TOSHIBA

Lab Report

for Berghoch ”B16“

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Introduction

In modern surveillance systems – whether deployed in residential or commercial settings – customers demand uninterrupted, error-free operation around the clock. Achieving this level of reliability requires seamless integration between Network Video Recorders (NVRs) and Hard Disk Drives (HDDs), ensuring the integrity of stored video data. This data is increasingly utilized by AI technologies for pattern recognition and the analysis of suspicious activities.

Toshiba Electronics Europe GmbH conducted a comprehensive evaluation of its surveillance-optimized HDDs – specifically the MG Series, S300, and S300 Pro – within a real-world NVR setup. The objective was to assess thermal performance and operational stability under sustained surveillance workloads. For this purpose, the Berghoch B16, a 16-channel entry-level NVR with a single HDD bay, was selected as the test platform.

Methodology

To simulate a realistic surveillance environment, six PoE network cameras of several types were connected to a dedicated switch, isolating camera power consumption from the

Picture 1: Berghoch B16 NVR in the Toshiba HDD Lab

Picture 2–3: NVR + PoE switch setup

test measurements. The system recorded continuous video streams with frequent motion, representative of typical residential and small retail scenarios.

Key evaluation criteria included:

- Recording and playback/search functionality
- Total video retention
- Power consumption (idle and operational)
- HDD surface temperature

This setup ensured consistent and repeatable conditions for assessing HDD performance.

HDD Models Evaluated

To assess thermal behavior and operational compatibility within the Berghoch B16 NVR, we tested a range of Toshiba surveillance-optimized HDDs across three product families:

S300 Series (Entry-Level Surveillance HDDs):
Capacities: 2 TB, 4 TB, 6 TB

S300 Pro Series (High-Endurance Surveillance HDDs):
Capacities: 4 TB, 6 TB, 8 TB, 10 TB

MG Series (Enterprise-Class HDDs with Surveillance Support):
Capacities: 18 TB, 24 TB

This choice allowed us to compare performance across different capacity classes and endurance levels, ranging from entry-level to enterprise-grade solutions, under identical surveillance workloads.

Test Conditions and Measurement Settings

The test environment was designed to simulate a realistic surveillance workload while maintaining controlled laboratory conditions:

Camera Setup:

Six PoE (Power over Ethernet) network cameras were connected via a PoE switch, continuously recording full-motion video 24/7. This configuration mirrors common deployment scenarios in residential and small commercial environments.

Ambient Temperature:

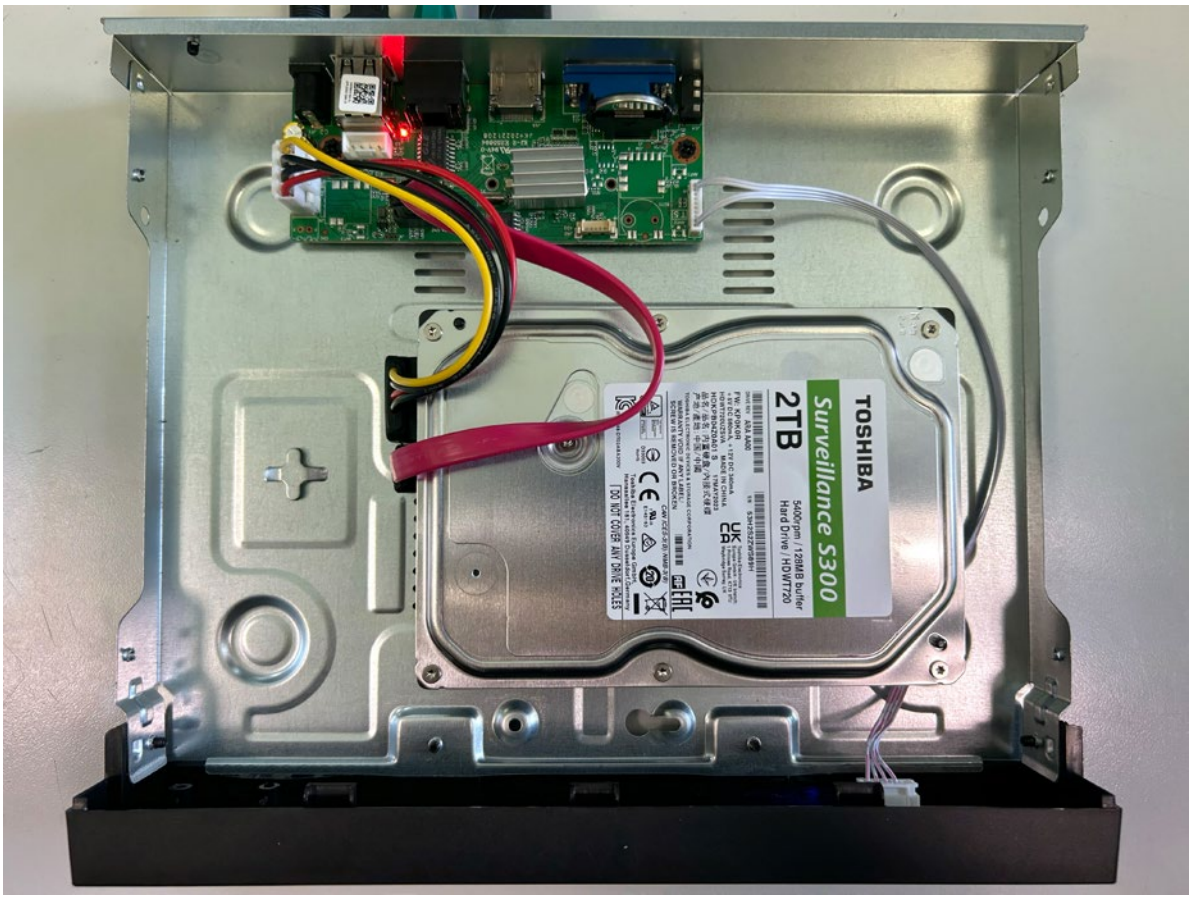
The laboratory ambient temperature was kept at 22-24 °C throughout the test period.

