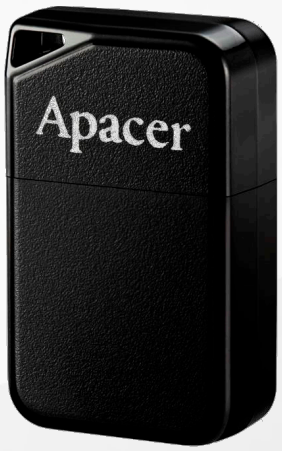
Apacer

RoHS Compliant

USB Flash Drive

EH163-M Product Specifications



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Specifications Overview:

- **Compatible with USB specification revision 3.1 and backward compatible with USB 2.0 and 1.1**
  - USB3.0 max. transfer rate: 5 Gb/s
  - Backward compatible with 480 Mb/s & 12 Mb/s
- **Capacity**
  - 8, 16, 32, 64 GB
- **Performance**[1]
  - Sequential read: Up to 225 MB/sec
  - Sequential write: Up to 80 MB/sec
- **Flash Management**
  - Built-in hardware ECC
  - Wear-leveling algorithms
  - Flash bad-block management
  - Power saving implemented
  - S.M.A.R.T.
  - Power Failure Management
- **NAND Flash Type:** MLC
- **MTBF:** >1,000,000 hours
- **Flash Endurance:** 3K P/E cycle[2]
- **Temperature Range**
  - Operating: 0°C to 70°C
  - Storage: -25°C to 85°C
- **Supply Voltage**
  - 5V ± 5%
- **Power Consumption**[1]
  - Active mode (Max.): 190 mA
  - Idle mode: 45 mA
- **OS Support**
  - Windows: WinXP/7 or later
  - Mac: 10.2.8 or later
  - Linux: 2.4.10 or later
- **FW Update with Signing Mechanism**
- **Plug & Play**
- **Chip-On-Board Technology**
- **USB Bus-Powered Capability**
- **Dimensions:** 23.10 x 14.25 x 6.90, unit:mm
- **RoHS Compliant**

Notes:
1. Varies from capacities. The values for performances and power consumptions presented are typical and may vary depending on flash configurations or platform settings. The term idle refers to the standby state of the device.
2. Specified by NAND flash vendors

Table of Contents

1. General Description

Apacer EH163-M is a super speed USB 3.1 GEN 1 removable flash disk drive with USB 3.1 GEN 1 connection (backward compatible with USB 2.0/1.1) and supports various storage capacities.

Compatible with all USB specifications (USB 1.1/USB 2.0/USB 3.1 GEN 1) and featuring plug-and-play, EH163-M can be easily adopted in any computing system with an available USB port. The device can be automatically detected by the host computer so that users can access data to read, write, copy, or move data between host system drive and EH163-M. Data security-wise, EH163-M is built with the highest durability and ruggedness with a special Chip-On-Board (COB) packaging technology, which allows your precious files to be safely stored and protected against dust, water and shock at all times.

Moreover, no battery, cable, or software driver is required. EH163-M is widely compatible with mainstream computer platforms, no matter desktop or laptops, as long as there is an available USB port. EH163-M makes data transfer easy, fast and handy.

2. Product Specifications

2.1 Performance

Performance of EH163-M is listed below in Table 2-1.

Table 2-1 Performance Specifications

Performance \ Capacity	8 GB	16 GB	32 GB	64 GB
Sequential Read (MB/s)	225	225	225	225
Sequential Write (MB/s)	29	20	47	80

Notes:
- Results may differ from various flash configurations or host system setting.
- Sequential read/write is based on CrystalDiskMark 5.2.1 with file size 1,000MB.

2.2 Environmental Specifications

Environmental specifications of EH163-M product are shown in Table 2-2.

Table 2-2 Environmental Specifications

Parameter	Type	Specifications
Temperature	Operating	0°C to 70°C
	Non-operating	-25°C to 85°C
Vibration	Operating	7.69 GRMS, 20~2000 Hz/random (compliant with MIL-STD-810G)
	Non-operating	4.02 GRMS, 15~2000 Hz/random (compliant with MIL-STD-810G)
Shock	Operating	Acceleration, 50(G)/11(ms)/half sine (compliant with MIL-STD-202G)
	Non-operating	Acceleration, 1500(G)/0.5(ms)/half sine (compliant with MIL-STD-883K)

Note: This Environmental Specification table indicates the conditions for testing the device. Real world usages may affect the results.

