018	Category 3

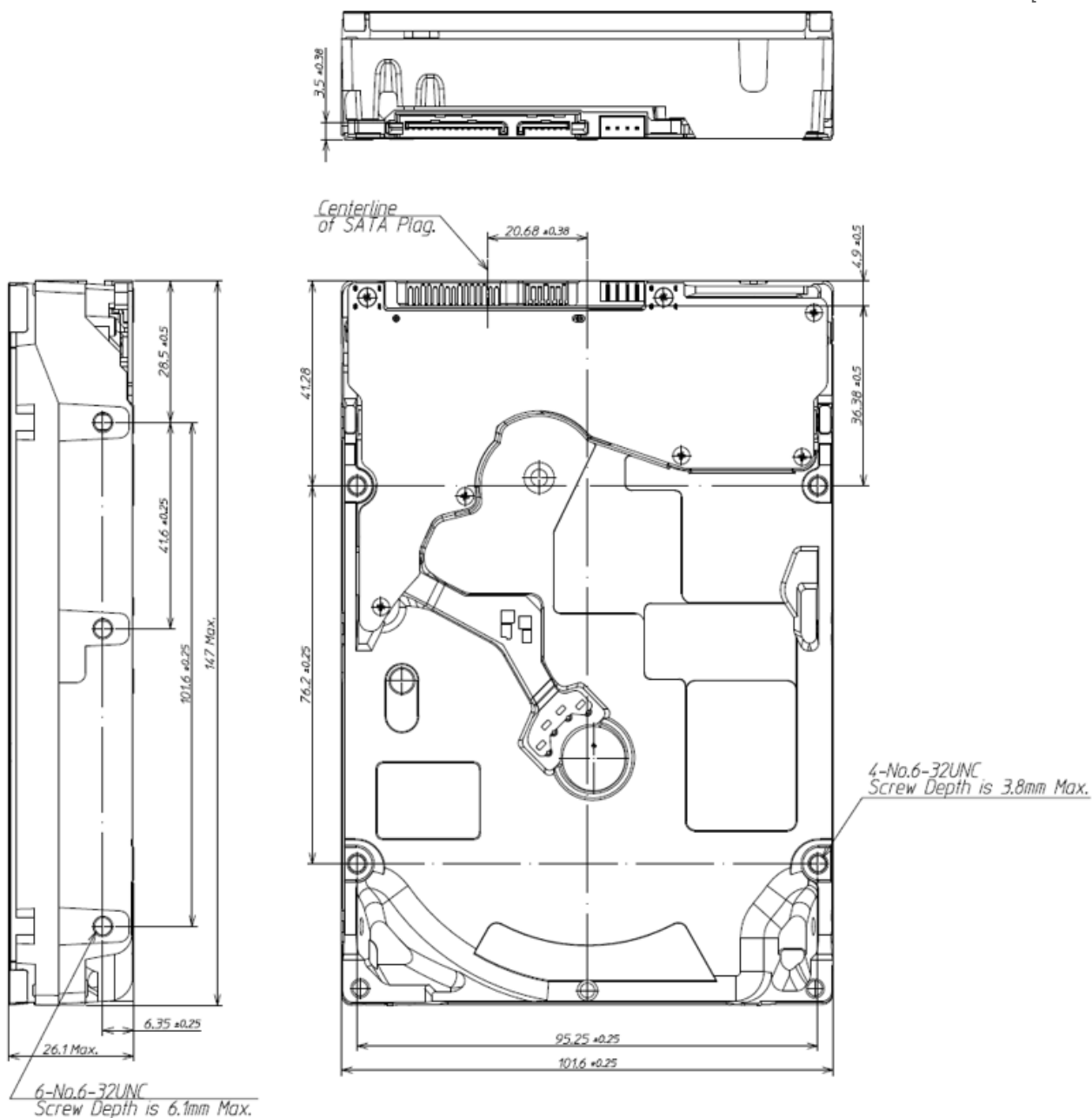
## UKCA Marking

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

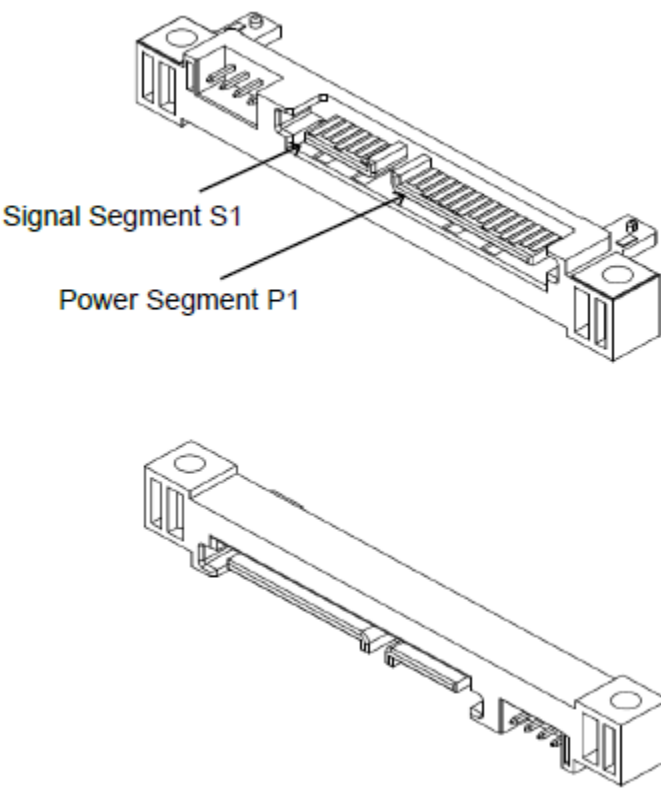
Item	MG10ACA20T	MG10ACA18T	MG10ACA16T
Width (Max)	101.85 mm		
Height (Max)	26.1 mm		
Length (Max)	147.0 mm		
Weight (Max)	720 g		

[Unit: mm]





INTERFACE CONNECTOR



SATA plug connector overview

## INTERFACE CONNECTOR (SATA plug) SIGNAL ALLOCATION

Segment	Pin No.	Pin Definition	
Signal Segment	S1	GND	2 <sup>nd</sup> Mate
	S2	A+	Differential Pair A from PHY (Device Rx+)
	S3	A-	Differential Pair A from PHY (Device Rx-)
	S4	GND	2 <sup>nd</sup> Mate
	S5	B-	Differential Pair B from PHY (Device Tx-)
	S6	B+	Differential Pair B from PHY (Device Tx+)
	S7	GND	2 <sup>nd</sup> Mate
Power Segment	P1	-	(Unused)
	P2	-	(Unused)
	P3	PWDIS	Enter/Exit Power Disable (Option)
	P4	GND	1 <sup>st</sup> Mate
	P5	GND	2 <sup>nd</sup> Mate
	P6	GND	2 <sup>nd</sup> Mate
	P7	V5	5 V Power Pre-Charge 2 <sup>nd</sup> Mate
	P8	V5	5 V Power
	P9	V5	5 V Power
	P10	GND	2 <sup>nd</sup> Mate
	P11	Spin	Staggered Spin-up Mode Detect (Input)
		ACT	Activity LED Drive (Output)
	P12	GND	1 <sup>st</sup> Mate
	P13	V12	12 V Power Pre-Charge 2 <sup>nd</sup> 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
78h	ACCESSIBLE MAX ADDRESS CONFIGURATION
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
2Fh	READ LOG EXT
47h	READ LOG DMA EXT
C4h	READ MULTIPLE
29h	READ MULTIPLE 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
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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