HDD Temperature Measurement:

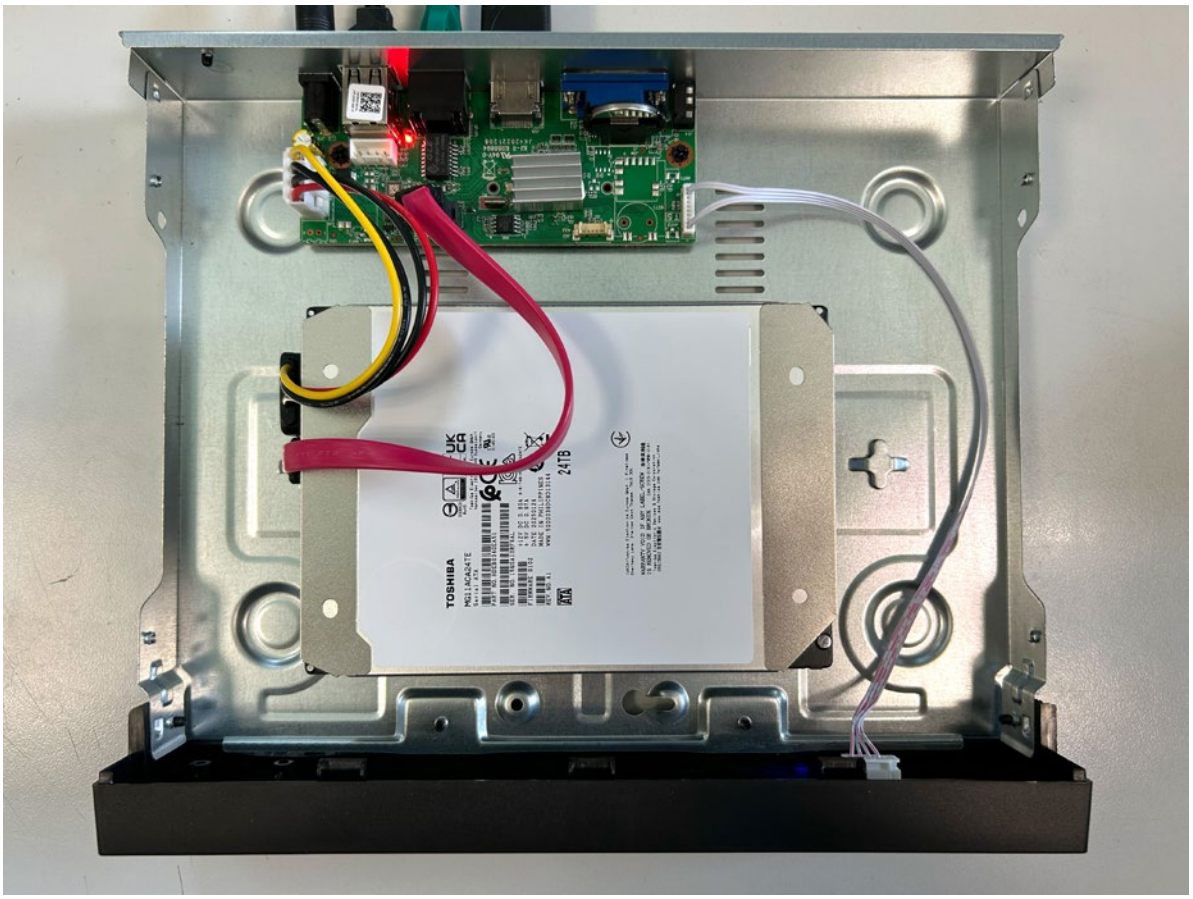
HDD surface temperature was measured using an infrared thermometer. For accuracy, we found a model-specific “golden spot” on each HDD chassis – typically the area with the most direct thermal coupling to the internal drive components.