2.3 Certification and Compliance

EH163-M complies with the following standards:

- CE (Criteria B)
- UKCA
- FCC
- RoHS
- MIL-STD-810G

3. Flash Management

3.1 Performance-optimized USB Controller

The heart of EH353 is the USB controller, which translates standard USB signals into the data and controls of the flash media. This proprietary USB controller is specifically designed to attain high data throughput from host to flash.

3.2 Power Saving Implemented

The internal controller of the USB model is designed with power saving implementations, allowing the device to operate at low power consumption.

3.3 Program RAM Architect

The internal Program RAM implementation allows the host to upgrade firmware codes anytime when needed.

3.4 Error Correction Code (ECC)

Flash memory cells can deteriorate with use, which might lead to random bit errors in the stored data. Thus, this USB applies the BCH ECC Algorithm, which can detect and correct errors occurring during Read process, ensure data to be read correctly, as well as protect data from corruption. This device can correct up to 39bit/1K data.

3.5 Flash Block Management

Current production technology is unable to guarantee total reliability of NAND flash memory array. When a flash memory device leaves factory, it comes with a minimal number of initial bad blocks during production or out-of-factory as there is no currently known technology that produce flash chips free of bad blocks. In addition, bad blocks may develop during program/erase cycles. Since bad blocks are inevitable, the solution is to keep them in control. Apacer flash devices are programmed with ECC and block mapping technique to reduce invalidity or error. Once bad blocks are detected, data in those blocks will be transferred to free blocks and error will be corrected by designated algorithms.

3.6 Power Failure Management

Power Failure Management plays a crucial role when power supply becomes unstable. Power disruption may occur when users are storing data into the SSD, leading to instability in the drive. However, with Power Failure Management, a firmware protection mechanism will be activated to scan pages and blocks once power is resumed. Valid data will be transferred to new blocks for merging and the mapping table will be rebuilt. Therefore, data reliability can be reinforced, preventing damage to data stored in the NAND Flash.

3.7 Global Wear Leveling

Flash memory can be erased a limited number of times, This number is called the erase cycle limit, or write endurance limit, The erase cycle limit applies to each individual erase block in the flash device.

In a typical application, and especially if a file system is used, specific pages are constantly updated (e.g., the page that contains the FAT, registry, etc.). Without any special handling, these pages would wear out more rapidly than other pages, reducing the lifetime of the entire flash.

To overcome this inherent deficiency, Apacer's EH353 uses Global Wear Leveling algorithm. This algorithm ensures that consecutive writes of a specific sector are not written physically to the same page in the flash. This spreads flash media usage evenly across all pages, thereby maximizing flash lifetime.

The Global Wear Leveling mechanism provides write/erase cycles for reliable data storage over an extended period.

3.8 S.M.A.R.T.

S.M.A.R.T. is an abbreviation for Self-Monitoring, Analysis and Reporting Technology, a self-monitoring system that provides indicators of drive health as well as potential disk problems. It serves as a warning for users from unscheduled downtime by monitoring and displaying critical drive information. Ideally, this should allow taking proactive actions to prevent drive failure and make use of S.M.A.R.T. information for future product development reference.

Table 3-1 SMART Attribute ID List

ID (Hex)	Attribute Name
162 (0xA2)	Spare Block Count
163 (0xA3)	Maximum Erase Count
164 (0xA4)	Average Erase Count
166 (0xA6)	Total Later Bad Block Count
167 (0xA7)	Protect Mode

4. Electrical Specifications

4.1 Operating Voltage

Table 4-1 lists the supply voltage for EH163-M.

Table 4-1 Operating Range

Item	Range
Supply Voltage	5V ± 5% (4.75-5.25V)

4.2 Power Consumption

Table 4-2 lists the power consumption for EH163-M.