Power Consumption Measurement:

Total power consumption of the NVR unit was measured using a Rohde & Schwarz HMC8015 high-precision power analyzer, ensuring reliable and repeatable readings.



Picture 4: NVR with S300 HDD



Picture 5: NVR with MG-Series HDD

Picture 6: Infrared thermometer in action

TEST RESULTS

Power and temperature

Manufacturer	Berghoch	S300	S300	S300	S300 pro	S300 pro	S300 pro	S300 pro	MG-Series	MG-Series
Model	B16	2TB	4TB	6TB	4TB	6TB	8TB	10TB	18 TB	24 TB
Version/Firmware	5.01.32	Air-SMR	Air-SMR	Air-SMR	Air-CMR	Air-CMR	Air-CMR	Air-CMR	Helium-CMR	Helium-CMR
Cameras	3	HDWT720	HDWT840	HDWT860	MD10ADA 400EV	MD10ADA 600V	MD10ADA 800V	MD10ADA 10TV	MG09ACA 18TE	MG11ACA 24TE
Idle (no camera)	(Watt)	3,5	4,5	5	6,8	7	9,7	8,8	7	10
Recording (6 cams)	(Watt)	5,6	6	6	8	8,6	10,5	10,5	8	10
HDD int. Temperature**	(degC)	37	38	38	40	46	48	50	42	47
Recording		ok	ok	ok	ok	ok	ok	ok	ok	ok
Playback/Search		ok	ok	ok	ok	ok	ok	ok	ok	ok
Retention(*)	(days)	9	(18)	(27)	(18)	(27)	(36)	(45)	(81)	(108)

Table 1: NVR measurement results

(*) Retention measured for 2TB and estimated for all other capacities.
** Green – recommended, Blue – requires proper setup/environment, Red – not recommended

For the HDD models tested, we can confirm the compatibility of the Berghoch B16 with all Toshiba S300, S300 PRO and MG-Series models.

Power Consumption

Idle Power:

Idle power consumption (standby of the NVR unit without any recording or playback) ranged from 3.5 W to 10 W, depending on the HDD model.

The S300 2TB had the lowest idle power at 3.5 W, while the S300 Pro 8TB/10TB and MG-Series drives reached up to 10.5 W.

Recording Power (6 cameras):

Under full recording load, power consumption increased across all models.

The S300 2TB/4TB/6TB models remained efficient, consuming 5.6–6 W.

The S300 Pro 4TB–10TB and MG-Series drives peaked at 10-10.5 W, reflecting their higher performance and capacity.

HDD Internal Temperature

Internal temperatures ranged from 37 °C to 50 °C:

S300 Series drives stayed cooler, between 37–38 °C.

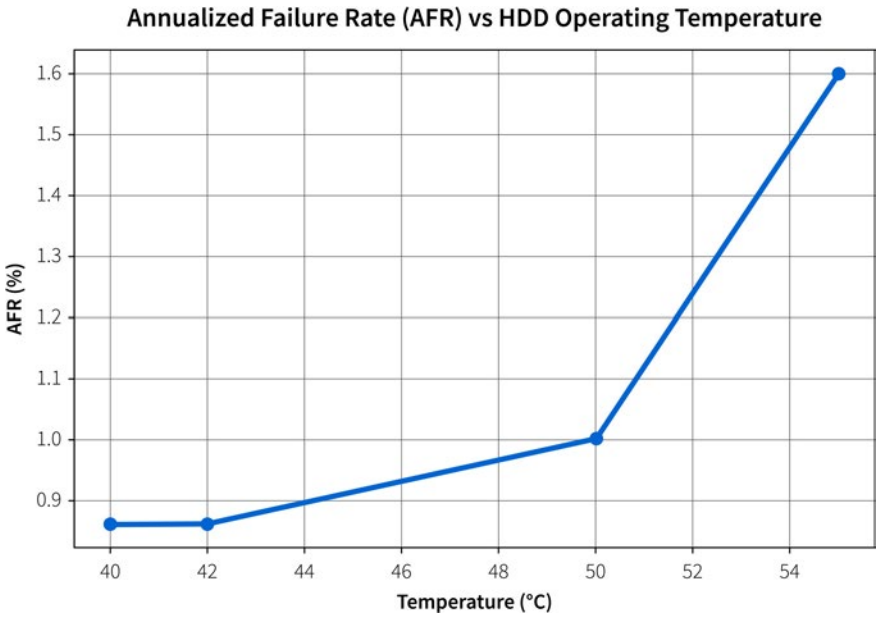
S300 Pro Series consistently reached 40-50 °C, due to their higher power consumption.

The MG-Series drives recorded the temperature at 47 °C, which is expected given their helium-sealed, high-capacity design.

This means from a functional point of view, all tested HDD models can be used in the B16 NVR, as the functional limit of the HDDs is 70 °C (S300/S300 Pro) resp. 60 °C (MG-Series).

Reliability Assessment

The average operating temperature has a significant impact on the long-term reliability of an HDD. If the temperature exceeds 42 °C, failure rates begin to rise. While the Annualized Failure Rate (AFR) remains relatively low – below 1% per year – at 42 °C, it increases to 1% at 50 °C, and reaches 1.6% at 55 °C, nearly doubling the failure rate compared to the recommended threshold.



This indicative graph illustrates the direct correlation between temperature and HDD reliability for S300 Pro drives. It highlights the critical importance of maintaining optimal environmental conditions – such as proper airflow, ventilation, and ambient temperature control – especially in entry-level NVR setups where thermal management may be limited.

Considering these findings, S300 models are the most suitable for the Berghoch B16 NVR due to their lower power consumption and cooler operating temperatures. The S300 Pro 4TB may be used with caution, but models 6TB and above should be avoided unless the system is installed in a well-ventilated or air-conditioned environment. For applications requiring extended retention times, MG-Series drives (14–18TB) are also viable, though higher capacities are not recommended due to increased thermal load and reduced reliability in entry-level setups.

Functionality

All HDD models successfully supported continuous recording, playback and search operations. The S300 2TB provided approximately 9 days of retention under the test conditions. Higher-capacity models would naturally offer extended retention, and we listed the expected retention times based on estimations. All HDD recording technologies (SMR and CMR) are compatible with the B16 recorder. Continuous overwriting was confirmed for the lower capacity models.

Summary

The evaluation confirmed that all tested Toshiba surveillance HDDs – S300, S300 Pro, and MG Series – performed reliably in the Berghoch B16 NVR under continuous 24/7 recording conditions. Key findings include:

- Stable Operation: All drives maintained uninterrupted recording and playback functionality.
- Search Performance: Playback and search operations were executed flawlessly across all models.
- Energy Efficiency: S300 models demonstrated the lowest power consumption, making them ideal for energy-conscious environments.
- Thermal Management: Some drives exhibited effective heat dissipation, even under full recording load.

In addition to its reliable performance, the Berghoch B16 stands out as a highly power-efficient and cost-optimized entry-level NVR. Compared to similar devices, it offers substantial savings in energy consumption, with estimated annual electricity costs of approximately €30 – based on Germany's average household electricity price of €0.30/kWh – versus €60 or more for competing models. This makes it an excellent choice for users seeking dependable surveillance functionality with minimal operational costs.

These results validate the suitability of Toshiba's surveillance-optimized HDDs and the Berghoch B16 NVR for residential, home office, and small business environments.

Recommendations

S300 Series (2–6TB)

Recommended as the default choice for entry-level surveillance setups. These drives offer optimal thermal performance, low power consumption, and high reliability – ideal for domestic premises, home offices, and small businesses.

S300 Pro Series (4–10TB)

These models are technically compatible; however, capacities of 6 TB and above usually exhibit increased temperatures during operation. The 4TB variant may be used with caution, provided the NVR is installed in a well-ventilated or air-conditioned environment. Due to thermal concerns, S300 Pro drives are generally not recommended for entry-level NVRs.

MG Series (14–18TB)

Suitable for applications requiring extended retention times or compliance with data retention policies. However, given the entry-level nature of the B16 NVR, deploying MG-Series drives only makes sense in scenarios where high-capacity storage is essential. Capacities beyond 18TB are not recommended due to thermal and reliability considerations.

Interested in performing a test in our lab yourself or planning a visit? We'd be happy to support you.

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