Table 4-2 Power Consumption (Unit: mA)

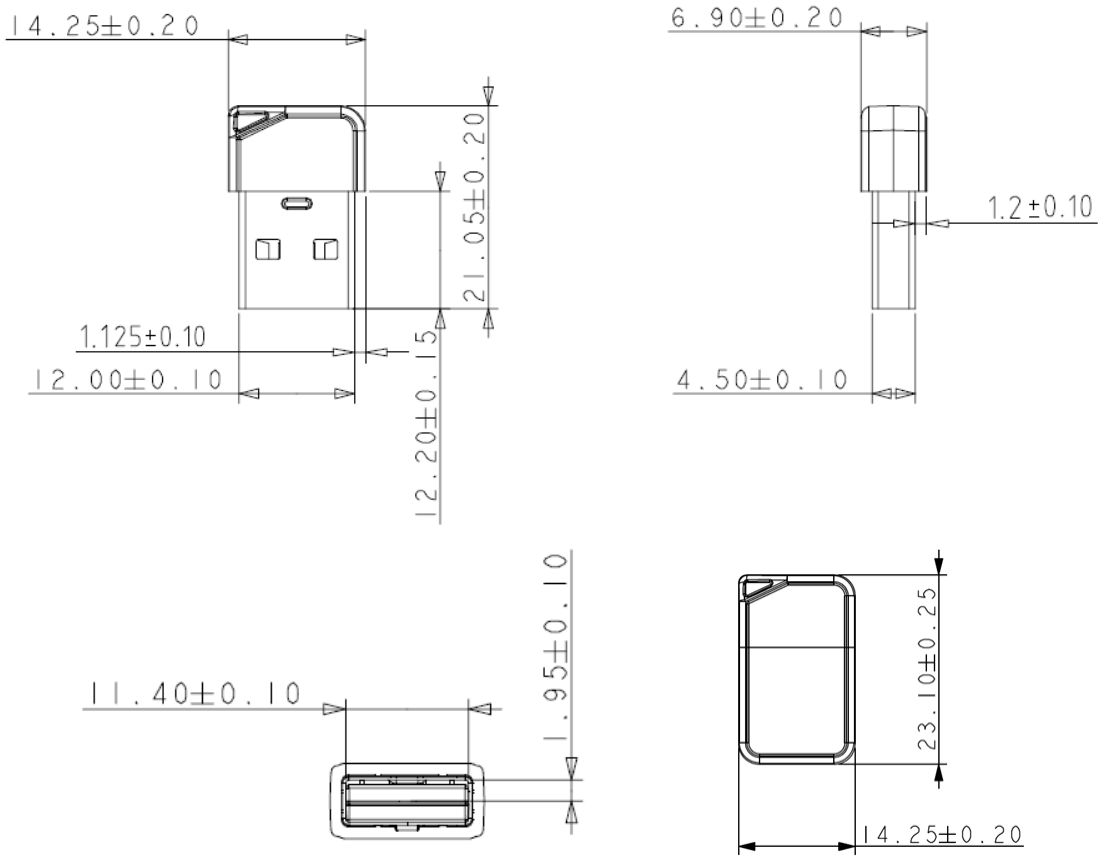
Mode \ Capacity	8 GB	16 GB	32 GB	64 GB
Active (Max.)	135	130	135	190
Idle	45	45	45	45

Notes:
- All values are typical and may vary depending on flash configurations or host system settings.
- Power consumption is measured using CrystalDiskMark 5.2.1.

5. Mechanical Specifications

Table 5-1 Physical Dimensions

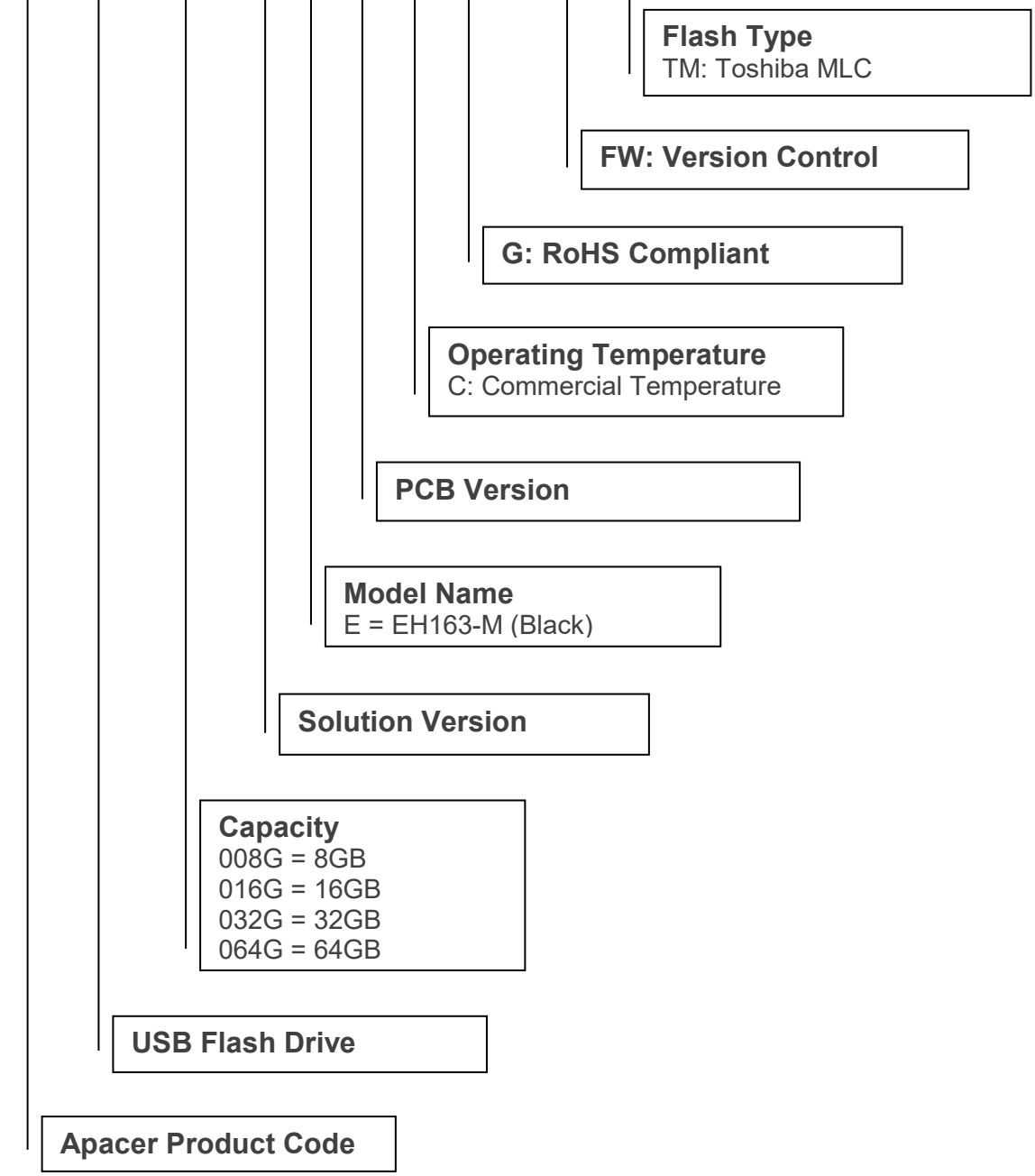
Parameter	Unit	8 GB	16 GB	32 GB	64 GB
Length	mm	23.10 ± 0.25			
Width		14.25 ± 0.20			
Height		6.90 ± 0.20			



6. Product Ordering Information

6.1 Product Code Designations

AP HA xxxG 3 E A C G – A TM



6.2 Valid Combinations

The following table lists the available models of the EH163-M series which are in mass production or will be in mass production. Consult your Apacer sales representative to confirm availability of valid combinations and to determine availability of new combinations.

Capacity	Valid Combination
8GB	APHA008G3EACG-ATM
16GB	APHA016G3EACG-ATM
32GB	APHA032G3EACG-ATM
64GB	APHA064G3EACG-ATM

Revision History

Revision	Description	Date
1.0	Official release	3/21/2016
1.1	Added shock and vibration test specifications	3/25/2016
1.2	Revised performance and power consumption values for 16GB	7/5/2016
1.3	Added S.M.A.R.T. and Power Failure Management to Features	9/29/2016
1.4	- Updated the spec sheet format - Updated mechanical specifications	11/8/2016
1.5	Updated Dimensions on Specifications Overview page	4/24/2019
1.6	- Updated vibration and shock specifications at Table 2-2 - Added 2.3 Certification and Compliance	6/6/2023

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